

LICENSE TO COVER

Construction Permit LMS-0000210741

KRGH (FM) Holliday TX

FACID 173112

TRANSMITTER POWER OUTPUT

TRANSMITTER POWER OUTPUT = 2,980 WATTS

325 FEET 7/8" COAX = -1.10dB

FOUR-BAY ANTENNA = +9.78 dB (H) +7.41dB (V)

EFFECTIVE RADIATED POWER = 22,000 WATTS (H) 12,750 WATTS (V)

SPECIAL OPERATING CONDITIONS:

- Grace Community Church of Amarillo requests waiver of 47 C.F.R. § 73.509 to allow Station KGVB, as authorized herein, to receive contour overlap from the 100 dBu contour of second adjacent channel Station KZKL(FM), Wichita Falls, TX (Facility ID No. 55381) on Channel 213C3.
- Antenna Manufacturer Proof-of-Performance is attached
- Surveyor Affidavit attached
- Installing Engineer Certification attached
- Community Contour Coverage Map attached
- The constructed antenna pattern meets the Principal minima and their associated field strength limits



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

**Directional FM Antenna
KRGH
Grace Community Church of Amarillo
Holliday, TX**

A model PSIFM5CLOG antenna with mounts was customized and used in conjunction with a duplicate of the customer's 41.5" face tower to create the necessary directional radiation pattern. The final antenna consists of eight radiating elements with special spacing and offsets. The antenna array is center fed. Each radiating element receives equal power and the necessary phase to achieve the final pattern.

Pattern testing was performed using a 1/3-scale model element and tower. The azimuth plane measurements were taken on a ground reflection test range. This type of test range utilizes the reflected signal and direct signal from the source antenna to form an interference pattern on the antenna under test. The antenna and tower under test were mounted to a turntable that allowed the structure to be rotated 360° in the azimuth plane. The source antenna was located approximately 75 ft. from the antenna under test. The source height above ground was adjusted to peak the first lobe of the interference pattern at the antenna under test.

The test antenna was mounted in the center of rotation of the turntable. The antenna and mounting structure were rotated clockwise while data was recorded in a counter clockwise direction. All feed cables to the antenna were secured and grounded during pattern measurements. A Hewlett Packard 8753E-network analyzer operating at 272.7 MHz was used as both the source and receiver. The level of the received signal was compared with a standard dipole to establish the directivity of the final pattern. The final pattern measured does not exceed the envelope pattern and is 85.6% of the envelope RMS.

The antenna is to be mounted 95 meters (312 ft.) above ground level per the construction permit. A deviation of +2/-4 meters from the approved center of radiation is allowed. No other antenna can be installed within 10 ft of any radiating element. The antenna is to be mounted to the northeast tower face using the supplied custom mounts. All antenna bays are to be positioned 62° True and certified by a licensed surveyor. It is recommended that a broadcast engineer is present to supervise the installation of the antenna and that he or she certifies the antenna has been installed according to the enclosed instructions.



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

An input power level of 2.32 kW will be required at the antenna input in order to reach the licensed 22 kW ERP. The transmitter output power requirements are dependent upon the transmission line size and length used to feed the antenna. The final length of transmission line must be determined after installation.

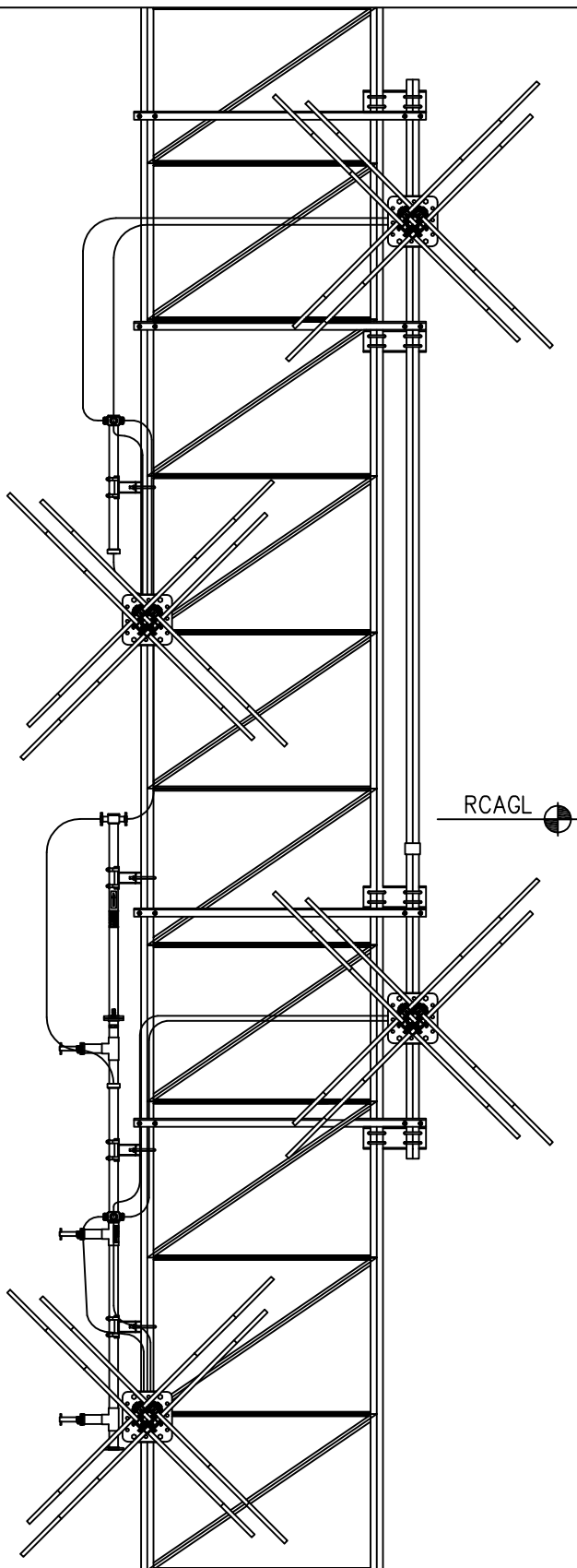
Antenna Specifications

Antenna Model	PSIFM5CLOG-4 Custom
Type	4-bay directional FM antenna
Bay Spacing	Custom bay spaced elements
Frequency	90.9 MHz
Polarization	Circular/Elliptical
Envelope RMS	.543
Composite RMS	.465
Gain (h-pol)	9.50 (9.78 dB)
Gain (v-pol)	5.51 (7.41 dB)
Input	1-5/8" EIA center fed input
Input power	2.32 kW
Power rating	5 kW
Length	22.25 ft.
Weight	358 lbs.
Wind Area	41 sq. ft.

Statement of Certification

This is to certify the antenna has been designed, fabricated and tested under my supervision and it meets the required envelope pattern limitations set forth in the stations construction permit.

Douglas A. Ross
President
Propagation Systems Inc.



SPECIFICATIONS	
BAY SPACING ('L')	72.000 IN
APERTURE ('A')	18 FT (5.5 M)
RCAGL:	311 FT (94.8 M)
WEIGHT:	358 LB (162 kg)
WIND AREA:	41 FT ² (3.8 M ²)
POWER RATING:	5 kW
H-POL GAIN:	9.50 (9.78 dB)
V-POL GAIN:	5.51 (7.41 dB)
POLARIZATION	CIRCULAR
NOTE: 1. WEIGHT AND WIND AREA ARE ESTIMATED. WIND AREA IN ACCORDANCE WITH TIA/EIA-222-F $\Sigma(CaAc)$	
2. TIE WRAP COAX. CABLE AT $\pm 16"$ O.C.	

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

ANTENNA ELEVATION AND SPECIFICATIONS

MODEL:	PSIFM5CLOG-4 Custom	DRAWN BY:	G. LINK	DATE:	3/13/23
CHANNEL/FREQUENCY:	90.9 MHz	APPROVED BY:		DATE:	
SCALE:		DRAWING NO.:	2483-001	REV.	

REV. MADE BY CHECKED BY DATE CHANGE

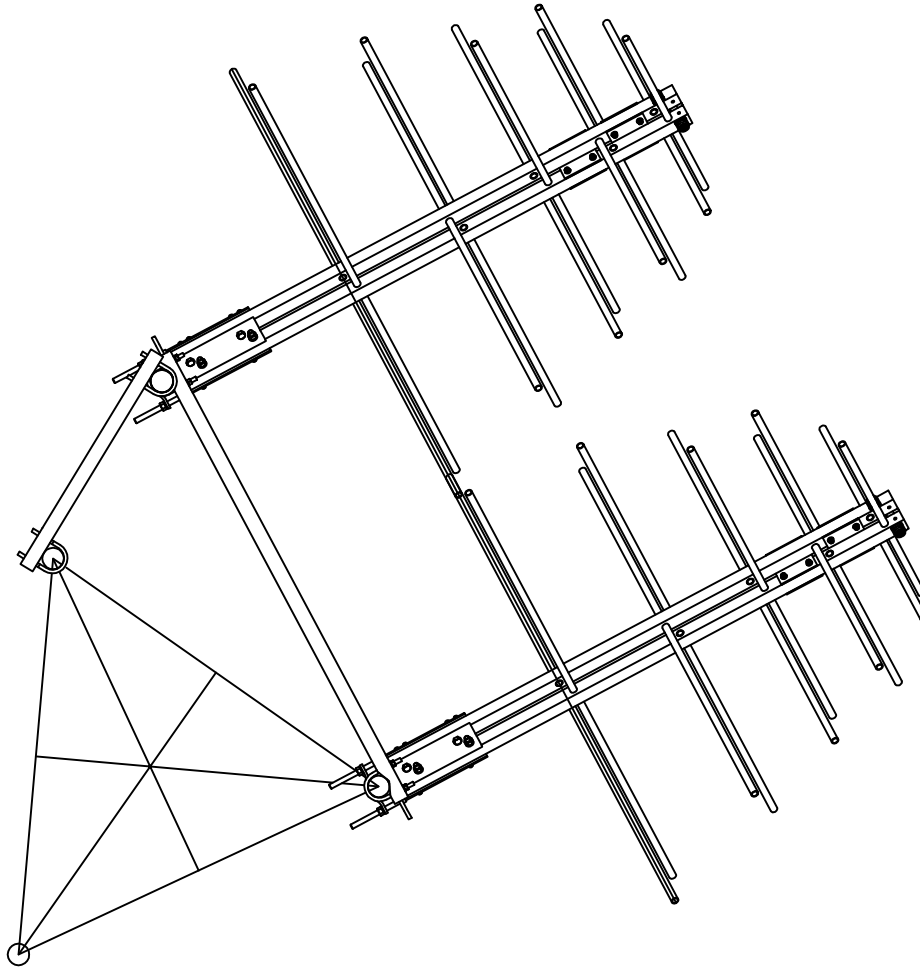
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any information for the making of drawings, prints or other reproductions hereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon the written permissions of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the forgoing agreement.

SIZE
A



335°

62°



PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

ANTENNA ORIENTATION DETAIL

MODEL: PSIFM5CLOG-4 Custom	DRAWN BY: G. LINK	DATE: 3/13/23
CHANNEL/ FREQUENCY: 90.9 MHz	APPROVED BY:	DATE:
SCALE:	DRAWING NO.: 2483-002	REV.

This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any information for the making of drawings, prints or other reproductions hereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon the written permissions of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the forgoing agreement.

SIZE

A

Maximum Envelope Tabulation

Antenna Model: PSIFM5CLOG-4 Custom

Grace Community Church of Amarillo

Station: KRGH

Frequency: 90.9 MHz

Location: Holliday, TX

Maximum ERP: 22 kW

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.431	4.09	6.11
10	0.542	6.46	8.10
20	0.662	9.64	9.84
30	0.761	12.74	11.05
40	0.876	16.88	12.27
50	0.958	20.19	13.05
60	0.994	21.74	13.37
62	1.000	22.00	13.42
70	0.977	21.00	13.22
80	0.914	18.38	12.64
90	0.800	14.08	11.49
100	0.704	10.90	10.38
110	0.590	7.66	8.84
120	0.473	4.92	6.92
130	0.376	3.11	4.93
140	0.358	2.82	4.50
150	0.358	2.82	4.50
160	0.358	2.82	4.50
170	0.358	2.82	4.50
180	0.358	2.82	4.50
190	0.358	2.82	4.50
200	0.358	2.82	4.50
210	0.358	2.82	4.50
220	0.358	2.82	4.50
230	0.358	2.82	4.50
240	0.358	2.82	4.50
250	0.358	2.82	4.50
260	0.358	2.82	4.50
270	0.358	2.82	4.50
280	0.358	2.82	4.50
290	0.358	2.82	4.50
300	0.358	2.82	4.50
310	0.358	2.82	4.50
320	0.358	2.82	4.50
330	0.358	2.82	4.50
340	0.358	2.82	4.50
350	0.358	2.82	4.50

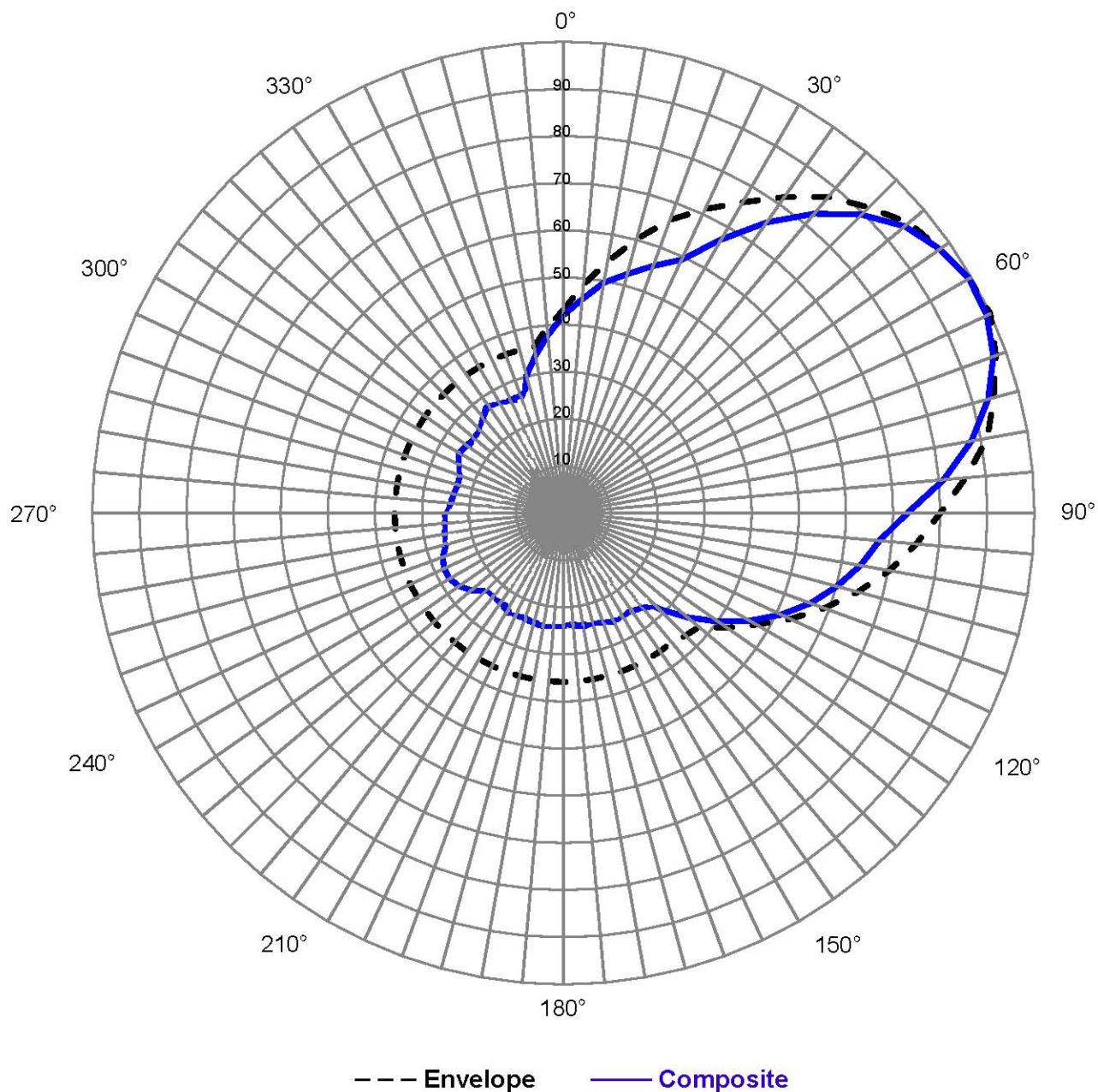
Composite Pattern Tabulation

Antenna Model: PSIFM5CLOG-4 Custom
 Grace Community Church of Amarillo
 Station: KRGH
 Frequency: 90.9 MHz
 Location: Holliday, TX
 Maximum ERP: 22 kW

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.420	3.874	5.88
10	0.497	5.425	7.34
20	0.558	6.856	8.36
30	0.670	9.872	9.94
40	0.829	15.127	11.80
50	0.946	19.704	12.95
60	F.€€€	2G737	13.1 G
70	0.971	20.758	13.17
80	0.880	17.022	12.31
90	0.730	11.728	10.69
100	0.640	9.022	9.55
110	0.559	6.876	8.37
120	0.457	4.588	6.62
130	0.3ì G	HG10	í .€7
140	0.2ĭ í	1.î î 4	F.Hí
150	0.GG	F.F€	Á.4H
160	0.Fì I	0.ĭ ĭ í	Ä.F.G
170	0.FJJ	0.ĭ ĭ F	Á.ĭ J
180	0.Fì 4	0.ĭ ĭ í	Á1.G
190	0.G€	0.JFĭ	Á.€ĭ
200	0.FJJ	0.ĭ ĭ F	-€5J
210	0.1ĭ J	0.ĭ €	-F.5G
220	0.206	0.932	-0.31
230	0.255	1.428	1.55
240	0.279	1.707	2.32
250	0.272	1.628	2.12
260	0.238	1.242	0.9Î
270	0.1JJ	0.ĭ ĭ F	-€î 1
280	0.19G	0.ì 27	-€B G
290	0.1Jĭ	0.ĭ ĭ I	-€î 9
300	0.1ì ì	0.ĭ ĭ ì	-F.F2
310	0.1ĭ ì	0.Î J7	-F.ĭ ĭ
320	0.Fĭ ì	0.Î Jĭ	-F.ĭ ĭ
330	0.G18	F.€ Î	Ä.FJ
340	0.2ĭ H	1.Î 35	G1I
350	0.340	2.538	4.05



Relative Field Azimuth Plane Pattern



Pattern Type:	Measured Composite
Antenna Model:	PSIFM5CLOG-4 Custom
Polarization:	Circular
RMS (envelope)	0.543
RMS (composite)	0.465

Tower:	Eastpoint Tower 41.5" Face
Orientation:	62°
Frequency:	90.9 MHz
Station:	KRGH
Date:	6/28/2023



PROVEN
SURVEYING

2406 Kell Boulevard
Wichita Falls, TX 76309-5326
Phone: (940) 322-6450
TBPLS FIRM# 10015000

February 7, 2024

Larry Ewing Engineering
Radio By Grace

Mr. Ewing:

Certificate of Survey:

On January 9, 2024, Proven Surveying conducted a survey at the KGVb antenna site located in Dundee, Texas. True North was established by GPS observation on NGS Monument "Dundee". The Antenna was positioned at an azimuth of 62 degrees in accordance with the "Antenna Orientation Detail" Drawing Number 2483-002 by Propagation Systems, Inc.

Respectfully,

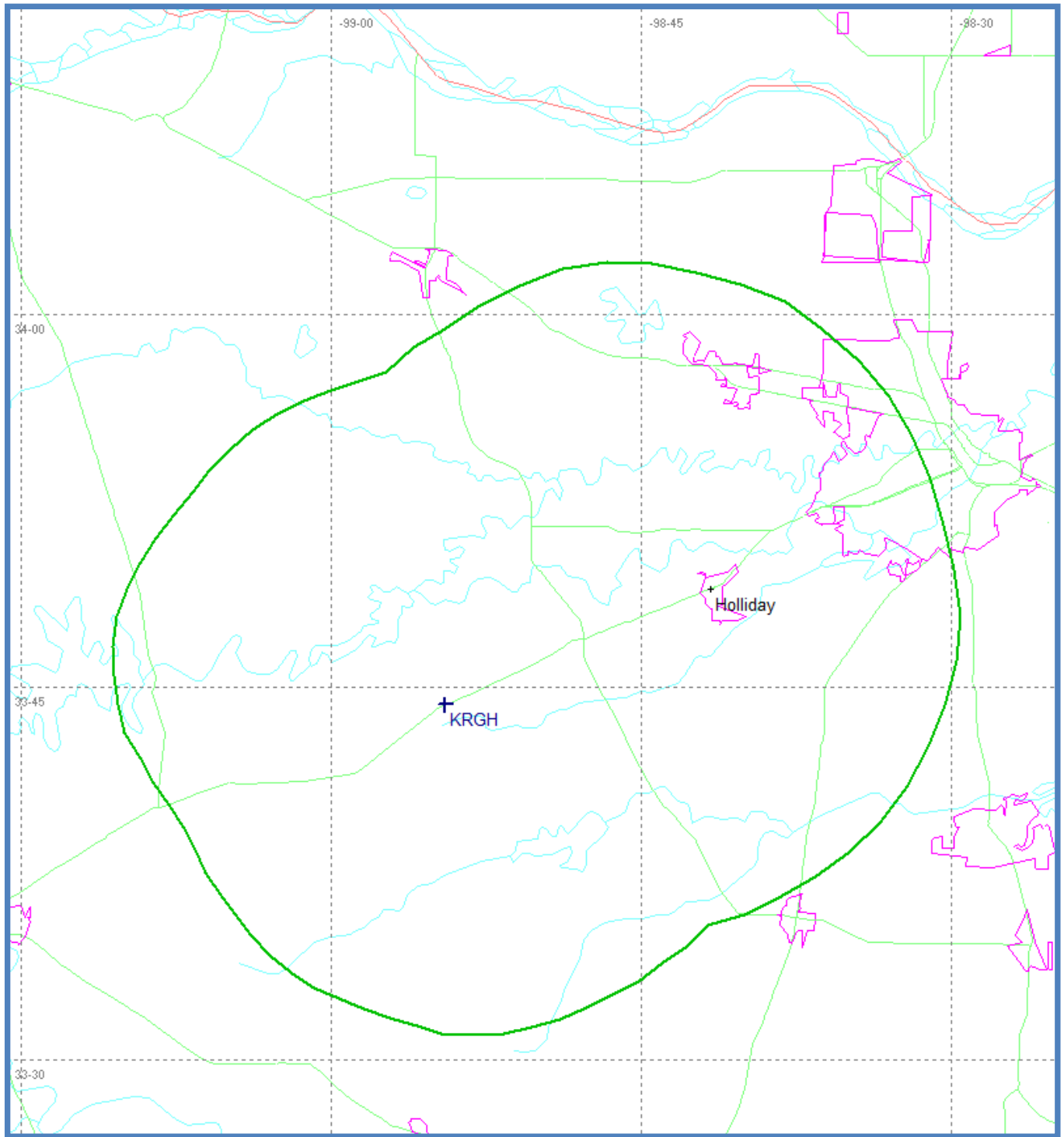
Brad Litteken
Texas RPLS 6838



THESE NOTES WERE PREPARED FROM SURVEY FIELD WORK PERFORMED BY PROVEN
SURVEYING JANUARY 09, 2024 WORK ORDER 230043-2.

Copyright 2024, Proven Surveying. This document shall not be altered, duplicated, or electronically reproduced without the
written authorization of Proven Surveying

Community Contour Coverage Map





From the Desk of
Jim Turvaville
SBE Certified Radio Engineer

RE: Antenna Installation
KRGH (FM) Holliday Texas
Grace Community Church of Amarillo

TO WHOM IT CONCERNS:

I, Jim Turvaville, do certify that I have personally overseen the installation of the directional antenna for the above station. Along with Jay Jenkins, Sr the antenna array manufactured by Propagations Systems Inc was assembled and installed on the tower according to the specific instructions provided by PSI.

I have installed dozens of FM directional antennas and my work is a matter of record with the Federal Communications Commission.

Respectfully,

Jim Turvaville, Owner
Turbo Tech Services
Certified Radio Engineer - Consultant
FCC License PG-10-19743