

**GREG BEST
CONSULTING, INC.**

16100 Outlook Avenue
Stilwell, KS 60085
816-792-2913

June 12, 18

FM DIRECTIONAL ANTENNA INSTALLATION CERTIFICATION

In accordance with FCC Rule 73.316, this document will address relevant subsections regarding directional antenna requirements for an application for licensure. In particular, this document addresses 73.316 (c) (2) (i)-description of the antenna, 73.316 (c) (2) (ii) & (iii)-plot and tabulation of the composite azimuth pattern, 73.316 (c) (2) (iv) & (v)-antenna mounting configuration, 73.316 (c) (2) (vi)-other antenna proximity, 73.316 (c) (2) (vii)-certifying engineers qualification and certification, 73.316 (c) (2) (viii)-attached surveyor's statement of proper antenna orientation, and 73.316 (d)-proximity of other broadcast antennas.

DESCRIPTION OF ANTENNA

The antenna installed is a new directional broadband antenna consisting of two bays manufactured by Electronics Research Inc. (ERI), of Chandler, Indiana with model number 1051-2CP-DA-SP.

The antenna is mounted at the South Mt. Morrison site for the purpose of radiating the combined radio station signals applied to the antenna. The antenna is a steel structure. This antenna is side-mounted on the NE leg of the tower with the center of the antenna at 135 feet. The composite antenna consists of two bays of crossed dipole elements that are spaced appropriately to result with the desired radiation pattern. A current mechanical specification of the antenna model is attached. The mechanical specification contains a drawing of the side view of the antenna and dimensions for the height and width of the antenna. The antenna is built using the current TIA-EIA-222G design standard.

RF power is fed to the antenna via a 6 1/8" rigid coaxial transmission line that is attached to the tower and has also been taken into account as part of the structural analysis. The next pages depict the composite azimuth patterns and tabulated values for the 2 radio station signals applied to the antenna.

PLOT AND TABULATION OF ANTENNA (KQMT)

ERI[®] Horizontal Plane Relative Field Pattern

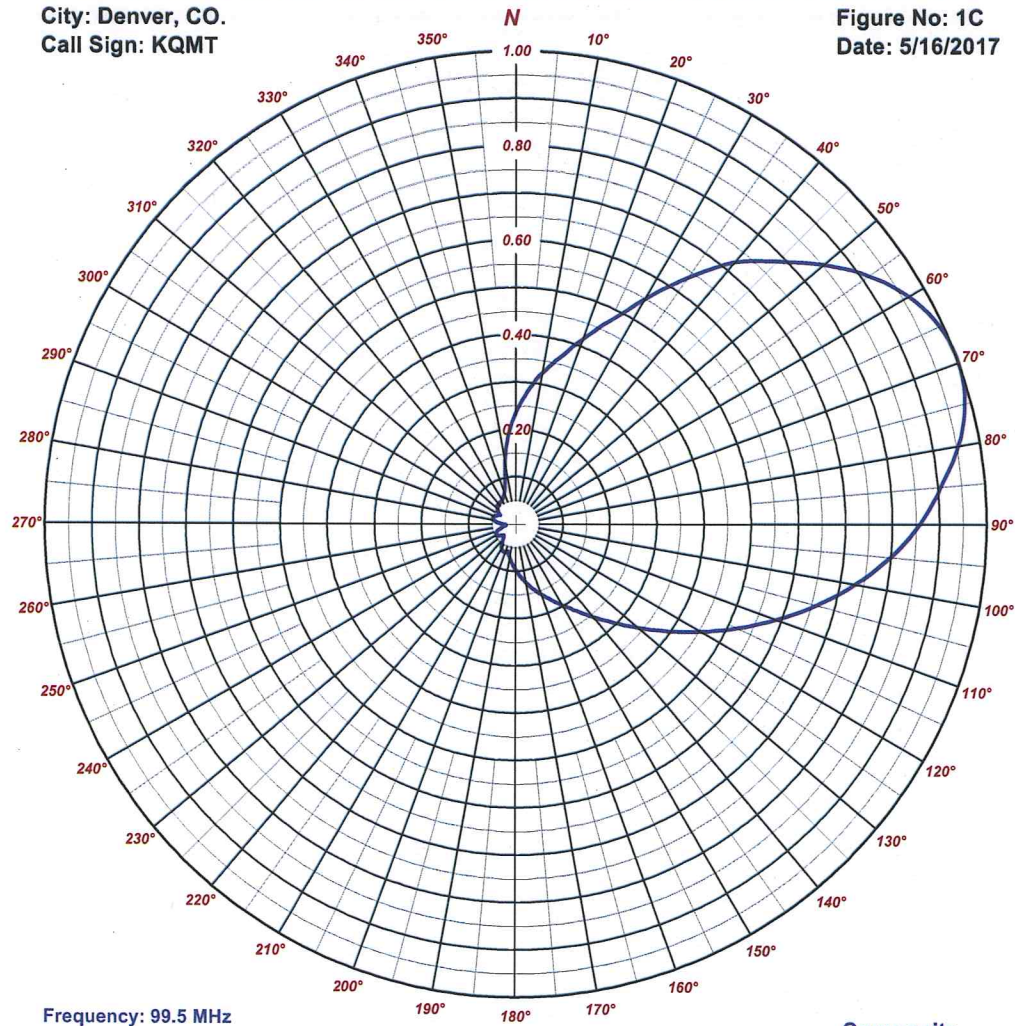
Electronics Research, Inc. 7777 Gardner Rd. Chandler, IN 47610 Phone(812) 925-6000 Fax(812) 925-4030 Web: www.eriinc.com

City: Denver, CO.

Call Sign: KQMT

Figure No: 1C

Date: 5/16/2017



Frequency: 99.5 MHz

Antenna Type: 1051-2CP-DA-SP

Antenna Orientation: 70° True

Antenna Mounting: Custom

Tower Type: Stainless G 8

Composite

RMS: .437

Maximum: 1 @ 69°

Minimum: .021 @ 261°

Composite pattern of the horizontal and vertical components.

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: 5/16/2017

Station: KQMT

Antenna: 1051-2CP-DA-SP

Location: Denver, CO.

Antenna Orientation: 70° True

Frequency: 99.5 MHz

Number of Bays: 2

Azimuth	Envelope			Polarization	Azimuth	Envelope			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.233	1.788	2.523	Vertical	180°	0.097	0.313	-5.046	Vertical
5°	0.278	2.553	4.070	Vertical	185°	0.084	0.234	-6.301	Vertical
10°	0.323	3.452	5.380	Vertical	190°	0.073	0.174	-7.597	Vertical
15°	0.363	4.358	6.393	Vertical	195°	0.063	0.131	-8.814	Vertical
20°	0.415	5.675	7.540	Vertical	200°	0.064	0.137	-8.638	Horizontal
25°	0.473	7.374	8.677	Vertical	205°	0.065	0.138	-8.613	Horizontal
30°	0.548	9.895	9.954	Horizontal	210°	0.059	0.115	-9.379	Horizontal
35°	0.634	13.260	11.225	Horizontal	215°	0.049	0.080	-10.962	Horizontal
40°	0.721	17.173	12.349	Horizontal	220°	0.040	0.052	-12.881	Horizontal
45°	0.784	20.297	13.074	Horizontal	225°	0.036	0.042	-13.799	Horizontal
50°	0.852	23.962	13.795	Horizontal	230°	0.039	0.050	-12.994	Horizontal
55°	0.914	27.584	14.407	Horizontal	235°	0.045	0.067	-11.756	Horizontal
60°	0.963	30.578	14.854	Horizontal	240°	0.047	0.074	-11.307	Horizontal
65°	0.992	32.453	15.113	Horizontal	245°	0.044	0.064	-11.909	Horizontal
70°	1.000	32.993	15.184	Horizontal	250°	0.037	0.044	-13.532	Horizontal
75°	0.987	32.161	15.073	Horizontal	255°	0.027	0.024	-16.166	Horizontal
80°	0.955	30.084	14.783	Horizontal	260°	0.021	0.014	-18.403	Horizontal
85°	0.906	27.090	14.328	Vertical	265°	0.024	0.019	-17.313	Horizontal
90°	0.859	24.340	13.863	Vertical	270°	0.033	0.035	-14.552	Horizontal
95°	0.800	21.127	13.248	Vertical	275°	0.042	0.058	-12.386	Horizontal
100°	0.733	17.732	12.488	Vertical	280°	0.048	0.076	-11.212	Horizontal
105°	0.663	14.487	11.610	Vertical	285°	0.049	0.080	-10.992	Horizontal
110°	0.591	11.519	10.614	Vertical	290°	0.046	0.070	-11.536	Horizontal
115°	0.522	8.980	9.533	Vertical	295°	0.040	0.054	-12.684	Horizontal
120°	0.456	6.868	8.368	Vertical	300°	0.040	0.052	-12.852	Vertical
125°	0.396	5.177	7.141	Vertical	305°	0.046	0.069	-11.599	Vertical
130°	0.342	3.865	5.872	Vertical	310°	0.051	0.084	-10.746	Vertical
135°	0.296	2.893	4.614	Vertical	315°	0.054	0.095	-10.221	Vertical
140°	0.258	2.195	3.415	Vertical	320°	0.055	0.099	-10.064	Vertical
145°	0.226	1.681	2.255	Vertical	325°	0.055	0.101	-9.975	Vertical
150°	0.200	1.315	1.189	Vertical	330°	0.057	0.109	-9.634	Vertical
155°	0.178	1.043	0.181	Vertical	335°	0.062	0.127	-8.975	Vertical
160°	0.160	0.841	-0.752	Vertical	340°	0.069	0.159	-7.993	Vertical
165°	0.143	0.675	-1.704	Vertical	345°	0.089	0.261	-5.829	Vertical
170°	0.127	0.531	-2.746	Vertical	350°	0.131	0.570	-2.439	Horizontal
175°	0.112	0.411	-3.859	Vertical	355°	0.183	1.111	0.456	Vertical

Horizontal Polarization:

Maximum: 3.735 (5.723 dB)

Horizontal Plane: 3.735 (5.723 dB)

Maximum ERP: 33.000 kW

Vertical Polarization:

Maximum: 3.450 (5.378 dB)

Horizontal Plane: 3.450 (5.378 dB)

Maximum ERP: 30.479 kW

Total Input Power: 8.835 kW

Reference: KQMT1M.FIG

This list shows the the maximum azimuth values of either the horizontal or vertical components.

PLOT AND TABULATION OF ANTENNA (KQKS)

ERI[®] Horizontal Plane Relative Field Pattern

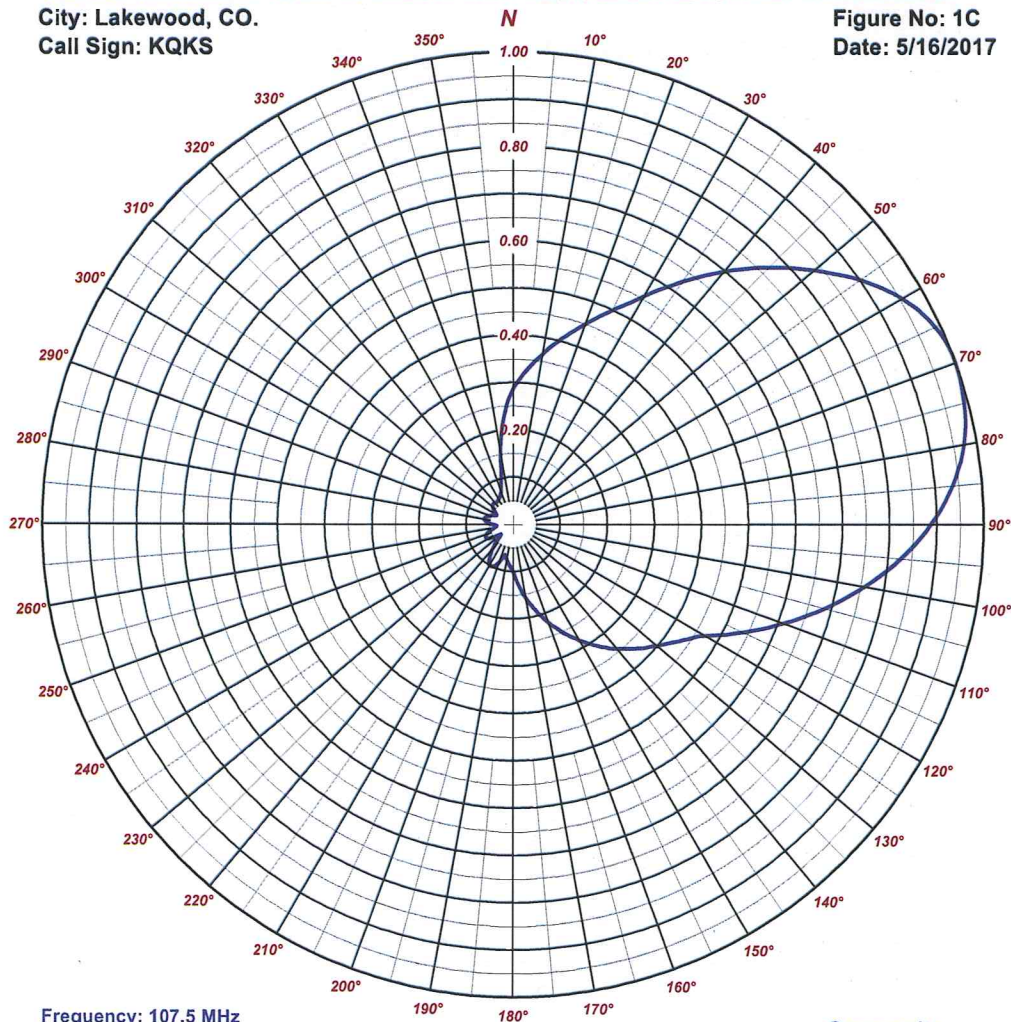
Electronics Research, Inc. 7777 Gardner Rd. Chandler, IN 47610 Phone(812) 925-6000 Fax(812) 925-4030 Web: www.erinc.com

City: Lakewood, CO.

Call Sign: KQKS

Figure No: 1C

Date: 5/16/2017



Frequency: 107.5 MHz

Antenna Type: 1051-2CP-DA

Antenna Orientation: 70° True

Antenna Mounting: Custom

Tower Type: Stainless G 8

Composite

RMS: .449

Maximum: 1 @ 70°

Minimum: .033 @ 228°

Composite pattern of the horizontal and vertical components.

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

Station: KQKS

Location: Lakewood, CO.

Frequency: 107.5 MHz

Date: 5/16/2017

Antenna: 1051-2CP-DA-SP

Antenna Orientation: 70° True

Number of Bays: 2

Azimuth	Envelope			Polarization	Azimuth	Envelope			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.284	2.656	4.242	Horizontal	180°	0.101	0.337	-4.725	Vertical
5°	0.324	3.466	5.398	Horizontal	185°	0.087	0.252	-5.978	Vertical
10°	0.364	4.372	6.406	Horizontal	190°	0.076	0.188	-7.250	Vertical
15°	0.405	5.411	7.333	Horizontal	195°	0.070	0.161	-7.930	Horizontal
20°	0.449	6.650	8.228	Horizontal	200°	0.088	0.253	-5.965	Horizontal
25°	0.498	8.178	9.127	Horizontal	205°	0.099	0.323	-4.905	Horizontal
30°	0.555	10.175	10.075	Vertical	210°	0.100	0.329	-4.834	Horizontal
35°	0.624	12.869	11.095	Vertical	215°	0.086	0.243	-6.135	Horizontal
40°	0.696	15.995	12.040	Vertical	220°	0.063	0.131	-8.827	Horizontal
45°	0.767	19.435	12.886	Vertical	225°	0.040	0.052	-12.873	Horizontal
50°	0.834	22.973	13.612	Vertical	230°	0.035	0.039	-14.050	Horizontal
55°	0.900	26.745	14.272	Horizontal	235°	0.048	0.076	-11.166	Horizontal
60°	0.954	30.038	14.777	Horizontal	240°	0.061	0.122	-9.135	Horizontal
65°	0.989	32.255	15.086	Horizontal	245°	0.064	0.135	-8.684	Horizontal
70°	1.000	33.000	15.185	Horizontal	250°	0.058	0.110	-9.590	Horizontal
75°	0.992	32.459	15.113	Vertical	255°	0.046	0.070	-11.574	Horizontal
80°	0.973	31.226	14.945	Vertical	260°	0.036	0.043	-13.695	Horizontal
85°	0.937	28.990	14.622	Vertical	265°	0.036	0.044	-13.598	Horizontal
90°	0.888	26.048	14.158	Vertical	270°	0.046	0.071	-11.475	Horizontal
95°	0.828	22.620	13.545	Vertical	275°	0.057	0.107	-9.696	Horizontal
100°	0.759	19.012	12.790	Vertical	280°	0.062	0.125	-9.015	Horizontal
105°	0.686	15.546	11.916	Vertical	285°	0.059	0.114	-9.445	Horizontal
110°	0.612	12.377	10.926	Vertical	290°	0.049	0.080	-10.964	Horizontal
115°	0.541	9.657	9.848	Vertical	295°	0.040	0.054	-12.678	Horizontal
120°	0.473	7.393	8.688	Vertical	300°	0.041	0.056	-12.530	Vertical
125°	0.432	6.145	7.885	Horizontal	305°	0.048	0.077	-11.151	Horizontal
130°	0.400	5.275	7.222	Horizontal	310°	0.056	0.103	-9.885	Horizontal
135°	0.373	4.583	6.612	Horizontal	315°	0.059	0.115	-9.380	Horizontal
140°	0.345	3.931	5.945	Horizontal	320°	0.058	0.111	-9.562	Horizontal
145°	0.315	3.283	5.162	Horizontal	325°	0.057	0.109	-9.641	Vertical
150°	0.284	2.671	4.267	Horizontal	330°	0.060	0.118	-9.282	Vertical
155°	0.254	2.127	3.278	Horizontal	335°	0.064	0.137	-8.633	Vertical
160°	0.222	1.623	2.104	Horizontal	340°	0.073	0.176	-7.533	Vertical
165°	0.190	1.192	0.764	Horizontal	345°	0.095	0.297	-5.272	Vertical
170°	0.159	0.836	-0.777	Horizontal	350°	0.149	0.729	-1.373	Horizontal
175°	0.128	0.542	-2.658	Horizontal	355°	0.224	1.661	2.205	Horizontal

Horizontal Polarization:

Maximum: 3.687 (5.667 dB)

Horizontal Plane: 3.687 (5.667 dB)

Maximum ERP: 33.000 kW

Vertical Polarization:

Maximum: 3.642 (5.614 dB)

Horizontal Plane: 3.642 (5.614 dB)

Maximum ERP: 32.600 kW

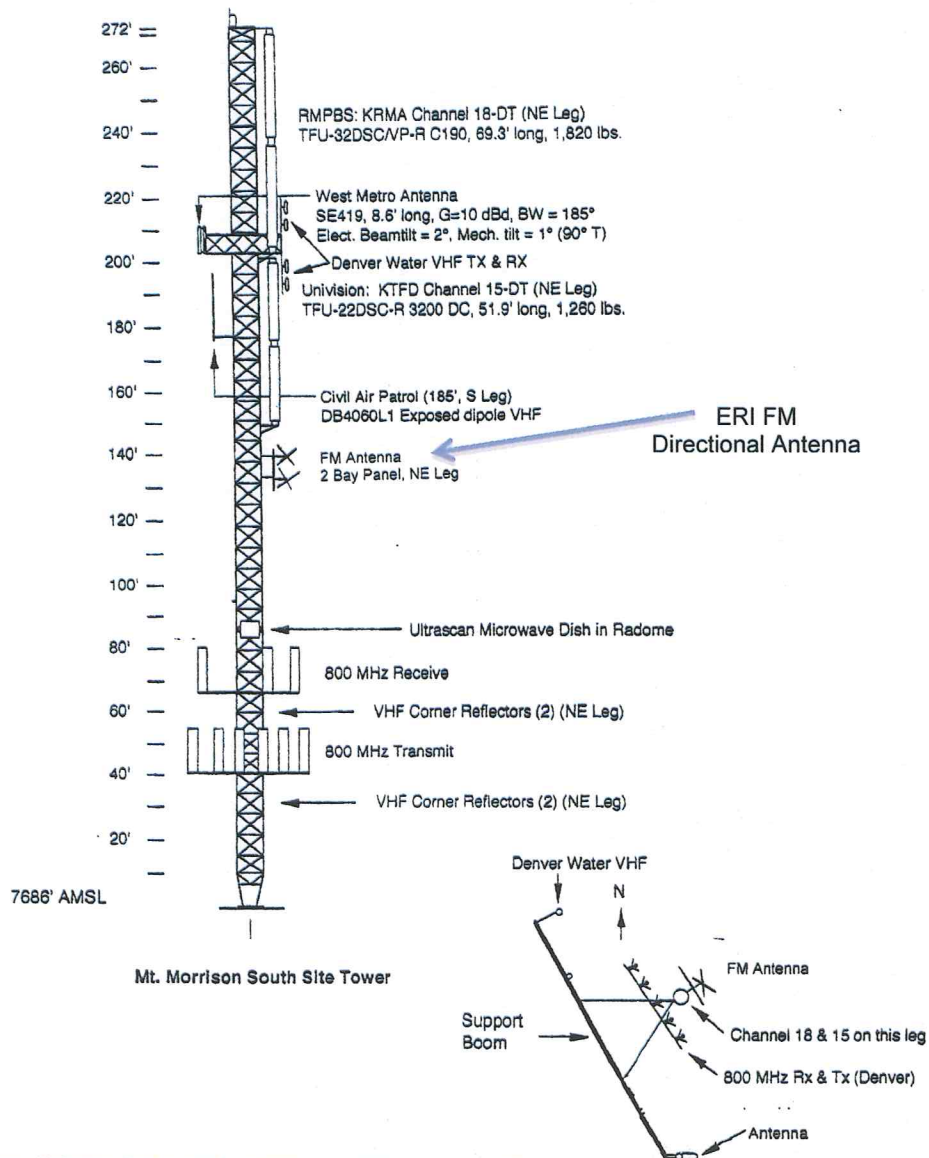
Total Input Power: 8.951 kW

Reference: KQKS1M.FIG

This list shows the the maximum azimuth values of either the horizontal or vertical components.

The following diagram shows the mounting location of the directional antenna. The antenna is side-mounted to the tower and is mounted in accordance with the instructions provided by ERI, the antenna manufacturer. The antenna is not mounted on the top of an antenna tower which includes a top-mounted platform larger than the nominal cross-sectional area of the tower in the horizontal plane. The tower has no top mounted platform.

Exhibit A.1 - Tower Elevation Drawing



The directional antenna is the only appurtenance that is mounted in the vertical aperture of the tower where the antenna is mounted. There are no other antennas or other items mounted on any tower leg or face at the same height as the antenna described here.

June 12, 2018

The antenna is designed for a maximum field oriented towards an azimuth of 70 degrees and the attached surveyor's report confirms the antenna is oriented at a recorded azimuth that is less than 1 degree from the design specification.

I personally have examined the antenna installation on the tower and have found it is installed as specified by the manufacturer. My qualifications are a matter of public record and include registration as a Professional Engineer registered in Colorado and 3 other states. I have a Masters of Science in Electrical Engineering and have performed engineering design work for 40+ years in the field of RF communications.

The attached surveyors report will stipulate that the ERI directional antenna is mounted at the proper orientation direction that corresponds with instructions as provided by the antenna manufacturer.

Finally, there are no other FM or TV broadcast antennas within 60 meters of the ERI directional antenna that is the subject of this report.

I hereby certify that the foregoing report or statement was prepared by me but may include work performed by others under my supervision or direction. The statements of fact contained herein are believed to be true and correct based on my personal knowledge, information and belief unless otherwise stated; with respect to facts not known of my own personal knowledge, I believe them to be true and correct based on their origin from sources known to me to be generally reliable and accurate. I have prepared this document with due care and in accordance with applicable standards of professional practice.

Sincerely,



President
Attachments



1051-2CP-DA-SP

July 7, 2016

PRELIMINARY MECHANICAL SPECIFICATION FOR 1051-2CP-DA-SP KQMT/Bear Creek Development * Mt. Morrison, CO

MECHANICAL CHARACTERISTICS:

ARRAY LENGTH: 12.00 feet

CALCULATED WEIGHT:

No Ice:	1,700 lbs
With 1/2" Ice:	2,500 lbs

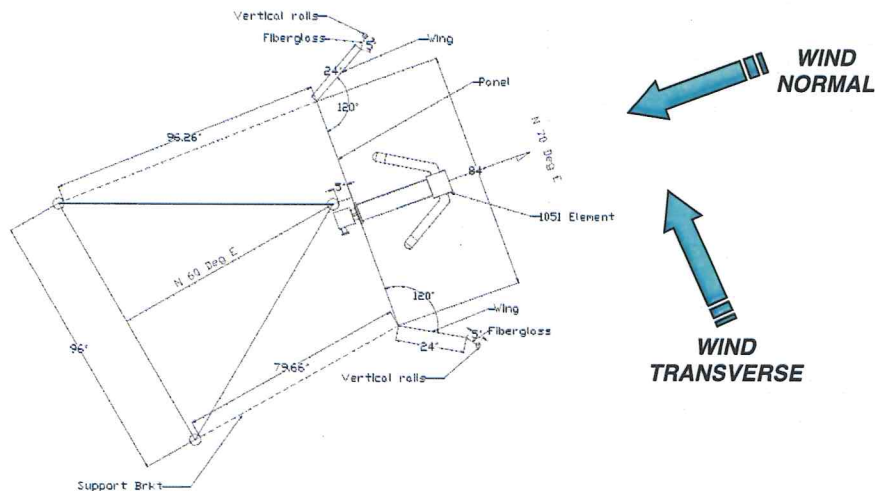
CALCULATED EFFECTIVE PROJECTED AREA (EPA):

NORMAL EXPOSURE

No Ice:	75 ft ²
With 1/2" Ice:	132 ft ²

TRANSVERSE EXPOSURE

No Ice:	73 ft ²
With 1/2" Ice:	123 ft ²



NOTES:

1. Please note, the listed weights and effective wind areas are based upon the **PRELIMINARY** design of the antenna.
 2. Loads calculated in accordance with the ANSI/TIA-222-G standard.
 3. No wind shielding taken into account for supporting structure.
 4. Loading includes preliminary design for all aperture components including radiating elements, reflective panels, parasitic elements, feed harnessing, and mount brackets. Loading does **NOT** include support mast.
- Please contact ERI's Structural Division if you have any questions concerning the provided Mechanical Specifications.**

ELECTRONICS RESEARCH, INC. ERI



CHAMBERS CONSULTING, INC.

TEL 303-697-0650
chaconinc@chamberscon.com

805 Bear Creek Avenue
Mail: P.O. Box 339
Morrison, Colorado 80465-0339

To Whom It May Concern:
From: L. G. "Gus" Chambers, PLS
Colorado Registration No. 16099
Date: June 11, 2018
Subject: FCC Azimuth Determination



On June 7, 2018 I surveyed the azimuth bearing of two antennas connected to the northeast leg of the main transmission tower on Mt. Morrison. The stations using these antennas are KQMT (99.5 FM) and KQKS (107.5 FM).

I performed the survey using baseline control points that I had established on December 5, 2015 using GPS RTK using a one point localization with WGS84 North as the basis of rotation.

I determined an azimuth of 69°00'20".