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March 23, 1998

BY HAND

Mr. Carl Huie
Federal Communications Commission
Experimental Licensing
Office of Engineering & Technology
2000 M Street, NW; Suite 480
Washington, DC 20554

Re: Experimental Application of Diversified Communication Engineering, Inc.; Call Sign WA2XMY

Dear Carl:

Please find enclosed an engineering report to supplement the experimental license modification application of Diversified Communication Engineering, Inc. ("DCE"). This information was requested by Mr. Steve Sharkey from the International Bureau during recent meetings with the FCC.

If you require any further information for processing, please do not hesitate to call me at (202) 828-3182.

Sincerely,

Eric W. DeSilva

cc: Mr. Steve Sharkey (w/encl.)
Enclosures: Delawder Communications, Inc. Engineering Report

DELAWDER COMMUNICATIONS, INC.
5568 General Washington Drive, Suite A-218
Alexandria, Virginia 22312
(703) 658-5390

ENGINEERING REPORT

Diversified Communication Engineering, Inc.
Austin, TX (12 GHz Experimental Station)

EXHIBIT EE

ENGINEERING REPORT IN SUPPORT OF 12 GHz EXPERIMENTAL APPLICATION

I. Introduction

1. Diversified Communication Engineering, Inc. (DCE) is the licensee of experimental station WA2XMY, which is authorized to conduct tests of a terrestrial 12 GHz transmit facility near Kingsville, Texas. By pending modification, DCE proposes to add a second test location to WA2XMY at Austin, Texas, where additional tests of a low-powered terrestrial 12 GHz transmit facility will be conducted.

2. The tests will be conducted in the 12.2 to 12.7 GHz frequency band, which is authorized for use by the Direct Broadcast Satellite (DBS) Service. In support of the experimental test site at Austin, this engineering report demonstrates that the proposed test facility will not cause significant interference to DBS receive sites which are located within 50 miles of the experimental station's transmitter site.

II. Description of Terrestrial Interference In The DBS Downlink Band

2. The interference studies included with this report were conducted using the DBS specifications and protection criteria submitted to the FCC on April 11, 1994 by **DIRECTV™** entitled ***Terrestrial Interference in the DBS Downlink Band*** (hereafter referred to as the "**TI-DBS Report**"[1]). From the **TI-DBS Report** the following pertinent

[1] **DIRECTV™** operates in the broadcast satellite configuration at 101° W longitude. For the purpose of this study, it is assumed that the DBS specifications and protection criteria of the **TI-DBS Report** are also applicable for the other existing DBS Service which transmits at 61.5° W longitude and 119° W longitude.

information is specified:

(a) The satellite antenna shaped beam provides EIRP coverage of the contiguous United States ranging from 49 dBW in the West to 54 dBW in the Southeast. A "worst-case" minimum value of 49 dBW is used for the DBS transmit EIRP for each carrier-to-interference (C/I) ratio study of this report.

(b) The DBS subscriber antenna is typically an 18 inch aperture offset parabolic reflector with a feed horn, having a peak gain of 34 dB. A horizontal plane antenna pattern is provided as Figure 2.3-2 of the **TI-DBS Report** for the receive antenna pointed at a 40° elevation angle above the horizon, and demonstrating that at the horizon this receive antenna will have a gain which varies from -34 dB to -50 dB (relative to the peak gain). Figure 1 is a tabulation of an envelope pattern of the Figure 2.3-2 pattern used for determining each C/I ratio value of this report[2].

(c) Interference to a DBS receive site is considered present from a terrestrial interfering source for C/I ratio values below 6.0 dB at the low noise block frequency downconverter (LNB). The LNB input power (the carrier signal) is determined as follows:

Satellite EIRP (using the stated minimum):	49.0 dBW
Path Loss (Free Space):	-206.0 dB
Subscriber Antenna Gain:	34.0 dBi
LNB input power:	-123.0 dBW

[2] The elevation angles from the Austin Area to the 61.5° W, 101° W and 119° W DBS satellites are approximately 37°, 55° and 48°, respectively. The absolute dB pattern values at the horizon for antennas pointed at these higher elevation angles are likely to be lower than shown by Figure 1. The results of this study can be considered conservative results when compared with the actual interference which will likely result.

A power level at the LNB from the interfering signal that is greater than -129.0 dBW (or the equivalent value of -99 dBmW) will result in a C/I ratio below 6 dB dB, causing predicted interference to the DBS receive site.

3. Test results at the Kingsville facility indicate that a C/I ratio of 6 dB is a conservative interference level, and that a more realistic C/I ratio for the purpose of demonstrating protection to DBS receive locations is 4.8 dB. A study of both C/I ratio levels is included herein; and the results demonstrate that an insignificant difference in interference area is predicted to exist between these two C/I ratio levels. (For a C/I ratio of 4.8 dB, the equivalent power level at the LNB from the interfering signal is -97.8 dBmW.)

4. All C/I ratio studies included in this report use the above specifications in order to determine potential interference to DBS receive sites from the proposed experimental facility.

III. Description of the Proposed Experimental Transmit Facility at Austin

5. The following transmit facilities are proposed for the experimental facility at Austin:

Latitude:	N 30° 15' 48" (NAD 27);
Longitude:	W 97° 44' 36" (NAD 27);
Transmitter Output Power:	-25.0 dBW (3.2 mW);
System Loss:	2.5 dB;
Antenna Type:	custom horn (directional);
Antenna Orientation:	180° True;
Maximum Antenna Gain:	10.0 dBi;
Maximum EIRP:	-17.5 dBW;
Polarization:	H or V;

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Ground Elevation:	473' AMSL;
Antenna Rad. Center Height:	261' AGL (max.).

(Note: The transmitter output power and EIRP have been reduced by 25 dB from the values specified in the pending modification application. The tests at Austin will be conducted at these reduced power levels.)

6. Figure 2, attached, is the horizontal plane radiation pattern for the proposed custom horn antenna. The pattern characteristics of Figure 2 are used for each C/I ratio value included in this report.

IV. C/I Results

7. The two existing DBS 12.2 to 12.7 GHz licensees have broadcast satellite configurations at 61.5° West Longitude, 101° West Longitude and at 119° West Longitude. From any terrestrial point located within a 50 mile radius of the experimental transmitter site, the DBS receive site antenna is approximately orientated as follows:

	For 61.5° Satellite	For 101° Satellite	For 119° Satellite
horizontal plane azimuth:	125° T	186° T	218° T
vert. plane elev.:	37°	55°	48°

8. Using the transmit facilities of the experimental station and assuming free space path loss, a study has been conducted to determine the receive power to all points located within 50 miles of the experimental station transmitter site. The receive power at any location has been adjusted due to the pertinent receive antenna discrimination data of Figure 1. As explained in Section II, a receive power level

of -99 dBmW corresponds to a C/I ratio value of 6 dB; and a receive power level of -97.8 dBmW corresponds to a C/I ratio value of 4.8 dB.

9. Map 1, attached, is a map which shows the location of the predicted 4.8 and 6.0 dB C/I ratio contours for DBS receive antennas orientated to receive the existing 61.5° satellite service. Similarly, Maps 2 and 3, attached, show the same C/I ratio contour levels as predicted to exist for the DBS receive antennas orientated to receive the existing 101° and 119° satellite services, respectively. It is the area inside either the 6 or 4.8 dB C/I ratio contour (whichever level one may deem appropriate) which is predicted to receive interference from the experimental facility. As demonstrated by Maps 1 through 3, interference is only predicted to exist within 2,100 feet of the transmitter location at Austin.

V. Conclusion

10. The C/I studies included in this report demonstrate that the two existing 12 GHz DBS services (and having a total of three different satellite positions) should not experience significant interference from the proposed experimental test facility at Austin. Using a satellite EIRP of 49 dBW, the interference will not extend more than 2,100 feet from the test facility transmitter site, as shown by Maps 1, 2 and 3.

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ENGINEERING REPORT

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FIGURE 1

HORIZONTAL PLANE ENVELOPE PATTERN TABULATION OF

TI-DBS REPORT RECEIVE ANTENNA POINTED AT A

FOURTY DEGREE ELEVATION ANGLE

Bearing break points from antenna max. (°)	Relative Gain (dB)	(34 dBi max.) Absolute Gain (dB)
0	-45	-11
60	-45	-11
127	-35	-1
133	-35	-1
145	-42.7	-8.7
150	-50	-16
174	-50	-16
178	-46	-12
182	-46	-12
186	-50	-16
210	-50	-16
215	-42.7	-8.7
227	-35	-1
233	-35	-1
300	-45	-11

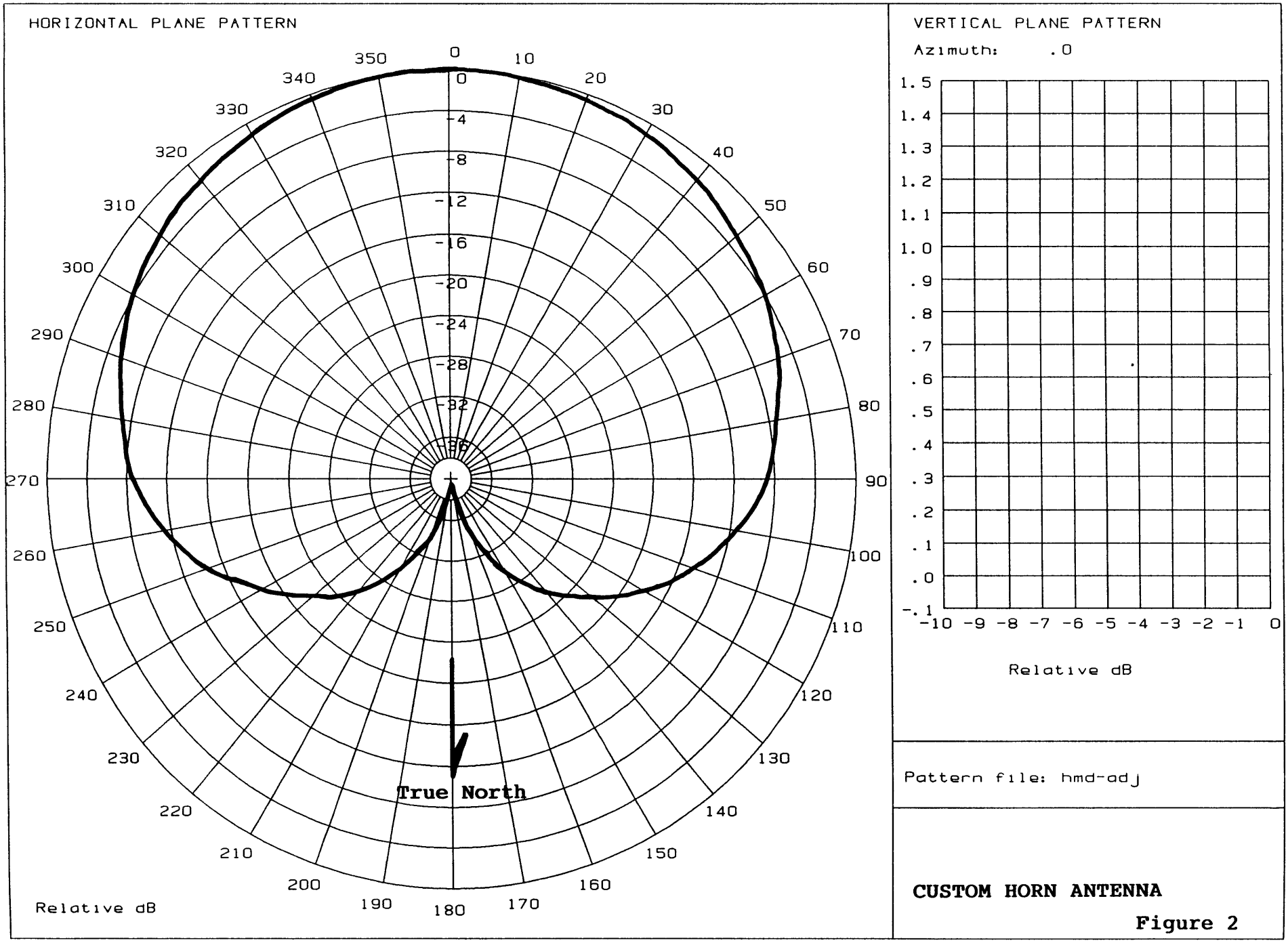
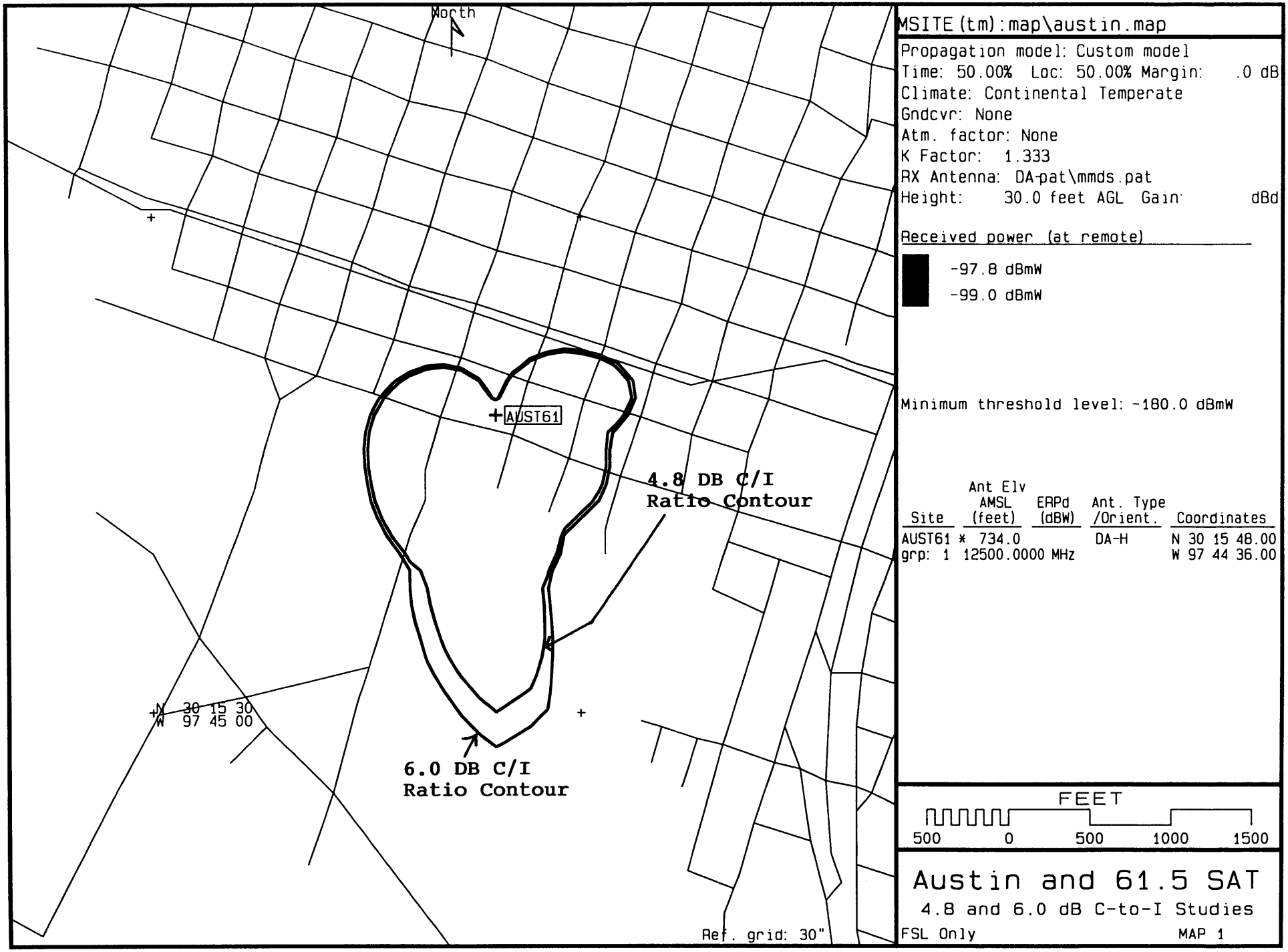
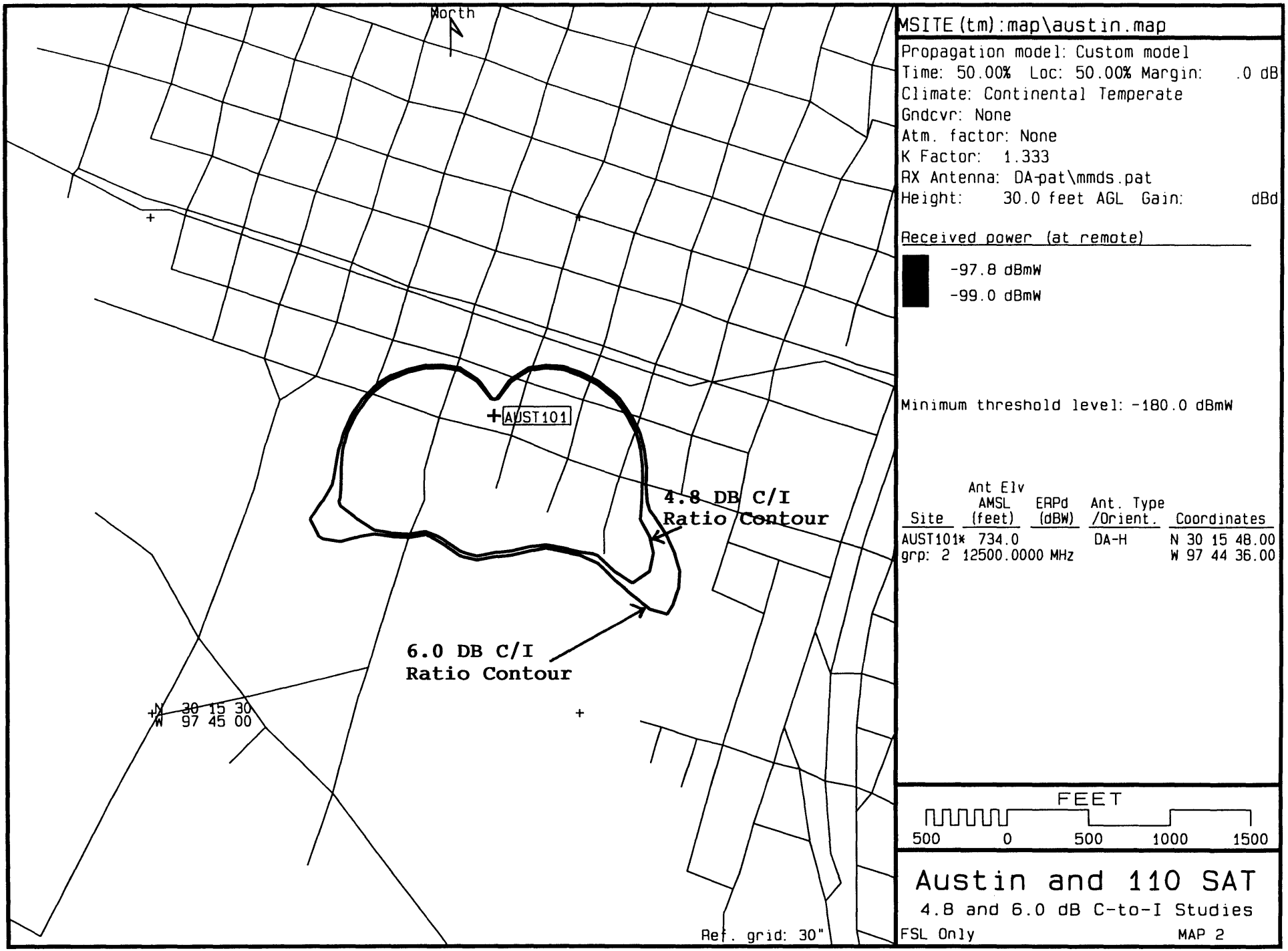
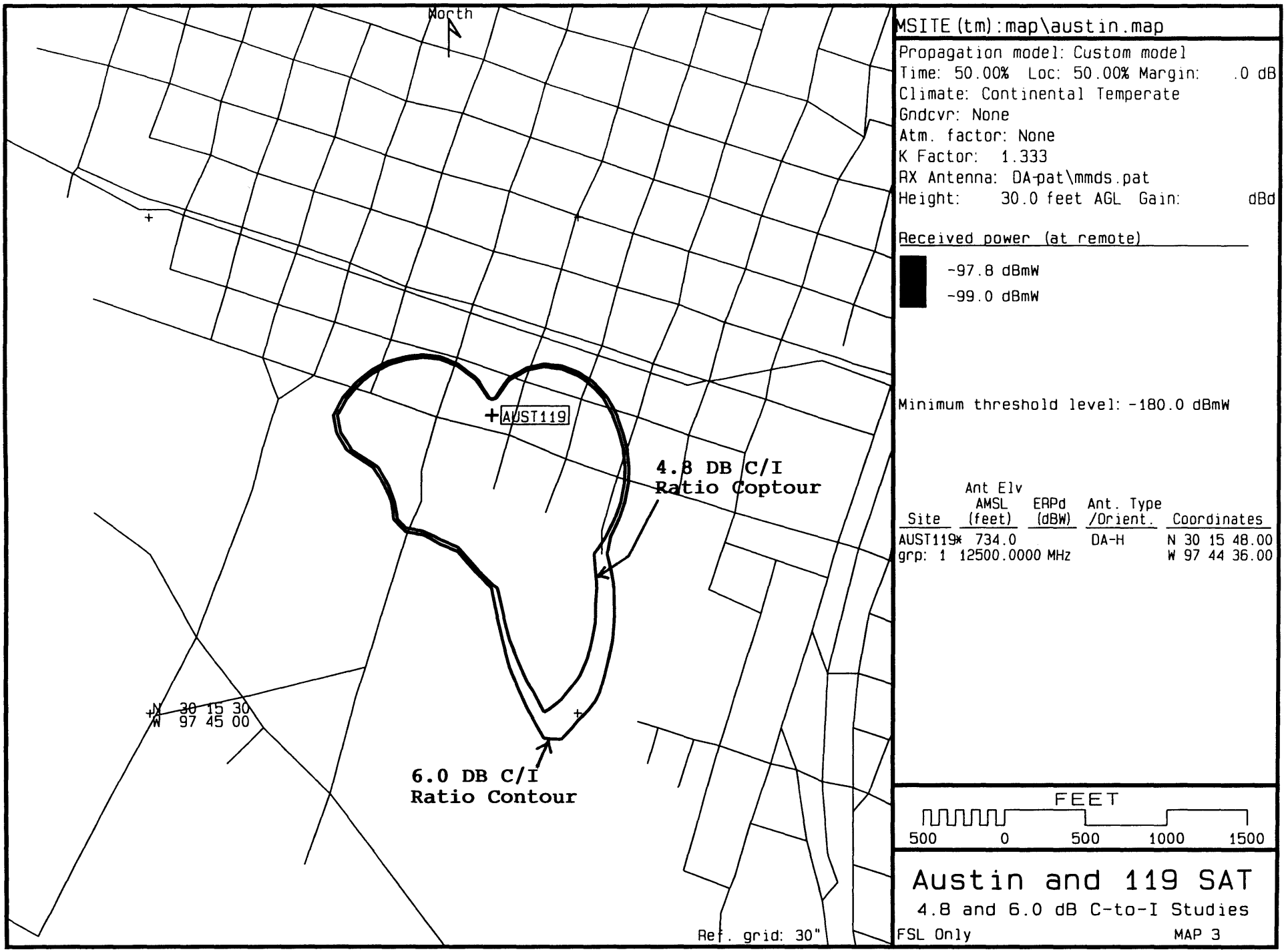

HORIZONTAL PLANE PATTERN
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
310
320
330
340
350
0
-4
-8
-12
-16
-20
-24
-28
-32
-36
True North
Relative dB
VERTICAL PLANE PATTERN
Azimuth: .0
1.5
1.4
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
.0
-.1
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0
Relative dB
Pattern file: hmd-adj
CUSTOM HORN ANTENNA

Figure 2


North
AUST61
4.8 DB C/I
Ratio Contour
6.0 DB C/I
Ratio Contour
N 30 15 30
W 97 45 00
Ref. grid: 30"
MSITE (tm): map\austin.map
Propagation model: Custom model
Time: 50.00% Loc: 50.00% Margin: .0 dB
Climate: Continental Temperate
Gndcvr: None
Atm. factor: None
K Factor: 1.333
RX Antenna: DA-pat\mmds.pat
Height: 30.0 feet AGL Gain: dBd
Received power (at remote)
-97.8 dBmW
-99.0 dBmW
Minimum threshold level: -180.0 dBmW
Site | Ant Elv AMSL (feet) | ERPd (dBW) | Ant. Type /Orient. | Coordinates
AUST61 * 734.0 DA-H N 30 15 48.00
grp: 1 12500.0000 MHz W 97 44 36.00
FEET
500 0 500 1000 1500
Austin and 61.5 SAT
4.8 and 6.0 dB C-to-I Studies
FSL Only
MAP 1


North
AUST101
4.8 DB C/I
Ratio Contour
6.0 DB C/I
Ratio Contour
N 30 15 30
W 97 45 00
Ref. grid: 30"
MSITE (tm): map\austin.map
Propagation model: Custom model
Time: 50.00% Loc: 50.00% Margin: .0 dB
Climate: Continental Temperate
Gndcvr: None
Atm. factor: None
K Factor: 1.333
RX Antenna: DA-pat\mmds.pat
Height: 30.0 feet AGL Gain: dBd
Received power (at remote)
-97.8 dBmW
-99.0 dBmW
Minimum threshold level: -180.0 dBmW
Site | Ant Elv AMSL (feet) | ERPd (dBW) | Ant. Type /Orient. | Coordinates
AUST101* 734.0 DA-H N 30 15 48.00
grp: 2 12500.0000 MHz W 97 44 36.00
FEET
500 0 500 1000 1500
Austin and 110 SAT
4.8 and 6.0 dB C-to-I Studies
FSL Only
MAP 2



MSITE (tm): map\austin.map

Propagation model: Custom model
Time: 50.00% Loc: 50.00% Margin: .0 dB
Climate: Continental Temperate
Gndcvr: None
Atm. factor: None
K Factor: 1.333
RX Antenna: DA-pat\mmds.pat
Height: 30.0 feet AGL Gain: dBd

Received power (at remote)

-97.8 dBmW
-99.0 dBmW

Minimum threshold level: -180.0 dBmW

Site	Ant Elv AMSL (feet)	ERPd (dBW)	Ant. Type /Orient.	Coordinates
AUST119*	734.0		DA-H	N 30 15 48.00
grp: 1	12500.0000 MHz			W 97 44 36.00

FEET
500 0 500 1000 1500

Austin and 119 SAT

4.8 and 6.0 dB C-to-I Studies

FSL Only MAP 3

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I, Darryl K. DeLawder, declare and state as follows:

That I have received a Bachelor of Science degree in electrical engineering from Villanova University;

That I have been retained by Diversified Communication Engineering, Inc. to prepare this Engineering Exhibit;

That I have either prepared or directly supervised the preparation of all technical information contained in this Engineering Exhibit;

That the facts stated in this Engineering Statement are true of my own knowledge, except as to such statements as are herein stated to be on information and belief, and as to such statements I believe them to be true.

03-19-98
Date

Darryl K. DeLawder