

## Foundation Specifications for 5.6-Meter Ka-Band Earth Station Antennas



### 1.0 INTRODUCTION

1.1 This document specifies typical foundation characteristics, designs, requirements and dimensional specifications for the Andrew 5.6-Meter Ka-Band Earth Station Antenna.

### 2.0 FOUNDATION LOADING CHARACTERISTICS

2.1 Foundation loads are applied to the foundation as shown in Figure 1. Positive applied forces are in the direction of the X, Y, and Z coordinate axes.

2.2 Varying load conditions are dependent upon incident angle of the wind and elevation/azimuth angles of the antenna. Foundation loading moment for various elevation/azimuth versus wind conditions are listed in Table 1.

### 3.0 ANCHOR BOLT REQUIREMENTS

3.1 Typical anchor bolt installation configurations and dimensions are shown in Figure 2.

3.2 Andrew Type 302217 Anchor Bolt Kit includes anchor bolts, alignment plates and required mounting hardware as shown.

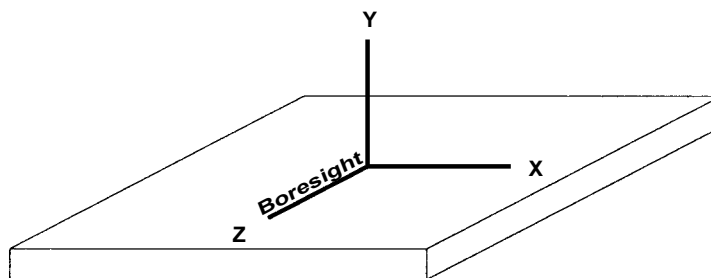


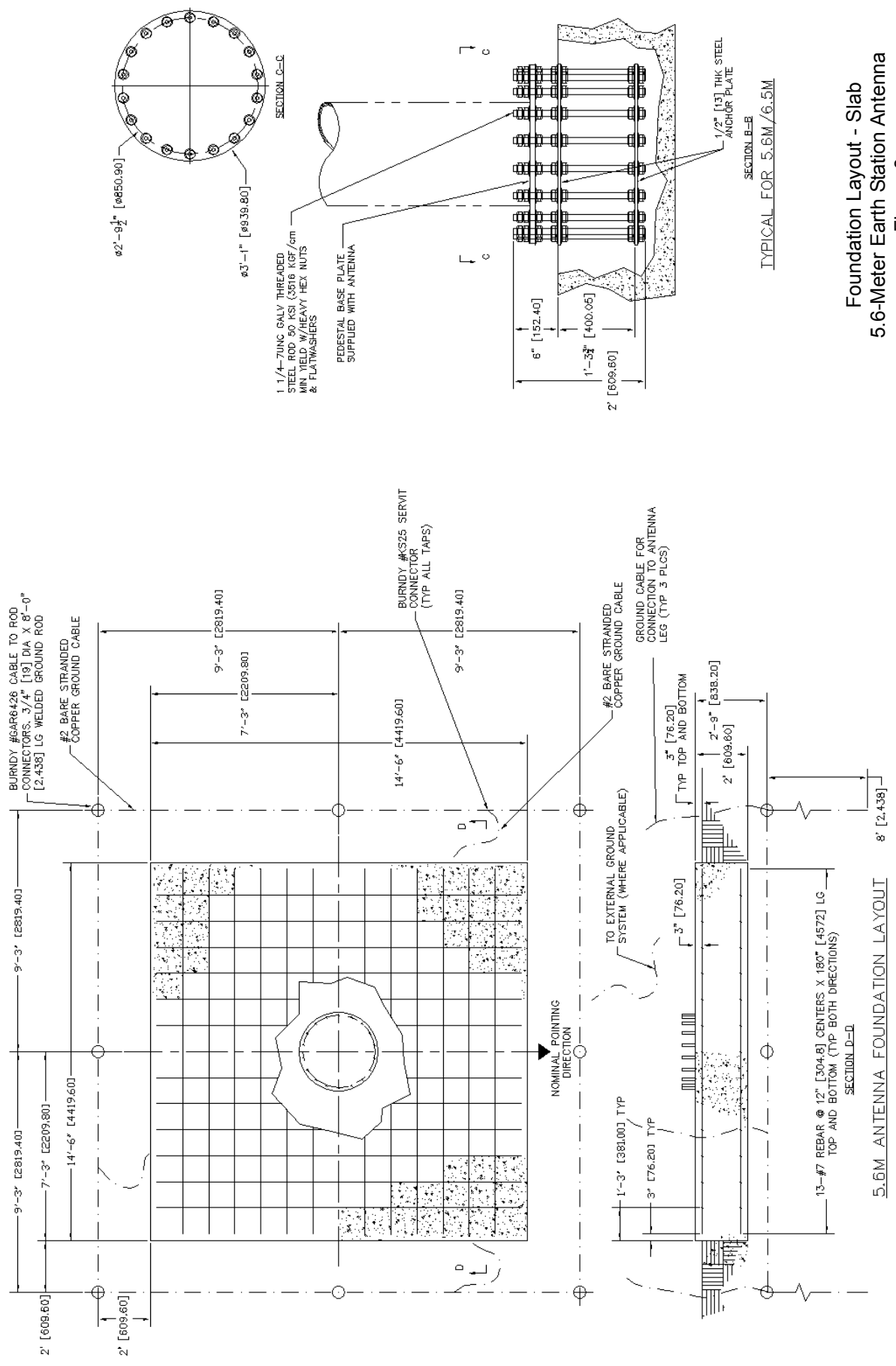
Figure 1. 5.6-Meter Foundation Coordinate System

**5.6 METER Ka BAND  
FOUNDATION INTERFACE LOADS  
125 MPH WIND SPEED - DEADWEIGHT INCLUDED**

Elevation Angle	Wind Angle	F <sub>x</sub> (lbs)	F <sub>y</sub> (lbs)	F <sub>z</sub> (lbs)	M <sub>x</sub> (in-lbs)	M <sub>y</sub> (in-lbs)	M <sub>z</sub> (in-lbs)
5	0	-108	-7347	-16990	-1849565	-26825	18160
	30	-417	-7189	-16138	-1766123	-121137	63425
	60	-793	-7106	-14986	-1622292	-228784	117959
	90	1841	-5592	1729	372285	427777	-255601
	120	2096	-5430	5046	798732	489996	-291724
	150	961	-5203	7956	1154065	236801	-133243
	180	62	-5025	10557	1478601	14667	-5877
30	0	-68	-14232	-13818	-1344019	-13442	18418
	30	-421	-13953	-13502	-1328310	-107957	113806
	60	-392	-12164	-10935	-1098100	-111681	112592
	90	1845	-4861	1492	303340	365374	-421665
	120	1979	-3984	4267	763190	394103	-453679
	150	1009	-3086	6346	1076505	212041	-236368
	180	33	-2596	7412	1226014	6771	-4972
60	0	-27	-19246	-6858	-477325	-1628	8620
	30	-184	-16904	-6029	-498911	-33824	82024
	60	554	-11128	-3464	-376470	49832	-145636
	90	1841	-4225	832	154214	206032	-560460
	120	1756	-3318	2472	546496	197577	-536368
	150	1035	-2657	3578	837163	123230	-326666
	180	0	-2435	4117	982113	0	2796
90	0	-43	-3986	-1845	-623112	24	12824
	90	1845	-3986	-43	-26174	-1026	-604171
	180	43	-3986	1845	590821	-24	-7232

	F <sub>x</sub> (lbs)	F <sub>y</sub> (lbs)	F <sub>z</sub> (lbs)	M <sub>x</sub> (in-lbs)	M <sub>y</sub> (in-lbs)	M <sub>z</sub> (in-lbs)
Max F <sub>x</sub>	2096	-5430	5046	798732	489996	-291724
Max F <sub>y</sub>	-27	-19246	-6858	-477325	-1628	8620
Max F <sub>z</sub>	-108	-7347	-16990	-1849565	-26825	18160
Max M <sub>x</sub>	-108	-7347	-16990	-1849565	-26825	18160
Max M <sub>y</sub>	2096	-5430	5046	798732	489996	-291724
Max M <sub>z</sub>	1845	-3986	-43	-26174	-1026	-604171

Table 1. 5.6-Meter Earth Station Antenna Foundation Loading



Foundation Layout - Slab  
5.6-Meter Earth Station Antenna  
Figure 3

### General Notes - Figure 3

1. All dimensions are shown in feet and inches.
2. Contractor shall field verify all dimensions locating existing construction before fabrication of new construction begins.
3. Concrete and related work shall be mixed, placed and cured in accordance with the "Building Code Requirements for Reinforced Concrete" ACI 318-89 (Rev 88) and "Specifications for Structural Concrete" ACI 301-84 (Rev 88) publication SP-15 (88).
4. Concrete shall develop a compressive strength of at least 3000 psi in 28 days with a maximum slump of 3" at time of placing.
5. Reinforcing bars shall conform to ASTM A615 (S1) grade 60 deformed type  $F_y = 60,000$  psi.
6. Unless otherwise noted, concrete cover for reinforcing bars shall conform to the minimum requirements of ACI 318-89 (Rev 88).
7. Fabrication of reinforcing steel shall be in accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" ACI 315-80 (Rev 86).
8. Provide  $3/4"$  x  $45^\circ$  chamfer on all exposed concrete edges.
9. Foundations have been designed to rest on undisturbed soil (per EIA-411-A and RS-222-D) with a minimum allowable net vertical bearing capacity of 2000 psf. If undesirable soil conditions are encountered, the engineer shall be notified.
10. Backfills shall be suitable excavated material or other suitable material compacted in 6" lifts to 90% of maximum density as determined by ASTM D1557.
11. Ground rods shall be driven to depths as shown (below permanent moisture level) and ground system resistance measured. The antenna structure shall be connected to a grounding system consisting of a number of interconnected ground rods. The system shall meet the standards of the Underwriters' Laboratories Publication No. UL96A for lightning protection. The ground rod system-to-earth resistance shall not exceed 10 Ohms at any time during the year.
12. Grounding system shown is the minimum necessary. Local conditions will dictate grounding system design.
13. This foundation is a typical design only. Certification of its suitability for a particular installation by a professional engineer is required prior to its use for actual fabrication.
14. If this foundation is to be located in an area where the annual frost penetration depth exceeds 15", the local building code specifying a minimum required foundation depth should be consulted.
15. A tolerance of  $\pm 1/8"$  applies to all anchor bolt layout dimensions.
16. Level top anchor plate to within  $\pm 1/8"$ .
17. For electrical power to antenna, 1-1/2" to 2-1/2" size conduit recommended. Type and depth to bury conduit to be determined by customer, in compliance with local codes. Direction to route conduit to be determined by location of communications building/shelter. Conduit to extend 6" (minimum) above surface of foundation slab. Open ends of conduit to be sealed to prevent moisture and foreign particle contamination.
18. IFL conduit required if no other means for routing cables are provided.
19. For routing IFL cables, 4" size conduit recommended. Type and depth to bury conduit to be determined by customer, in compliance with local codes. Location of conduit on foundation and direction to route conduit to be determined by location of communications building/shelter. Conduit to extend 36" (minimum) above surface of foundation slab. All bends to be large radius, maximum of two bends per run. Open ends of conduit to be sealed to prevent moisture and foreign particle contamination.

#### 4.0 FOUNDATION DESIGNS

4.1 The selected foundation for a particular site is dependent upon local conditions. Soil borings and foundation analysis should be performed by a qualified civil engineer.

4.2 A typical design for a slab type foundation is shown in Figure 2. Copies of these designs on D-size (22" x 34") sheets are available from Andrew on request. Refer to Drawing Number 240263.

#### 5.0 FOUNDATION ORIENTATION

5.1 Proper foundation orientation is required to obtain the desired orbital arc coverage from a particular site location.

The required azimuth and elevation angles of the antenna, relative to the mount must be determined to establish the appropriate foundation orientation. A specific foundation orientation requirement may be requested with the antenna as part of the installation package.

#### 6.0 ANTENNA GEOMETRY

6.1 Basic dimensional characteristics and azimuth adjustment range capabilities are shown in Figure 3.

6.2 Figure 4 illustrates varying dimensions from ground reference of selected antenna points as the elevation angle fluctuates from 0 to 90°.

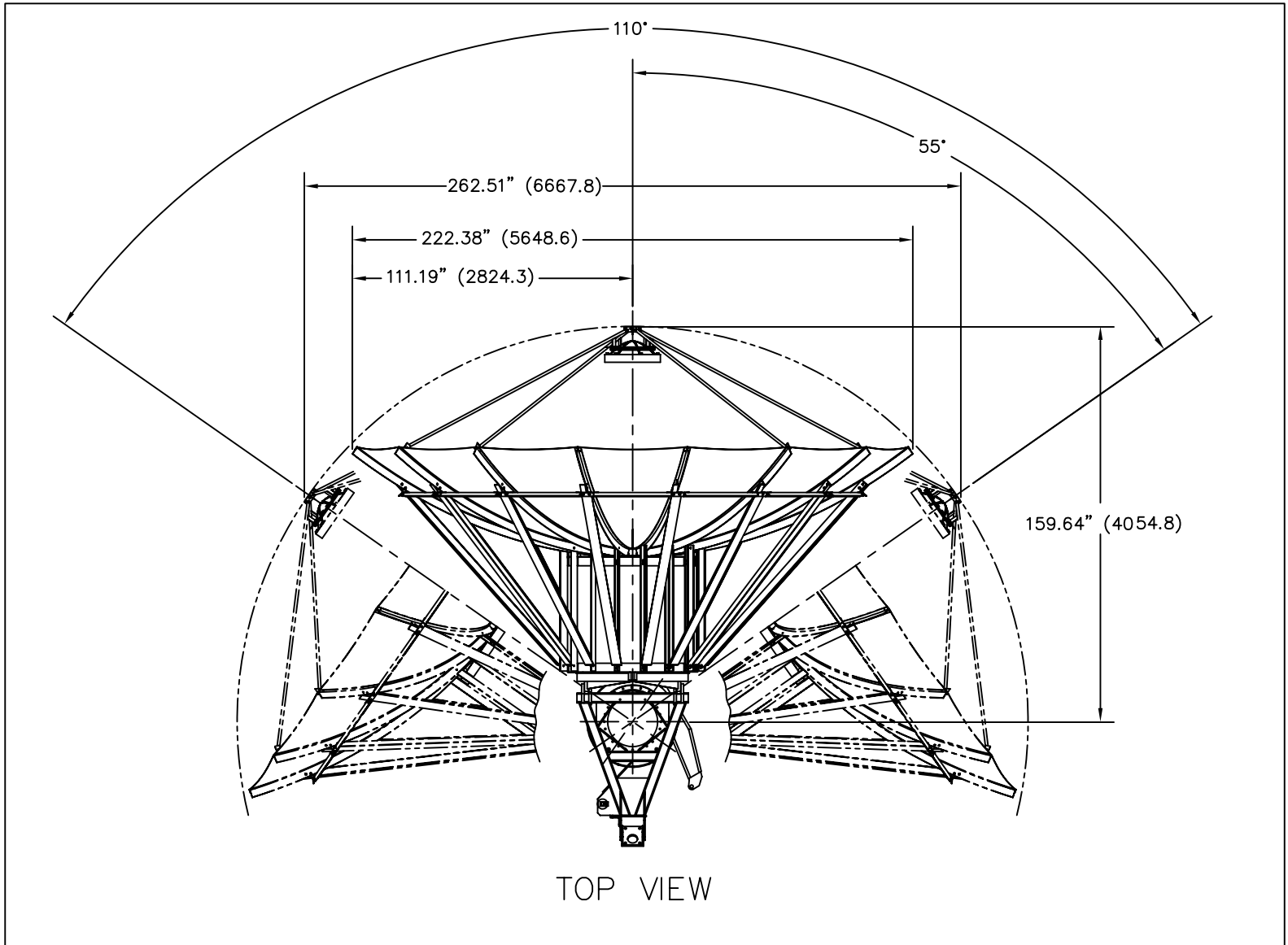


Figure 3. 5.6-Meter Earth Station Antenna Dimensional Characteristics

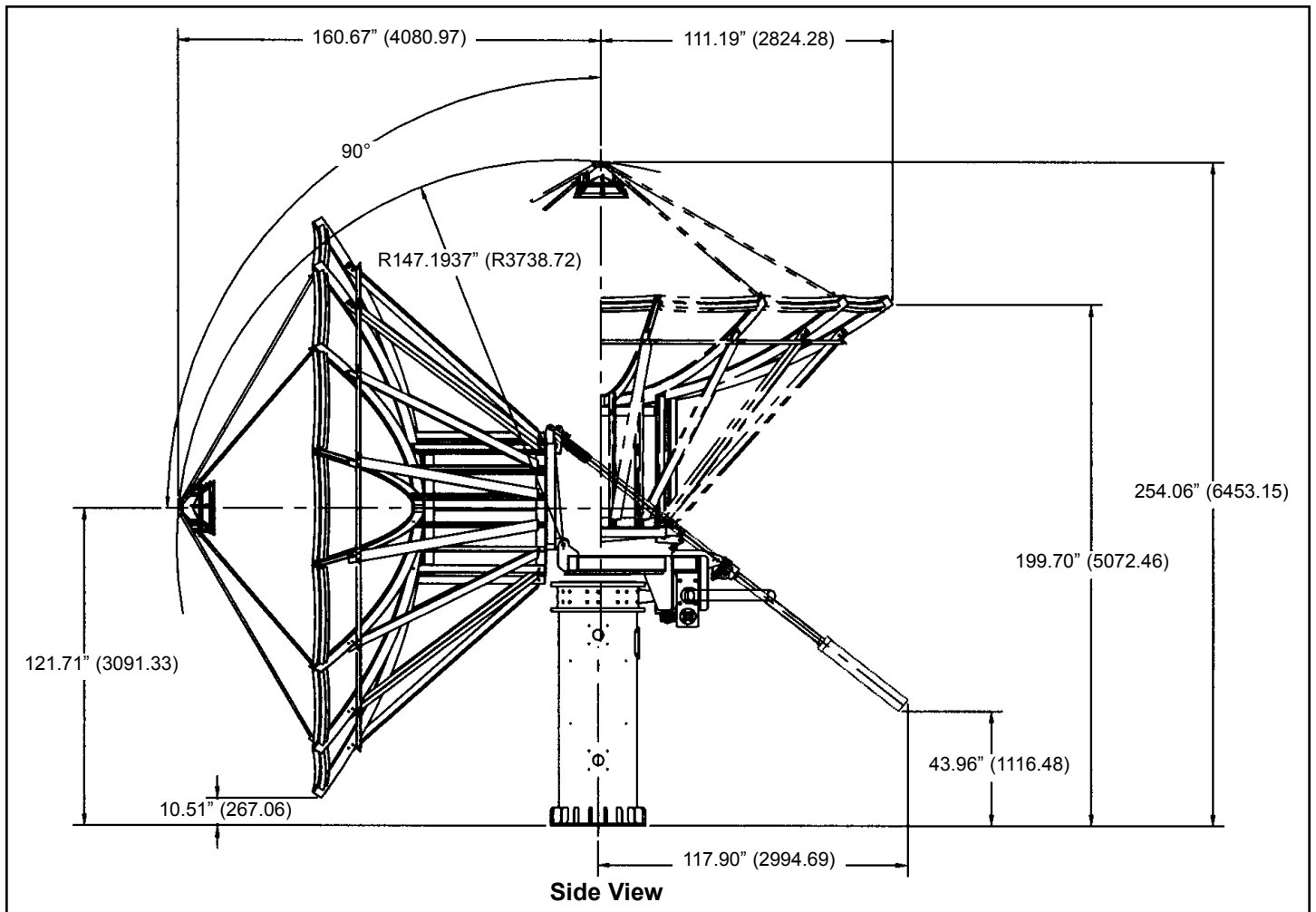


Figure 4. 5.6-Meter Earth Station Antenna Dimensional Characteristics



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