ELECTRONICS RESEARCH, INC. ERI®

Directional Antenna System for WBKC, Morgantown, Indiana

09/17/22

Electronics Research Inc. is providing a new FM antenna system to meet the FCC requirements and the general needs of radio station WBKC.

The antenna is the ERI model LP-2E-DA-HW configuration. The circular polarized system consists of two half-wavelength spaced bays using one driven circular polarized radiating element per bay, two horizontal parasitic element per bay and three vertical parasitic elements extending through both of the antenna bays. The antenna was mounted on the North 171 degrees East tower leg with bracketry to provide an antenna orientation of North 188 degrees East. The antenna was tested on a Pi-Rod tower that has a 54" face, which is the structure the station plans to use to support the array. All tests were performed on a frequency of 90.9 megahertz, which is the center of the FM broadcast channel assigned to WBKC.

Pattern measurements were made on a sixty-acre antenna pattern range that is owned and operated by Electronics Research, Inc. The tests were performed under the direction of Thomas B. Silliman, president of Electronics Research, Inc. Mr. Silliman has the Bachelor of Electrical Engineering and the Master of Electrical Engineering degrees from Cornell University and is a registered professional engineer in the states of Indiana, Maryland and Minnesota.

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Directional Antenna System
for
WBKC, Morgantown, Indiana

(Continued)

DESCRIPTION OF THE TEST PROCEDURE

The test antenna consisted of a full-scale model of the complete circular polarized system with the associated horizontal and vertical parasitic elements. The elements and brackets that were used in this test are electrically equivalent to those that will be supplied with the antenna. A section of 1 5/8 inch o.d. rigid coaxial line was used to feed the test antenna, and a section of 1 5/8 inch o.d. rigid outer conductor only was attached above the test antenna. The lines were properly grounded during all tests.

The power distribution and phase relationship to the antenna elements was adjusted in order to achieve the directional radiation patterns for both horizontal and vertical polarization components.

The proof-of-performance was accomplished using a seven foot face tower with identical dimension and configuration including all braces, ladders, conduits, coaxial lines and other appurtenances that are included in the actual aperture at which the antenna will be installed. The structure was erected vertically on a turntable mounted on a non-metallic building with the antenna centered vertically on the structure, making the center of radiation of the test approximately 30 feet above ground. The turntable is equipped with a motor drive and a US Digital angle position indicator. The resolution of this angle position indicator is one-hundredth of a degree.

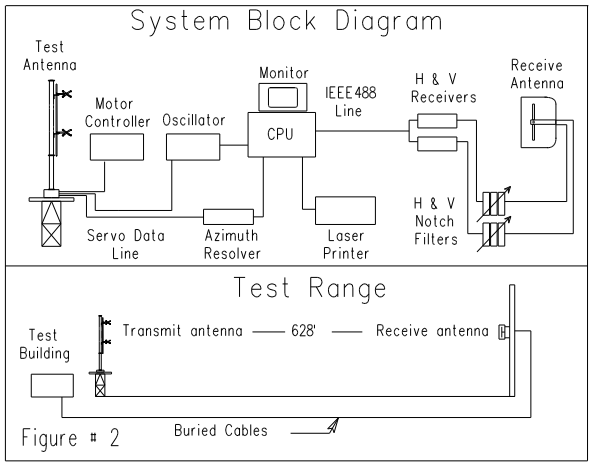


Figure # 2

The antenna under test was operated in the transmitting mode and fed from a HP8657D signal generator. The frequency of the signal source was set at 90.9 MHz and was constantly monitored by a Rohde & Schwarz ESVD measuring receiver.

(Continued)

A broadband horizontal and vertical dipole system, located approximately 628 feet from the test antenna, was used to receive the emitted test signals. The dipole system was mounted at the same height above terrain as the center of the antenna under test. The signals received by the dipole system were fed to the test building by way of two buried Heliax cables to a Rohde & Schwarz measuring receiver. This data was interfaced to a laser jet printer by means of a computer system. Relative field strength was plotted as a function of azimuth.

The measurements were performed by rotating the test antenna in a counter-clockwise direction and plotting the received signal on polar co-ordinated graph paper in a clockwise direction. Both horizontal and vertical components were recorded separately.

CONCLUSIONS

The circular polarized system consists of two half-wavelength spaced bays using one driven circular polarized radiating element per bay, two horizontal parasitic elements per bay and three vertical parasitic elements. The power distribution and phase relationship will be fixed when the antenna is manufactured. Proper maintenance of the elements should be all that is required to maintain the pattern in adjustment.

The LP-2E-DA-HW array is to be mounted on the North 171 degrees East tower leg of the 54 inch Pi-Rod tower at a bearing of North 188 degrees East. Blue prints provided with the antenna will show the proper antenna orientation alignment. The antenna alignment procedure should be directed by a licensed surveyor as prescribed by the FCC.

Attached are the measured patterns of the horizontal and vertical components. The composite pattern shows the maximum of either the H or V azimuth values. This patterns is greater than 85% of the FCC filed composite pattern. The actual measured pattern does not exceed the authorized FCC composite pattern at any azimuth. A calculated vertical plane relative field pattern is shown on Figure #3 attached. The power in the maximum will reach 3.20 kilowatts (5.051 dBk).

(Continued)

The RMS of the vertically polarized horizontal plane component does not exceed the RMS of the horizontally polarized horizontal plane component.

The composite horizontal and vertical maximum relative field pattern obtained from the measured data as shown on Figure #1 has an RMS that is greater that 85% of the filed composite pattern.

The clear vertical length of the structure required to support the antenna is 20 feet 5 inches.

The directional antenna should not be mounted on the top of an antenna tower that includes a top-mounted platform larger than the cross-sectional area of the tower in the horizontal plane.

No obstructions other than those that are specified by the blue prints supplied with the antenna are to be mounted within 75 ft. horizontally of the system.

The vertical distance to the nearest obstruction should be a minimum of 10 ft. from the directional antenna. Metallic guy wires should be a minimum distance of forty feet horizontally from the antenna.

ELECTRONICS RESEARCH, INC.

Dan Dowdle
ERI Test Range Director

Directional Antenna System
for
WBKC, Morgantown, Indiana

(Continued)

ANTENNA SPECIFICATIONS

Antenna Type:	LP-2E-DA-HW
Frequency:	90.9 MHz
Number of Bays:	Two

MECHANICAL SPECIFICATIONS

Mounting:	Custom
System length:	14 ft 4 in
Aperture length required:	20 ft 5 in
Orientation:	188° true

Input flange to the antenna 1 5/8” female.

ELECTRICAL SPECIFICATIONS
(For directional use)

Maximum horizontal ERP:	3.200 kW (5.051 dBk)
Horizontal maximum power gain:	1.419 (1.519 dB)
Maximum vertical ERP:	3.200 kW (5.051 dBk)
Vertical maximum power gain:	1.419 (1.519 dB)
Total input power:	2.256 kW (3.533 dBk)

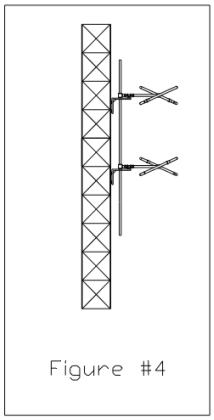


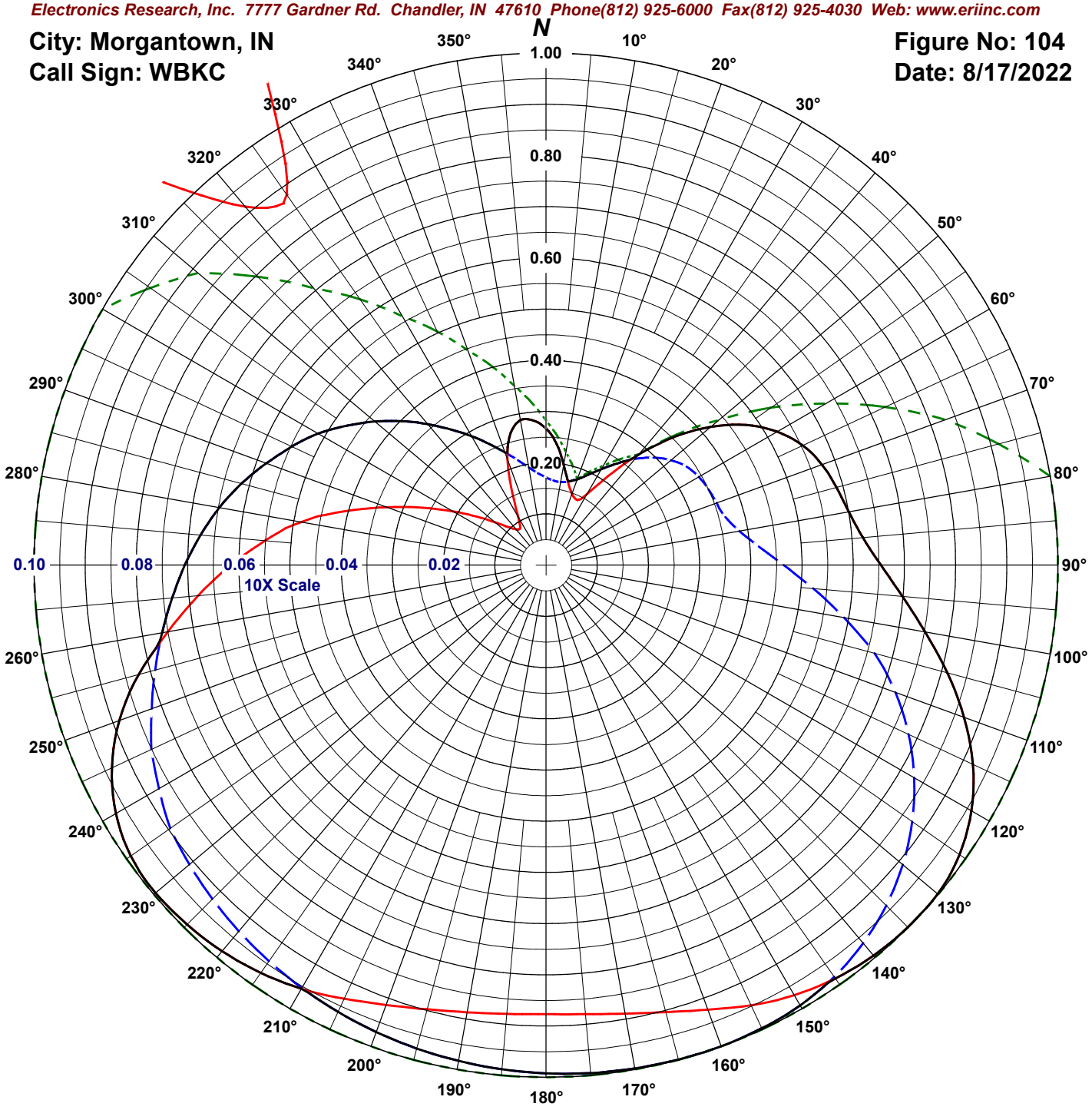
Figure #4

ERI® Horizontal Plane Relative Field Pattern

Electronics Research, Inc. 7777 Gardner Rd. Chandler, IN 47610 Phone(812) 925-6000 Fax(812) 925-4030 Web: www.eriinc.com

City: Morgantown, IN
Call Sign: WBKC

Figure No: 104
Date: 8/17/2022



Antenna Orientation: 188° True

Frequency: 90.9 MHz
Antenna Type: LP-2E-HW-DA

Antenna Mounting: 28" Radome
Tower Type: 54" Pirod

HORIZONTAL	VERTICAL	COMPOSITE	FCC ENVELOPE
RMS: .689	RMS: .682	RMS: .73	RMS: .857
Maximum: 1 @ 132°	Maximum: 1 @ 160°	Maximum: 1 @ 132°	Maximum: 1 @ 80°
Minimum: .087 @ 324°	Minimum: .165 @ 9°	Minimum: .169 @ 15°	Minimum: .178 @ 20°

ERI® Horizontal Plane Relative Field Pattern

Electronics Research, Inc. 7777 Gardner Rd. Chandler, IN 47610 Phone(812) 925-6000 Fax(812) 925-4030 Web: www.eriinc.com

Figure# 104 **Date: 8/17/2022**
Station: WBKC **Antenna: LP-2E-HW-DA**
Location: Morgantown, IN **Antenna Orientation: 188° True**
Frequency: 90.9 MHz **Number of Bays: 2**

Azimuth	Horizontal			Vertical			Azimuth	Horizontal			Vertical		
	Field	kW	dBk	Field	kW	dBk		Field	kW	dBk	Field	kW	dBk
0°	0.267	0.228	-6.425	0.171	0.094	-10.277	180°	0.877	2.461	3.912	0.992	3.151	4.985
5°	0.238	0.181	-7.422	0.166	0.088	-10.556	185°	0.880	2.476	3.938	0.988	3.125	4.948
10°	0.199	0.126	-8.981	0.165	0.087	-10.610	190°	0.887	2.516	4.007	0.983	3.092	4.903
15°	0.167	0.090	-10.472	0.169	0.091	-10.398	195°	0.898	2.581	4.118	0.977	3.055	4.849
20°	0.148	0.070	-11.535	0.178	0.101	-9.958	200°	0.914	2.673	4.269	0.970	3.011	4.788
25°	0.141	0.064	-11.970	0.195	0.121	-9.164	205°	0.934	2.792	4.459	0.962	2.963	4.717
30°	0.160	0.082	-10.880	0.216	0.150	-8.244	210°	0.955	2.919	4.653	0.953	2.909	4.638
35°	0.213	0.145	-8.394	0.242	0.188	-7.256	215°	0.972	3.022	4.803	0.944	2.850	4.549
40°	0.282	0.255	-5.937	0.271	0.234	-6.299	220°	0.984	3.099	4.913	0.933	2.787	4.451
45°	0.354	0.400	-3.974	0.297	0.282	-5.500	225°	0.992	3.149	4.982	0.922	2.718	4.343
50°	0.420	0.565	-2.482	0.319	0.325	-4.883	230°	0.996	3.172	5.013	0.909	2.646	4.225
55°	0.477	0.728	-1.380	0.335	0.359	-4.445	235°	0.990	3.136	4.964	0.896	2.569	4.097
60°	0.521	0.869	-0.610	0.345	0.380	-4.199	240°	0.970	3.010	4.786	0.873	2.439	3.873
65°	0.553	0.979	-0.093	0.350	0.392	-4.063	245°	0.936	2.801	4.472	0.850	2.314	3.644
70°	0.574	1.053	0.226	0.355	0.403	-3.944	250°	0.887	2.516	4.008	0.819	2.148	3.321
75°	0.587	1.104	0.429	0.363	0.421	-3.756	255°	0.824	2.171	3.367	0.790	1.999	3.009
80°	0.601	1.154	0.623	0.384	0.471	-3.272	260°	0.750	1.801	2.554	0.762	1.856	2.686
85°	0.621	1.234	0.913	0.417	0.557	-2.539	265°	0.682	1.487	1.724	0.733	1.718	2.350
90°	0.654	1.370	1.366	0.464	0.689	-1.617	270°	0.615	1.212	0.836	0.705	1.593	2.021
95°	0.699	1.563	1.939	0.524	0.878	-0.565	275°	0.550	0.969	-0.137	0.677	1.467	1.664
100°	0.752	1.810	2.576	0.591	1.119	0.489	280°	0.485	0.753	-1.233	0.648	1.342	1.277
105°	0.811	2.107	3.236	0.664	1.413	1.501	285°	0.406	0.528	-2.771	0.616	1.213	0.838
110°	0.869	2.416	3.831	0.726	1.687	2.271	290°	0.331	0.350	-4.561	0.581	1.081	0.340
115°	0.920	2.708	4.327	0.781	1.954	2.909	295°	0.265	0.225	-6.476	0.548	0.960	-0.175
120°	0.960	2.946	4.693	0.830	2.207	3.438	300°	0.210	0.141	-8.504	0.514	0.844	-0.737
125°	0.986	3.110	4.928	0.873	2.440	3.874	305°	0.165	0.087	-10.598	0.475	0.721	-1.420
130°	0.999	3.194	5.043	0.910	2.648	4.229	310°	0.130	0.054	-12.654	0.436	0.609	-2.156
135°	1.000	3.199	5.050	0.940	2.827	4.513	315°	0.106	0.036	-14.467	0.398	0.506	-2.959
140°	0.995	3.170	5.011	0.964	2.972	4.731	320°	0.091	0.027	-15.732	0.359	0.413	-3.840
145°	0.985	3.107	4.923	0.981	3.082	4.888	325°	0.088	0.025	-16.028	0.323	0.334	-4.757
150°	0.970	3.009	4.784	0.993	3.153	4.988	330°	0.109	0.038	-14.210	0.291	0.271	-5.678
155°	0.949	2.879	4.593	0.998	3.186	5.032	335°	0.155	0.077	-11.135	0.261	0.217	-6.627
160°	0.924	2.731	4.363	1.000	3.200	5.051	340°	0.221	0.156	-8.074	0.234	0.176	-7.554
165°	0.904	2.614	4.172	0.999	3.196	5.047	345°	0.267	0.228	-6.421	0.212	0.144	-8.419
170°	0.889	2.531	4.032	0.998	3.187	5.034	350°	0.287	0.264	-5.776	0.194	0.120	-9.206
175°	0.880	2.480	3.945	0.996	3.172	5.013	355°	0.284	0.258	-5.892	0.180	0.104	-9.835

Horizontal Polarization:
Maximum: 1.419 (1.519 dB)
Horizontal Plane: 1.419 (1.519 dB)
Maximum ERP: 3.200 kW

Vertical Polarization:
Maximum: 1.419 (1.519 dB)
Horizontal Plane: 1.419 (1.519 dB)
Maximum ERP: 3.200 kW

Total Input Power: 2.256 kW
Reference: WBKC104.FIG

ERI® Horizontal Plane Relative Field Pattern

Electronics Research, Inc. 7777 Gardner Rd. Chandler, IN 47610 Phone(812) 925-6000 Fax(812) 925-4030 Web: www.eriinc.com

Figure# 1 **Date: 8/17/2022**
Station: WBKC **Antenna: LP-2E-HW-DA**
Location: Morgantown, IN **Antenna Orientation: 188° True**
Frequency: 90.9 MHz **Number of Bays: 2**

Azimuth	Envelope			Polarization	Azimuth	Envelope			Polarization
	Field	kW	dBk	Maximum		Field	kW	dBk	Maximum
0°	0.267	0.228	-6.425	Horizontal	180°	0.992	3.151	4.985	Vertical
5°	0.238	0.181	-7.422	Horizontal	185°	0.988	3.125	4.948	Vertical
10°	0.199	0.126	-8.981	Horizontal	190°	0.983	3.092	4.903	Vertical
15°	0.169	0.091	-10.398	Vertical	195°	0.977	3.055	4.849	Vertical
20°	0.178	0.101	-9.958	Vertical	200°	0.970	3.011	4.788	Vertical
25°	0.195	0.121	-9.164	Vertical	205°	0.962	2.963	4.717	Vertical
30°	0.216	0.150	-8.244	Vertical	210°	0.955	2.919	4.653	Horizontal
35°	0.242	0.188	-7.256	Vertical	215°	0.972	3.022	4.803	Horizontal
40°	0.282	0.255	-5.937	Horizontal	220°	0.984	3.099	4.913	Horizontal
45°	0.354	0.400	-3.974	Horizontal	225°	0.992	3.149	4.982	Horizontal
50°	0.420	0.565	-2.482	Horizontal	230°	0.996	3.172	5.013	Horizontal
55°	0.477	0.728	-1.380	Horizontal	235°	0.990	3.136	4.964	Horizontal
60°	0.521	0.869	-0.610	Horizontal	240°	0.970	3.010	4.786	Horizontal
65°	0.553	0.979	-0.093	Horizontal	245°	0.936	2.801	4.472	Horizontal
70°	0.574	1.053	0.226	Horizontal	250°	0.887	2.516	4.008	Horizontal
75°	0.587	1.104	0.429	Horizontal	255°	0.824	2.171	3.367	Horizontal
80°	0.601	1.154	0.623	Horizontal	260°	0.762	1.856	2.686	Vertical
85°	0.621	1.234	0.913	Horizontal	265°	0.733	1.718	2.350	Vertical
90°	0.654	1.370	1.366	Horizontal	270°	0.705	1.593	2.021	Vertical
95°	0.699	1.563	1.939	Horizontal	275°	0.677	1.467	1.664	Vertical
100°	0.752	1.810	2.576	Horizontal	280°	0.648	1.342	1.277	Vertical
105°	0.811	2.107	3.236	Horizontal	285°	0.616	1.213	0.838	Vertical
110°	0.869	2.416	3.831	Horizontal	290°	0.581	1.081	0.340	Vertical
115°	0.920	2.708	4.327	Horizontal	295°	0.548	0.960	-0.175	Vertical
120°	0.960	2.946	4.693	Horizontal	300°	0.514	0.844	-0.737	Vertical
125°	0.986	3.110	4.928	Horizontal	305°	0.475	0.721	-1.420	Vertical
130°	0.999	3.194	5.043	Horizontal	310°	0.436	0.609	-2.156	Vertical
135°	1.000	3.199	5.050	Horizontal	315°	0.398	0.506	-2.959	Vertical
140°	0.995	3.170	5.011	Horizontal	320°	0.359	0.413	-3.840	Vertical
145°	0.985	3.107	4.923	Horizontal	325°	0.323	0.334	-4.757	Vertical
150°	0.993	3.153	4.988	Vertical	330°	0.291	0.271	-5.678	Vertical
155°	0.998	3.186	5.032	Vertical	335°	0.261	0.217	-6.627	Vertical
160°	1.000	3.200	5.051	Vertical	340°	0.234	0.176	-7.554	Vertical
165°	0.999	3.196	5.047	Vertical	345°	0.267	0.228	-6.421	Horizontal
170°	0.998	3.187	5.034	Vertical	350°	0.287	0.264	-5.776	Horizontal
175°	0.996	3.172	5.013	Vertical	355°	0.284	0.258	-5.892	Horizontal

Horizontal Polarization:
Maximum: 1.419 (1.519 dB)
Horizontal Plane: 1.419 (1.519 dB)
Maximum ERP: 3.200 kW

Vertical Polarization:
Maximum: 1.419 (1.519 dB)
Horizontal Plane: 1.419 (1.519 dB)
Maximum ERP: 3.200 kW

Total Input Power: 2.256 kW
Reference: WBKC104.FIG

ERI® Vertical Plane Relative Field Pattern

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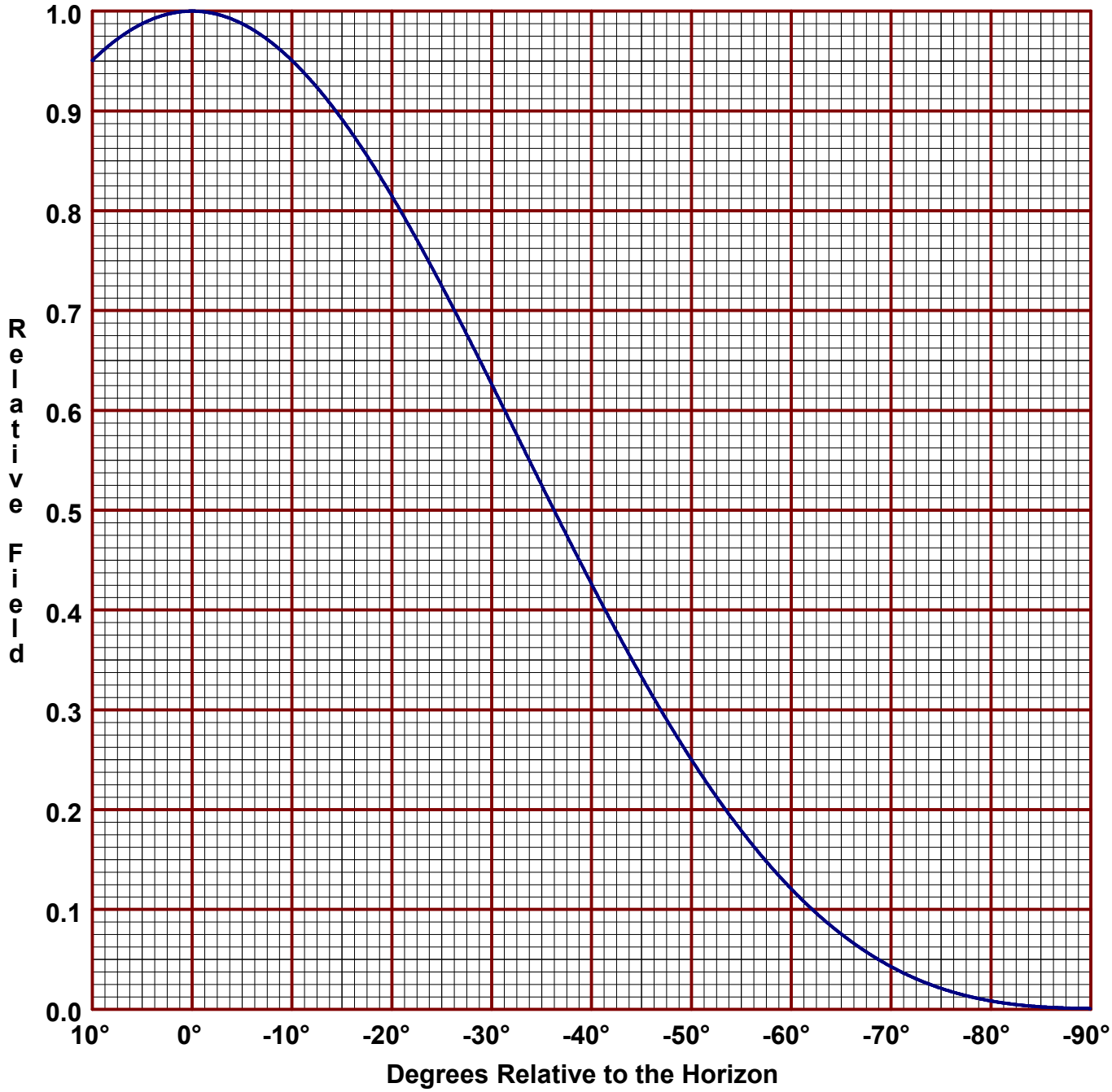
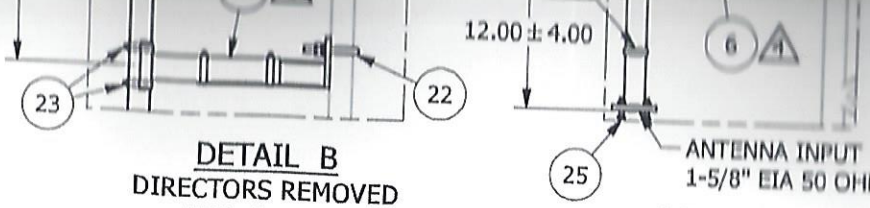
Figure No: 3
Call Sign: WBKC
Location: Morgantown, IN
Frequency: 90.9 MHz
Antenna: 2 bay LP-2E-HW-DA

Date: 8/17/2022
H/V Power Ratio: 1
.5 Wave-length Spacing
0° Beam Tilt
0% First Null Fill



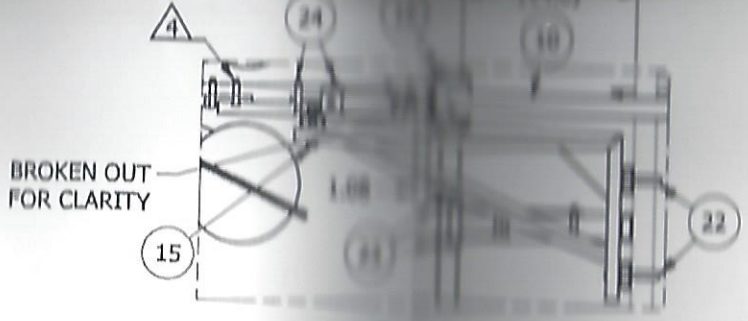
Horizontal Polarization:
Maximum: 1.419 (1.519 dB)
Horizontal Plane: 1.419 (1.519 dB)
Maximum ERP: 3.200 kW

Vertical Polarization:
Maximum: 1.419 (1.519 dB)
Horizontal Plane: 1.419 (1.519 dB)
Maximum ERP: 3.200 kW

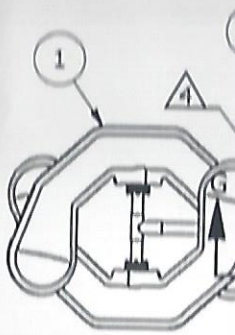


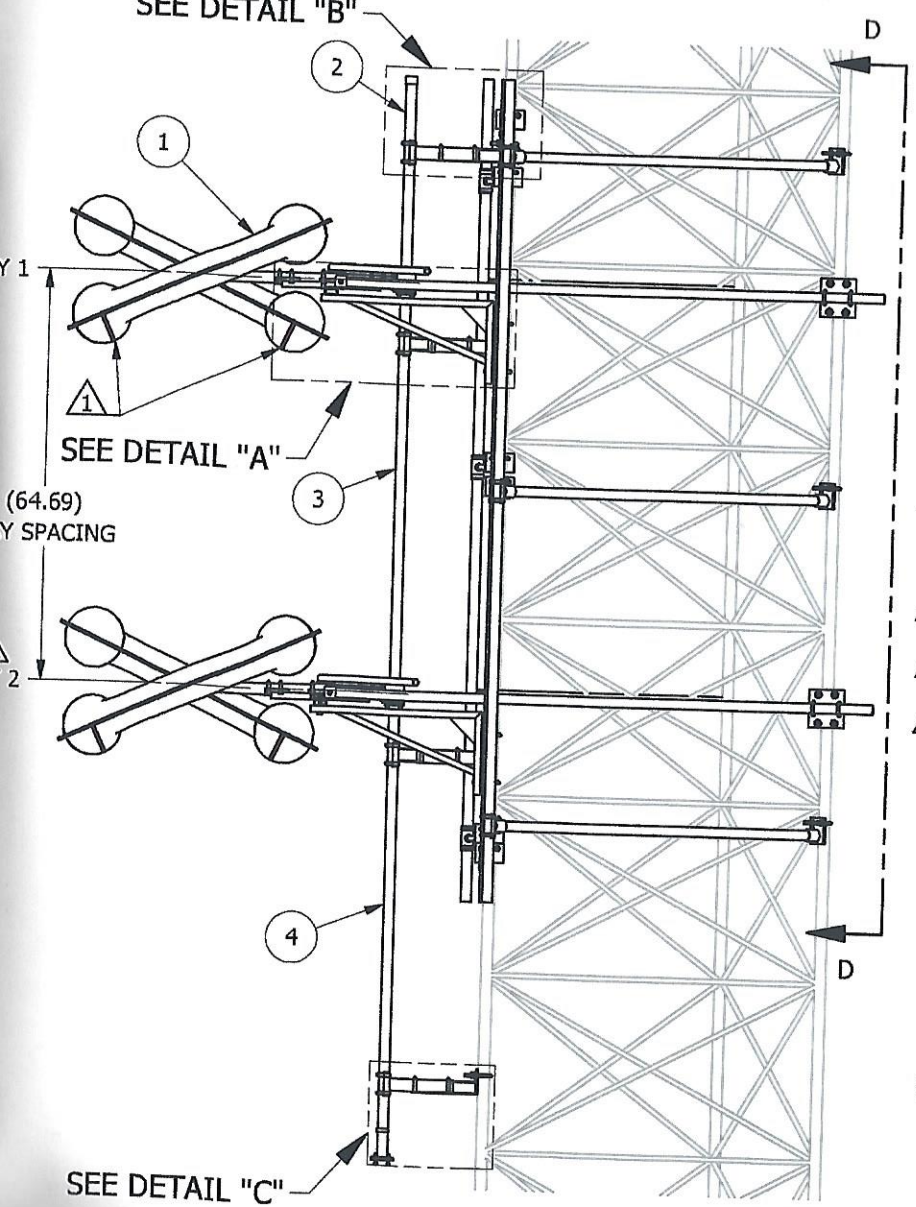
DETAIL B
DIRECTORS REMOVED
FOR CLARITY
SCALE 1 / 15

DETAIL C
SCALE 1 / 15



DETAIL A
TYPICAL CONNECTION
DIRECTORS REMOVED FOR CLARITY
SCALE 1 / 15





ELEVATION VIEW
SCALE 1 / 30

NOTES:

1. ALL RED BANDS DESIGNATE SIDE TO BE MOUNTED DOWNWARD.
2. ASSEMBLE ANTENNA SYSTEM BY MATING CORRESPONDING NUMBERS.
3. OVERALL LENGTH OF ANTENNA SYSTEM IS 15.2' APPROXIMATE.
4. ENSURE TO PLUMB ANTENNA VERTICALLY BY LOOSENING HOSE CLAMPS ON PRE-CLAMPED SUPPORT SADDLES AND ADJUSTABLE LINE BRACKETS.
5. FINAL ORIENTATION TO BE DETERMINED BY STATION PERSONNEL.
6. BAY 2 IS INVERTED (INSULATORS UP, NOT VISIBLE DUE TO RADOME).
7. THE SUPPORTING STRUCTURE SHOWN HEREON IS SUPPLIED BY OTHERS AND IS USED ONLY FOR ILLUSTRATION PURPOSES. ERI IS NOT RESPONSIBLE & DOES NOT WARRANT ANY FIT-UP INTERFERENCE.
8. UNLESS OTHERWISE NOTED, ALL BOLTED CONNECTIONS SHALL INITIALLY BE BROUGHT TO A SNUG-TIGHT CONDITION WHERE JOINT TIGHTNESS IS ATTAINED WITH A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF AN IRONWORKER USING AN ORDINARY SPUD WRENCH TO BRING THE PLIES INTO FIRM CONTACT. A SYSTEMATIC APPROACH SHALL BE USED TO BRING THE JOINT INTO A SNUG-TIGHT CONDITION STARTING WITH THE MOST RIGID PART OF THE JOINT AND PROCEEDING TOWARD THE FREE EDGES.
9. FOR FINAL TIGHTENING, ERI RECOMMENDS AN ADDITIONAL 1/3 TURN BE APPLIED TO ALL BOLTS UP TO Ø3/4" OR TORQUED AN ADDITIONAL 150 FT-LBS FOR BOLTS OVER Ø3/4", UNLESS OTHERWISE NOTED. FINAL TIGHTENING OF ALL BOLTS SHOULD BE COMPLETED AFTER FINAL CONSTRUCTION OF THE STRUCTURE/ASSEMBLY. PLEASE NOTE, SPECIAL ATTENTION SHALL BE GIVEN TO TIGHTENING OF 1/2" DIAMETER A325 BOLTS, U-BOLTS, AND THREADED RODS AS TO PREVENT STRIPPING THE THREADS FROM OVER-TIGHTENING.

ITEM	QTY	PART
25	1	RLA100
24	4	HC0036
23	26	HC0028
22	10	UB0813
21	34	NU0616
20	34	WL06SS
19	34	WF06SS
18	13	UB0616
17	4	UB0616
16	2	HWK110
15	2	HWK000
14	3	BT163VD
13	3	BT163VD
12	3	BT163VD
11	3	BT163VD
10	2	BTFGARE
9	2	BTFGARE
8	2	BT39520
7	2	BT39520
6	2	BT39520
5	2	BT39520
4	1	CL1032
3	1	CL1061B
2	1	CL1063B
1	2	AE-LP-1C

PROJECT NO.	39520/1	
ERI APPROVAL	NAME	
DRAWN BY	NHM	9/
DRAFTING		
DESIGN MGR.	K. SCHARP	9/
ENG.		

CERTIFIED

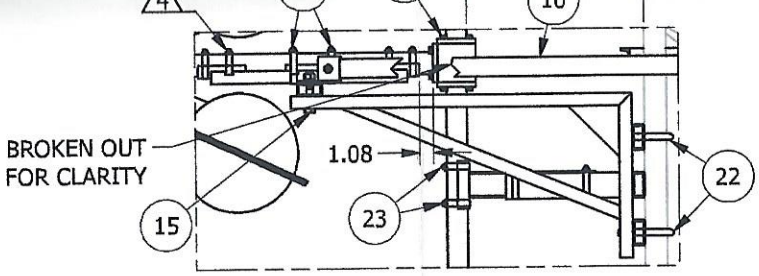
THIRD ANGLE PROJECTION

MATERIAL

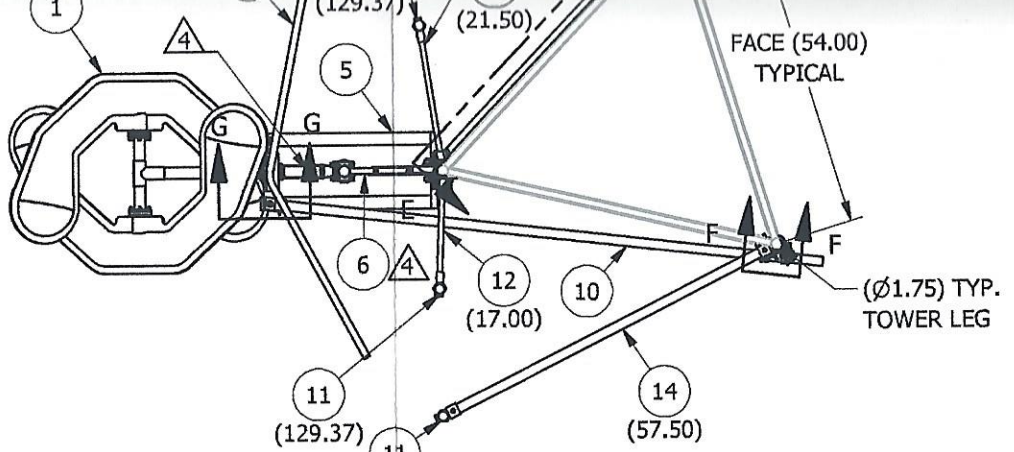
FINISH

NNA INPUT
" EIA 50 OHM

IL C
1 / 15



DETAIL A
TYPICAL CONNECTION
DIRECTORS REMOVED FOR CLARITY
SCALE 1 / 15



TOP VIEW
SCALE 1 / 30

NOTES:

1. ALL RED BANDS DESIGNATE SIDE TO BE MOUNTED DOWNWARD.
2. ASSEMBLE ANTENNA SYSTEM BY MATING CORRESPONDING NUMBERS.
3. OVERALL LENGTH OF ANTENNA SYSTEM IS 14.2' APPROXIMATE.
4. ENSURE TO PLUMB ANTENNA VERTICALLY BY LOOSENING HOSE CLAMPS ON PRE-CLAMPED SUPPORT SADDLES AND ADJUSTABLE LINE BRACKETS.
5. FINAL ORIENTATION TO BE DETERMINED BY STATION PERSONNEL.
6. BAY 2 IS INVERTED (INSULATORS UP, NOT VISIBLE DUE TO RADOME).
7. THE SUPPORTING STRUCTURE SHOWN HEREON IS SUPPLIED BY OTHERS AND IS USED ONLY FOR ILLUSTRATION PURPOSES. ERI IS NOT RESPONSIBLE & DOES NOT WARRANT ANY FIT-UP INTERFERENCE.
8. UNLESS OTHERWISE NOTED, ALL BOLTED CONNECTIONS SHALL INITIALLY BE BROUGHT TO A SNUG-TIGHT CONDITION WHERE JOINT TIGHTNESS IS ATTAINED WITH A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF AN IRONWORKER USING AN ORDINARY SPUD WRENCH TO BRING THE PLIES INTO FIRM CONTACT. A SYSTEMATIC APPROACH SHALL BE USED TO BRING THE JOINT INTO A SNUG-TIGHT CONDITION STARTING WITH THE MOST RIGID PART OF THE JOINT AND PROCEEDING TOWARD THE FREE EDGES.
9. FOR FINAL TIGHTENING, ERI RECOMMENDS AN ADDITIONAL 1/3 TURN BE APPLIED TO ALL BOLTS UP TO Ø3/4" OR TORQUED AN ADDITIONAL 150 FT-LBS FOR BOLTS OVER Ø3/4", UNLESS OTHERWISE NOTED. FINAL TIGHTENING OF ALL BOLTS SHOULD BE COMPLETED AFTER FINAL CONSTRUCTION OF THE STRUCTURE/ASSEMBLY. PLEASE NOTE, SPECIAL ATTENTION SHALL BE GIVEN TO TIGHTENING OF 1/2" DIAMETER A325 BOLTS, U-BOLTS, AND THREADED RODS AS TO PREVENT STRIPPING THE THREADS FROM OVER-TIGHTENING.

ITEM	QTY	PART NUMBER	DESCRIPTION
25	1	RLA100-21	1-5/8" HARDWARE KIT
24	4	HC0036	#36 HOSE CLAMP SS FITS 7/8" TO 2-3/4"
23	26	HC0028	#28 HOSE CLAMP, SS (FITS 1-1/4" TO 2-1/4")
22	10	UB0813-0262GA2	1/2-13 x 2-5/8" C-C GALV. UBOLT w/ NUT LW&FW
21	34	NU0616	3/8 - 16 SS HEX NUT, WAX COATED
20	34	WL06SS	3/8 in, SS LOCK WASHER
19	34	WF06SS	3/8 in, SS FLAT WASHER
18	13	UB0616-0250A	3/8-16 X 2-1/2" C-C U-BOLT, STAINLESS STEEL
17	4	UB0616-0200	3/8-16 X 2" C-C U-BOLT, STAINLESS STEEL
16	2	HWK1102	3" BLOCK BOLT KIT - 2 SIDES - O-RINGS
15	2	HWK0006	3" SADDLE, HARDWARE KIT
14	3	BT163VDB2-2-57.50	Ø1.63 VERTICAL DIRECTOR BRACKET (OVER 30" LG.)
13	3	BT163VDB1-2-21.50	Ø1.63 VERTICAL DIRECTOR BRACKET (UNDER 30" LG.)
12	3	BT163VDB1-2-17.00	Ø1.63 VERTICAL DIRECTOR BRACKET (UNDER 30" LG.)
11	3	BT163VD1-129.37	Ø1.63 VERTICAL DIRECTOR
10	2	BTFGARB0-84-87.00	FIBERGLASS ANTI-ROTATION BRACKET
9	2	BTFGARB06-2	RADOME ANTI-ROTATION BRACKET PLATE
8	2	BT39520-4	2" X 1" X .13" TH ALUM CHANNEL
7	2	BT39520-3	HORIZONTAL DIRECTOR BRACKET
6	2	BT39520-2	LEG TO LINE BRACKET, RADOMES
5	2	BT39520-1	27" ELEMENT BRACKET, LEG MOUNT
4	1	CL1032	1-5/8"-6' MATCHING SECTION ASSY. RFF/SFF
3	1	CL1061B-61.69	1-5/8" INTERBAY LINE ASSEMBLY SFF/SFF
2	1	CL1063B-30.84	1-5/8" QUARTER-WAVE STUB ASSY
1	2	AE-LP-1CR0	11" LP ELEMENT, 1-5/8" LINE w/ RADOMES

BILL OF MATERIAL

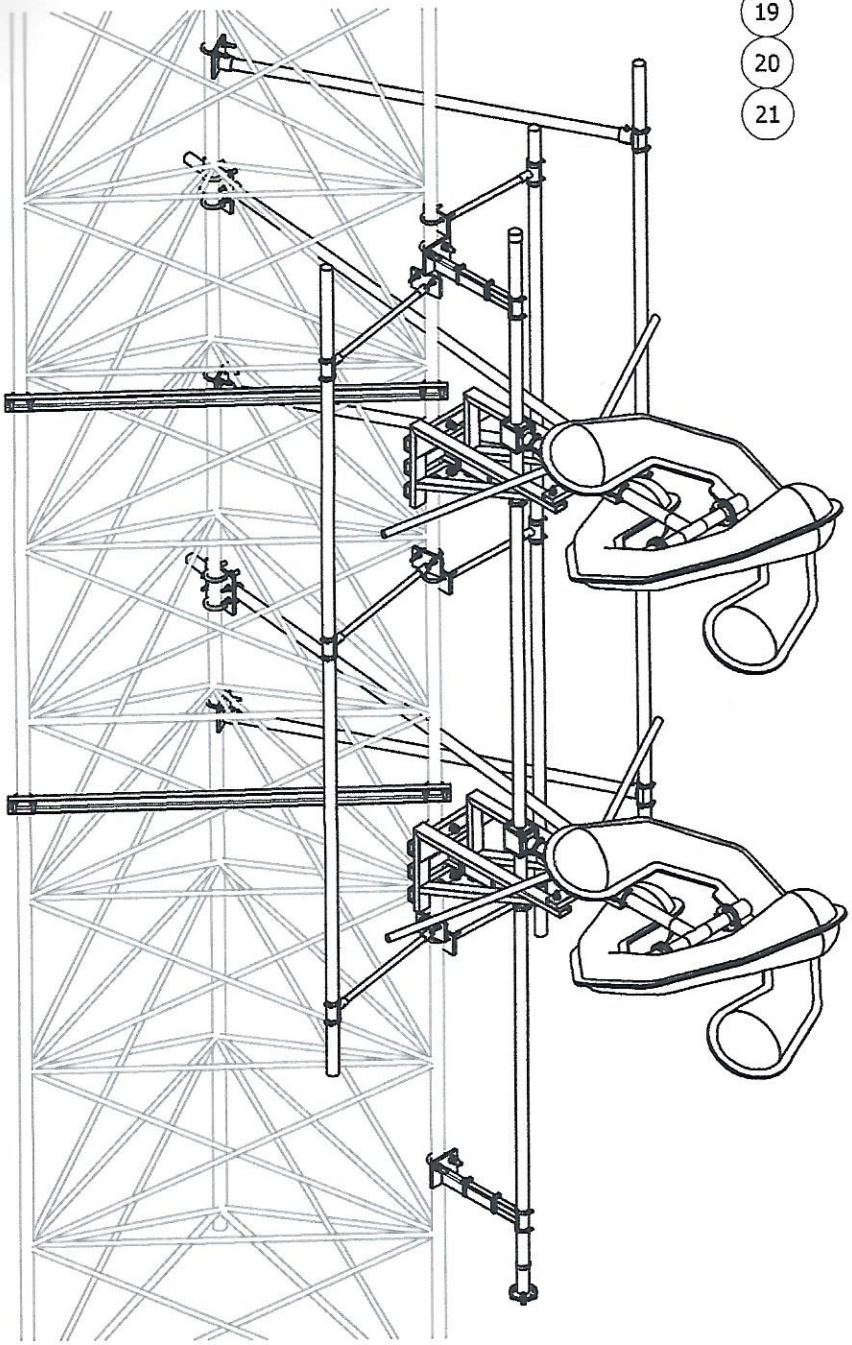
PROJECT NO.	39520/1	
ERI APPROVAL	NAME	DATE
DRAWN BY	NHM	9/15/2022
DRAFTING		
DESIGN MGR.	K. SCHARP	9/21/2022
ENG.		
MANUF.		

THIRD ANGLE PROJECTION

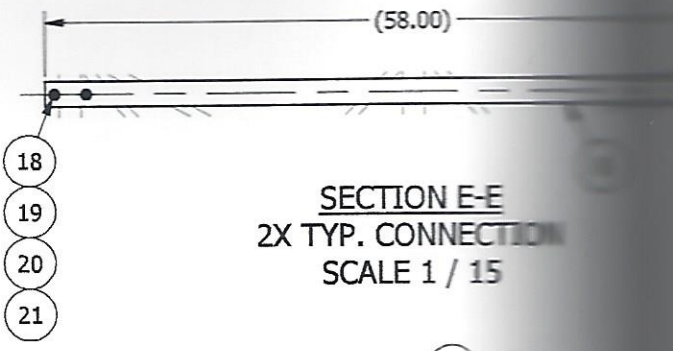
TOLERANCES
OVERALL-NOT CUMULATIVE
1 PLACE DECIMAL ± .1
2 PLACE DECIMAL ± .03

ELECTRONICS RESEARCH INC.
ESTABLISHED 1943
7777 GARDNER
CHANDLER, IN
47610-9219
PHONE: (812)
FAX: (812) 925

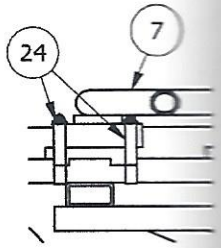
TITLE:
LP-2E-HW-DA INSTALLATION DETAILS
MORGANTOWN, IN
WBKC - FM STATION 90.9



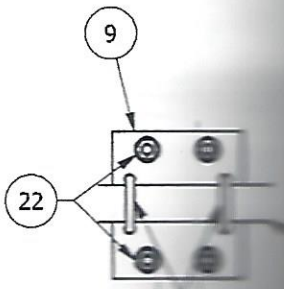
ELEVATION VIEW
SCALE 1 / 25



SECTION E-E
2X TYP. CONNECTION
SCALE 1 / 15



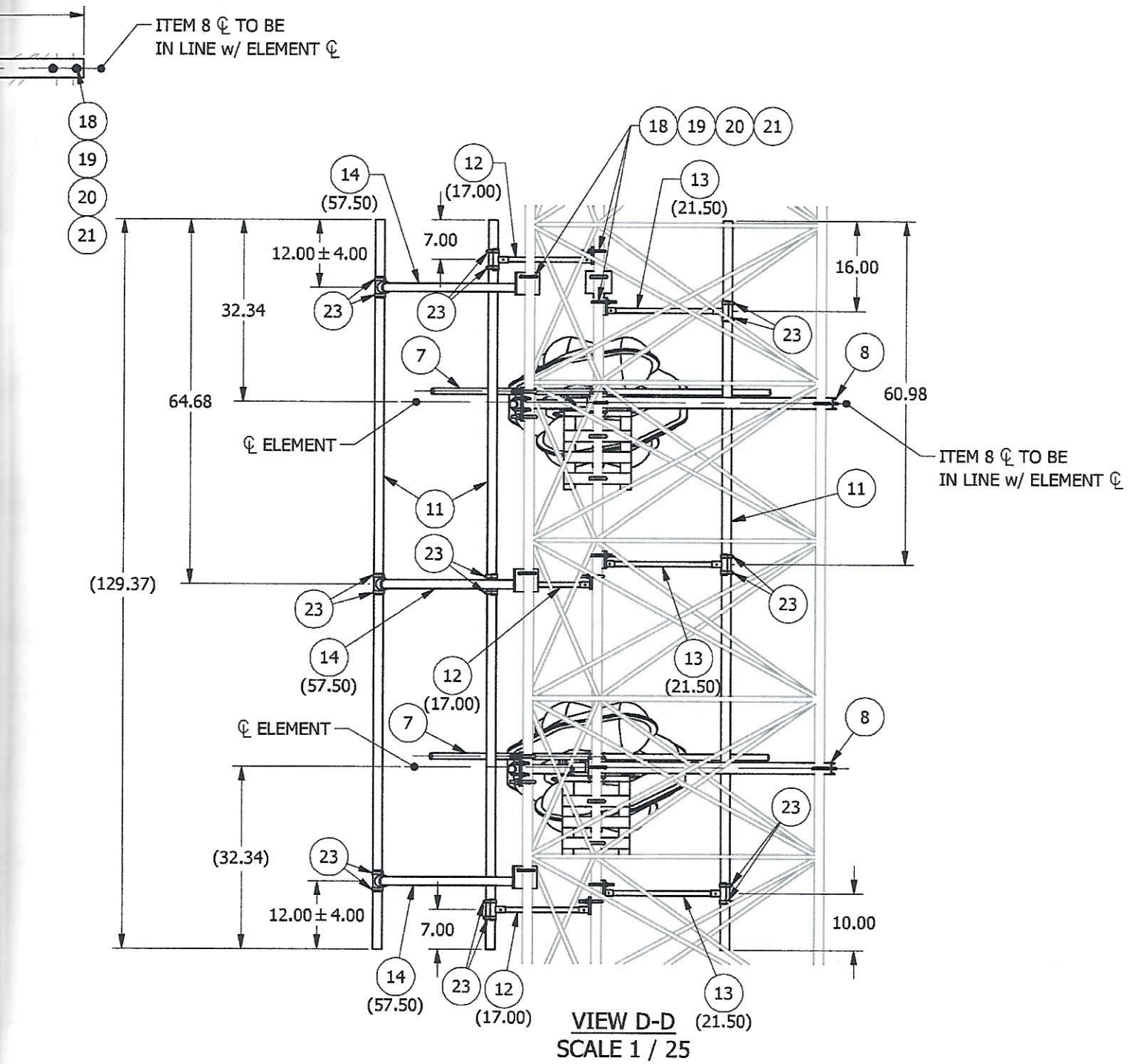
SECTION G-G
TYPICAL CONNECTION
ARB'S REMOVED FOR CLARITY
SCALE 1 / 8



SECTION F-F
TYPICAL CONNECTION
SCALE 1 / 8

THIRD ANGLE PROJECTION

MATERIAL



VIEW D-D
SCALE 1 / 25

PROJECT NO.	39520/1	
ERI APPROVAL	NAME	DATE
DRAWN BY	NHM	9/15/2022
DRAFTING		
DESIGN MGR.	K. SCHARP	9/21/2022
ENG.		
MANUF.		
EXT. APPROVAL	RG	9/21/2022
SUPERSEDES PART NO.		
FILE NAME: IA39520-1.idw		

ELECTRONICS RESEARCH INC.
ESTABLISHED 1943
7777 GARDNER Rd.
CHANDLER, IN
47610-9219
PHONE: (812) 925-6000
FAX: (812) 925-4030

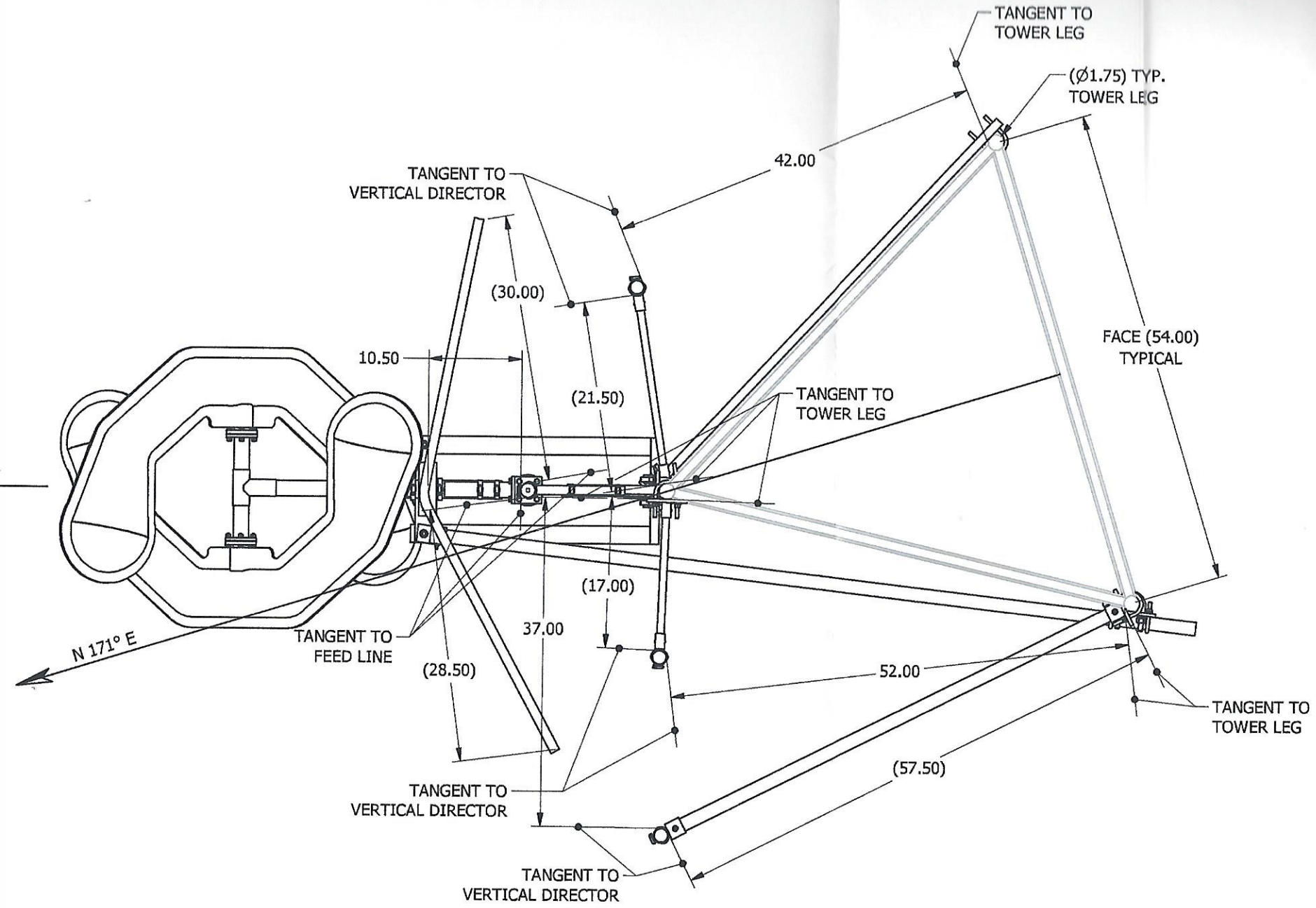
TITLE:
LP-2E-HW-DA INSTALLATION DETAILS
MORGANTOWN, IN
WBKC - FM STATION 90.9

SIZE	CAGE CODE	DWG NO.	REV.
B	OZNS1	IA39520-1	
SCALE: AS NOTED	WEIGHT: 321 lbmass	SHEET: 2 OF 3	

TOLERANCES
ERALL-NOT CUMULATIVE
SS OTHERWISE SPECIFIED,
IMENSIONS ARE IN INCHES
APPLICABLE AT 20°C (68°F)

RET DIMENSIONS AND TOLERANCES
PER ASME Y14.5M-1994

1 PLACE DECIMAL ± .1
2 PLACE DECIMAL ± .03
3 PLACE DECIMAL ± .010
ANGULAR ± .5°
FRACTIONAL ± 1/16"
LEG HOLE -0", +1/16"



TOP VIEW
SCALE 1 / 15

PROJECT NO.	39520/1	
ERI APPROVAL	NAME	DATE
DRAWN BY	NHM	9/15/2022
DRAFTING		

TITLE: LP-2E