



Structural Components, LLC
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November 30, 2009

Re: **Structural Analysis Report - FAILS**
Structure: 380ft Guyed Tower
Site Address:
Site Name:
Site Number:
SC Number: 090028

Dear Mr. Smith:

Per your request, Structural Components, LLC, has completed a structural analysis of the 380ft guyed tower named Exell Cattle Co, located in Potter County, Texas, to verify the tower's compliance to the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures with the proposed antenna and line configuration for RT & Sons.

We regret to inform you that with the proposed addition of (2) Andrew PL6-59-PXA and (2) 3/8" coax at the 300ft elevation, in addition to the existing loading, the tower does not satisfy the structural strength requirements of the TIA/EIA-222-F standard using an 85 mph fastest-mile (equivalent to 105 mph 3-second gust) basic wind speed with no ice and a 73.6 mph fastest-mile basic wind speed with 1/2" ice.

Please refer to the following structural analysis report, which gives complete details of the analysis including data used, assumptions made, loading considered, and results.

We trust you find this report satisfactory. Please do not hesitate to contact us if you should have any questions or concerns.

Best regards,
Structural Components LLC

1 INTRODUCTION

Structural Components, LLC, has structurally analyzed the following tower at the request of Jay Tichbourne of RT & Sons, to determine whether the tower complies with applicable building codes and design standards for the proposed loading configuration.

| Tower Information | |
|-------------------|---------------------|
| Type | 3-Sided Guyed Tower |
| Height | 380ft |
| Manufacturer | Unknown |
| Model | Unknown |

| Site Information | |
|------------------|--------|
| Site Name | |
| Site Number | |
| Address | |
| County | Potter |
| State | Texas |

The analysis was performed using RISA tower, a structural analysis program developed by RISA Technologies specifically for the communication tower industry.

Information about the tower was provided by RT & Sons. Structural Components, LLC, performed a site visit and tower climb on 02/16/2009.

2 INFORMATION USED IN THE ANALYSIS

The following information was either provided to us or gathered by us for use in the structural analysis.

| Data | Document | Author | Date | File |
|------------|--------------------------------------|-----------------------|------------|-------------|
| Tower | Steel & Antenna Mapping Report | Structural Components | 02/18/2009 | Job #090028 |
| Loading | Steel & Antenna Mapping Report Email | Structural Components | 02/18/2009 | Job #090028 |
| | | Stelera | 02/10/2009 | --- |
| Soil | --- | --- | --- | --- |
| Foundation | --- | --- | --- | --- |

The following assumptions were made in order to complete the analysis. These assumptions must be checked. If they do not accurately represent the existing or proposed tower, foundation, soil, and loading conditions, we must be notified so that we can make the appropriate changes to our analysis, conclusions, and recommendations.

1. The tower and foundation are constructed as shown in the provided drawings, previous structural analysis reports, mapping reports, photos, and/or other documents.
2. The tower and foundation are in good condition with no corrosion or damage.
3. The tower and foundation have been properly maintained in accordance with industry standards.
4. The foundation was correctly designed and installed in accordance with applicable codes and standards.
5. The tower legs and bracing are assumed to be ASTM A500-46 and A572-50 steel, respectively.

3 DESIGN STANDARD

The tower analysis was performed in accordance with the following design criteria.

| | |
|----------------------------------|---|
| Standard: | TIA/EIA-222-F <i>Structural Standards for Steel Antenna Towers and Antenna Supporting Structures</i> |
| Building Code: | 2006 International Building Code |
| Basic Wind Speed without Ice: | 85 mph fastest-mile (equivalent to 105 mph 3-second gust) |
| Basic Wind Speed with Ice: | 73.6 mph fastest-mile |
| Ice Thickness: | 1/2" radial |
| Serviceability Basic Wind Speed: | 50 mph fastest-mile |

4 APPURTENANCES

The following antennas, mounts, transmission lines, and other appurtenances were considered for the structural analysis.

| Elev. (ft) ⁽¹⁾ | Appurtenance | Line ⁽²⁾ | Notes |
|---------------------------|---|--|-------------------------------|
| 380.0 | (1) 16 Element Dipole (1) 10ft Omni (1) 15ft Omni (3) 2ft Standoff Mounts (1) Large Red Light | (1) 1/2" (1) 7/8" (1) 7/8" (1) 1" Conduit | Existing |
| 336.0 | (1) 8ft 8 Element Dipole (1) 2ft Standoff Mount | (1) 7/8" | Existing |
| 335.0 | (1) Wind Station | (3) 1/4" | Existing |
| 300.0 | (2) Andrew PL6-59-PXA (2) Pipe Mounts | (2) 3/8" | RT & Sons Proposed |
| 258.0 | (1) Pipe Mount (unused) | --- | Existing |
| 252.0 | (1) Wind Station | (3) 1/4" | Existing |
| 250.0 | (2) Small Red Lights | From 1" Conduit | Existing |
| 167.0 | (1) Wind Station | (3) 1/4" | Existing |
| 125.0 | (2) Small Red Lights | From 1" Conduit | Existing |
| 23.0 | (1) 2ft 6 Element Yagi | (1) 1/4" | Existing |
| 14.0 | (1) 2ft 6 Element Yagi | (1) 1/4" | Existing |
| 6.5 | (1) 12"x12"x12" Solar Panel | From 1" Conduit | Existing |

Notes:

1. Elevations reference centerline of panel, yagi, and dish antennas, and base of whip antennas, in relation to the base of the tower.
2. (2) RT & Sons proposed 3/8" TX lines assumed to be located as shown on the Feedline Plan in Appendix A. Contact us for further analysis if the lines cannot be placed as indicated.

5 RESULTS

5.1 TOWER MEMBER STRESS LEVELS

The tower has the following stress ratios in its structural members.

| Elev. (ft) | Member | Stress Ratio |
|------------|---------------|--------------|
| 0 – 380.0 | Tower Legs | 2.05 |
| 0 – 380.0 | Tower Bracing | 1.56 |
| 0 – 380.0 | Guy Wires | 1.71 |

Stress ratio (SR) criteria:

SR ≤ 1.00 is completely within code limits.

SR ≤ 1.05 is considered within acceptable tolerance of code limits.

SR > 1.05 is outside acceptable tolerance of code limits and requires structural modifications.

5.2 FOUNDATION REACTIONS

| Reaction Type | Original Design Reactions | Current Analysis Reactions | Foundation Status |
|-----------------------------------|---------------------------|----------------------------|--|
| Tower Base – Axial (kips) | --- | 88.82 | <i>Insufficient information to analyze</i> |
| Tower Base – Shear (kips) | --- | 0.46 | |
| Inner Guy Anchor – Uplift (kips) | --- | 17.73 | |
| Inner Guy Anchor – Sliding (kips) | --- | 25.72 | |
| Outer Guy Anchor – Uplift (kips) | --- | 23.66 | |
| Outer Guy Anchor – Sliding (kips) | --- | 25.59 | |

The foundations could not be analyzed due to the lack of original design reactions and a geotechnical engineering report.

5.3 TOWER DEFLECTION

The deflections are listed below for key tower elevations using the serviceability wind speed listed in section 3. At 300ft elevation, the sway and twist results greatly exceed the allowable beam deflections of the proposed dishes (less than 1.0).

| Elev. (ft) | Displacement (in) | Sway (deg) | Twist (deg) |
|------------|-------------------|------------|-------------|
| 380.0 | 6.79 | 0.28 | 4.13 |
| 300.0 | 9.35 | 0.10 | 5.14 |
| 250.0 | 6.57 | 0.32 | 3.64 |
| 167.0 | 2.49 | 0.12 | 1.98 |
| 110.0 | 1.52 | 0.05 | 1.16 |
| 23.0 | 0.66 | 0.10 | 0.21 |

6 CONCLUSIONS

The tower does not satisfy the structural strength requirements of the standards and codes listed in section 3, nor the recommended sway and twist requirements for the proposed dishes. **Structural modifications are required.**

7 RECOMMENDATIONS

The following structural analyses/modifications are recommended:

- 1) Perform a full structural analysis on the foundation to verify that it is able to withstand the foundation reactions provided in Section 5.2
- 2) Address all TIA maintenance issues presented in Structural Components' Guyed Tower Steel & Antenna Mapping Report dated 02/18/2009
- 3) Install a tower wrap from 0 to 320ft (TIA maintenance issues "Top girt of section 3 is bent" and "Empty pipe mount at 258" may be ignored). A tower wrap is a new tower structure installed around the existing tower to support all proposed and future antenna loadings. The wrap avoids any removal or downtime of existing antennas and TX lines.

With the proposed tower wrap installed, the tower will be in structural compliance with the TIA/EIA-222-F standard using an 85 mph fastest-mile (equivalent to 105 mph 3-second gust) basic wind speed with no ice and a 73.6 mph fastest-mile basic wind speed with 1/2" ice for RT & Sons proposed loading. Full modification drawings are available upon order.

APPENDIX A
Tower Profile and Calculations

APPENDIX B
Data Provided for Analysis