

# Oklahoma Department of Transportation Minimum Tower Standard.

## 1 Introduction

Standards for tower development within the State of Oklahoma will allow for efficient use of tower space and a collaborative effort between agencies to build microwave backhaul systems and expand radio system coverage. Towers need to be designed to allow future growth plans.

## 2 Standards

The following standards should be followed for the construction of any tower to be utilized by the communications systems of the state. Some of the standards are specific to items and some reference nationally recognized standards

1. Tower design must conform to standard TIA-222-G
2. Twist and sway per TIA-222-G for 10-foot diameter parabolic antenna of less than or equal to .884 degrees. The worst case wind speed for the county shall be used to compute the load.
3. Material:
  - a. Solid Rod must meet ASTM A572 grade 50
  - b. Angles must meet ASTM A36
  - c. Pipe must meet ASTM A500 Grade B
  - d. Steel plates must meet ASTM A36
  - e. Connection bolts must meet either ASTM A325 or ASTM A490
  - f. Anchor bolts must meet ASTM F1554
  - g. Tower leg pipe must meet ASTM A500 Grade B/C
4. Base reactions per TIA-222-G will be based on wind speed and icing for the county of location
5. All bolts are galvanized in accordance with ASTM A153 (hot dipped) or ASTM B695 Class 50 (mechanical). All other structural materials are galvanized in accordance with ASTM123
6. Minimum welds 5/16" unless otherwise specified. All welding must conform to AWS D1.1 specifications
7. Concrete must meet the American Concrete Institute ACI 318: Building Code Requirement for Reinforced Concrete
8. The foundation must be based on the soil report as defined in EAI standard 222
9. All concrete is 3000 psi at 28 days ultimate strength
10. Reinforcing bar must meet ASTM A615-60, 60ksi minimum yield
11. Lighting must meet FCC Advisory Circular #AC70/7460: Obstruction Marking and Lighting
12. The installation of tower lighting must conform to the National Electric Code (NEC): Tower lighting Kits

13. Grounding for the tower and equipment must meet the greater of TIA-222-G or R56 grounding standards

### 3 Loading

The minimum load shall be based on the following information:

1. Three (3) 10' solid parabolic antennas with raydoms and six (6) waveguide EX52 lines with the centerline at the highest level of the tower
2. Three (3) DB264 type antennas top mounted and three (3) 7/8" transmission lines
3. Three (3) DB810 type antennas top mounted and three (3) 7/8" transmission lines
4. Three (3) DB264 type antennas mounted 10' below the highest level of the tower on three (3) 6' pivot side arms and three (3) 7/8" transmission lines
5. Three (3) DB810 type antennas mounted 10' below the highest level of the tower on three (3) 6' pivot side arms and three (3) 7/8" transmission lines
6. Four (4) 700 MHz LTE sector antennas mounted 40' from highest point of the tower and four (4) transmission lines rated for acceptable loss.
7. Three (3) 10' solid parabolic antennas with raydoms and six (6) waveguide EX52 lines mounted 50' from the highest point of the tower.
8. Tower shall be designed for 100% additional loading

### 4 Best Practices

A tower constructed for a specific purpose with no additional needs must still meet the materials requirements but may meet a lower loading requirement. Item 8 in the loading requirements should always be met with any tower. i.e. a tower strictly for LTE use could only require 4 LTE sector antennas, 3 parabolic antennas with mount points correlating to the tower height.