p) The applicable fall protection shall be used to match the lifting system being used.

11.12 Tilted Gin Poles. A gin pole that is tilted more than 1.5 degrees (more than 12.5 inches horizontal tilt over a 40 foot gin pole span length) is considered to be a tilted gin pole. Gin poles can be placed inside or outside of a tower and used in a tilted fashion. The type of rooster head is determined by whether the load line goes through the pole or runs on the outside of the pole. When the pole is tilted, the rooster head may not be able to rotate 360 degrees. Tilted gin poles can be leaned over from a few degrees to 45 degrees, or more, to accomplish lifts with a varied range of horizontal reach from the gin pole base. They are commonly used to stack or de-stack larger faced self-supporting towers, which often have a tapered cross section.

Typical tilted gin pole arrangements are noted in A-11(c).

11.12.1 Components of a Tilted Gin Pole. The basic components of a tilted gin pole are:

a) L, La, and Lb: Overall length of the gin pole and the length above and below the jump, or luffing line, attachment.

b) Rooster Head: A sheave or set of sheaves where the load line runs over the top of the gin pole.

c) Load Line: The load line runs from the hoist through a low level heel block, up the tower, and either runs through the gin pole center through the rooster head and back down to the load, or runs external of the gin pole, over the rooster head, and back down to the load.

d) Load Line Block: Is a top block fastened to a tower leg that is used to position the load line to run outside the gin pole, and over the top of the rooster head, then back down to the load.

e) Jump Line: The jump line runs from the hoist through a low level heel block, up the tower to a top block, then over to the gin pole attaching at the bridle. This jump line is used to jump, or lift, the gin pole into position and then is converted to a tilting line that tilts the gin pole in and out during a lift.

f) Jump Block: A top block used to jump the gin pole into position, then used as the tilting line block to change the angle of the gin pole during a lift.

g) Base Pivot System: The gin pole basket connection, supporting the downward reaction of the gin pole, and arranged to let the gin pole pivot at its base when tilted.

h) θt: Tilt angle from the vertical at the base of the gin pole, as well as the angle of the load line in its vertical position at the top of the gin pole.

i) Htilt: The horizontal distance the gin pole is tilted from the no-load vertical during a lifting operation, which is used to measure θt.

11.12.2 Side Movement of Tilted Gin Pole. Some lifting arrangements may require moving the gin pole from side to side in its tilted condition under load. This is often accomplished by attaching ropes, slings or come-a-longs to pull the pole horizontally. It is expected that a lateral force of 100 pounds be sufficient to move the pole laterally, and the method and force shall be clarified in the rigging plan. If a lateral force greater than 100 pounds is necessary, this could affect the capacity of the pole and its load chart. In these instances a qualified engineer shall be consulted.

11.12.3 Load Control Line. The load line in a tilted pole will adjust naturally as the pole moves and the load chart is based on this natural angle when the load is picked. During lifts, it is common to have a line attached to a load to keep the load from twisting and to help guide the load. This is a load control line, not a common tag line as otherwise described in this standard. It shall only transmit light forces on the load in relation to the strength of the gin pole. It is not intended to be used to pull the load out of a vertical straight down position, or otherwise increase the load line angle at the top of the gin pole. If a tag line, as defined otherwise in this standard, is to be attached to a tilted gin pole load, it is a special engineered lift situation. The added forces must be properly accounted for in the lifted load capacity with specific usage requirements included in the rigging plan.

11.12.4 Load Chart for Tilted Gin Pole. A load chart shall be provided for tilted gin pole lifts. Due to a variety of variables, charted lifts must be accompanied with a specific drawing or sketch which defines all aspects and rigging arrangements of the lifting system. It is the responsibility of the contractor to strictly stay within the rigging and arrangement parameters of this chart and its drawing. The following is a list of load chart parameters that must be specified with a typical tilted gin pole arrangement:

a) L, La and Lb.

b) Tilt and load line angles.

c) Htilt distances for identification of load line angles.

d) Basket reactions.

e) Jump line block loading and jump (tilt) line forces.

f) Load line tower attachment top block loading, if used.

g) Acceptable location(s) for jump (tilt) line attachment.

h) Specific method of running the load line (thru the pole or outside the pole).

i) Acceptable location, or range, the jump (tilt) block can be positioned above the base of the pole.

j) Method and limits of side movement.

k) Load control line specifications and limitations.

l) Balance point of gin pole and conditions associated with this balance point (see Notes).

Notes:

1. There is often a balance point of loading on a tilted gin pole where the sum of moments reverses its lateral force direction. This usually can occur when the pole approaches a vertical position and is dependent upon the load forces on the load line side of the gin pole, the weight of the gin pole and the reverse forces of the jump (tilt) line and load line. A minimum vertical gin pole tilt angle limit and a minimum force on the load line may be necessary to prevent unacceptable instabilities.

2. The gin pole shall always be tilted out and into position in a slow and controlled manner. When raising the pole back to a near vertical position, always ensure the jump (tilt) line and load line arrangements along with counterbalance loads are understood and can be kept under control.

3. Some tilted gin pole arrangements may require special engineered lift procedures for their use with specific site lift charts. This is to assure control under all circumstances and to limit the potential of instability concerns regarding moving the tilted pole to, or near, its vertical position.

11.13 Special Engineered Lift. Lifts outside the parameters of a standard load chart or a tilted gin pole load chart shall be considered as special engineered lifts. These lifts may take into consideration improved support conditions, reduced load line angles below charted angles, special rigging or load lift parameters that are not associated with, or included in, standard load chart parameters. Factors of safety for rigging components must meet the requirements of this standard and strength conditions for lifting devices and tower support must meet the requirements of the ANSI/TIA-322 standard.

Special engineered lifts shall be planned under the direction of a qualified engineer.

Standard load charts apply to conditions where the wind speed does not exceed a 30 mph gust at any elevation during the lift. Lifts required to be performed under higher wind conditions are considered as special engineered lifts.

Verification of the gin pole and support structure deflections, and load and tag line angle limitations shall be accomplished during a special engineered lift. This shall be conducted with special monitoring with documentation.

11.13.1 Engineered Lift Considerations. At a minimum, a special engineered lift shall consider the following:

a) Gin pole supports and orientation;

b) Lifted load accuracy;

c) Load line restraint within gin pole;

d) Load line position during lift;

e) Tag line angles and forces;

f) Trolley tag attachment location;

g) Wind conditions;

h) Gin pole tip deflection limitations;

i) Supporting structure deflection limitations;

j) Rigging requirements;

k) Support structure attachment capacities; and

l) Stiffness and strength of supporting structure.

11.14 Training. All workers shall be trained in accordance to the complexities of the work and the class of the pole they are working with. Knowledge may be attained through a combination of classroom training, experience and demonstrated proficiency.

It is the employer's responsibility to have a program in place to train and evaluate a worker's skills. The training of employees shall be performed by a qualified person able to perform such training as outlined in this standard.

11.14.1 Employers' written work procedures including company policies.

11.14.2 Documented eight hours of classroom training covering all aspects of the existing industry standards and the practical use along with procedures.

11.14.3 Documented practical training on the safe operation of gin pole use and other specialized equipment by using the following as a guideline:

Workers shall have the following minimum training:

a) Pertinent information provided by the manufacturer;

b) Interpretation of load charts and an understanding of their limitations;

c) Acceptable methods for measuring and monitoring load line and tag line angles, and deflection limitations;

d) Acceptable methods of verifying hoist anchorage and stability;

e) Be familiar with hand signals being used;

f) Be familiar with the operations of two-way radios if they are being used;

g) Be familiar with the work being completed;

h) Shall be a competent rigger; and

i) Shall complete field experience verification on the type of gin pole being used.

Note: Workers shall have, at a minimum, 40 hours of documented experience on the class and type of gin pole they are using, and demonstrate the ability to perform trial lifts, load testing and proper utilization of the equipment.

12. CLIMBING FACILITIES AND ACCESS

12.1 Objective. The objective of this section is to set forth minimum requirements for accepted industry best practices for fall protection on communications sites, and how to properly assess climbing facilities on the site based upon the scope of work and the existing site conditions.

The competent person shall understand the design requirements of a proper ladder arrangement and have a clear understanding of how to assess climbing facilities with respect to safety and other applicable standards.

12.2 Pre-Climb Hazard Assessment. As part of the job hazard analysis, the competent person shall assess the condition of the ladder climb facility for: structural condition, climbing restrictions and blockage in relation to how the ladder is going to be used to complete the scope of work.

This assessment shall be communicated to all workers to ensure safe access, work and egress from the structure. An alternate route or means must be planned and communicated to workers.

Note: It is the owner's responsibility to maintain climbing facilities in accordance to the applicable standards.

12.3 Ladder Cages. For this standard, ladder cages around a vertical fixed ladder are not considered any type of fall protection.

12.4 Obstruction Warning Signs. Where there is an obstruction to the climbing facility and a warning sign is posted, workers shall identify and address the potential hazard.

Where the climbing facility is obstructed and a warning sign is not posted, communication shall be made to the owner to post a sign or remove the obstruction.

12.5 Alternate Climbing Paths. Alternate paths may require the installation of temporary and/or permanent fall protection anchorages.

Note: Optional/alternative climbing paths shall include provisions for 100% tie-off fall protection, and those anchorages shall be labeled accordingly.

12.6 Training. The competent person on site shall be familiar with the climbing facility standards to ensure they are able to recognize those climbing facilities that do not comply with the applicable standards and what steps to take to mitigate the hazards. The competent person shall, at a minimum, recognize the following ladder requirements.

Note: The following list is a guideline for the competent person:

a) The vertical rails shall be uniform and adequately spaced apart with a minimum of 12 inches plus the width of a fixed safety rail, if in place.

b) The horizontal steps or rungs shall have a uniform separation with a minimum of 10 inches and a maximum of 16 inches.

c) Steps and rungs shall be uniform in diameter and length with a minimum diameter of 0.625 inches and minimum length of 4.5 inches and have a means so the climber's foot cannot slide off the end.

d) The horizontal spread between step bolt attachments shall not exceed 24 inches.

e) On all ladders, there shall be a clear space for climber to place their feet and have a dimension of 7 inches horizontally.

f) The climbing facility placement shall provide a horizontal clearance for the worker to access, work and egress from the structure. The recommended distance is 30 inches, but 24 inches is allowed with signage.

In the event a safety climb or similar device is present, it shall be assessed to ensure that it is properly installed, unobstructed and maintained.

13. STRUCTURAL CONSTRUCTION LOADING CONSIDERATIONS

13.1 Objective. The objective of this section is to set forth minimum requirements and criteria for construction activities and structural loading when working on communication structures.

13.2 Application. The application of this section relies on design criteria from ANSI/TIA-322 standard. Qualified engineers shall use the design criteria in ANSI/TIA-322 to calculate the loads on a communication structure.

13.3 Rigging Plans. A construction work plan known as a rigging plan is essential and expected for construction projects in the communications structures industry.

Note: *The details of a rigging plan are outlined in Section 4.8.*

Refer to A-4(d) for a rigging plan template.

Based upon the scope of work, all construction shall be classified in accordance with this standard outlining the minimum level of responsibility for establishing the plan. Proposed activities shall be outlined in a written rigging plan prior to implementation of Class II, III and IV construction.

Unless otherwise clearly specified, the contractor is in sole control of the means and methods used for the construction project at hand. The complexity of construction will fall between a series of plan classes with the least complex defined as Class I and the most complex as Class IV.

An onsite competent rigger shall be identified for all classes of construction for identifying hazards and for authorizing prompt corrective measures as required in the field.

A competent rigger may prepare rigging plans for Class I and II construction, but a qualified person is required to prepare rigging plans for Class III and IV construction. Either the competent rigger or the qualified person may engage a qualified engineer for the construction activity at hand, but for Class III and IV construction, a qualified person shall coordinate the involvement of a qualified engineer for proper evaluation of the strength and stability of the structure.

An engineering evaluation of the various rigging arrangements for lifting systems, load and tag line forces, block loadings, special structure attachments and for equipment anchorages may be necessary. This may come in the form of qualified load charts for equipment being used or from special lift evaluations for unusually complex rigging arrangements. The loads on rigging equipment and on structures from rigging equipment must be known. The competent rigger and qualified person shall be trained and/or experienced to know when to engage engineering assistance for an accurate assessment of equipment or rigging loads for the construction plan.

13.3.1 Rigging Plan Considerations. The rigging plan shall consider the following in accordance with this standard when applicable:

a) Operational and non-operational construction loads.

b) Construction equipment.

c) Supporting structure.

d) Construction sequence and duration.

e) Required load testing and field monitoring.

f) The qualified individuals necessary to complete the plan shall be noted.

13.4 Operational and Non-Operational Loads. The rigging plan shall take into account operational and non-operational construction loads.

13.4.1 Operational Loading. Operational construction loads are loads applied to the structure by the rigging system and the loads being lifted during the operation under nominal wind loading conditions.

Operational loads to a structure are the reaction forces through equipment, loads from slings typically supporting attached blocks and pulleys, unequal loads or forces from guys, potential guy slippage forces and forces or loading from any other structure attachments.

A minimum impact factor equal to 1.3 shall be applied to operational construction loads on a structure.

For calculation purposes, the wind loading used during operational construction is a uniform effective 30 mph wind speed. Wind shall be considered to occur from the directions that result in the maximum member forces and reactions. It is up to the contractor's competent rigger and qualified person to determine safe wind loads for various construction activities. This may be limited to maximum wind loading requirements for specific lifting equipment, but never more than what riggers can comfortably handle and control during an activity. This will often be less than 30 mph, but any construction activity in winds exceeding 30 mph shall be considered as special and the provisions of the ANSI/TIA-322 for special engineered lifts shall apply.

The capacity of a lifting device, i.e. cranes, gin poles, etc., shall be the lower of the manufacturers' capacity (load charts) or the capacity of the device or the supporting structure calculated in accordance with this standard.

Note: For specific equipment, lifts shall not be performed in winds exceeding equipment manufacturer's specifications.

13.4.2 Non-Operational Loading. Non-operational construction loads are applied to the structure by outside forces such as wind and weather. It takes into consideration the rigging system, material, equipment or other loading attached to the structure when lifts are not being performed. These conditions apply to the structure in its various stages of construction. All aspects of construction shall be designed, engineered or otherwise controlled to meet the following 3-second gust wind strength conditions:

a) 45 mph during the work day;

b) 54 mph for less than 24 hours;

c) 60 mph for 24 hours to less than one week;

d) 68 mph for one week to less than 6 weeks;

e) 72 mph for 6 weeks to 6 months; and

f) Structure design wind speed for greater than 6 months.

Loads such as snow, ice, rain and earthquake are not considered due to the low probability of occurrence during construction unless specific to the region you are working in.

In hurricane prone regions and for construction durations greater than one week, appropriate plans that can be implemented before the onset of a forecasted hurricane must be prepared to provide additional bracing, temporary guys, etc. if required to meet the strength requirements for the full hurricane wind speed for the site.

Note: ANSI/TIA-322 specifies the required structural strength for the supporting structure.

13.5 Construction Equipment. The equipment items below are the responsibility of the contractor and outline the common equipment typically used for communication structure work.

The effects on the structure from heel (base) blocks, crown (top) blocks and other similar rigging attachments to the structure that apply horizontal and vertical forces shall be considered.

13.5.1 Blocks. When placing blocks on a structure, as a minimum, the following loading considerations shall be taken into account when sizing the rigging and determining the effects on the structure:

a) Location of hoist with respect to the structure;

b) Location and arrangement of a tag line's added loading to the lifted load forces;

c) Angles between the line passing through the blocks;

d) Angles between the slings supporting the blocks;

e) Sling attachment locations;

f) Clearances available for load and jump lines; and

g) Fleet angle of lines running thru blocks.

To minimize loads on the structure, it is preferable to attach heel blocks to foundations with adequate anchorages, separate of the structure, refer to A-13(a). In situations where heel blocks are attached to a structure, care shall be taken to ensure that the load on the structure does not create undesirable conditions such as; unacceptable structure twist, member deformation, connection overloading, etc. Connections shall be sized for the expected maximum forces and reactions of the rigging system in accordance with this standard and in combination with the engineering applications required in ANSI/TIA-322.

13.5.2 Slings.

a) Blocks, gin poles and other lifting devices are commonly attached to towers with slings. The attachment forces created by these loads shall be accounted for in assessing the anchorage strengths. The following gives guidance on the use of slings and blocks:

All sling angles forces shall be calculated for the proper sling size and structure loading force. In the rigging process a sling angle of 60 degrees is the goal with 45 degrees the minimum. If sling angles less than 45 degrees are used for supporting blocks, gin poles or other equipment, special attention to the increased forces shall be given. In the event minimum sling angles are not specifically noted in the rigging plan, the qualified person or qualified engineer can use 45 degrees as a minimum angle for calculating sling forces. The competent rigger shall be responsible to use this minimum angle in rigging, or to properly account for and document the use of steeper angles in their rigging plans, refer to A-13(b).

b) Slings shall be attached to the supporting structure preferably at panel points, but in all cases shall be with a connection that avoids slippage and prevents damage to the structural members or tower appurtenances. Slings shall be protected from sharp edges and surfaces with softeners, blocks or other means. Wrap efficiencies tolerances for tight turns, refer to A-13(c).

c) Wire rope fleet angles for sheaves or blocks shall be limited to a 1:12 slope (5 degrees).

13.5.3 Rigging Components. Rigging components shall be sized based on actual lifted loads and applied forces with their strengths reduced by a factor of safety as defined in Section 10. All loads shall be lifted within the working load limits (WLL) defined by the equipment manufacturer or this standard.

13.5.4 Lifting Devices. The capacity of a lifting device, i.e. cranes, gin poles, support extensions, or other, shall be the lower of the manufacturer's capacity (load charts) or the capacity of the device and the supporting structure calculated in accordance with the ANSI/TIA-322 standard.

A lifting device may simply be a block attached to the structure. There are four common types of lifting arrangements often used for work on communication structures utilizing only top blocks:

a) Top block only with a straight tag.

b) Top and heel blocks with straight tag.

c) Top block only with trolley system.

d) Top and heel blocks with trolley tag.

Note: Refer to A-13(d).

13.5.5 Rigging Considerations. It is the contractor's responsibility to have a rigging plan that properly assesses and considers the loading on the structure, along with all anchorages, for these types of lifting arrangements. When tags are used, the increased force on the load line shall be considered. A-13(f) provides line multipliers that may be used to determine load line and tag line forces based upon the gross load, load angle, and tag angle for straight tag configurations. Once the lifted load forces on the load or jump lines are properly identified, forces and loads on slings, blocks and all connecting equipment shall be determined and used with minimum allowable safety factors as outlined in this standard. Due consideration for end connection, wrap and D/d ratio reduction shall apply. For end connection efficiencies with wire rope lines running over sheaves, refer to A-13(c).

For a complete lifting system, the lifted height above grade; the horizontal and vertical distances of the tagging hoist; the load line angle required for the work; and the gross lifted load need to be known to properly assess forces and loads on rigging equipment and reactions to the structure from this equipment. Refer to A-13(f) as an example of information necessary for determining load line and tag forces.

It is the intent of this standard for lifts and pulling procedures on the tower, or on the ground, to be within equipment manufacturer's intended use and safe working load limits. The use of equipment outside its intended use, or in any altered arrangement, is discouraged and at minimum must follow special engineered lift procedures as outlined in Section 11.13 regardless if a gin pole is used. Such use shall have all forces and reactions properly identified and verified to be within allowed equipment and structure limitations, and such equipment may only be used if allowed by the equipment manufacturer. Impact factors shall be appropriately applied as directed by the qualified engineer, but not less than as specified in ANSI/TIA-322. Limitations of the use of such equipment shall be clearly defined in the rigging plan. The use of mobile equipment to pull or release load on tag lines (instead of a hoist or capstan), alterations to any lifting device, lifting loads under forks of a lift designed as a fork lift, construction equipment used to hoist or transport loads (i.e. dozers, excavators, etc.) fall within the intent of this provision.

To convert degrees to inches on a load chart, refer to A-13(g). This chart converts degrees to a horizontal distance compared to a vertical distance below the top block or top sheave in a gin pole rooster head.

13.5.6 Base Mounted Hoists. A base mounted hoist used for lifting material or for tagging can directly affect the loads on a structure and must be used in accordance with manufacturer recommendations and comply with Section 8.

13.5.7 Capstan Hoists. A capstan hoist used for lifting material or for tagging can directly affect the loads on a structure and must be used in accordance with manufacturer recommendations and comply with Section 15.

13.6 Proof Loading and Load Testing. Proof loads, or other load testing, described in this standard shall be implemented under controlled conditions. Loads shall not exceed the working load limit (WLL) of any rigging component, allowable capacity of the hoist or overload to the structure. For load testing, it is acceptable to lower the factor of safety on the wire rope to a minimum of 3.5 with due consideration for end efficiency reductions, as applicable. The minimum factor of safety for synthetic ropes for load testing can be reduced to 7.0 which include both knot end efficiency and sheave efficiency losses up to 50%. For efficiency reductions below 50%, the applicable safety factor shall be determined by dividing 3.5 by the reduced efficiency to ensure an overall effective safety factor of no less than 3.5:1.

13.6.1 Load Testing and Verification. Load testing and verification of the operation of the rigging system (gin pole, blocks, hoist, load line, tag line, etc.), when required in the rigging plan, shall include the following:

a) Raise and lower a load an appropriate distance to verify all moving parts function properly.

b) Verify the deflections under a lifted load (tagged as appropriate) are within anticipated magnitudes. This is usually accomplished by sighting through a transit and gaging a measuring device or comparing to a gin pole or tower vertical leg member of known dimension.

c) Inspect all components of the rigging system, including anchorages, for proper arrangement and operating condition.

d) Verify tower masts, or individual tower mast members, do not have unacceptable twist, rotation or deflection.

13.7 Removal of Structure Members or Their Connections. The potential for partial or complete collapse of a structure may exist when constructing, dismantling or altering structural components of a structure. Special requirements are usually necessary for the removal of any structural member, such as a diagonal, horizontal or vertical member, refer to A-13(h), (i), (j) and (k). A procedure defining critical steps in the process shall be provided and followed by the rigging crew during all phases of the work. This plan is considered a Class IV rigging plan. Such a procedure shall take into consideration temporary reinforcing of members to support the structure while structural components are disconnected or altered.

A suitable temporary bracing shall be reviewed by a qualified engineer and installed in a secure position prior to member removal or disconnect. This condition is required unless the qualified engineer's structural analysis indicates otherwise and is documented in the rigging plan. Such an analysis shall be in accordance with the latest revision of ANSI//TIA-322.

Temporary guys may be required in situations where guy slippage and/or instantaneous release of a guy is possible.

13.7.1 Bolt Replacement. Removing members with only a one bolt connection is the same as removing the member and temporary bracing is required. In situations where there is more than one bolt per connection, one bolt at a time may be removed in accordance to the rigging plan.

13.8 Temporary Guys. In some instances towers may have enough mast strength to allow simultaneous disconnect, and letting in, of all guys at one level without the use of temporary or back-up guys. In order to qualify for this procedure, a structural analysis must be performed to verify that the tower will have the minimum strength to withstand a 45 mph 3-second gust wind condition. This is for a relative calm daytime work period. For overnight conditions, longer periods of time, or due to other special circumstances, increased tower strength is necessary. These strength conditions are based on the duration factors as required in Section 13.4.2 with analysis procedures required as outlined in ANSI/TIA-322.

During the tightening of the temporary guy(s) and the loosening of the guy(s) being disconnected, the tower structure shall be maintained in as close as vertical alignment as reasonably possible. Without other professional guidance, the vertical alignment of the tower shall be monitored and at least maintained with horizontal movement limited to within 1/120 of the smaller distance of the two adjacent guy spans.

The spans referred to are the one above and the one below the guy being released, with horizontal movement at the elevation of the guy being disconnected. For a top guy, the limit of horizontal deflection shall be with due consideration of the span below the guy connection. For re-attaching permanent guys, this same procedure shall be accomplished in reverse. The limits of horizontal mast movement during such a defined procedure shall be specified in the rigging plan, refer to A-13(k).

A suitable temporary guy wire or wires acting as a back-up member shall be reviewed by a qualified engineer and installed in a secure position prior to removal or disconnect of an existing permanent guy wire. This condition is required unless the qualified engineer's structural analysis indicates otherwise and is documented in the rigging plan. Such an analysis shall be in accordance with the latest revision of ANSI/TIA-322. This condition is required unless the qualified engineer's structural analysis indicates otherwise and is documented in the rigging plan. Such an analysis shall be in accordance with the latest revision of ANSI/TIA-322. This includes the strength of the end connection and its attachments, including anchorages, and with due consideration for end connection efficiencies and eccentric loadings.

13.8.1 Guy Installation. Guys shall be installed in a manner to minimize unbalanced lateral forces applied to the mast. During guy installation, the effects of unequal guy forces in combination with operational condition forces shall be considered. In lieu of a structural analysis, the structure shall be monitored during guy installation to maintain vertical alignment of 1/120 (ratio of horizontal movement to the smaller of the two adjacent guy spans) or the value specified in the rigging plan.

13.8.2 Guy Slippage. When using components where the potential for guy release or slippage could occur, a rigging plan shall be completed to satisfy at least one of the following conditions:

a) The use of non-slip connections shall be required for all guys;

b) Proper use of temporary guys with non-slip connections;

c) Redundant non-slip (back-up) guy connections are used to limit guy slippage to the larger of 12 inches or 50% of the masts face width, but not greater than 24 inches; or

d) A structural analysis in accordance with ANSI/TIA-322 verifying that the guyed structure can withstand slippage, or instantaneous release, of any one guy.

Notes:

1. Guy connections that may result in slippage without redundant non-slip connections shall not be used for overnight conditions.

2. Examples of typical slip potential and non-slip connections are noted in A-13(l), (m) and (n).

3. Typical wire rope clip torques required for a proper connections are noted in A-13(o).

13.8.3 Cantilever Length of Guyed Mast. A guyed mast cantilever length is the distance the tower mast extends above the top set of guys. This cantilever condition often governs the capacity and strength of a guyed tower under construction. All parts of a tower under each sequence of construction must have a minimum strength based on loading with the duration factors as required in Section 13.4.2 with analysis procedures required as outlined in ANSI/TIA-322 standard. Temporary guys or other strengthening measures may be required in order the meet these minimum strength conditions.

Note: Loads during construction may subject leg splice connections of guyed masts to extra high tension forces, forces not accounted for when the structure is in its final designed configuration.

13.9 Foundation and Anchorage Inspections and Alterations. For excavated inspection of susceptible damaged or deterioration of foundations, or to their connecting parts, temporary supports shall be considered. When inspection of an anchorage determines degradation of the anchor may be significant, the use of temporary supports shall be provided throughout foundation inspection, replacement or alteration activities. Temporary supports shall, at minimum, meet the loading conditions from forces noted in Section 13.4.2. When removal of overburden is required, the removal shall be completed with a process approved by a qualified engineer.

13.9.1 Temporary Anchorages. Temporary anchorages shall take into consideration the strength of the unexcavated soil. Remaining soil strength shall be capable of withstanding required loading conditions with a factor of safety of 2.0. Due consideration for a sudden release of a severely corroded anchor shaft shall be given. The impact loading of a sudden anchor release restrained by cables, slings or other support shall also be considered, but shall not be considered with an impact factor of less than 1.4 times the initial release force.

The distance a released anchor can travel must also be considered. Unless a specific analysis confirms or requires otherwise, this distance shall be limited to the larger of 12 inches or 50% of the mast face width, but not greater than 2 feet.

13.10 Dismantling/Modification Considerations. Complete documentation of the existing structure and/or antenna is required for proper evaluation. A physical inspection (i.e. measurements, ultrasonic inspection, drilling of holes, etc.) shall be performed when the necessary data is not otherwise available.

Existing structures and/or antennas shall be inspected for signs of deterioration (i.e. corrosion, stress cracking, overloading, damage, etc.). Remedial repairs shall be performed as needed, or the deterioration shall be considered in the structural analysis for the rigging plan.

Lifted loads shall be field verified prior to the lift unless the weight is confirmed by the competent rigger or qualified person. This weight verification may be accomplished by loosening fasteners or by providing longer fasteners to allow movement while maintaining control and securement of the load, and measuring it with a direct weight indicator. If the load is not within estimated weight limitations, the lift shall be aborted and the load shall be re-secured. The actual weight for the lift, and its effect on the rigging plan, shall be evaluated.

13.11 Climbing Facilities. All construction shall consider the placement and interference of climbing facilities including safety climb devices. All obstructed or damaged climbing facilities must be evaluated and shall be repaired, replaced or removed as required. When obstruction or removal of a climbing facility is unavoidable, an alternate means for safe climbing shall be provided. When an alternate means is not feasible, signage shall be provided in accordance with ANSI/TIA-222-G and refer to Section 12 of this standard.

13.12 Site Evaluation. A job hazard assessment shall be completed prior to any work or climbing activities. Refer to the pre-job survey in the appendix of this standard for guidelines.

13.13 Training. The training program shall ensure all employees have the knowledge and understanding of this standard to prepare a rigging plan and perform the work according to an approved rigging plan.

Other training considerations may apply to site-specific construction projects.

14. TRAINING PROGRAM

All employees involved in construction relating to this standard shall be qualified according to the complexity of the work. Employees may attain qualification through a combination of classroom training, experience and/or demonstrated proficiency.

It is the employer's responsibility to have a program in place to train their employees to recognize potential hazards inherent with communication structures.

Training requirements for specific topics are addressed in the applicable sections of this standard.

14.1 Objective. The objective of this section is to outline minimum requirements employers shall follow when developing a training program for their employees. Refer