Frankfort, Kentucky

Application for New FM Translator

On Channel 294

by

Eastern Kentucky University

Exhibit 12A

Terrain Data

November 2009

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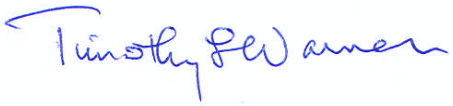
Declaration

I declare, under penalty of perjury, that I am a technical consultant to broadcasting and other communications systems, that I have over twenty-five years of experience in the engineering of broadcast and other communications systems, that I am familiar with the Federal Communications Commission's Rules found in the Code of Federal Regulations Title 47, that I am a Professional Engineer registered in North Carolina, that I have prepared or supervised the preparation of the attached Exhibit 12A, Terrain Data, for Eastern Kentucky University, and that all of the facts therein, except for facts of which the Federal Communications Commission may take official notice, are true to the best of my knowledge and belief.



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Narrative

This Exhibit provides additional details on the terrain data used for the proposed new translator to serve Frankfort, Kentucky. The terrain data used to determine the maximum effective radiated power and contour protection was extracted from the NED 03 terrain database as described later in this exhibit.

In irregular terrain, it is normal for the height above average terrain ("HAAT") to vary depending on the terrain database used. This exhibit provides details of the differences for two radials which can determine the maximum effective radiated power for this facility, the 0° and 180° radials.

Description of Calculations

For translators, FCC Rules §74.1235(b) requires the calculation of the HAAT along 12 specific radials, at 30 degree increments beginning with true north. For studies using digital terrain data and linear interpolation, the elevation is calculated for at least 50 points on each radial. Linear interpolation at each point uses the nearest four points which surround the calculation point. For this application, the point spacing is 0.1 kilometers, which produces 131 points along each radial.

At Frankfort, Kentucky, the distance which corresponds to 3 seconds of latitude is approximately 303 feet (92 meters). For longitude, 3 seconds corresponds to approximately 239 feet (73 meters). The nearest four points are therefore no farther than about 386 feet (118 meters) for a farthest diagonal point, using a 3 second database. For a 30 second terrain database, that corresponds to a maximum distance of 3,860 feet (1,180 meters).

For the two radials of interest for this application, the terrain averages will be based on the nearest line of points lying east and west of the transmitter site. Using the 3 second terrain,

those lines are approximately 84º 51' 42" West Longitude and 84º 51' 45" West Longitude. For 30 second terrain, the corresponding lines are 84º 51' 30" and 84º 52' 00". Note that the terrain databases were developed at different dates using different horizontal datums. The computer program used transforms the data for presentation in NAD27 for Media Bureau filings.

Figures 1 and 2 compare the 0º Radial from the transmitter site, as interpolated from the 3 second and 30 second terrain databases respectively. Figures 3 and 4 present the 180 degree radial. Inspection of the 30 second radials shows the terrain profile to be a series of segments, where each straight segment is a linear interpolation from a single set of four points. On the 3 second profiles, the points are much closer together. The profiles approach smooth curves rather than connected line segments.

The 3 second profiles also show significantly higher and lower elevations than the 30 second profiles. In general, the 30 second terrain misses both extremes, in addition to missing much of the intermediate detail.

Figures 5 and 6 show a comparison of the terrain over the area of concern. Figure 5 uses the 30 second terrain, while Figure 6 uses 3 second terrain. All other parameters are the same. Terrain is extracted on a grid with 0.1 kilometer spacing. The cyan lines North and South represent the area where the terrain is desired. The red and blue lines represent the actual data points used for the 30 second average. The lines for 3 second averages would not be distinguishable from the desired line at the scale printed. The 0º and 180º radials traverse river valleys. The degree of variability is greater in those directions than in most directions. The display resolution is the same for both figures, but the visual display is strikingly different.

Height Above Average Terrain Calculations

Transmitting antenna height above average terrain ("HAAT") for the NED 03 terrain data and NGDC 30 second terrain data are tabulated in Table 1. The elevation of terrain along the 12 radials specified in §74.1235(b) are extracted by a computer program which complies with the averaging methods of §73.312(d). The same point spacing and interpolation routines are used for both databases.

Table 1: Height Above Average Terrain

Bearing (degrees)	NED 03 HAAT (meters)	NGDC 30 HAAT (meters)
0	39.6	51.0
30	32.5	38.1
60	28.0	31.2
90	12.5	12.4
120	-5.7	-0.9
150	9.2	19.4
180	39.2	51.3
210	11.8	15.6
240	15.4	16.4
270	20.3	20.9
300	6.3	11.1
330	23.7	35.7
Average HAAT	19.4	25.2
Max HAAT	39.6	51.3
Maximum ERP	120 Watts	80 Watts

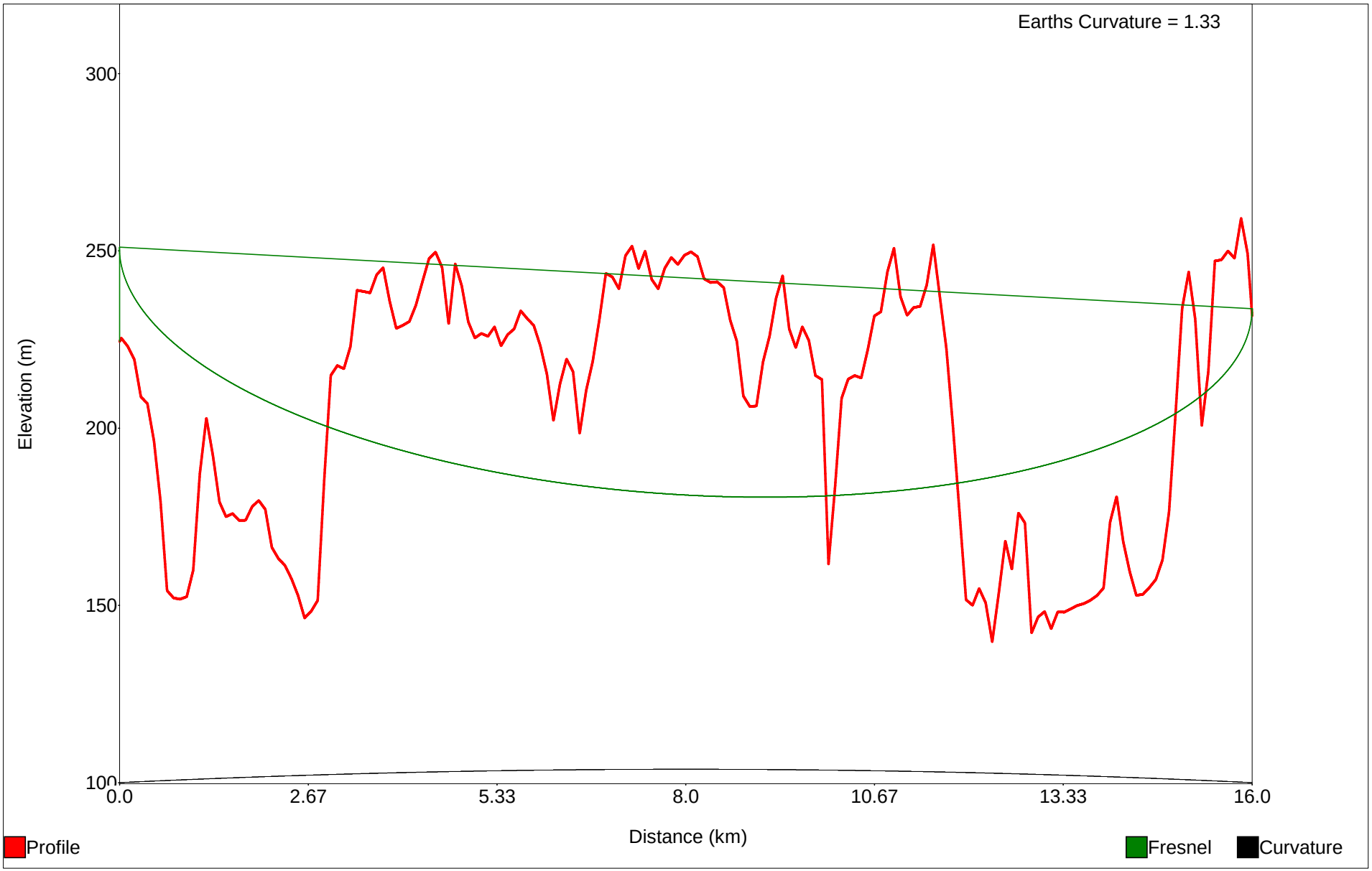
Summary

The allocation study and maximum ERP in the proposed application were prepared using the most recent terrain database developed by the United States Geological Survey. The greater accuracy complies with the requirement in §73.312 to use a database of 30 second "or

better" accuracy. The FCC has recognized in several decisions that 3 second terrain may be used to provide higher accuracy than the more prevalent 30 second data.

The maximum HAAT on any of the required radials does not exceed 40 meters. Therefore the maximum ERP should be 120 Watts.

Figure 1: W294BGmod 0º Radial NED03 Ter



Starting Latitude: 38-11-47 N
Starting Longitude: 084-51-44 W

End Latitude: 38-20-25.92 N
End Longitude: 084-51-44 W

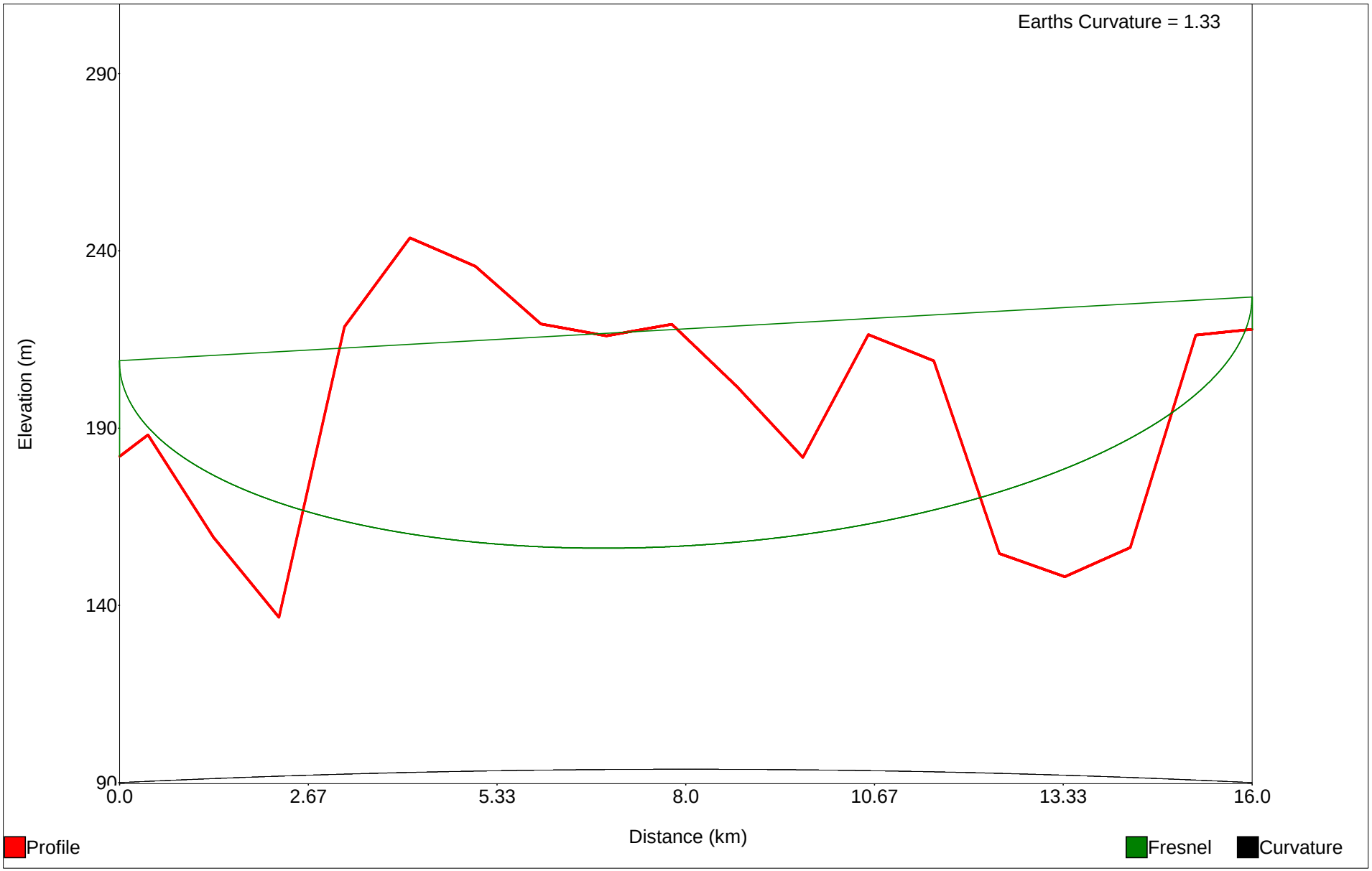
Distance: 16.0 km
Bearing: 0.0 deg

Transmitter Height (AG) = 26.6 m
Receiver Height (AG) = 2.0 m

Transmitter Elevation = 224.4 m
Receiver Elevation = 231.7 m

Frequency = 106.7 MHz
Fresnel Zone: 0.6

Figure 2: W294BGmod 0º Radial NGDC 30 arcsecond Ter



Starting Latitude: 38-11-47 N
Starting Longitude: 084-51-44 W

End Latitude: 38-20-25.92 N
End Longitude: 084-51-44 W

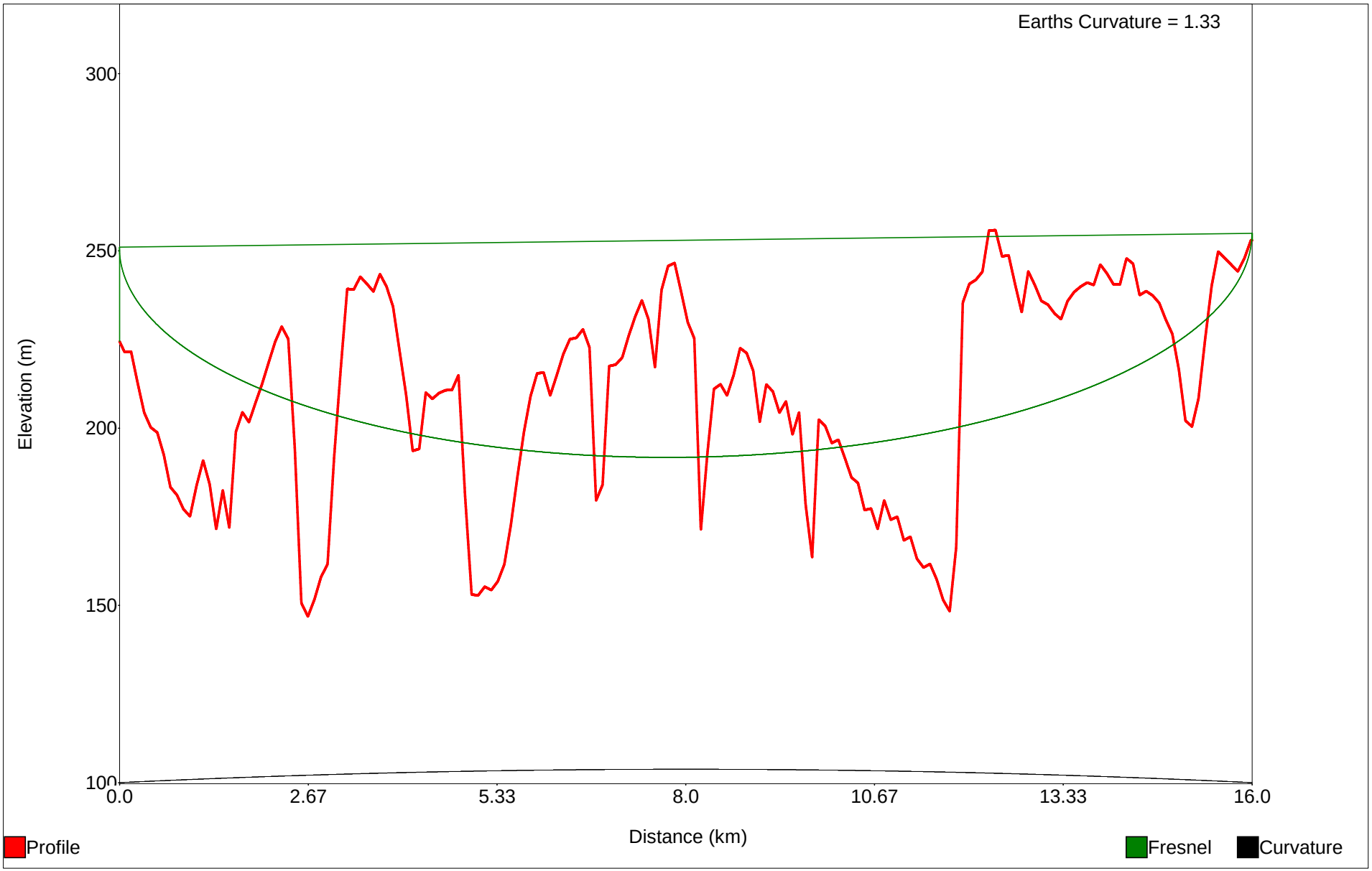
Distance: 16.0 km
Bearing: 0.0 deg

Transmitter Height (AG) = 27.0 m
Receiver Height (AG) = 9.1 m

Transmitter Elevation = 182.0 m
Receiver Elevation = 217.9 m

Frequency = 106.7 MHz
Fresnel Zone: 0.6

Figure 3: W294BGmod 180º Radial NED03 Ter



Starting Latitude: 38-11-47 N
Starting Longitude: 084-51-44 W

End Latitude: 38-03-08.06 N
End Longitude: 084-51-44 W

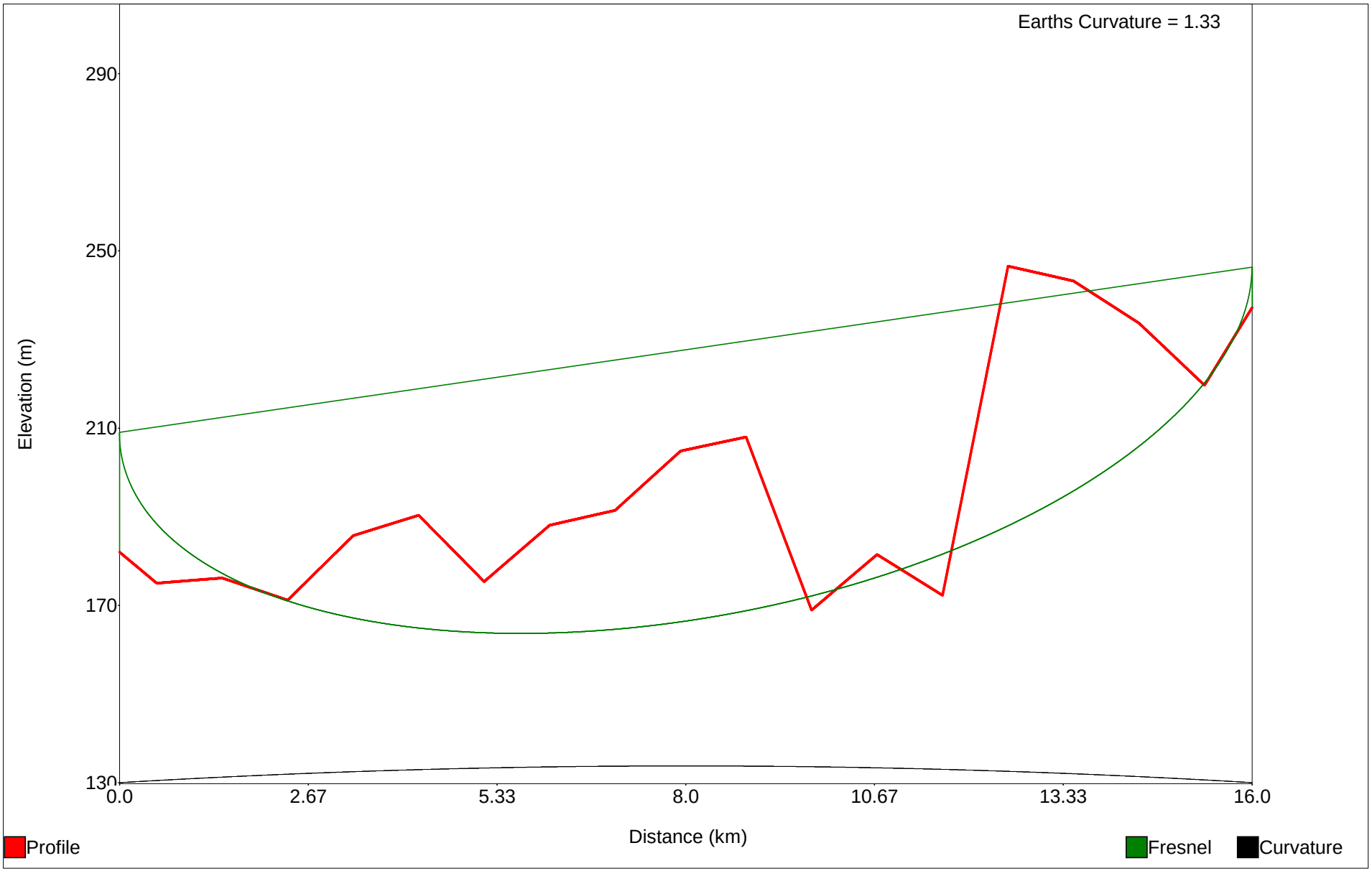
Distance: 16.0 km
Bearing: 180.0 deg

Transmitter Height (AG) = 26.6 m
Receiver Height (AG) = 2.0 m

Transmitter Elevation = 224.4 m
Receiver Elevation = 253.0 m

Frequency = 106.7 MHz
Fresnel Zone: 0.6

Figure 4: W294BGmod 180º Radial NGDC 30 arcsecond Ter



Starting Latitude: 38-11-47 N
Starting Longitude: 084-51-44 W

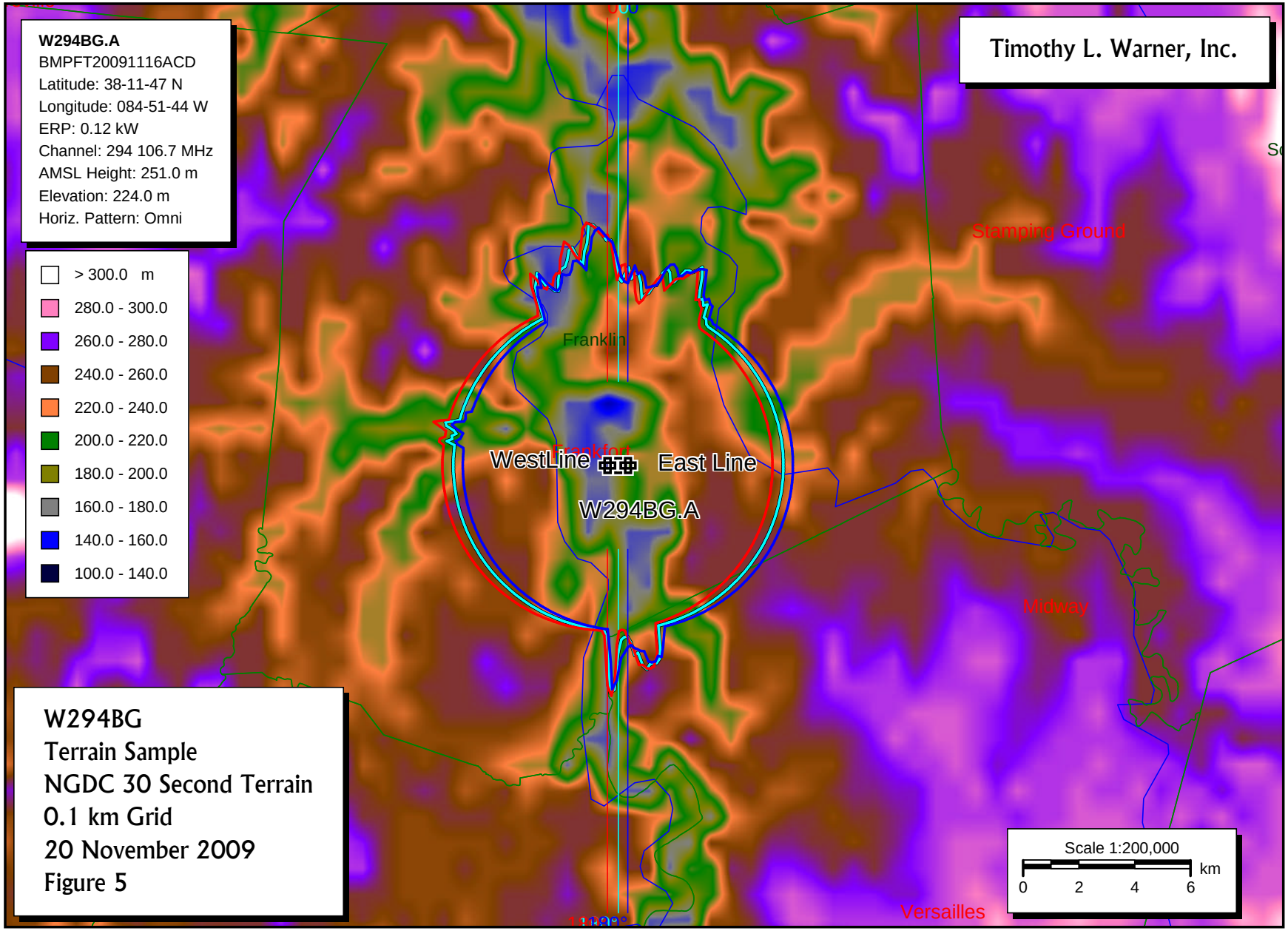
End Latitude: 38-03-08.06 N
End Longitude: 084-51-44 W

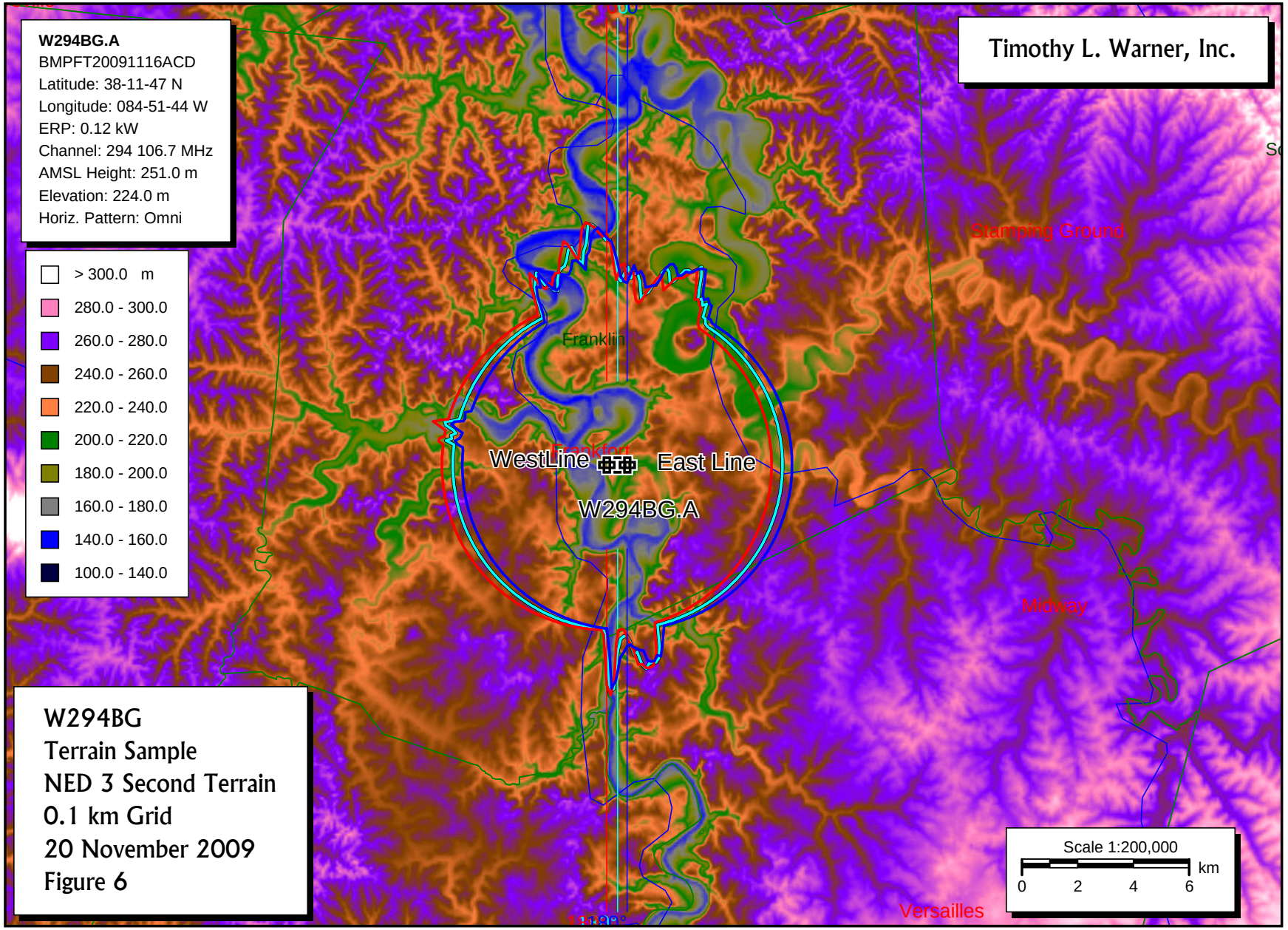
Distance: 16.0 km
Bearing: 180.0 deg

Transmitter Height (AG) = 27.0 m
Receiver Height (AG) = 9.1 m

Transmitter Elevation = 182.0 m
Receiver Elevation = 237.2 m

Frequency = 106.7 MHz
Fresnel Zone: 0.6


W294BG.A
BMPFT20091116ACD
Latitude: 38-11-47 N
Longitude: 084-51-44 W
ERP: 0.12 kW
Channel: 294 106.7 MHz
AMSL Height: 251.0 m
Elevation: 224.0 m
Horiz. Pattern: Omni
> 300.0 m
280.0 - 300.0
260.0 - 280.0
240.0 - 260.0
220.0 - 240.0
200.0 - 220.0
180.0 - 200.0
160.0 - 180.0
140.0 - 160.0
100.0 - 140.0
Timothy L. Warner, Inc.
Stamping Ground
Franklin
Frankfort
WestLine
East Line
W294BG.A
Midway
Versailles
Scale 1:200,000
km
0 2 4 6
W294BG
Terrain Sample
NGDC 30 Second Terrain
0.1 km Grid
20 November 2009
Figure 5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BMPFT20091116ACD
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ERP: 0.12 kW
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Stamping Ground
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Scale 1:200,000
km
0 2 4 6
W294BG
Terrain Sample
NED 3 Second Terrain
0.1 km Grid
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Figure 6