

Structural Standards for Installation, Alteration
and Maintenance of Communication Towers,
Antennas and Antenna Supporting Structures
ANSI/TIA-1019 "DRAFT"



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N A B
2009



History

- ASCE 37-02 Design Loads on Structures During Construction
Approved in 2002
- TIA-1019 Gin Pole Standard was approved January 9, 2004.
- TIA-222-G
 - Revision of TIA/EIA-222-F
 - Standard for design of communication structures – Aug. 2005
- TIA-1019-Construction Standard “Fall of 2009”
 - **Includes the Gin Pole Standard**

Construction Mishaps





Industry Construction Standard - Benefits to the Tower Owner -

- Prevent Accidents
 - Saves Lives
 - Reduces Liabilities
 - Reduces Delays in Project Completion
- Prevent Undetected Structure Damage
- Reduce Construction Costs by Providing Safe Engineering Procedures and Guidelines Without Over-Designing



Tower Erection & Safety

- Hire a qualified contractor
- Request certificates of all insurance coverage's
- Safety must be required in contract documents
- Check references
- Ask questions

Three Phases

"in it's simplest form, new towers can be separated into three phases:

Concept



Design



Construction



Guyed Towers

- Tall towers require special rigging
- Number of available crews
- Rigging Plans
- Check your policy
- Planning is essential





Large Self-Supporting Tower

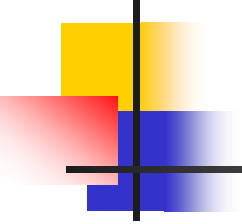
- Self-supporting tower have unique challenges
- RF Safety
- Communications
- Coordination
- Staging

Scope and Objective



- Consider construction equipment loading effects on a structure being erected or modified.
 - Cranes
 - Gin Poles
 - Lifting Blocks
 - Attached Rigging
- Accurate prediction of weather related loading during construction duration period.
- Providing an engineered approach to complete work safely throughout the entire construction process.

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 - 5.0 Gin Pole Analysis and Design
 - 6.0 Gin Pole Construction

 - Annex A Procurement and User Guidelines
 - Annex B Gin Pole Engineering Design
 - Annex C Evaluation of Existing Gin Poles
 - Annex D Rigging Plans
 - Annex E Wire Rope End Connections
 - Annex F Evaluation of a Communication Tower Site
 - Annex G Referenced Standards



Construction Safety & Efficiency Comes from “Proper Preplanning” With Rigging Plans

| Class | Definitions | Minimum Level of Responsibility |
|-------|---|--|
| I | Removal or addition of antennas, mounts, platforms, etc. that are light in comparison to the overall supporting structure and do not require the use of a gin pole or a gin pole not rated higher than Class A. | Competent Rigger |
| II | Rigging plans utilizing pre-approved installation methods. | Qualified Person |
| III | Custom or infrequent installation methods, removal of structural members, special engineered lifts, and unique situations | Qualified Person with Qualified Engineer |



Definitions

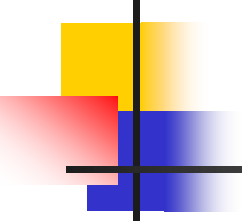
- **Competent Rigger:** a person knowledgeable and experienced with the procedures and equipment common to the Communication Structures Industry, and trained to identify hazards with authorization to take prompt corrective measures.
- **Qualified Person:** a person knowledgeable, experienced, trained and capable of developing rigging plans and that has successfully demonstrated the ability to solve, resolve and coordinate construction related to the Communication Structures Industry.
- **Qualified Engineer:** a professional engineer knowledgeable and experienced in the Communication Structures Industry.

Base Rigging

- Rigging Plan
- Licensed Engineer
- WLL
- Signage
- Barricades
- Site Safety



Operational and Non-Operational Conditions

- 
- **Operational**
 - Loading conditions of a structure during the actual lifting sequence.
 - Typically governs the strength requirements for lifting devices and their associated rigging.
(gin pole and attached rigging equipment loads)
 - **Non-Operational**
 - Loads on a structure when lifting is not performed.
 - Typically govern the strength requirements for the structure under construction.
(wind load conditions based on construction duration factor)

Operational and Non-Operational Conditions

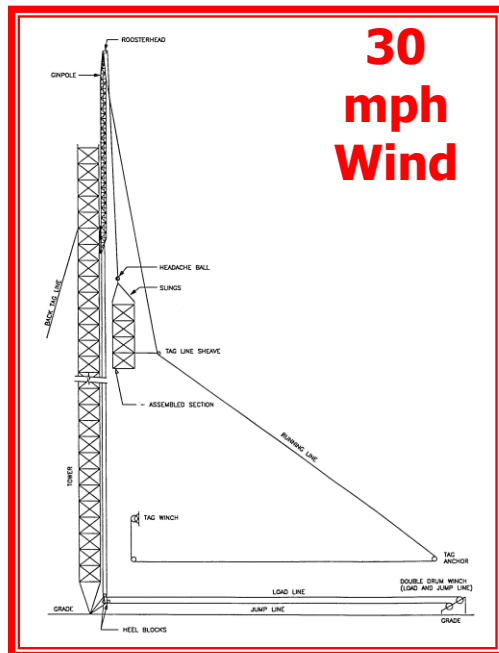
“Operational” Condition – During Construction Procedures

A Uniform effective 30 mph 3-sec gust wind speed used during lifts

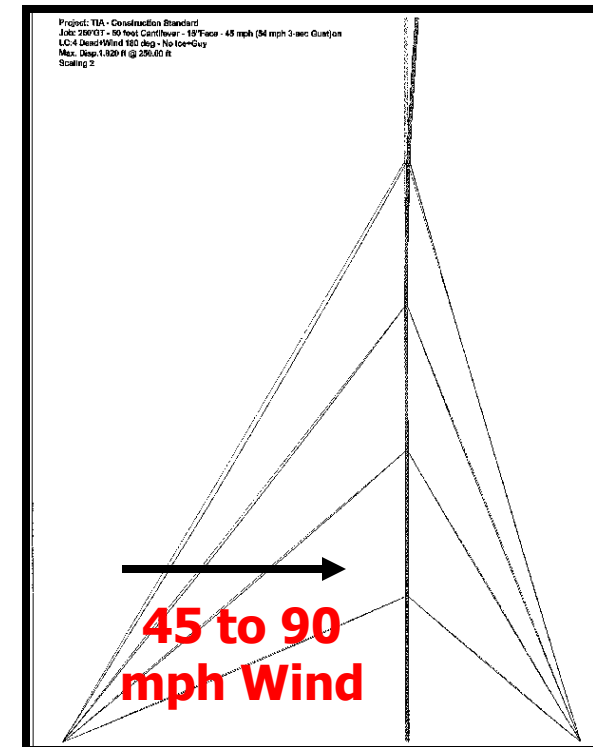
“Non-Operational” Condition – Weather Related Conditions

Winds from 45 mph to 90 mph based on the construction duration period.

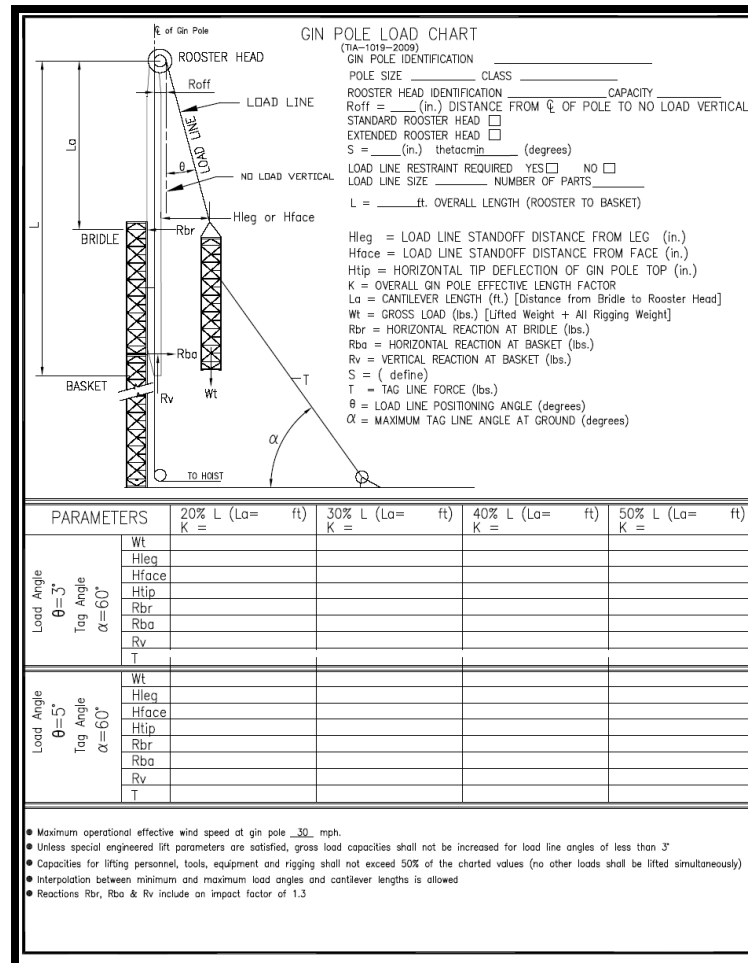
Operational



Non-Operational



All lifts within parameters of Gin Pole Charts, or Crane Charts, approved by an Engineer or Equipment Manufacturer



Vertical and Tilted Gin Poles Covered in Standard



Vertical Gin Pole

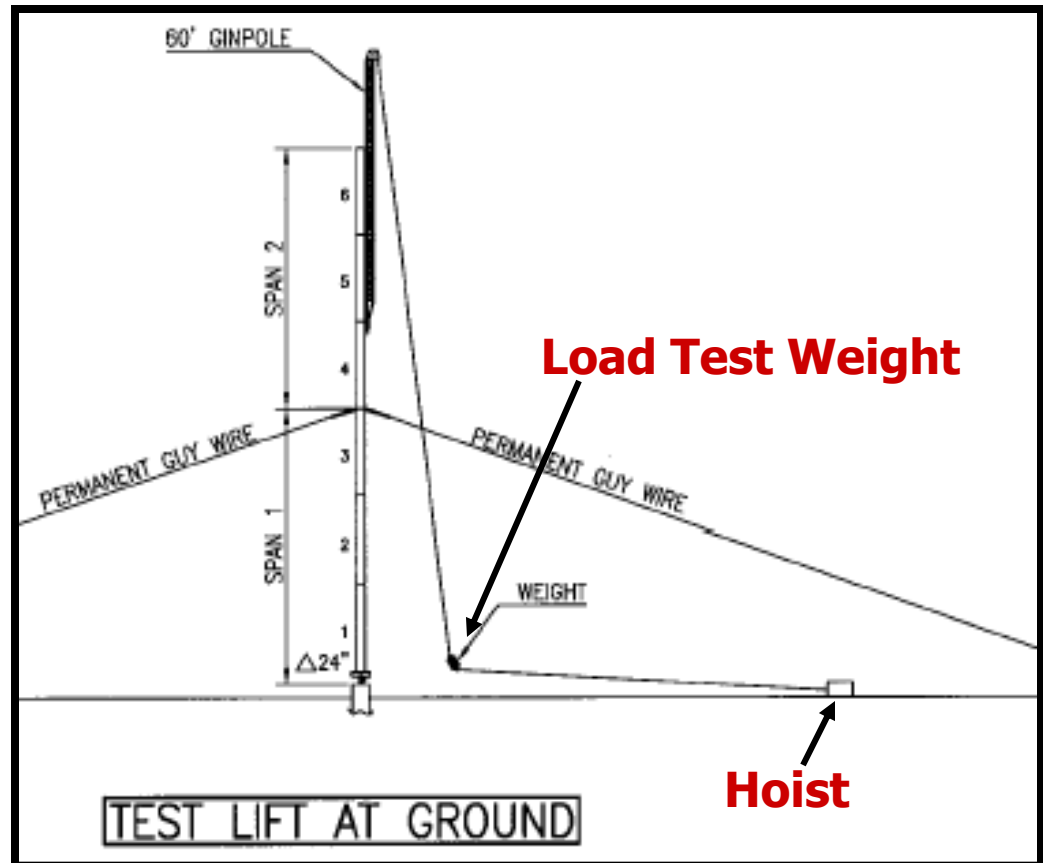


Tilted Gin Pole

Load Tests

For Checking Entire Rigging System (Operational Conditions)

- Load test to 1.5 times the anticipated load.
- If slip resistance is counted on for restraint a load test is required.
- Required for hoist if anchor calculations are not possible, or reliable.



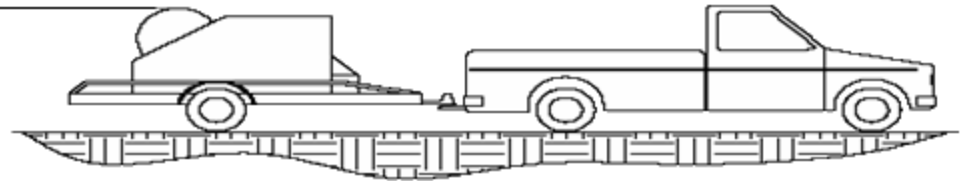
Lifting Existing Loads from Structures

- Weight verification necessary for load testing.
- Use of a load measuring device
- Unless the load weight is confirmed by accurate documentation or by calculation, the weight shall be field verified prior to making the lift.



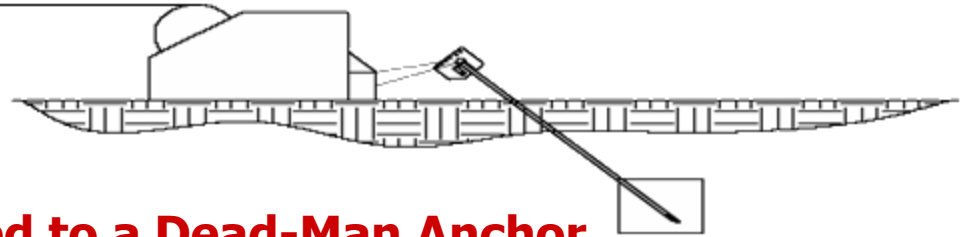
Hoist Anchorage May Require Load Testing

Load Line



Hoist On Trailer Anchored with Vehicle (Will Require Load Testing)

Load Line



Hoist Anchored to a Dead-Man Anchor

Load Line



Hoist Anchored to a Foundation Top



Non-Operational Duration Wind

“Wind Loads During Construction Period”

| <u>Construction Period</u> | | <u>Minimum Factor</u> | |
|--|---|-----------------------|-------------------------|
| Continuous work period | - | 0.50 | (0.5 x 90 mph = 45 mph) |
| Less than 24 hours (overnight conditions) | - | 0.60 | (54 mph) |
| 24 hours to 1 week | - | 0.67 | (60 mph) |
| 1 week to 6 weeks- | - | 0.75 | (67.5 mph) |
| 6 weeks to 6 months | - | 0.80 | (72.0 mph) |
| Greater than 6 months | - | 1.00 | (90 mph) |

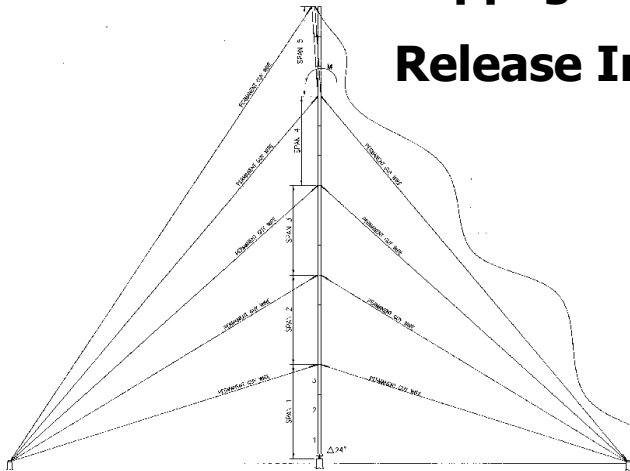
[Wind Speeds are 3-Second Peak Gust]

Guy Slippage Parameters Provided

- Unequal forces on the structure shall be considered due the potential of connection slippage!
- Can the structure withstand the unequal load?
- Temporary guy wires may be required

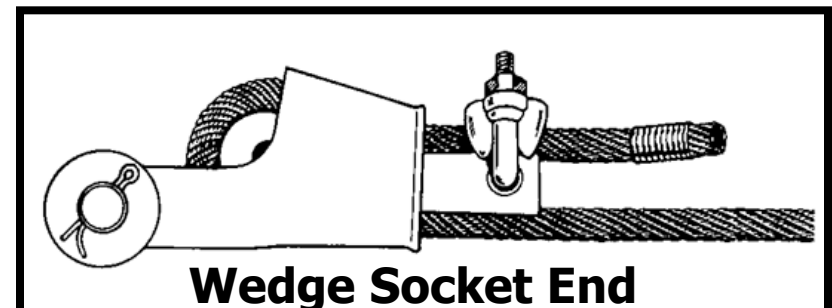
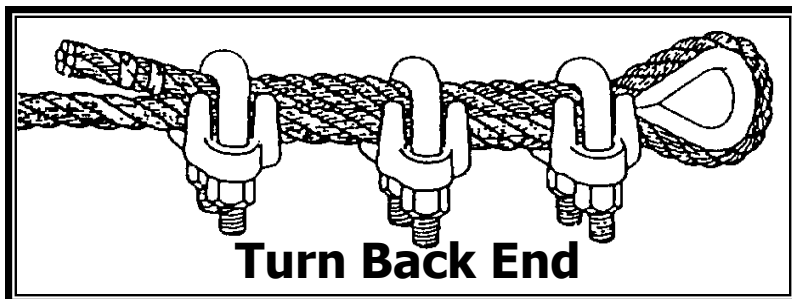
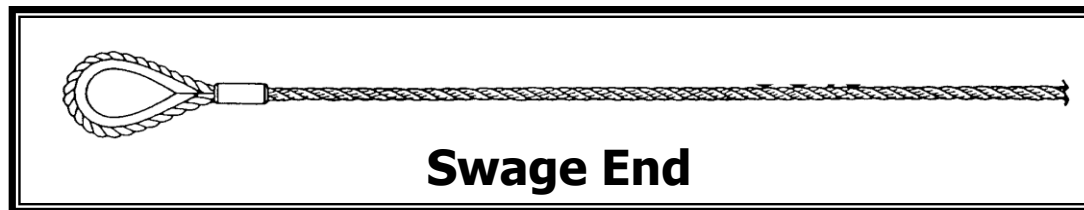
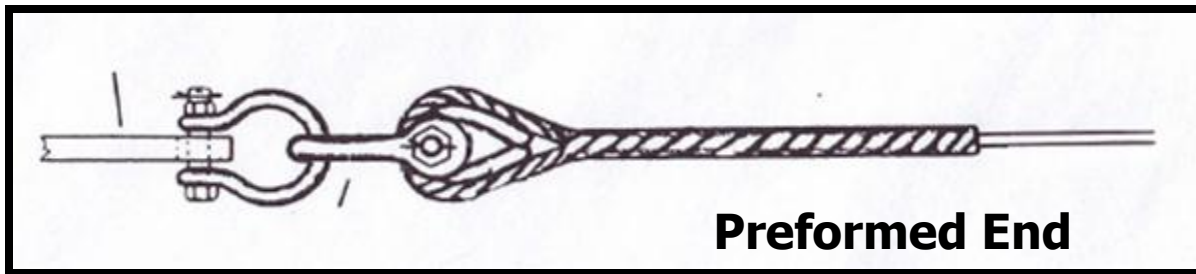
Slippage Im = 1.3

Release Im = 2.0



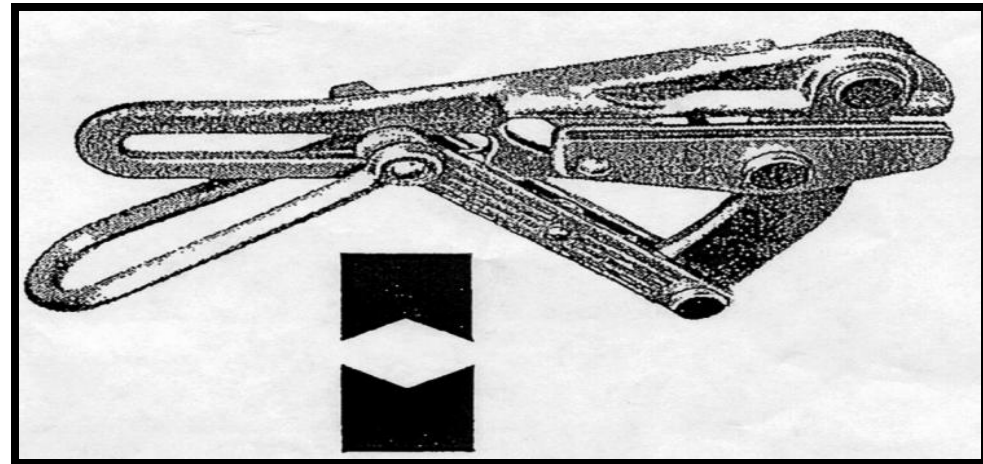
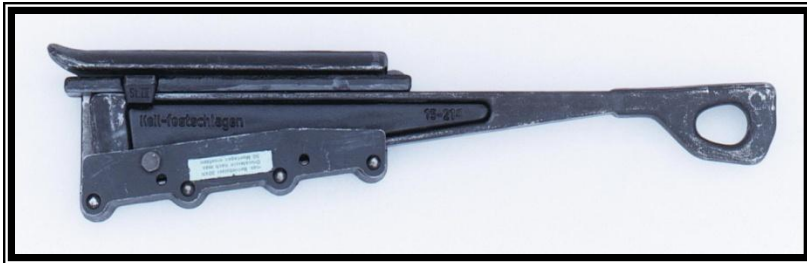
Non-Slip End Connections

- End Connections that when properly installed have not had a history of slippage problems



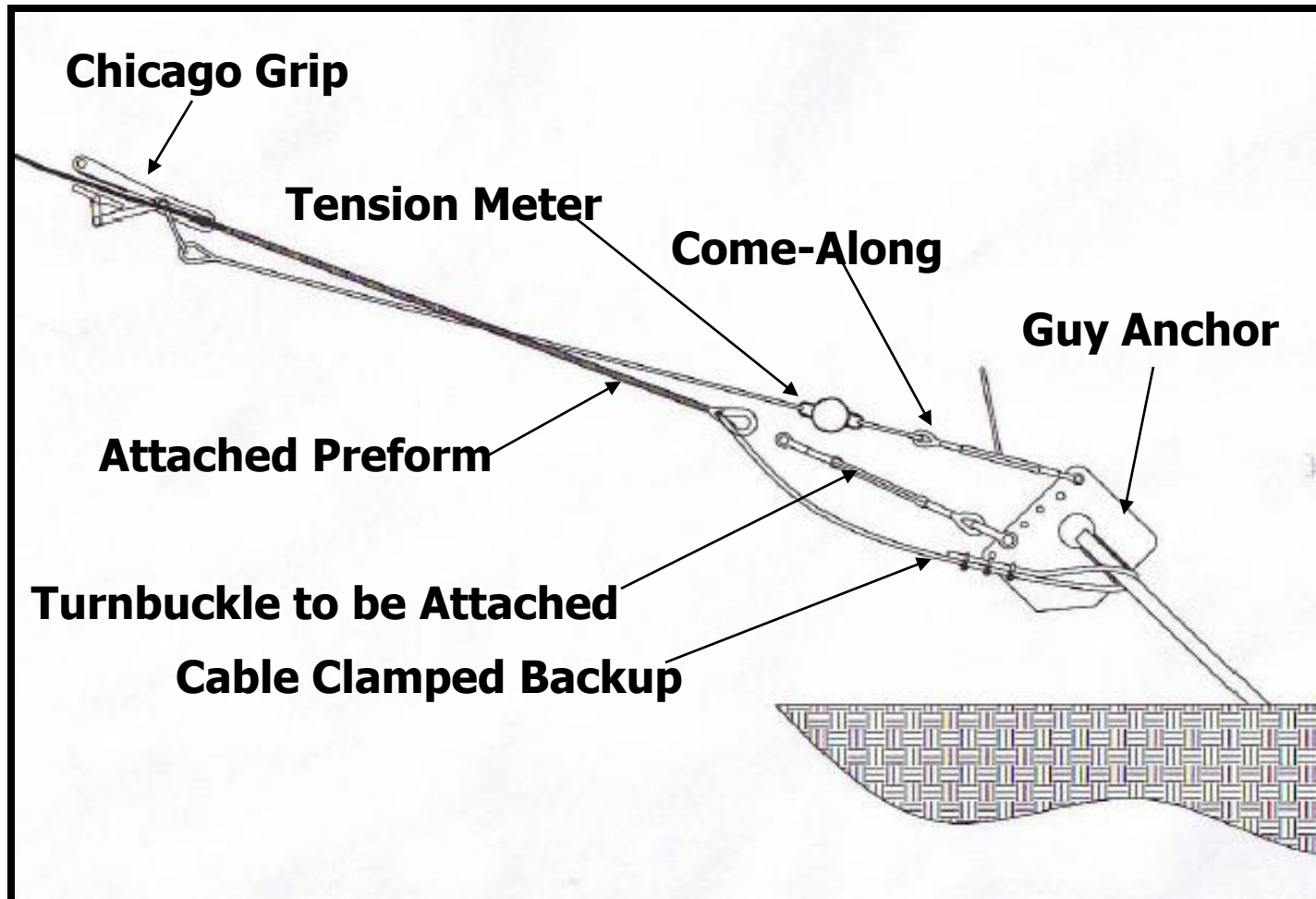
Slippage Connections Defined

- When frictional clamping devices are used that **may slip** during construction, the forces on the structure due to potential effects from **slippage or cable release** must be considered.
- The structure shall be analyzed for this potential slippage.



Temporary Backup System

- The backup system shall be of non-slip wire rope termination arranged to limit slippage to $\frac{1}{2}$ **face width** of tower, but not less than **12 inches** or more than **36 inches**.



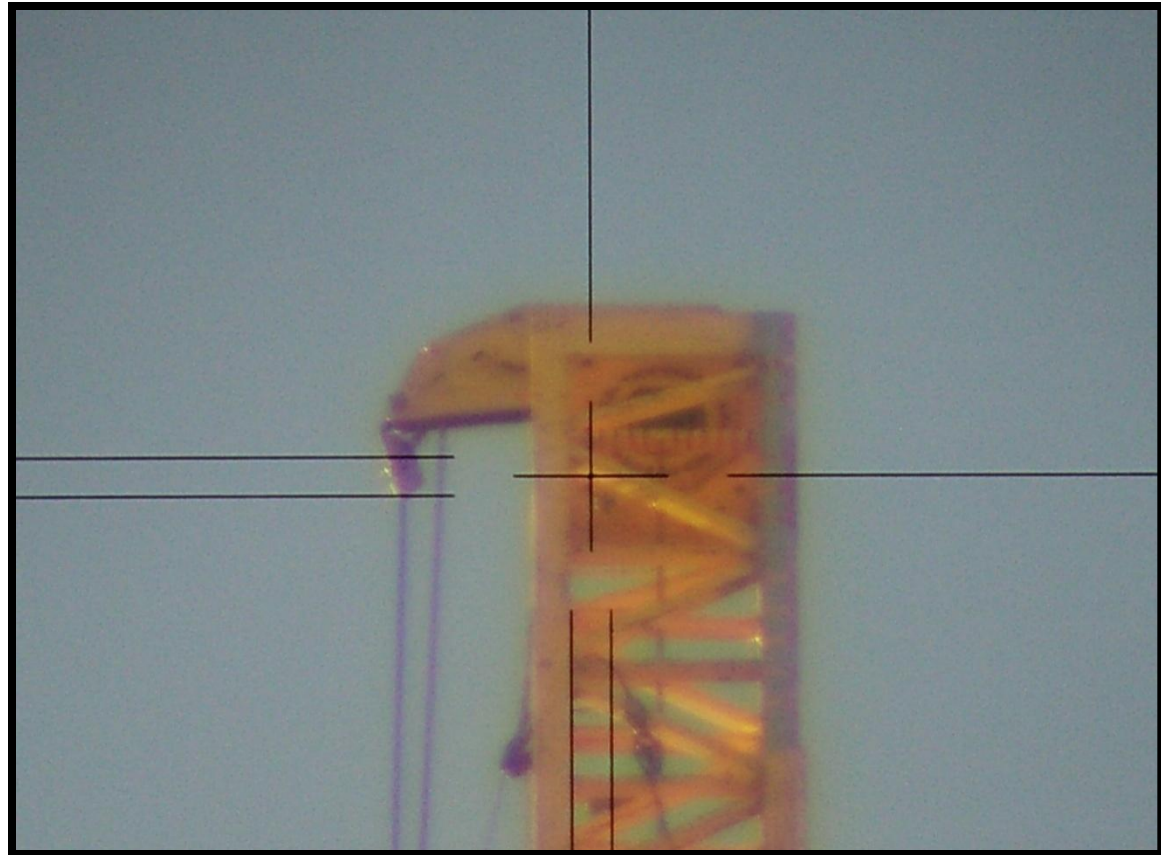


Special Engineering Lift

1. Any lift to be allowed on a special basis, which is outside of the standard "Load Chart", shall only be allowed at the direction of a qualified engineer.
2. Construction Lifting in higher than 30 mph winds
3. Special monitoring and measuring conditions, as specified by the engineer, shall be provided and used in the field during all "Special Engineered Lifts".



Monitoring Gin Pole Tip Deflection During a Lift “Thru a Transit”

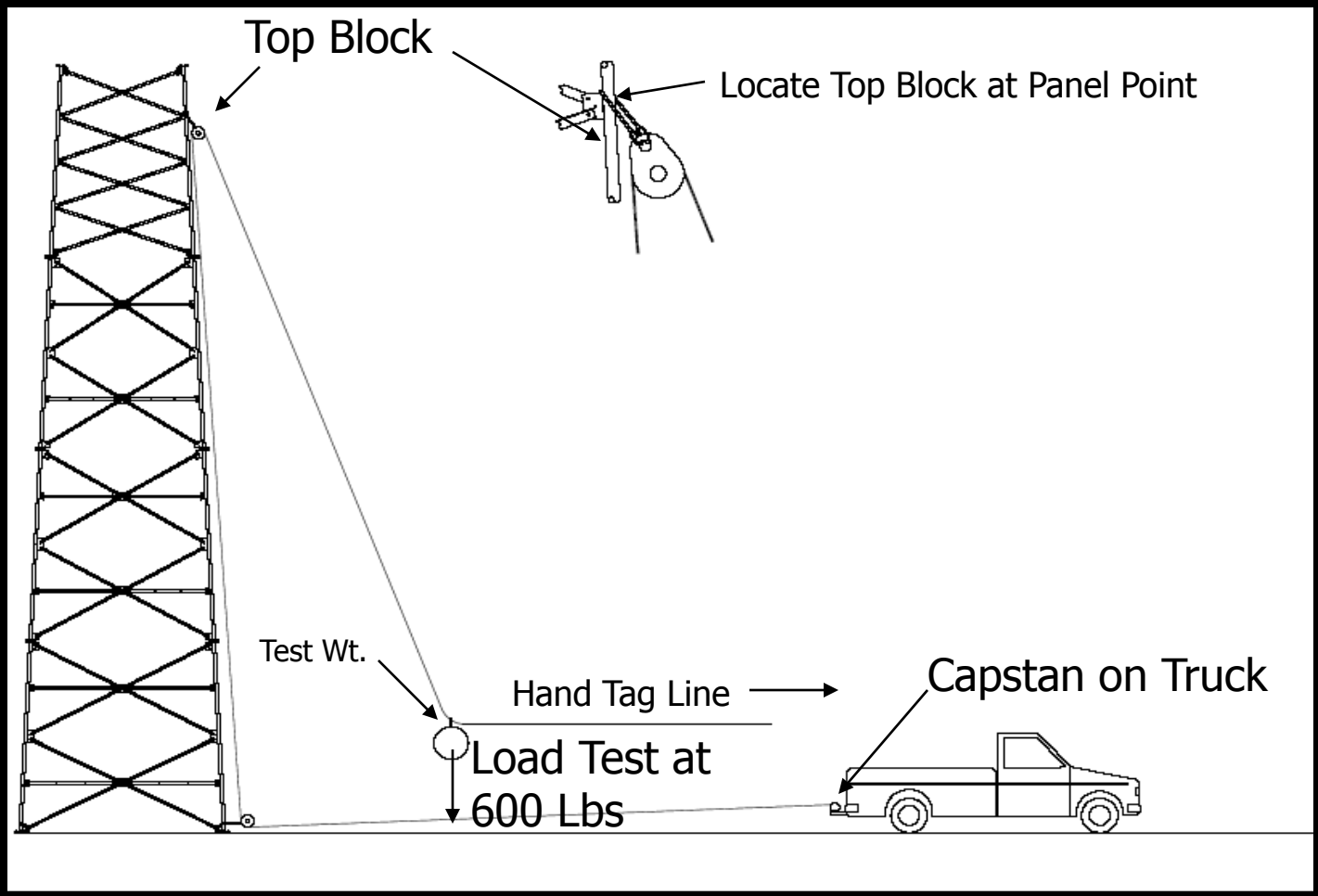


Capstan Hoist & Use of Synthetic Rope

- Factor of Safety for Rope at 10 to 1. (to account for knots)
- The lifted load shall not exceed the hoist rated capacity.
- 1.5 times lift weight load test required – this will usually limit loads lifted with capstans to **600 lbs.** or less!



Capstan Load Test: Requires Load Test of 150% of Lifted Load






What Owners Need To Know!

- 1. This industry construction standard will be available in the near future.
- 2. It will be a basis to allow construction workers and engineers provide safe construction procedures without being overly conservative due to the lack of readily available, or properly understood, guidelines.
- 3. In the event it is required for construction projects it should lessen the liabilities of all parties participating in its proper use.
- 4. When properly used it **will prevent** future construction accidents and structure collapses!

NATE Checklist for Evaluating Qualified Contractors

| National Association of Tower Erectors | |
|---|--|
|  | |
| Checklist for Evaluating Qualified Contractors | |
| Name of Contractor: _____ | |
| Contact Person for Contractor: _____ | |
| Title: _____ | |
| Address: _____ | |
| Telephone: _____ | |
| <input type="checkbox"/> | The contractor has obtained insurance coverage appropriate for the scope of work, prior to commencing the work (e.g. worker's compensation; general liability; etc.). <i>(Attach Certificates of Insurance.)</i> |
| <input type="checkbox"/> | The contractor has the necessary experience, references and capability to properly perform the specific job at hand. |
| <input type="checkbox"/> | The contractor has a written safety program and agrees to conduct regular safety audits of its job sites by a competent person. |
| <input type="checkbox"/> | The contractor agrees to provide a site-specific safety plan including rigging, structural and RF safety procedures, and fall protection requirements for this specific job. |
| <input type="checkbox"/> | The contractor agrees there will be a competent and qualified person at the project site who will conduct daily safety audits. |
| <input type="checkbox"/> | The contractor agrees to maintain written records of the safety audits for a period of at least one year. |
| <input type="checkbox"/> | The contractor requires pre-employment physical agility or physical fitness tests to determine ability to perform job tasks. |
| <small>CONTINUED ON NEXT PAGE ►</small> | |

| Page 2 | |
|---|---|
| <input type="checkbox"/> | The contractor conducts drug screening of employees for unlawful use of controlled substances. |
| <input type="checkbox"/> | The contractor provides an orientation and awareness program for new hires prior to performance of any work. |
| <input type="checkbox"/> | The contractor ensures that their tower climbers have been properly trained and understand OSHA regulations in the areas of fall protection and rescue. |
| <input type="checkbox"/> | The contractor agrees to conduct a hazard assessment to determine the requirements for personal protective equipment, including fall protection. |
| <input type="checkbox"/> | The contractor maintains written documentation of all training as required. |
| <input type="checkbox"/> | If the contractor is required to maintain OSHA 300 logs, they have submitted those documents for the past two years. For those companies not required to keep OSHA 300 logs, they have provided the number of employees they have and a report on accidents they have sustained, including the nature, type and number of accidents for the past two years. |
| <input type="checkbox"/> | The contractor agrees to notify the Company in writing if subcontractors are to be used prior to the use of such subcontractors. |
| <input type="checkbox"/> | The contractor agrees that any subcontractors hired will be required to meet the same contractor requirements outlined in this document. |
| <input type="checkbox"/> | The contractor agrees to adhere to the provisions of OSHA Directive CPL 2-1.36 if any personnel hoisting is to be conducted. |
| <input type="checkbox"/> | The contractor agrees to maintain good housekeeping on the job site. |
| Individual Completing Questionnaire: _____ <small>(Print Name)</small> | |
| Title: _____ | |
| Date: _____ | |
| <i>This document will be kept on file in the Safety Manager's office.</i> | |
| <small>REV 9/08</small> | |



Contractor Qualifications, RFP, Comparison Form

- Hire a qualified contractor
- Check their references
- Certificate of insurance
- Rigging Plan

MULTI-EMPLOYER ISSUES

- **Potential civil and criminal liability**
- **Amendments currently being aggressively pursued in Washington will enhance criminality (for amputations, disfiguring injuries, permanent loss of brain function) as well as to make a conviction go from:**

- **Current:**

- **6 mos imprisonment**

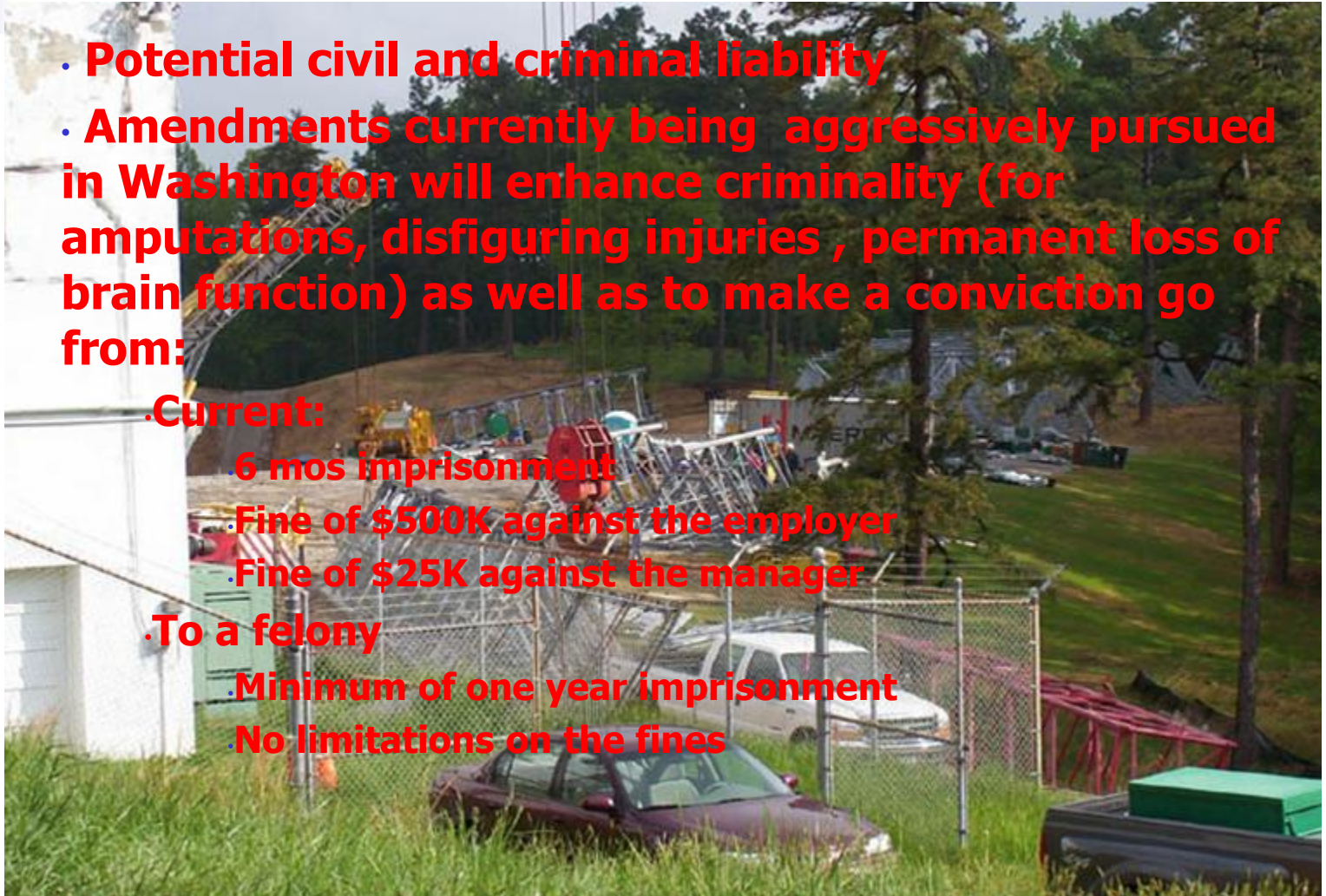
- **Fine of \$500K against the employer**

- **Fine of \$25K against the manager**

- **To a felony**

- **Minimum of one year imprisonment**

- **No limitations on the fines**





Thank You!

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