



Telecommunications Industry Foundation

The Telecommunications Industry Foundation (“TIF”) is pleased to announce publication of the following TIF White Paper:

APPURTENANCE INSTALLATION IMPACT TO
CLIMBING FACILITIES AND ANTENNA
SUPPORTING STRUCTURES

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DEDICATION

This TIF White Paper is dedicated to the memory of Dean McKenzie, Director; Directorate of Construction, OSHA. Dean had an incredible enthusiasm for the American spirit and the ability to work together to solve problems using prevention through design. This was evident in his passion for quality. He would often remark that craftsmanship was critical to a safe working environment.

Dean took a real interest in the telecommunications industry and encouraged the working group that developed this TIF White Paper to hear from all sides of the industry.

As a result, we continue to seek to work together to create a guide that will help others do quality work in a safe manner.



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INTRODUCTION

This TIF White Paper (the “*White Paper*”) on the impact of new appurtenance installations and how to maintain the design performance required by End Users (defined below) to antenna supporting structures (each, a “*Structure*”) and the Climbing Facilities. A “Climbing Facility”, as referenced in this White Paper, is intended to be designed in accord with Section 12 of the ANSI / TIA 222 Rev. H standard and incorporates items such as rung and rail, steps, step bolts, climber platforms, and safety climbs. This White Paper reinforces current standards in holding that obstruction to the Climbing Facilities shall be a last resort. An Installation (defined below) shall not cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

The working group of the Telecommunications Industry Foundation (“*TIF*”) that developed this White Paper included members from each of the industry Stakeholders, as defined in this White Paper. The intent of the working group was to create a white paper that would foster communication between the Stakeholders by providing an improved understanding of the roles and responsibilities for each Stakeholder. By providing instruction, advancing communication and presenting feedback solutions, this White Paper endeavors to support the telecommunications industry and each of the individual Stakeholders in preserving the integrity of Climbing Facilities. This White Paper is not intended to amend replace or interpret ANSI / TIA 222 Rev. H.

The Board of Directors for TIF will be supporting feedback through a portal on its website. Additionally, the Appurtenance Installation Decision Tree (attached hereto as ‘Appendix A’) provides an illustrative example of the communication pathways between the Stakeholders.

While this White Paper is partitioned according to the disciplines of the Stakeholders (defined below), this White Paper is applicable in its entirety.

PURPOSE

The intent of this White Paper is to educate and promote the sharing and availability of information among stakeholders within the telecommunications industry (each, a “*Stakeholder*”). After reading this White Paper each Stakeholder should better understand their role and responsibility regarding the installation, modification, or maintenance of a new Appurtenance (*defined below*) on a Structure (each, an “*Installation*”). This White Paper communicates best practices to avoid Installations that cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

Stakeholders may include:

- Carriers, government bodies (E.G. e911), broadcasters, the entity engaging Contractor to perform the Installation, and other end users (together, the “*End Users*”);
- Structure owners, tower owners & communication facility owner (together, “*Structure Owners*”);
- Manufacturers;
- Architectural & Engineering firms assisting in the design and/or Installation and the Engineer of Record (together, the “*Engineer*”);
- General Contractors, subcontractors and other contractors (together, the “*Contractor(s)*”); &

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- A Standards Body who produces voluntary consensus standards for products, services, processes, systems and personnel in the United States.

END USERS

End Users have RF System Designs that require the installation of equipment on Structures that are owned by various parties. Some examples include communities, tower owners and carriers. Due to the need to install equipment that meets these RF System Design requirements, a Structure may require the Installation to obstruct the Climbing Facilities. It is never the intent of an End User that an appurtenance, mount or other products affixed to the Structure (each, an **“Appurtenance”**) causes damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. End Users deploying their networks endeavor to have Installations performed in harmony with the following objectives:

1. RF System Design requirements and the components required as a part of the network design, including known and proposed locations of installed equipment, is to be provided to Engineers for the creation of the construction drawings, permit drawings, structural and/or modification drawings (the **“Drawings”**);
2. Qualified Contractors and Engineers shall be contracted for Installations in order to ensure that the Installation will be compliant with all applicable laws, standards and regulations;
3. Installation should not adversely impact the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation;
4. Obstruction of the Climbing Facilities may only occur when required for system design or structural requirements in accordance with best practices and ANSI / TIA 222;
5. If an obstruction is permitted, it should not cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation;
6. Appurtenances approved by Engineers for Installation should be selected in order to minimize obstruction and allow for protection of the Climbing Facilities and safety climb (*if present*);
7. If existing damage or discrepancies to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation are found and communicated to the Engineer before Installation commences, the Engineer will promptly communicate their findings to the other Stakeholders; &
8. Timely notice and documentation shall be provided by Contractors to Engineers if an obstruction was required to meet the RF System Design requirements and performances. This notice shall document and certify that no damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation was caused during Installation.

To achieve an effective Installation, End Users seek to have the assistance from the other Stakeholders involved in the process of deploying and maintaining the network infrastructure. The following are some specific areas where assistance would be beneficial:

Structure Owners – Supply data and assist Engineers in identifying where Climbing Facilities are located on Structures and if there are any other issues or other installed systems upon the Structure that are present and may pose issues with Installation.

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Manufacturers – Develop Appurtenance designs that meet the required design standards and consider the presence of Climbing Facilities and safety climbs during design process.

Engineer – Utilize the data and information provided by the End Users and Structure Owners to identify possible issues at the Installation location. Additionally, work in conjunction with Manufactures to furnish Drawings which incorporate designs and Appurtenances that, once properly installed, will not adversely impact the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

Contractors – Provide qualified personnel to perform the Installation. Contractor personnel are responsible for assessing the Structure and the Appurtenances to determine if the Installation will be able to meet the A&E design. In carrying out these responsibilities, Contractor shall effectively communicate, to the applicable party designated by End User (each, an **“End User Designee”**), any and all issues that will impact the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

STRUCTURE OWNERS

Structure Owners are responsible for the ownership and maintenance of the Structure and engages with the End User to understand their needs and if there is capacity on the Structure for the End User’s requested Installation. If capacity is available, the Installation shall not cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

It is a combination of effort between all Stakeholders to identify potential Installation issues that will or may impact the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. The Structure, Climbing Facilities and existing Appurtenances shall be compliant and maintained in accordance with the RF System Design that the Structure and existing Appurtenances were designed to meet. Any new Appurtenances and modifications to the Structure shall incorporate the current revision of the ANSI / TIA 222 standard.

The International Building Code (**“IBC”**) 2018 has adopted ANSI / TIA 222 Rev. H as the design standard for communication structures which includes design updates for Climbing Facilities and Appurtenances on new Structures and any later modifications thereto. This standard also provides recommendations to be used to create a maintenance and condition assessment program to effectively manage the maintenance requirements on these Structures.

The American National Standards Institute (**“ANSI”**) / American Society of Safety Professionals (**“ASSP”**), formerly ASSE, A10.48 is the standard for means and methods to ensure a safe working environment and is titled **“Criteria for Safety Practices with the Construction, Demolition, Modification and Maintenance of Communications Structures”**. Structures designed, maintained and upgraded in compliance with the ANSI / TIA 222 and the IBC have specific design requirements for Climbing Facilities. Due to the unique intended

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use of these Structures, the design requirements for Climbing Facilities are different than what is specified by the ANSI / ASSP A14.3 and the OSHA Subpart X for fixed ladders.

Structure Owners must follow two pertinent standards, ANSI / TIA 222 for engineering and design, and ANSI / TIA 322 standard for qualified engineers review of rigging plans. Structure Owners require that Contractors comply with the applicable OSHA, FCC, FAA and ANSI / ASSP A10.48 regulations, standards and best practices for the means and methods used to complete the Installation. When properly informed of issues that are not compliant with the latest revision to the ANSI / TIA 222 and 322 standards, the Structure Owner shall correct these identified issues with the Structure, Climbing Facilities, safety climb (*if present*), and any other known system installed upon a Structure affected by the Installation.

The Structure Owner should have documentation of the existing Climbing Facilities that can be utilized by the Engineer during the design phase. If adequate documentation is not available or provided by the Structure Owner, it may be necessary to convey or capture this data in a different manner. This may require redline Drawings, field review by an engineering firm, drone use and/or the selection of a universal mount or appurtenance to allow the Engineer to update or modify the Drawings. The Structure Owner should review any Drawings submitted by the Engineer prior to Installation by the Contractor. Appurtenances should be designed to allow for universal application, while taking into account unknown locations of Climbing Facilities.

The ANSI / TIA 222 standard allows for modification of Climbing Facilities; this may include modifying the safety climb, modifying the climbing path, or complete removal of the safety climb if it cannot be maintained as per the Manufacturer's requirements or as a part of Structural modifications to allow the Structure to support antennas. Removal of a safety climb should be the last resort.

The ANSI / TIA 222 standard does allow for Structures to be designed that are not intended to be climbed or do not have a safety climb installed for all locations that may be accessed. For Structures where this condition exists, Structure Owner shall provide signage that meets the requirements of the ANSI / TIA 222 standard.

To achieve an effective Installation, Structure Owners seek to have the assistance from the other Stakeholders involved in the process of deploying and maintaining the network infrastructure. The following are some specific areas where assistance would be beneficial:

End Users – Communicate the RF System Design requirements to the Engineer, with guidance that the Structure, Climbing Facilities, safety climb (*if present*), and any other known system installed upon a Structure affected by the Installation are not damaged during Installation. Additionally, support the Engineer in working with the Structure Owners, Contractors and Manufactures to develop accurate Drawings. Finally, require the Engineer to update the redline Drawings to show the Climbing Facilities, safety climb (*if present*) and the accurate install location. Best practice is for End Users to notify the Structure Owner when any modification to the Climbing Facilities, Structure or safety climb occurs.

Manufacturers – Support the feedback loop with Contractors and End Users to continually improve the design of Appurtenances. Provide Engineers with up to date design information allowing them to provide communication and direction on the

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Appurtenances in their Drawings. Finally, be specific about limitations on designs, strut angles, collar design specifications and hardware placement.

Engineer –

Utilize data and information provided by End Users to analyze and identify possible issues at the Installation location. Additionally, work in conjunction with End Users to produce Drawings depicting the Installation (including the location of Climbing Facilities on the Structure). Utilize available structural data and consider the location and type of strut angles, attachment of struts, attachment of Appurtenances, and Climbing Facilities hardware when creating the Drawings. Incorporate designs and Appurtenances that, once properly installed, will not adversely impact the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

Contractors –

Always provide a safe work environment for its employees. The use and compliance with the ANSI / ASSP A10.48 standard is a minimum requirement to facilitate a safe work environment. Additionally, Contractors should avail themselves of training that allows them to support their employees regarding the OSHA, ANSI, FCC and FAA requirements at a minimum.

Contractors shall never cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. If an Installation will cause damage, Contractor shall document, in comprehensive detail, then submit documentation and findings to the End User Designee and Structure Owner for resolution that will prevent damage.

Provide feedback to the End User Designee concerning Appurtenances to encourage the improvement of the design, allowing for effective and efficient deployment of communications equipment.

The Safety Equipment Manufacturers Committee ("**SEMC**") has developed guidelines for the Manufacturer and installation of safety climbs for use on Structures designed via the ANSI / TIA 222 standard. If a safety climb will be damaged by the new or modified Appurtenance, then, before proceeding with the Installation Contractor shall promptly notify the End User Designee and shall not cause damage thereto. Contractor shall inspect the Climbing Facilities prior to each use and report deficiencies to the Structure Owners promptly if found.

MANUFACTURERS

Manufacturers of Appurtenances are responsible for designing them to meet ANSI / TIA 222 design requirements. In designing Appurtenances, Manufacturers shall consider the Structure, Climbing Facilities, safety climb (*if present*), and any other known system installed upon a Structure affected by the Installation. Additionally, Manufacturers will endeavor to create designs that minimize or eliminate adverse impacts on the Climbing Facilities, which will require solutions that take into consideration items like step bolts, rung and rail type facilities, and Climbing Facilities that are built into the face of the

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Structure. As a last resort, these solutions may, when required, involve the obstruction of the Climbing Facilities, as allowed by the ANSI / TIA 222 standard.

If a safety climb is installed upon the Structure, it should be considered in the design of the Appurtenance. Currently, there are many commercially available solutions that will aid in the protection of this safety climb and associated hardware. Manufacturers may also design Appurtenances in such a manner which allows the safety climb to pass through or around the Appurtenance without damage. In addition to offering compliant solutions, Manufacturers should supply complete installation instructions, which consider a variety of Installation options that may exist in the field, are included in the assembly package, providing Contractors a resource to complete Installation properly, and in a manner that will not adversely impact the Climbing Facilities or the safety climb.

Original equipment manufacturers (an “*OEM*”) and Manufacturers will also consider options for the transition around or through Appurtenances that may obstruct the Climbing Facilities. To achieve this, Manufacturers can design and develop Appurtenance accessories that allow for the retrofitting of existing Structures and Appurtenances to provide for the safe passage of the safety climb. It is the responsibility of the Contractor to verify that the adjustments to the safety climb comply with Manufacturers’ requirements and the current Safety Equipment Manufacturers’ Consensus Document, “Wire Rope Climb for Antenna Supporting Structures Guide”.

The role of the Manufacturer goes beyond the engineering and fabrication of products; supporting the education of Contractors and the Engineer is of utmost importance. Manufacturers play a role in educating many segments of the telecommunications industry by ensuring that Stakeholders are aware of the products available to improve the quality of an Installation. Working within consensus groups, Manufacturers can identify common areas requiring attention and provide information to Stakeholders, all while still protecting their proprietary solutions and designs. Correspondingly, Stakeholders can provide feedback to Manufacturers which will enable them to design and provide solutions that promote safe access and efficient deployment.

To achieve an effective Installation, Manufacturers seek to have the assistance from the other Stakeholders involved in the process of deploying and maintaining the network infrastructure. The following are some specific areas where assistance would be beneficial:

- End Users –** Feedback on what works well from a manufacturer and what changes could be of benefit in future design change cycles.
- Structure Owners –** Typical issues/problems identified and how to feedback to all manufactures of these issues so the industry can address and make changes.
- Engineer –** Include information available to Engineer within the Drawings depicting the type of Climbing Facilities and where they are/will be located on the Structure. Additionally, Drawings should depict any obstructions on the Structure and where they are located.
- Contractors –** Manufacturers rely on Contractors to be qualified. As such, Contractors should:
(i) create a fall protection plan that considers the specific site issues and conditions; (ii) inspect any attachment or anchor points that will be used for fall

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protection; and (iii) never assume that anchor/attachment points are sufficient without inspection before each use.

Finally, Manufacturers require that Appurtenances are installed upon the type of Structure they were intended for and installed in a manner that meets the design requirements.

ENGINEER

The Engineer undertakes a complex and diverse role throughout the Installation. While there are instances where a single Engineer provides multiple services for an Installation or project, generally, the professional services required for an Installation or project are completed by numerous individuals and/or groups across multiple firms, each of which specializes in a specific service.

Even though best efforts are made to coordinate amongst all Stakeholders, the timing of work orders from multiple End Users with varying degrees of information and scopes of work makes this task difficult. It becomes even more complicated when multiple engineers are working on an Installation or project and there is no single point of contact coordinating their efforts. Due to the foregoing, it is critical that effective communication be fostered and supported by all Stakeholders, particularly End Users.

While the remainder of this section focuses on the creation of Drawings used for permit approval and Installation, the following engineering services will also be required, in most cases, to complete the Installation or project: mount analyses, mount modifications, tower analyses and tower modifications. As part of the production of Drawings, the Engineer will exercise reasonable due diligence and utilize all available data on the site, Structure, Appurtenance (End User specified or not), Climbing Facilities and the Manufacturer's data to provide Drawings that will facilitate installations, modifications and/or maintenance that will not cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. To achieve this, it may be necessary for the Engineer to incorporate universal mounts or other solutions into their deliverables in order to meet End User's requirements. Alternatively, the Engineer may deem it necessary for End Users to authorize the Contractor to perform a site assessment, mount mapping or tower mapping so that the Engineer may provide Drawings that reflect actual site conditions.

The Engineer shall endeavor to perform their services in accordance with the following:

1. Create Drawings promoting awareness of Appurtenance or modification locations with regard to the Climbing Facilities and add specific language to the Drawings stating that the Installation shall not cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.
2. Use data provided by End Users and Structure Owners to identify the elevation of the proposed Installation and the location of the Climbing Facilities, if available;
3. Review and incorporate Manufacturers data and/or current mount analysis and notify the End User Designee if there is not enough engineering documentation to satisfy the requirements of the applicable codes, regulations and industry standards;
4. When there is a modification to an existing Appurtenance, the Engineer shall have the modified state of the Appurtenance represented in the Drawings;

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5. Facilitate communication between the End User, Structure Owner, Contractor and other engineers to address changed conditions on site;
6. Review existing closeout packages and/or redlined Drawings, if any, to identify any obstructions to the Climbing Facilities; &
7. Identify the availability of sufficient data to design a mounting system that will comply with End User's requirements. If, at any point, it is determined that sufficient data is not available (and universal mounts and solutions are not feasible), then the Engineer should recommend that a site assessment, mount mapping or tower mapping is performed, which will determine the location of the Climbing Facilities and other systems installed upon the Structure.

To achieve an effective Installation, the Engineer seeks to have the assistance from the other Stakeholders involved in the process of deploying and maintaining the network infrastructure. The following are some specific areas where assistance would be beneficial:

End Users –

Provide authorization for Engineer to perform the scope of work for the Installation (this may be done via a Notice To Proceed, Purchase Order, or other mechanism agreed to by the relevant Stakeholders) and communicate the authority of the Engineer to the other Stakeholders. Supply Engineer with complete and accurate data so that they can facilitate the creation of accurate and effective Drawings that protect the Structure, Climbing Facilities, safety climb (*if present*), and any other known system installed upon a Structure affected by the Installation. This includes the support necessary to address unknown or changed conditions on a site. Allow the Engineer to recommend changes to the type and/or location of the mounts or appurtenance system. Produce a documented scope of work delineating the expectations, responsibilities and authority of the Engineer to promote Installations that do not damage the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

Post Installation, End Users shall verify that the Installation did not damage the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. Any changed conditions to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation shall be communicated to the Structure Owner.

Facilitate communication between the Engineer, Structure Owners and Contractor to address issues that impact the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

Structure Owners –

Supply to the Engineer all available Structure Drawings (including originals) and previous installation redlines that delineate the type, dimensions, sizing and location(s) of the Climbing Facilities.

Facilitate communication between the Engineer, End Users and Contractor to address issues that impact the Structure, Climbing Facilities, safety climb (*if*

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present), or any other known system installed upon a Structure affected by the Installation. Provide authorization for Engineer to perform the scope of work for the Installation (this may be done via a Notice To Proceed, Purchase Order, or other mechanism agreed to by the relevant Stakeholders).

Manufacturers – Provide design options to allow Engineer flexibility to make changes that will not cause damage the Structure, Climbing Facilities, safety climb (*if present*), and any other known system installed upon a Structure affected by the Installation.

Contractors – If there are site conditions that preclude the proper Installation of the Appurtenance as articulated in the Drawings distributed by the End User, then Contractor shall communicate with the End User Designee prior to Installation. For instance, if there is a material difference in the supplied Drawings and what was previously installed on the Structure, Contractor shall communicate with the End User Designee so the Drawings can be properly updated. The Installation shall not deviate from the supplied Drawings unless directed to do so by the End User Designee.

Additionally, Contractor is expected to be aware of the applicable regulations, industry standards, Manufacturer's requirements and engineering designs prior to performing the Installation. The Installation shall not be completed in a manner that causes damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

CONTRACTORS

Contractors engaged in the deployment, installation, and maintenance of Structures shall provide a safe work environment for its employees. It is never the intent of a Contractor to cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. Contractors will review the Drawings and any other documentation provided and facilitate on-site feedback to the appropriate Stakeholders to avoid an Installation that will damage the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. As a part of this feedback, Contractors will communicate changed conditions, obstructions, and any other discrepancy to the other Stakeholders in order to facilitate adjustment to the design or Appurtenance supplied. Contractors shall endeavor to perform Installations in compliance with the following:

1. Ensure that all personnel are properly trained in compliance with the applicable codes, regulations and industry standards, including, without limitation, OSHA, ANSI / TIA 222, Safety Equipment Manufacturers Consensus document, ANSI / ASSP A10.48, FAA marking and lighting requirements, FCC OET 56, 65, and other local laws that may affect the Climbing Facilities;
2. Review of available site information to create a plan to perform the scope of work in accordance with the applicable site and design requirements. If Contractor does not have the necessary information to perform its duties, Contractor shall immediately request said information and remain in active communication with the Stakeholders;

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3. Employ qualified personnel that can assess changed conditions or obstructions and communicate with the End User Designee;
4. Consistent with the applicable scope of work, document the Climbing Facilities (if not shown) and any known issues with the Structure, Climbing Facilities, safety climb (*if present*), and any other known system installed upon a Structure affected by the Installation within the scope of work;
5. Understand Manufacturer's and regulatory requirements for the safety climb and Climbing Facilities;
6. Develop an on-site fall protection plan that addresses the Structure, Climbing Facilities and climbing path; &
7. Perform the authorized scope of work in accordance with the applicable site design and Drawings.

To complete an Installation that does not cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation, the following are some specific areas where assistance would be beneficial:

End Users –

Facilitate effective communication amongst the Stakeholders, particularly Manufacturers, so Contractors are provided with Appurtenances and systems that meet industry standards and allow for an effective Installation that will not cause damage to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. End Users must educate their staff to understand the importance of an Installation and how to use feedback from Contractors to facilitate communication amongst Manufacturers, Structure Owners and the Engineer so that said parties may develop designs that eliminate or neutralize damage and obstructions to the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation.

Provide authorization for Contractor to perform the scope of work for the Installation (this may be done via a Notice To Proceed, Purchase Order, or other mechanism agreed to by the relevant Stakeholders).

Structure Owners –

Communicate with the Engineer to provide information on where and what type of Climbing Facilities are present; which allows the Engineer and End Users to select Appurtenances that will not adversely impact the Structure, Climbing Facilities, safety climb (*if present*), or any other known system installed upon a Structure affected by the Installation. Foster strong communication between Stakeholders concerning known issues and support effective reporting of issues to allow for documentation and resolution.

Provide authorization for Contractor to perform the scope of work for the Installation (this may be done via a Notice To Proceed, Purchase Order, or other mechanism agreed to by the relevant Stakeholders).

Manufacturers –

Create designs that consider the Climbing Facilities and safety climb (*if present*). Provide options for consideration when climbing path obstruction is necessary that will aid in the transition past the obstruction in allowing for 100% connection 100% of the time. Manufacturers shall provide complete installation directions

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and drawings that: (i) address the location(s) of members tolerances; (ii) design allowances so the Climbing Facilities are not damaged; and (iii) facilitate the pass through or bypass of a wire rope safety climb. Designs should also allow for some universality of the design to allow for Installation on Structures where the Climbing Facilities are unknown (I.E. a self-supporting tower with leg mounts, assume that one of the legs has Climbing Facilities and that it may be equipped with a safety climb).

Engineer –

Communicate with Stakeholders to produce Drawings showing the Installation in detail, including, without limitation, the exact location of Climbing Facilities on a Structure. Engineer provided Drawings should consider the location and type of strut angles, attachment of struts, attachment detail of the Appurtenance to the Structure, and Climbing Facilities hardware (E.G. pegs).

CLOSING STATEMENT

All Stakeholders are encouraged to use this White Paper. It is intended to coordinate communication, data, design improvements, feedback, and installations that do not cause damage to the structure, climbing facility, safety climb if present or any other system installed on the structure. This White Paper was created to support the understanding and education of roles and responsibilities of each Stakeholder. The working group intends to utilize feedback from Stakeholders to improve this White Paper over time. Suggestions and feedback can be provided via a portal on the TIF website.

The TIF Board of Directors and the working group will not comment on site specific issues. However, there may be published answers to questions that seek to add clarity to the Climbing Facilities, roles and responsibilities.

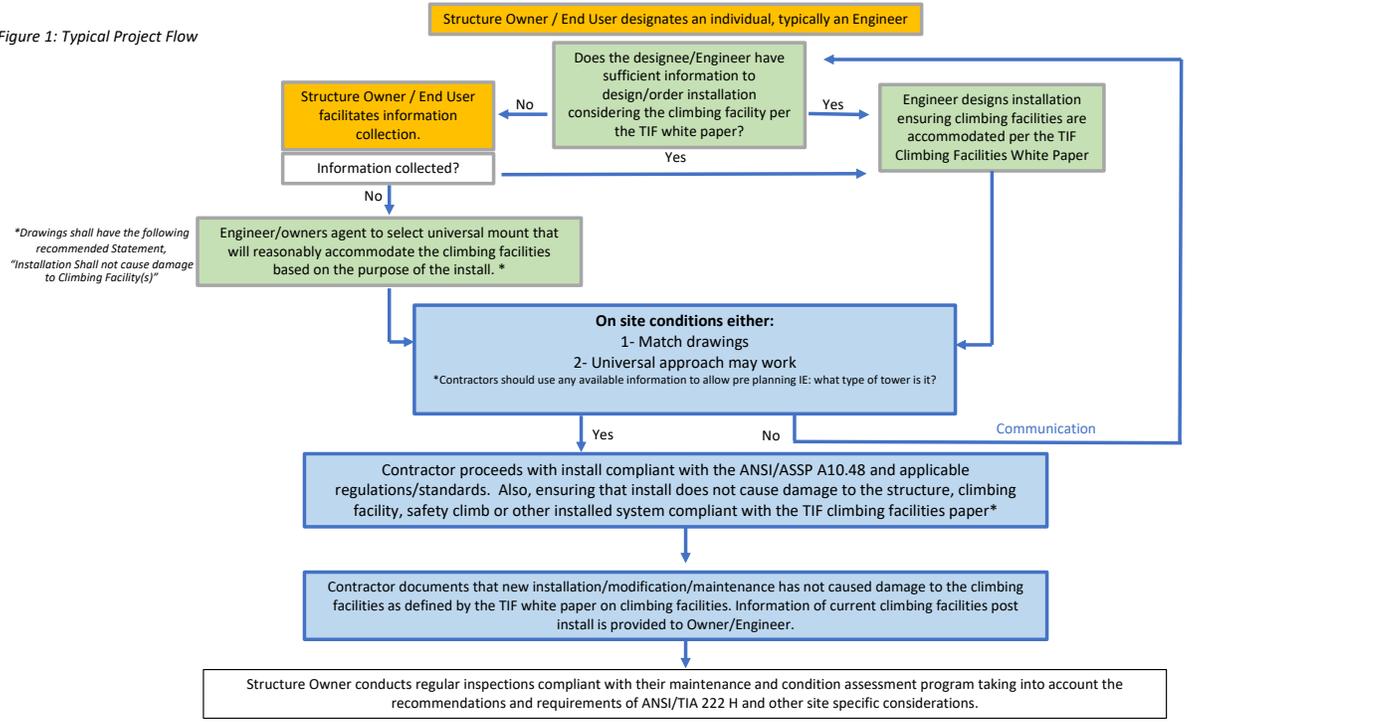
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APPENDIX A

APPURTENANCE INSTALLATION DECISION TREE

Figure 1: Typical Project Flow



Note: Process shown is typical for the installation/modification/maintenance of towers and appurtenances and consideration of the climbing facilities as defined in the TIF Climbing Facilities White Paper. End user, contractor shall report final configuration of the climbing facilities.

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REFERENCES

- “Wire Rope Climb for Antenna Supporting Structures Guide”
 - (Available on https://global.ihs.com/foundation_white_papers.cfm)
- ANSI / ASSP A10.48
- ANSI / TIA 222 Rev. H
- ANSI / TIA 322
- 2018 IBC

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