

## SECTION 01010

### SUMMARY OF WORK

(IBB M&R Project No. 6113, Refurbish Antenna Towers at IBB Saipan Tinian Transmitting Station at the Commonwealth of the Northern Mariana Islands)

#### GENERAL

To fix corrosion damage, the Contractor is required to provide all necessary personnel, materials, equipment to satisfactorily complete the work of the base award and the optional work if awarded on specified antenna towers as shown in the *Table No. 1, Antenna Towers at Saipan Site* and as shown in the *Table No. 2, Antenna Towers at Tinian Site* at IBB Saipan Tinian Transmitting Station at the Commonwealth of the Northern Mariana Islands. The Contractor shall coordinate the work of this Section with all other Sections and shall comply with requirements of all other Sections as required.

Table No. 1, Antenna Towers at Saipan Site

Antenna Tower Designation	Tower Type	Approximate Tower Height, Ft
Tower No. A and Tower No. B	Guyed tower with triangular section of mast	171
Tower No. C, Tower No. D, and Tower No. E	Self-supporting four leg Tower	170.5

Table No. 2, Antenna Towers at Tinian Site

Antenna Tower Designation	Tower Type	Approximate Tower Height, Ft
Tower No. 1	Guyed tower with triangular section of mast	238
Tower No. 2	Guyed tower with triangular section of mast	429
Tower No. 3	Guyed tower with triangular section of mast	429
Tower No. 4	Guyed tower with triangular section of mast	429
Tower No. 5	Guyed tower with triangular section of mast	238
Tower No. 6	Guyed tower with triangular section of mast	313
Tower No. 7	Guyed tower with triangular section of mast	313
Tower No. 8	Guyed tower with triangular section of mast	298
Tower No. 9	Guyed tower with triangular section of mast	173
Tower No. 10	Guyed tower with triangular section of mast	177
Tower No. 11	Guyed tower with triangular section of mast	313
Tower No. 12	Guyed tower with triangular section of mast	319
Tower No. 13	Guyed tower with triangular section of mast	216

Note: The heights of the antenna towers provided in the above tables are not for construction but for reference only. The Contractor is required and is responsible to field verify all dimensions prior to construction.

The Commonwealth of the Northern Mariana Islands consists of three major islands. They are Rota, Saipan, and Tinian islands, which are all situated in the Pacific Ocean about 3,800 miles southwest of Honolulu, Hawaii, about 1,560 miles southeast of Tokyo, Japan, and about 140 miles north of island of Guam. IBB Saipan Tinian Transmitting Station consists of two transmitting sites of Saipan and Tinian, which are separated by about five air miles. The climate of Saipan and Tinian is tropical with average temperature in the mid 80<sup>0</sup>F. The local dry season is from December through June, and the rainy season runs from July through November. Travelers to IBB Saipan Tinian Transmitting Station usually fly through Honolulu or Tokyo and arrive at Saipan International Airport. Travelers then take small commercial airplanes with seats about five passages to fly between Saipan and Tinian during the daytime. Commercial ferry services between Saipan and Tinian is also available during the daytime. IBB Station manager's permanent duty station is located at Saipan.

IBB Saipan Transmitting site is about 7.4 acres and is located at southwest corner of Saipan near the airport. IBB Tinian Transmitting site is about 838 acres and is located at northwest corner of Tinian.

The work of refurbishing specified antenna towers including optional work includes but is not limited to: replacement of corroded structural members and fasteners, replacement of corroded climbing ladders, replacement of corroded personal fall arrest protective systems, replacement of corroded platforms, replacement of corroded guard posts on the platforms, repair of corroded guy anchor rods as required and other repair work as specified in the technical specifications. The Contractor shall not damage any existing structures or equipment at the sites or he will be responsible for the repair and/or the replacement at no cost to the Government. The Contractor is also required to:

1. Coordinate the work with the Station's operation and broadcasting schedules to minimize any disruption to the ongoing Station's operation and broadcasting.
2. Climb antenna towers and properly identify each corroded structural members and fasteners that are required to be replaced. The Contractor may consider using proper markers such as crayons for marking purpose. Start the work by identifying and replacing the most severely corroded structural members and fasteners first. Generally, steel corrosions are more severe with the increase of elevation.
3. Complete all contract work; conduct proper quality control and comprehensive inspection prior to informing Government for final inspection.
4. Properly dispose of removed steel, clean the sites, and promptly correct all identified deficiencies.

## **LOCATIONS**

The Contractor is required to perform and finish the contract work at the IBB Saipan Tinian Transmitting Station at Saipan and Tinian islands of the Commonwealth of the Northern Mariana Islands.

## **WORKING HOURS AND COORDINATION**

The Contractor is required to coordinate the work and comply with IBB Station's normal operation hours Monday through Friday, 8:00 AM until 4:30 PM except local and Federal holidays. The Contractor is not permitted to work outside of the Station's normal operation hours and is not permitted to work alone without any Government's supervision at each site. All requests of working outside of the Station's normal operation hours or overtime will be reviewed case by case and ultimately decided by the Station manager and the Contracting Officer. Decisions of allowing or disallowing working outside of Station's normal operation hours or overtime will be made based on availabilities of Station's staff and contingent on availability of Government resources.

Disruptions or interruptions to any ongoing antenna broadcasting at each site must be closely coordinated with IBB Station manager and be approved by the Station manager prior to starting to work. Under no circumstances shall work begin on any antenna prior to coordination with the IBB station manager. The Contractor shall develop a working plan that will include coordination of construction activities with the IBB Station manager and a means of verifying that the antennas are de-energized prior to starting the contract work.

The Contractor shall provide qualified and experienced supervisory personnel and laborers necessary to perform the contract work. As a minimum, one supervisor personnel is required to be present at each working site during the entire working hours for every working day during the performance of the contract work. The contractor's on site supervisor shall be fluent in English. All contractor personnel shall conduct themselves in a professional and courteous manner and shall fully comply with OSHA construction safety regulations, OSHA fall protection regulations, and IBB safety policies at each site. Climbing or working on any antenna towers without 100% fall protection will not be permitted.

## **SUMMITTALS**

The Contractor is required to submit five (5) hard copies for each submittal that is specified in the technical sections to IBB Headquarters in Washington, DC for review, information, or approval. All submittals shall be sent to:

Attention: Richard Cai, P.E., S.E.  
Room No. 4456  
Cohen Federal Building  
333 Independence Ave. SW  
Washington, DC 20237

Dir. Tel. No. (202) 205 -0680  
E-mail: RCAI@IBB.GOV

## SUBMITTAL PROCEDURES

Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix. Identify Project, Contractor, subcontractor and supplier, pertinent drawing and detail number, and specification section number, appropriate to submittal. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions and coordination of information is in accordance with requirements of the work and Contract Documents.

IBB approval is required for the following submittals:

No.	Submittals	Section of Specifications
1	Working Plan	02220 Metal Removal and Disposal
2	Structural Design Calculations and Drawings of Steel Climbing Ladders	05121 Replacement of the existing climbing ladders on antenna towers
3	Working Plan	05121 Replacement of the existing climbing ladders on antenna towers
4	Certificates	05121 Replacement of the existing climbing ladders on antenna towers
5	Working Plan	05120 Structural Maintenance Work
6	Mechanical Specifications and Product Data	05120 Structural Maintenance Work
7	Structural Design Calculations and Drawings	05122 Personal Fall Arrest Protective System
8	Working Plan	05122 Personal Fall Arrest Protective System
9	Zinc Coating Repair Material	05120, 05121, 05122, and 05055

IBB approval is not required for the following submittals:

No.	Submittals	Section of Specifications
1	Record of All Replacements	05120 Structural Maintenance Work
2	Product Data	05122 Personal Fall Arrest Protective System
3	Certificates	05122 Personal Fall Arrest Protective System
4	Shipping Bill	05055 Metal Work
5	Certifications and Qualifications of Welders, Welding Operations, and Welding Inspectors	05055 Metal Work
6	Tests, Inspections, Verifications, and Welding Testing Records	05055 Metal Work

Schedule submittals to expedite project, and deliver to IBB. Coordinate submission of related items. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor. Identify variations from the Contract Documents and product or system limitations, which may be detrimental to successful performance of completed Work. Allow space on submittals for the Contractor and IBB AR/CO review stamps. When revised for resubmission, identify changes made since previous submission. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

## **MEETINGS**

After IBB has awarded the contract and before the Contractor purchases the material, the Contractor (include his project manager) is required to attend one contract review meeting at IBB Headquarters in Washington, DC and to attend onsite pre-construction meetings at Saipan site and Tinian site. The Contractor is fully responsible for all his travel expenses that are associated with the meetings. AR/CO will coordinate with the Contractor and schedule the meetings.

Agenda of the contract review meeting at IBB Headquarters in Washington, DC:

1. Review contract work.
2. Review preliminary construction schedule.
3. Discuss any potential difficulties that the Contractor may encounter

Agenda of the onsite pre-construction meetings at Saipan and Tinian:

1. Review contract work. The Contractor is strongly recommended to consider arriving at sites in advance and to consider climbing antenna towers in order to fully understand the actual steel corrosion conditions and the amount of the contract work.
2. Review Station's normal operation hours and broadcasting schedules and discuss the practical working hours and sequences.
3. Review detailed project construction schedule. Establish work starting and finishing dates for each site.
4. Review Contractor's staging area at each site.
5. Discuss any potential difficulties that the Contractor may encounter

The Contractor is responsible for productions and distributions of the meeting minutes (draft and final) to participants within five (5) working days after each meeting.

## **PRODUCT DELIVERY REQUIREMENTS**

Transport and handle products with proper care and in accordance with manufacturer's instructions. Promptly inspect shipments to ensure products comply with the requirements of the contract, quantities are correct, and products are undamaged. Promptly repair or replace any damaged parts. Provide necessary equipment and personnel to load, unload, and transport all material to each site.

## **PRODUCT STORAGE AND HANDLING REQUIREMENTS**

Store and protect all material in accordance with care and manufacturers' instructions. Store with seals and labels intact and legible. Arrange storage of products to permit access for Government inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

## **CONSTRUCTION ACTIVITIES AT EACH SITE**

Conduct regular quality control. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship. Perform the work by persons qualified to produce required and specified quality.

## **QUALITY CONTROL AND INSPECTION**

The Contractor shall conduct independent inspection for all complete repair work. The Contractor's inspectors must climb antenna towers to conduct independent and comprehensive inspection for all complete repairs on each antenna tower. All deficiencies shall be fixed and re-inspected prior to Government final acceptance inspection.

The Contractor is required to provide the Government with an advance notice of not less than 45 working days for the final acceptance inspection at each site. The Contractor shall coordinate with the Government for final acceptance inspection and shall promptly fix all identified deficiencies at each site.

## **REFERENCES**

For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code. Obtain copies of standards where required by product specification sections. When specified reference standards conflict with Contract Documents, request clarification from IBB AR/CO before proceeding. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of IBB AR/CO shall be altered from Contract Documents by mention or inference otherwise in reference documents.

## **CLEANING**

Maintain working areas free of waste materials, debris, and rubbish. Remove debris and rubbish from site and dispose off-site promptly. Maintain each site in a clean and orderly condition.

## **WARRANTY**

All materials and workmanship shall be under warranty for a period of one year after final acceptance of the work by IBB. The Contractor is fully responsible for all expenses including travel, shipping, labor, and material that are associated with the warranty repair work.

END OF SECTION

## SECTION 02220

### METAL REMOVAL AND DISPOSAL

#### GENERAL

This section describes work of removal and disposal of the existing rusted and corroded steel climbing ladders including existing rigid rail personal fall arrest protective systems, corroded steel members and fasteners, corroded guardrails including posts, corroded platforms, and corroded steel gratings from the Antenna Tower No. A, B, C, D, and E at Saipan and the Antenna Tower No. 1-13 at Tinian site. The Contractor shall coordinate the work of this Section with all other Sections and shall comply with requirements of all other Sections as required. All removed steel members and fasteners are prohibited to be reused.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.

#### **Work at Saipan Site:**

Remove and dispose of corroded fasteners, corroded platforms, and other corroded parts from Antenna Tower No. A, B, C, D, and E.

Remove and dispose of corroded steel members and corroded steel climbing ladders top to bottom from Antenna Tower No. A and B. The Contractor is required to disassemble, preserve, and reinstall the recently installed fall arrest protective systems on the new climbing ladders on these towers.

#### **Work at Tinian Site:**

Remove and dispose of corroded fasteners, corroded gratings, corroded guardrails including posts, and other corroded parts from Antenna Tower No. 1-13.

Remove and dispose of corroded steel climbing ladders top to bottom including rigid rail personal fall arrest protective systems from Antenna Tower No. 1-13.

#### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

#### OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Part 1910 Occupational Safety and Health Standards, 29 Code of Federal Regulations (CFR), Subpart M, Fall Protection, 1926.500, 1926.501, 1926.502, 1926.503 and any other applicable requirements in 29 CFR 1926 Construction Industry

EM 385-1-1 (2003) Safety and Health Requirements Manual By U.S. Army Corps of Engineers

## TELECOMMUNICATION INDUSTRY ASSOCIATION

TIA-222-G (2006) Structural Standard for Antenna Supporting Structures and Antennas

### **SUBMITTALS**

Government approval is required for submittals with a "G" designation; submittals with a "FIO" designation are submitted for information only.

#### **Working Plan (G, five sets)**

The Contractor is required to submit detailed working plans that contain:

- A working schedule with the consideration and coordination of the IBB Station broadcasting schedule and the normal working hours.
- Qualifications and names of designated PM and site supervisor.
- Descriptions and procedures of how to accomplish the work.
- A health and safety plan that addresses workers' health, safety protection in compliance with applicable Federal, State, and local rules and regulations.
- A rigging plan that addresses how to carry out the removal of metal from the antenna towers, descriptions of each hand tool and power tool to be used, and how to transport the removed metal from the antenna towers to the ground.
- A RF safety plan which describes how all workers on site monitor and safeguard each other against potential excessive RF exposure.
- A disposal plan that addresses how to carry out the disposal.
- A fire prevention and responding plan with descriptions of how many fire extinguishers will be placed near the work at each site.

### **EXECUTION**

When performing the contract work, the Contractor is required to comply with Federal, State, and local health and safety regulations especially health and safety requirements that are outlined in TIA-222-G, EM 385-1-1 (2003) Safety and Health Requirements Manual By U.S. Army Corps of Engineers, Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR).

The Contractor shall coordinate the work with the Government, IBB Station working and operational schedules, and the broadcasting schedules to prevent and minimize any disruption to the ongoing Government operation and broadcasting at sites. The Contractor shall take necessary measures to protect Government properties at sites and to prevent the antenna towers from receiving any damage while performing the work.

Use hand tools or power tools to conduct metal removal work. Corroded fasteners may be jammed in the joints that may require extra planning and effort to properly remove them. Do not use dangerous gas or flame cutting practice to perform metal removal

work on any antenna towers or in the antenna field. Do not use dangerous free-falling practice to transport any removed metal from any antenna towers to the ground. All removed metal shall be safely transported from the antenna towers to the ground.

All removed metal shall be placed temporary in the Government designated areas, and they shall be removed promptly from the sites in accordance with the applicable Federal, State, and local rules and regulations.

Before beginning any metal removal work, the Contractor shall survey each site and verify and confirm the contents of the work. The Contractor shall take necessary precautions to avoid overstress, damage any existing antenna towers and their structural members.

During the metal removal work the Contractor shall take necessary actions to protect all government properties and all personnel working in and around each site. Any damaged members and parts caused by the Contractor shall be promptly repaired or replaced at no cost to the Government. Removal of other-than-specified metal from any antenna towers will not be permitted. The Contractor shall coordinate the work of this section with all other work and shall ensure that structural elements will not be overstressed or permanently deformed or damaged.

Smoking on any antenna tower or in the antenna field will not be permitted. Sparks that are generated by hand tools or power tools must be properly contained to prevent them from falling into the antenna field and to prevent the fire from occurring in the antenna field. The Contractor shall place reasonable fire extinguishers near the work in each antenna field in order to be able to quickly respond to and extinguish a fire if it occurs.

## **CLEAN UP**

All debris and rubbish shall be removed from IBB sites. Debris shall be removed and transported in a manner to prevent spillage on streets. Comply with applicable Federal, State, and local rules and regulations regarding hauling and disposal.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.



Photo No. 1, Tinian Site

Note:

This photo was taken from antenna tower No. 9 looking toward Antenna Tower No. 8, 7, 6, 5, 4, 3, 2, 1, 10, 11, 12, and 13.



Photo No. 2, Top of the Climbing Ladder and the Outrigger Structure, Tinian Site



Photo No. 3, Top of the Climbing Ladder and the Outrigger Structure, Tinian Site



Photo No. 4, Climbing Ladder on Antenna Tower, Tinian Site



Photo No. 5, Connection Detail of the Climbing Ladder on Antenna Tower, Tinian Site



Photo No. 6, Connection Detail of the Climbing Ladder on Antenna Tower, Tinian Site



Photo No. 7, Climbing Ladder on Antenna Tower, Tinian Site



T

Photo No. 8, Climbing Ladder on Antenna Tower, Tinian Site



Photo No. 9, Corroded Guardrails Including Posts Around the Platform, Tinian Site



Photo No. 10, Climbing Ladder on Antenna Tower, Tinian Site



Photo No. 11, Climbing Ladder Offset at Platform, Tinian Site



Photo No. 12, Climbing Ladder on Antenna Tower, Tinian Site



Photo No. 13, Mast Base of Guyed Antenna Tower, Saipan Site



Photo No. 14, Climbing Ladder on Guyed Antenna Tower, Saipan Site



Photo No. 15, Climbing Ladder on Guyed Antenna Tower, Saipan Site



Photo No. 16, Climbing Ladder on Guyed Antenna Tower, Saipan Site



Photo No. 17, Corroded Diagonal Bracing Member on Guyed Antenna Tower, Saipan Site



Photo No. 18, Corroded Diagonal Bracing Member on Guyed Antenna Tower, Saipan Site



Photo No. 19, Corroded Steel Grating on Guyed Antenna Tower, Saipan Site

END OF SECTION

## SECTION 05055

### METAL WORK

#### GENERAL

This section describes metal work, fabrication, and inspection of climbing ladders, personal fall arrest protective systems, guardrails including posts, and platforms. The Contractor is responsible for field identification, determination, and verification of all sizes or dimensions of the rusted or corroded structural steel members and fasteners that are required to be replaced. The Contractor shall coordinate the work of this Section with all other Sections and shall comply with requirements of all other Sections as required. All removed steel members and fasteners are prohibited to be reused. Used or recycled material for the replacements will not be accepted.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.

#### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM A 36/A36M (2004) Carbon Structural Steel
- ASTM A 500 (1984) Specification for Cold-formed Welded and Seamless carbon Steel Structural Tubing in rounds and Shapes
- ASTM A 123/123M (2002) Zinc (Hot-Dip Galvanized) Coatings On Iron and Steel Products
- ASTM A 153/A 153M (2004), Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- ASTM A 325 (2006) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
- ASTM A325M (2005) Structural Bolts, Steel, Heat Treated, 830 Mpa Minimum Tensile Strength (Metric)
- ASTM A 514/A 514M (1994a) High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding

ASTM A 780 (2001) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM E 94 (1993) Radiographic Testing

ASTM E 165 (1995) Liquid Penetrant Examination Inspection Method

ASTM E 709 (1995) Magnetic Particle Examination

ASTM A 1023 (2002) Stranded Carbon Steel Wire Ropes for General Purposes

#### AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 (2000) Structural Welding Code – Steel

#### AMERICAN INSTITUTE OF STEEL CONSTRUCTION

AISC ASD Manual (1989) Manual of Steel Construction Allowable Stress Design

#### Telecommunications Industry Association

TIA-222-G (2005) Structural Standard for Antenna Supporting Structures and Antennas

#### Research Council on Structural Connections (RCSC)

RCSC (2004) Specification for Structural Joints Using ASTM A325 or A490 Bolts

#### OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR)

### **SUBMITTALS**

Government approval is required for submittals with a "G" designation; submittals with a "FIO" designation are submitted for information only.

#### **1. Shipping Bills (FIO, five sets)**

One set of shipping bill shall be submitted to IBB HQ in Washington DC and two sets to IBB CNMI Station prior to material delivery or arrival.

**2. Certifications and Qualification of Welders, Welding Operators, Welding Inspectors and Welding Testing Records (FIO, five sets)**

Copies of certifications of welders, welding operators, and welding inspectors shall be submitted prior to commencing steel fabrication.

Records of welding tests including inspections and verifications of welding for the materials and the fabrication shall be submitted.

**3. Zinc Coating Repair Material (G, five sets)**

Material specifications and instructions of application

**QUALIFICATION OF WELDERS, WELDING INSPECTORS, AND WELDING OPERATORS**

Welders, welding inspectors, and welding operators shall be current AWS certified welders, AWS certified welding inspectors, and AWS certified welding operators. The certificates shall show the qualified welders by names and shall specify the welding codes and procedures, and the dates of the qualifications or certifications were issued.

The Contractor shall certify that only AWS certified welders, inspectors, and operators will perform the contract work. The qualifications of the welders and the welding operators shall be qualified and certified for the particular type of work to be done in accordance with the requirements of AWS D1.1 prior to commencing steel fabrication.

All expenses in seeking certifications of the welders, inspectors, and operators are solely borne by the Contractor. Non-qualified and non-certified welders, inspectors, and operators by AWS are prohibited from performing any welding and inspection of the contract work.

**MATERIALS**

All steel shapes, plates, and bars shall conform to ASTM A36/A36M ( $F_Y = 36$  ksi). Dual certified steel conforming to ASTM A36/A36M ( $F_Y = 36$  ksi) and A572 Grade 50 ( $F_Y = 50$  ksi) is acceptable. Use ASTM A36 steel for all steel replacement. Use high strength bolts for all bolt replacements. Use ASTM A307 J or U-bolts for all J or U-bolt replacements.

High strength bolts, nuts, and washers:

Bolts: ASTM A325 type 1; Nuts: ASTM A563DH; Washers: ASTM F436-1.

When high strength bolts are used for bearing type connections and are defined as snug-tightened joints, helical spring-lock washers ASME B18.21.1 are required to be used and be installed under the nuts.

J or U-bolts, nuts and washers:

J or U-bolts: ASTM A307 Grade C,  $f_y = 36$  ksi min.; Nuts: ASTM A563A Heavy Hex; Washers: ASTM F844.

## **FABRICATION**

When performing the contract work, the Contractor is required to comply with TIA-222-G, AISC ASD, AWS D1.1, RCSC, and Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR).

Steel must be straight before being laid off or worked. If straightening is necessary, it shall be done by methods that do not impair the metal. Sharp kinks or bends shall be the cause for rejection of the material. Material with welds will not be accepted. Used or recycled material will not be accepted. Where heating is required, precautions shall be taken to avoid overheating the metal, and it shall be allowed to cool in a manner that will not impair the original properties of the metal. Flame cutting of material other than structural steel shall be subject to approval and shall be indicated in the submittals. Shearing shall be accurate and all portions of the work shall be neatly finished. Corners shall be square and true unless otherwise shown. Re-entrant cuts shall be filleted to a minimum radius of 3/4 inch unless otherwise approved. Finished members shall be free of twists and bends.

Steel may be cut by mechanically guided or hand-guided torches with accurate profiles that are smooth and free of cracks and notches. Steel surfaces and edges to be welded shall be prepared in accordance with AWS D1.1. Remove slag and sharp edges by chipping, grinding, or other means.

### **Steel Welding**

Welding procedures of steel shall be prequalified as described in AWS D1.1 or shall be qualified by tests as prescribed in AWS D1.1.

Welding process of steel shall be performed by an electric arc welding process and shall conform to the applicable provisions of AWS D1.1. Welding shall be performed to minimize residual stresses, distortion, and shrinkage.

#### **Welding Technique**

Filler Metal - Electrodes, electrode-flux combination and grades of weld metal shall conform to the appropriate AWS D1.1 for the base metal and welding process being used or shall be as shown where a specific choice of AWS D1.1 is permitted. The AWS D1.1 designations of the electrodes to be used shall be included in the schedule of welding procedures. Only low hydrogen electrodes shall be used for manual shielded metal-arc welding regardless of the thickness of the steel. A controlled temperature storage oven shall be used at the welding shop as prescribed by AWS D1.1 to maintain low moisture of low hydrogen electrodes.

Preheat and Interpass Temperature - Preheating shall be performed as required by AWS D1.1 or as otherwise specified except that the temperature of the base metal shall be at least 70 degrees F. The weldments to be preheated shall be slowly and uniformly

heated by approved means to the prescribed temperature, held at that temperature until the welding is completed and then permitted to cool slowly in still air.

Workmanship - Workmanship for welding shall be in accordance with AWS D1.1.

Preparation of Base Metal - Prior to welding, the Contractor shall inspect the metal surfaces to be welded to assure compliance with AWS D1.1.

Temporary Welds - Temporary welds required for fabrication shall be made under the controlled conditions prescribed for permanent work. Temporary welds shall be made using low-hydrogen welding electrodes and by welders qualified for permanent work as specified in these specifications. Preheating for temporary welds shall be as required by AWS D1.1 for permanent welds except the temperature of the base metal shall be at least 70 degrees F in any case. In making temporary welds arcs shall not be struck in other than weld locations. Each temporary weld shall be removed and ground flush with adjacent surfaces after serving its purpose.

Tack Welds - Tacks welds that are to be incorporated into the permanent work shall be subject to the same quality requirements as the permanent welds and shall be cleaned and thoroughly fused with permanent welds. Preheating shall be performed as specified above for temporary welds. Multiple-pass tack welds shall have cascaded ends. Defective tack welds shall be removed before permanent welding.

The Contractor is not permitted to perform any steel welding in any antenna field.

### **Bolted Connections**

Bolts, nuts, and washers shall be of the type specified. All nuts shall be equipped with washers unless otherwise noted. Beveled washers shall be used where bearing faces have a slope of more than 1:20 with respect to a plane normal to the bolt axis. Where the use of high strength bolts is specified, the materials, workmanship, and installation shall conform to the RCSC (2004) Specification for Structural Joints Using ASTM A325 or A490 Bolts.

Bolt Holes - Bolt holes shall be accurately located, smooth, perpendicular to the member and cylindrical.

Holes for regular bolts shall be drilled or subdrilled and reamed in the shop and shall not be more than 1/16 inch larger than the diameter of the bolt.

Holes for high strength bolts shall have diameters of not more than 1/16 inch larger than bolt diameters. If the thickness of the material is not greater than the diameter of the bolts the holes may be punched. If the thickness of the material is greater than the diameter of the bolts the holes may be drilled full size or subpunched or subdrilled at least 1/8 inch smaller than the diameter of the bolts and then reamed to full size. Poor matching of holes will be cause for rejection. Drifting occurring during assembly shall not distort the metal or enlarge the holes. Reaming to a larger diameter of the next

standard size bolt or slot will not be permitted without AR/CO's review and approval during the installation.

### **Installation and Tightening of Bolts**

All installation and tightening of high strength bolts ASTM A325/A325M shall be in accordance with RCSC (2004) Specification for Structural Joints Using ASTM A325 or A490 Bolts.

To avoid corrosion acceleration, using combinations of dissimilar material such as stainless steel and carbon steel shall be avoided.

### **FABRICATION FINISHES**

All steel finish shall be hot-dip zinc galvanized in accordance with ASTM A 123/A 123M.

Each steel fastener finish including high strength bolts, nuts, washers, bolts, J and U-bolts, saddle clips and wire rope clips shall be hot-dip zinc galvanized in accordance with ASTM A 153/A 153M.

### **Repair of Zinc-Coated Steel Surfaces**

Zinc galvanized finish on steel could be damaged due to rough handling during shipping or installation. The Contractor is required to repair all damaged zinc galvanized finish coating surfaces of steel and steel fasteners with qualified zinc coating repair material that meets or exceeds the requirements of ASTM A 780 -01, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings for repairing the damaged galvanized steel surfaces. Zinc coating repair material that does not meet or is lack of proof to meet the requirements of ASTM A780 will not be permitted to be used at sites.

The Contractor may consider following qualified zinc coating repair material for repairing the damaged zinc-coated steel surfaces:

- ZRC® Cold Galvanizing Compound or
- ZRC Galvilite®

ZRC Corporate Headquarters  
145 Enterprise Drive  
Marshfield, MA 02050 USA

Phone:(781) 319-0400  
Toll-Free:(800) 831-3275  
Fax: (781) 319-0404

## **TESTS, INSPECTIONS, AND VERIFICATIONS**

The Contractor is required to conduct his own quality control and to inspect, test, and verify the quality of each steel fabrication and installation of the contract work. The Government may conduct inspection of steel fabrication at Contractor's workshop. The Contractor is required to coordinate and provide necessary and safe access, support, and assistance to the Government during the inspection and to take prompt measures to correct each identified deficiency.

### **Inspection of Steel Welding**

The Contractor shall maintain a qualified inspection program and shall perform inspections of steel fabrication work. All welding shall be subject to inspection to determine conformance with the requirements of AWS D1.1.

### **Visual Examination of Steel Welding**

The Contractor shall conduct visual examinations for all completed welds. All completed welds shall be cleaned and carefully examined for insufficient throat or leg sizes, cracks, undercutting, overlap, excessive convexity or reinforcement and other surface defects to ensure compliance with the requirements of AWS D1.1.

### **Non-destructive Testing of Steel Welding**

The Contractor is required to conduct non-destructive independent testing on minimum 20% of total length of steel weld for each different type of welding for the fabrication products of modified connections of tubing steel of the top bracket assemblies of Section 05122, climbing ladders, platforms, guardrails including posts, detail No. 1 plan view of connection detail of Section 05121. Selections of welding elements for testing shall be representative and reasonable, and they shall be selected and decided by the independent inspectors only.

All non-destructive testing shall be conducted and recorded by qualified welding inspectors only who are currently certified as AWS Certified Welding Inspectors (CWI). Submit testing records as required.

The Contractor is required to conduct minimum one of the following allowable non-destructive testing as described in AWS D1.1. When in doubt, using combinations of the following testing is encouraged:

- Radiographic testing
- Radiation imaging systems
- Ultrasonic testing
- Magnetic particle
- Dye penetrant inspection

All expenses of the non-destructive testing of the welds are solely borne by the Contractor.

The Government will reject any welds that have defects prohibited by AWS D1.1 or possess any degree of incomplete fusion, inadequate weld size or penetration or undercutting. Welds include following defects require repair or will be rejected:

- Surface cracks including longitudinal, transverse, radiation, crater
- Cavities including gas pockets, internal porosity, surface porosity, shrinkage
- Slag, flux, metal oxides, foreign material
- Incomplete fusion or penetration
- Undercut, underfill on face, groove or fillet
- Underfill of root, excessive face reinforcement, groove or fillet
- Excessive root reinforcement
- Overlap, arc strikes
- Excessive weld spatter, poor tie-in
- Rough surface, incorrect shape, incorrect profile, poor appearance,
- Are blow, welding distortion, warpage

### **Supplemental Examination/Non-destructive Testing of Steel Welding**

When the soundness of any weld is suspected of being deficient or defect due to faulty welding or stresses that might occur during shipment or erection, the Government reserves the right to perform non-destructive tests before final acceptance. The cost of such inspection will be borne by the Government. Such tests could be subject to any forms of non-destructive testing determined by the AR/CO or the Contracting Officer. This may include Radiographic testing, Radiation imaging systems, Ultrasonic testing, Magnetic particle, and Dye penetrant inspection that will be used to thoroughly investigate the parts in question. The costs of such investigation will be borne by the Government. However, any identified defects will be the cause for rejection and the rejected parts are required to be repaired or replaced and be retested independently by a qualified third party approved by AR/CO and by using the previous Government conducted non-destructive testing methods at the Contractor's sole expenses and at no cost to the Government.

### **Repair of Steel Welding**

Deficient and defective welds shall be properly repaired in accordance with AWS D1.1. Deficient and defective weld metal shall be removed to sound metal by use of air carbon-arc or oxygen gouging. Oxygen gouging shall not be used on ASTM A 514/A 514M steel. The surfaces shall be thoroughly cleaned before welding. Welds that have been repaired shall be retested by the same methods that are used in the original inspection. Costs of weld repairs and retesting shall be borne by the Contractor and at no cost to the Government.

## **EXECUTION**

### **Installation**

All parts to be installed shall be thoroughly cleaned. Packing compounds, rust, dirt, grit, and other foreign matter shall be removed. Where units or items are shipped as assemblies, they shall be inspected by the Contractor prior to installation. Bolts shall be

tightened firmly and uniformly by using proper size sockets only (full effect of a manpower for each bearing type connection).

**Alignment, Setting, and Tolerance**

Each unit shall be accurately aligned so that no binding in any moving parts or distortion of any member occurs before it is fastened in place. The alignment of all parts with respect to each other shall be true within the requirements of TIA-222-G and AISC ASD Manual (1989) Manual of Steel Construction Allowable Stress Design.

End of Section

## SECTION 05120

### STRUCTURAL MAINTENANCE WORK

#### GENERAL

This section describes structural maintenance work of replacements of corroded structural steel members and fasteners including high strength bolts, bolts, U-bolts, J-bolts, washers, nuts, and replacements of corroded guardrails including posts on the specified antenna towers at Saipan and Tinian sites. See Photo No. 1-27 for illustration including optional work. The Contractor is responsible for field identification, determination, and verification of all sizes or dimensions of the rusted or corroded structural steel members and fasteners that are required to be replaced. The Contractor is required to identify the existing structural connection types and the dimensions of the existing structural fasteners. The Contractor is responsible and is required to ensure that all replacements of structural members and fasteners shall match or exceed their original material mechanical strengths or grades and shall match their original connection types and original dimensions of fasteners and members. Change of any material or connection type or dimensions of fasteners and members will not be permitted. Used or recycled material for the replacements will not be accepted. The Contractor shall coordinate the work of this Section with all other Sections and shall comply with requirements of all other Sections as required. All removed steel members and fasteners are prohibited to be reused.

The Contractor shall prioritize the work of the replacements of the corroded structural fasteners and members with reasonable logic and judgment. Start the work by identifying and replacing the most severely corroded structural members and fasteners first. Generally, steel corrosions are more severe with the increase of elevation.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.

#### **Saipan Site Brief Background**

Antenna Tower A and B are about 167 ft guyed steel towers. Antenna Tower C, D, and E are about 170 ft four-leg self-supporting steel towers.

The two guyed towers at Saipan site were manufactured by Rohn Company in Peoria, Illinois in about 1982 or 1983. These antenna towers consist of pipe legs and single angle bracing members. As-built drawings of these antenna towers are not available. Sizes of the corroded bolts on the antenna towers are not unknown. It is the Contractor's responsibility to identify the sizes of all existing corroded bolts and members that are required to be replaced. Identical sizes of high strength bolts (ASTM A 325) and members shall be used to replace all corroded bolts and members.

The three self-supporting towers at Saipan site were manufactured by Jarlso Fabrikker Company in Norway in about 1988. These antenna towers consist of single angle legs and single angle bracing members. As-built drawings of these antenna towers are not available. Existing steel members and fasteners on these antenna towers appear in metric unit. Sizes of the corroded metric bolts are unknown. It is the Contractor's responsibility to identify the sizes of all existing corroded bolts that are required to be replaced. Identical sizes of high strength bolts in metric (ASTM A 325M) shall be used to replace all corroded bolts.

Schematic drawings of Antenna Tower A, B, C, D, and E are attached in Section J of the RFP. They shall be used for information only and shall not be used for any other purposes.

## **Tinian Site**

### **Brief Background**

Antenna Tower No. 1 through 13 are guyed steel towers. As-built drawings of these antenna towers are included for information. They shall not be used for any other purposes.

## **Work of the Base Award**

### **Saipan Site**

1. Replace corroded climbing ladders on Antenna Tower No. A and B and re-install fall arrest protective systems on the new climbing ladders. See Section 05121 and 05122.
2. Completely replace each existing platform (catwalk) system that under the outrigger structures between EL 157.5 ft and 170.5 ft on Antenna Tower C, D, and E. See Photo No. 10-17 for illustration. The work includes replacements of gratings, guardrails including posts, platform supporting members, and fasteners. Each platform (catwalk) shall be designed, fabricated and installed in accordance with TIA-222-G and Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR). Each grating shall be securely anchored with minimum one saddle clip at each corner.
3. Replace each existing grating including anchors on the catwalks between EL 150.1 ft and EL 166.3 ft on Antenna Tower A and B. See Photo No. 19 for illustration. Each grating shall be designed, fabricated and installed in accordance with TIA-222-G and Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR). Each grating shall be securely anchored with minimum one saddle clip at each corner.

## **Work of the Base Award, Continued**

### **Tinian Site**

4. Antenna Tower No. 1 – 13  
Replace corroded climbing ladders and fall arrest protective systems on Antenna Tower No. 1-13. See Section 05121 and 05122.
  
5. Antenna Tower No. 1 – 13  
Replace each corroded guardrail including each corroded post, Steel ropes are stainless steel type and need not be replaced if no damaged is observed after inspection. Replace corroded fittings on stainless steel ropes, corroded steel gratings, corroded grating support, and corroded fasteners on the existing platforms and the platforms on the outrigger structures of Antenna Tower No. 1-13. Securely insert ASTM D1784, D1785, D2466 and D2564 schedule 40 Polyvinyl Chloride (PVC) plastic pipes or fittings into each hole of guard railing posts to provide non-conductive insulation to prevent stainless steel ropes or steel wire ropes from directly contacting the steel. See Photo No. 4-6 for illustration. Each replacement shall be designed, fabricated and installed in accordance with TIA-222-G and Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR). Each grating shall be securely anchored with minimum one saddle clip at each corner. The Contractor is responsible for determination of the details and quantities of the replacements of guardrails including posts, fittings on the stainless steel ropes, grating, grating support and fasteners. On Antenna Tower No. 9 modify the existing the guardrails including posts with steel ropes of the full-closure platform at the location of the climbing ladder entrance to allow a reasonable open entrance without any obstruction to the platform to/from the climbing ladder. The open entrance without any obstruction and the details on the platform shall be similar to the ones on other antenna towers at Tinian site. The work shall include but is not limited to: Adjustment of the positions of the existing guardrails including posts with structural ASTM A325 bolts with pretension, fabrication and installations of additional guardrails including posts with structural ASTM A325 bolts with pretension, rearrangements of the existing steel ropes or installation of additional steel ropes with fittings. Removed fasteners and fittings are not permitted to be reused.
  
6. Antenna Tower No. 1 – 13  
Install shim steel plates to fill any gaps between the steel support and the bottoms of the concrete counterweight.
  
7. Antenna Tower No. 1 – 13  
Remove total six cracked concrete counterweight blocks (damaged by 2004 typhoon, 150 mph wind, see Photo No. 29 and 30) and install total six Government supplied reinforced concrete counterweight blocks. All six cracked concrete counterweight blocks are located among 13 antennas at Tinian site.

The work includes remove and disposal of the damaged concrete counterweight blocks and installation of the reinforced concrete counterweight blocks. The Contractor is required to work with the Station manager or AR/CO to accurately identify all six cracked concrete counterweight blocks.

8. Antenna Tower No. 1 – 13

Completely replace three buckled or damaged steel supporting structures of concrete counterweight (damaged by 2004 typhoon, 150 mph wind). See Photo No. 28 similar. The work includes remove the damaged steel supporting structures, design, fabrication, and installation of the steel supporting structures. Each steel supporting structure shall be identical to the original one in dimensions except each leg shall be minimum steel angle L5x5x1/2 with a 1” diameter x 4” minimum embedment stainless steel wedge anchor. Reconnect all grounding to meet the original design intentions. The Contractor is required to include drawings with details of each replacement in the submittals and to seek Government’s review and approval prior to construction.

**Optional Work No. 1 (Saipan Site, Work outside of the Base Award)**

Antenna Tower No. A, B, C, D, and E

Remove and replace corroded structural fasteners and members. Perform the work as required in Table No. 1. Table No. 1 shows the total estimated quantities of the required replacements of the structural members (horizontal or diagonal bracing members) and fasteners on the antenna towers (excluding antenna curtains and reflecting screens) including fasteners on tower legs, tower bracing members, outrigger structures and climbing ladders (except platforms/catwalks and the ladder replacements, replacements of ladders and platforms/catwalks are required to be supplied with their own fasteners).

**Table No. 1, Saipan Site**

Antenna Tower Designation	Total Estimated Mast Horizontal or Diagonals to Be Replaced, qty	Total Estimated Fasteners to Be Replaced, qty
Guyed Tower No. A	10	350
Guyed Tower No. B	10	350
Self-supporting Tower No. C	0	300
Self-supporting Tower No. D	0	300
Self-supporting Tower No. E	0	300

Fasteners that are defined in this contract include but are not limited to: High strength bolts with washers and nuts, bolts, J or U-bolts with washers and nuts, steel grating saddle clips with bolts, wire rope clips by Crosby.

If the total estimated mast members and fasteners in above Table No. 1 Saipan Site are overestimated, the Contractor is required to return all unused material to IBB Station.

If the total estimated mast members and fasteners in above Table No. 1 Saipan Site are underestimated, the Government may consider excising options to request the Contractor to perform additional work to complete the replacement work of structural members and fasteners contingent on availability of funds.

**Optional Work No. 2 (Saipan Site, Work outside of the Base Award)**

Antenna Tower No. A, B, C, D, and E

Replace corroded sheave assemblies including sheaves, pins, bolts, shackles, steel plates that are directly associated and are parts of the assemblies. See Photo No. 20-24 for illustration. Crosby products are required to be used for the replacements.

Submittal:

If awarded, the Contractor is required to submit five (5) hard copies of the details and the mechanical specifications of all replacement parts for Government's review and approval prior to construction.

**Optional Work No. 3 (Saipan Site, Work outside of the Base Award)**

Antenna Tower No. A, B, C, D, and E

Replace corroded fittings such as shackles and severely corroded wire ropes with thimbles that directly support antenna curtains and/or reflecting screens and/or counterweight systems. See Photo No. 14, 16, 20, and 25 for illustration. Crosby products are required to be used for the replacements.

Submittal:

If awarded, the Contractor is required to submit five (5) hard copies of the details and the mechanical specifications of all replacement parts for Government's review and approval prior to construction.

**Optional Work No. 4 (Saipan Site, Work outside of the Base Award)**

Antenna Tower No. A and B

Install corrosion protection measures of concrete encasements for each guy anchor rod of Antenna Tower A and B (excluding antenna curtains and screens) The repair work of guy anchor rods for Antenna Tower A and B at Saipan site shall be included in Contractor's base bid. The repair work is mandatory, not an option.

The Contractor shall install concrete encasement for each guy anchor rod of Antenna A and B at Saipan site. See Photo No. 28, 29, 32, and 33 for illustration. See Figure No. 1 for concrete encasement detail.

Carefully remove top soil and excavate each anchor rod to expose its from finish grade to top of existing concrete or rock anchor footing. Use chisel or other means to carefully remove surrounding concrete or rock and expose minimum 2" deep from its original concrete or rock surface into its footing to examine corrosion condition. Coordinate with the Government for inspection of corroded guy anchor rods.

If the Government determines that diameter of any rod is greater than 70% of its original diameter, then the Contractor shall clean each rusted anchor rod to remove any existing rust or loose zinc corrosion products per SSPC 2 Hand Tool Cleaning or SSPC 3 Power Tool Cleaning, and then apply qualified zinc coating repair material on each rod. The Contractor is required to use paint brushes only to repair all damaged zinc galvanized finish coating surfaces and to achieve dry film thickness 3.5 mils or 88 micrometers minimum. Then install concrete encasements.

If the Government determines that diameter of any rod is reduced for more than 30% of its original diameter, then the Contractor is required use qualified welders to weld a new rod with adequate length and welding to the reduced section of the each damaged guy anchor rod. Each repaired section of the rod is required to develop its full tensile strength of the original diameter. Apply qualified zinc coating repair material on each repaired rod. The Contractor is required to submit engineering calculations and welding repair procedures with valid PE stamps for Government's review and approval prior to conducting any repair.

The Contractor shall comply with the requirements of welders and welding tests of Section 05055 when conducting repair of each guy anchor rod. The welds of each repair of guy anchor rod shall be tested in the field. The Contractor shall comply with requirements of Section 05055 for welders and testing of welds.

Use hot-dip galvanized metal sheet to set the min. 9" diameter concrete forms for each guy anchor rod. Forms shall be continuous from its concrete or rock footing to minimum 3" above the finished grade but not greater than the link plates that connect the turnbuckles. Pour concrete or grout into forms. Back fill and compact topsoil to match pre-repair condition.

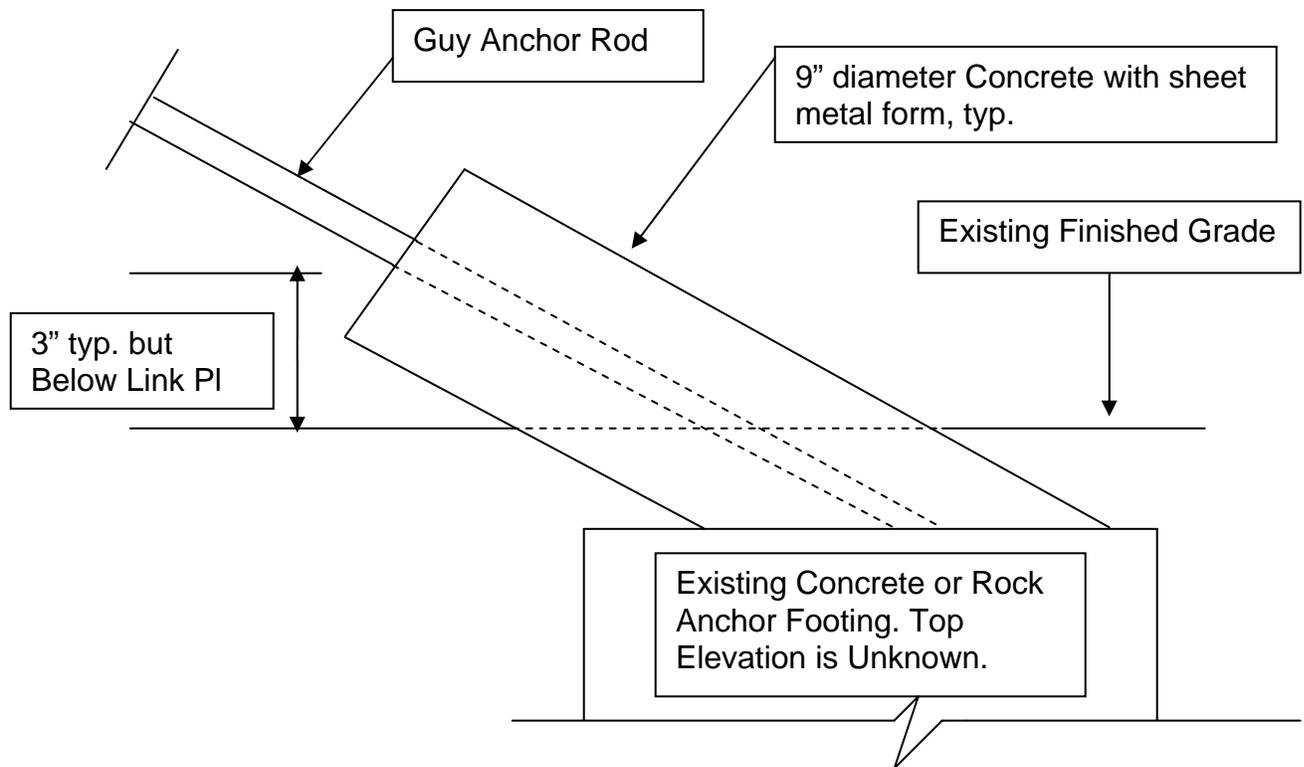


Figure No. 1, Typical Concrete Encasement of Guy Anchor Rod for Antenna Tower A and B, Saipan Site

**Submittal:**

If awarded, the Contractor is required to submit five (5) hard copies of the engineering calculations with valid PE stamps, welding repair procedures, copies of welder's AWS certificates for Government's review and approval prior to conducting any repair.

**Optional Work No. 5 (Tinian Site, Work outside of the Base Award)**

Antenna Tower No. 1 – 13

Remove and replace corroded structural fasteners and members. Perform the work as required in Table No. 2. Table No. 2 shows the total estimated quantities of the required replacements of structural fasteners on the antenna towers. Quantities of fasteners in Table No. 2 (excluding antenna curtains and reflecting screens) including fasteners on tower legs, tower bracing members, outrigger structures, platforms, fasteners on climbing ladders (except the ladder replacements, ladder replacements are required to be supplied with their own fasteners), and other specified components.

Size of the corroded bolts on Antenna Tower 1-13 appears 5/8" diameter ASTM A325X with ANCO lock nut, typical. However, it is the Contractor's responsibility to identify, verify, and confirm the sizes of all existing corroded bolts that are required to be replaced. Identical sizes of high strength bolts (ASTM A 325X) shall be used to replace all corroded bolts.

**Table No. 2, Tinian Site**

Antenna Tower Designation	Total Estimated Mast Fasteners to Be Replaced, qty
No. 1	250
No. 2	400
No. 3	400
No. 4	400
No. 5	250
No. 6	300
No. 7	300
No. 8	300
No. 9	200
No. 10	200
No. 11	300
No. 12	300
No. 13	250

Fasteners that are defined in this contract include but are not limited to: High strength bolts with washers and nuts, bolts, J or U-bolts with washers and nuts, steel grating saddle clips with bolts, wire rope clips by Crosby.

If the total estimated mast fasteners in above Table No. 2 Tinian Site are overestimated, the Contractor is required to return all unused material to IBB Station.

If the total estimated mast fasteners in above Table No. 2 Tinian Site are underestimated, the Government may consider excising options to request the Contractor to perform additional work to complete the work of structural fastener replacements contingent on availability of funds.

Replace all corroded fasteners on the steel supporting frames of the sheave assemblies on Antenna Tower 1-13. See Photo No. 9 for illustration. The Contractor is responsible for determination of the sizes and quantities of the replacements of the fasteners.

**Optional Work No. 6 (Tinian Site, Work outside of the Base Award)**

Antenna Tower No. 1 – 13

Replace corroded sheave assemblies on Antenna Tower 1-13 including sheaves, pins, bolts, shackles, steel plates that are directly associated and are parts of the assemblies. See Photo No. 27 for illustration. Crosby products are required to be used for replacements.

Submittal:

If awarded, the Contractor is required to submit five (5) hard copies of the details and the mechanical specifications of all replacement parts for Government's review and approval prior to construction.

**Optional Work No. 7 (Tinian Site, Work outside of the Base Award)**

Antenna Tower No. 1 – 13

Replace corroded steel plates and fittings such as shackles and severely corroded wire ropes with thimbles that directly support antenna curtains and/or reflecting screens and/or counterweight systems. See Photo No. 7 and 8 for illustration. Crosby products are required to be used for replacements.

Submittal:

If awarded, the Contractor is required to submit five (5) hard copies of the details and the mechanical specifications of all replacement parts for Government's review and approval prior to construction.

**REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

TELECOMMUNICATION INDUSTRY ASSOCIATION

TIA-222-G (2006) Structural Standard for Antenna Supporting Structures and Antennas

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR)

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC ASD Manual (1989) Manual of Steel Construction Allowable Stress Design

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M (2002), Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 153/A 153M (2004), Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 325	(2006) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A325M	(2005) Structural Bolts, Steel, Heat Treated, 830 Mpa Minimum Tensile Strength (Metric)
ASTM A 36/A 36M	(2000a) Carbon Structural Steel
ASTM A 307	(2000) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 53/A 53M	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 563/A563M	(2000) Carbon and Alloy Steel Nuts
ASTM A 6/A 6M	(2001) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 618	(1999) Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A 780	(2001) Standard Practice of Repair of Damaged and Uncoated Areas of Hot-dip Galvanized Coatings
ASTM F 436	(2000) Hardened Steel Washers
ASTM F 436M	(1993) Hardened Steel Washers (Metric)
ASTM F 959	(1999a) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
ASTM F 959M	(1999a) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners (Metric)
ASTM F 1554-99	Standard Specifications for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code – Steel
----------	--

ASME INTERNATIONAL (ASME)

ASME B18.21.1

(1999) Lock Washers (Inch Series)

Research Council on Structural Connections (RCSC)

RCSC

(2004) Specification for Structural Joints Using  
ASTM A325 or A490 Bolts

## **SUBMITTALS**

Government approval is required for submittals with a "G" designation; submittals with a "FIO" designation are submitted for information only.

### **1. Working Plan (G, five sets)**

- Before the work starts, the Contractor is required to submit a complete a working plan for each specified antenna tower showing all identified sizes, approximate locations, and quantities of the existing rusted or corroded fasteners and members to be replaced; sizes, locations, and quantities of the fasteners and members to be used for the replacements.
- Material mechanical specifications and details of the replacements of structural steel and fasteners.
- The working plan shall includes and reflects coordination with the Government and the IBB Saipan Tinian Station broadcasting schedule, construction schedule, descriptions of how work will be performed on site, a personal safety plan which describes accident prevention procedures, a fire prevention plan which describes fire prevention procedures, training and equipment such as quantities of fire extinguishes to be provided on site, and a RF safety plan which describes how all workers on site monitor and safe guard each other against potential excessive RF exposure, name, experience and qualification of the project manager and the site supervisor. Design calculations and drawings with current civil or structural P.E. stamps and with details of the replacements of the steel supporting structures of the concrete counterweight.

### **2. Records of All Replacements (FIO, five sets)**

The records shall contain complete descriptions for each specified antenna tower showing sizes, approximate locations, and quantities of the steel and fasteners that have been used for the replacements.

### **3. Zinc Coating Repair Material (G, five sets)**

Material specifications and instructions of application

## **STORAGE**

Material shall be properly stored in areas that are designated by IBB Station management and be properly protected without directly contacting to the ground and be properly covered against rain.

## **PRODUCTS**

### **STRUCTURAL STEEL AND FASTENERS**

All steel shapes, plates, and bars shall conform to ASTM A36/A36M ( $F_Y = 36$  ksi). Dual certified steel conforming to ASTM A36/A36M ( $F_Y = 36$  ksi) and A572 Grade 50 ( $F_Y = 50$  ksi) is acceptable. Use ASTM A36 steel for all steel replacement. Use high strength bolts for all bolt replacements. Use ASTM A307 J or U-bolts for all J or U-bolt replacements.

High strength bolts, nuts, and washers:

Bolts: ASTM A325 type 1; Nuts: ASTM A563DH; Washers: ASTM F436-1.

When high strength bolts are used for bearing type connections and are defined as snug-tightened joints, helical spring-lock washers ASME B18.21.1 are required to be used and be installed under the nuts.

J or U-bolts, nuts and washers:

J or U-bolts: ASTM A307 Grade C,  $f_y = 36$  ksi min.; Nuts: ASTM A563A Heavy Hex; Washers: ASTM F844.

Concrete:  $f'_c = 4,000$  psi @ 28 days with normal weight 145 pcf per ACI 318.

Reinforcing steel bars shall be deformed and conform to ASTM A 615 with  $f_y = 60,000$  psi minimum.

Grout: Grouting material shall meet the requirements of CRD C-621. Use NS Grout (non-shrink, non stain, non-metallic) by The Euclid Chemical Company or approved equivalent. Compressive Strength: 5,000 psi @ 3 days.

### **FABRICATION FINISHES**

All steel finish shall be hot-dip zinc galvanized in accordance with ASTM A 123/A 123M.

Each steel fastener finish including high strength bolts, nuts, washers, bolts, J and U-bolts, saddle clips and wire rope clips shall be hot-dip zinc galvanized in accordance with ASTM A 153/A 153M.

#### **Repair of Zinc-Coated Steel Surfaces**

Zinc galvanized finish on steel could be damaged due to rough handling during shipping or installation. The Contractor is required to use paint brushes only to repair all damaged zinc galvanized finish coating surfaces of steel and steel fasteners with qualified zinc coating repair material that meets or exceeds the requirements of ASTM A 780 -01, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings for repairing the damaged galvanized steel surfaces and achieving dry film thickness 3.5 mils or 88 micrometers minimum. Zinc coating repair material that does not meet or is lack of proof to meet the requirements of ASTM A780 will not be permitted to be used at sites.

The Contractor may consider following qualified zinc coating repair material for repairing the damaged zinc-coated steel surfaces:

- ZRC® Cold Galvanizing Compound or
- ZRC Galvilite®

ZRC Corporate Headquarters  
145 Enterprise Drive  
Marshfield, MA 02050 USA

Phone:(781) 319-0400  
Toll-Free:(800) 831-3275  
Fax: (781) 319-0404

## **EXECUTION**

When performing the contract work, the Contractor is required to comply with TIA-222-G, AISC ASD, AWS D1.1, RCSC, and Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR).

## **STEEL FABRICATION**

Steel fabrication shall be performed in accordance with TIA-222-G and AISC ASD Manual. Fabrication and assembly shall be conducted in the fabrication shop to the greatest extent possible. Sharp edges on the sides of the structural members shall be removed to smooth by grinding or sanding.

Prior to zinc galvanization, all steel surfaces shall be properly prepared. Dirt and dust on steel surfaces shall be removed. Rust on steel shall be removed. Sharp edges of steel shall be removed by grinding or sanding. Weld with sharp projections and weld spatters that are loosely bonded to the weld or steel surfaces shall be scraped or ground from the surfaces. The Contractor shall consider using power tools such as grinders, sanders, wire brushers, chipping hammers or needle guns for steel surface preparation.

The Government will reject poor steel surface finish such as steel surface with sharp edges, weld with sharp projections, or weld spatters that are loosely bonded to the weld.

See Section 05055 for additional requirements of metal work or steel fabrication.

## **INSTALLATION**

To avoid and minimize any disruption to the ongoing Government facility operation and broadcasting, the Contractor shall coordinate with the Government and IBB Station management for construction activities prior to construction. Unapproved disruption will not be accepted. Unapproved working schedules or schedule changes will not be accepted. The Contractor's site supervisor shall remain at job site at all time during the construction activities.

The Contractor is required to comply with safety requirements of Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures

During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR) when performing the contract work. Each Contractor's rigger is required to wear qualified full body harness that meets the OSHA fall protection requirements to prevent from falling and to be 100% fall protected while ascending, descending, moving from point to point or working on any part or location of the antenna towers. Climbing on any antenna tower without wearing full body harness and fall arrest protective system will not be permitted.

The Contractor is responsible for maintaining structural stability for each antenna tower while performing the work and is responsible for any design, fabrication, and installation of any temporary support or bracing members that are required in order to perform the work and to avoid any overstressing or deformation to any member of each antenna tower.

The Contractor shall not perform contract work on any antenna tower when encountering strong wind, thunderstorm, lightning, or raining or other unsafe working weather or condition.

Before working on each antenna tower, the Contractor shall first assess the corroded members and fasteners and prioritize the work of replacements of the members and fasteners. Conduct the work with replacing the most severe corroded members and fasteners first by applying sound logic and judgment in determination and to prioritize the replacements of the corroded members and fasteners. Use high-strength ASTM A325/A325M bolts to replace corroded bolts except J or U-bolts shall comply with ASTM A307.

Corroded members and fasteners shall be removed by hand tools or power tools and be placed in a container for each antenna tower for Government's verification and inspection. Flaming cutting of any corroded members and fasteners on any antenna tower will not be permitted at Saipan and Tinian sites. The Contractor is responsible for determining the proper, practical, and effective ways to conduct the work of the replacements of the members and fasteners without exposing each antenna tower to any increasing risks of possible overstressing or becoming of unstable conditions. The Contractor shall replace one corroded structural member at a time and replace one corroded fastener at a time for each connection. The Contractor is not permitted to conduct any unapproved removal or modification of any structural member or fastener from any antenna tower. Field reaming or modifying any existing fastener hole for the bolt installation will not be permitted without AR/CO's review and approval. Field welding on any antenna tower will not be permitted without AR/CO's review and approval. Prior to installation of each fastener, the Contractor shall clean fastener hole to remove any existing rust or loose zinc corrosion products per SSPC 2 Hand Tool Cleaning or SSPC 3 Power Tool Cleaning, after rust removal, further clean each hole per SSPC 1 Solvent Cleaning to remove grease or oil. Then apply zinc repair coating material to each hole with brushes only and properly cure/dry the coating before starting to install the fastener.

Installation of ASTM A325/A325M bolts shall be in accordance with *RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts and AISC ASD Manual of Steel Construction Allowable Stress Design*.

Pretensioned joints:

- Each joint of all bracing members on all self-supporting towers at Saipan
- Each joint of all tower legs (angles and solid rods) at Saipan and Tinian
- Each joint of all platforms and outrigger structures of guyed and self-supporting towers at Saipan and Tinian

Snug-tightened joints:

- Each joint of all mast bracing members on all guyed towers at Saipan and Tinian

Pretensioned joints:

Install each ASTM A325/A325M bolt with pretension force in accordance with Section 8.2 of *RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts*. Typical pretensioned force is equal to 70% of the specified minimum tensile strength of the high strength bolt.

- Comply all technical requirements especially the requirements of pre-installation tests and inspection of the *RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts*.

Snug-tightened joints:

- Install each ASTM A325/A325M bolt with sockets only in accordance with Section 8.1 of *RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts*. Achieve snug-tightened condition with the full effort of a rigger or an ironworker to bring all plies in the joint to firm contact. When high strength bolts are used for bearing type connections and are defined as snug-tightened joints, helical spring-lock washers ASME B18.21.1 are required to be used and be installed under the nuts.
- Nuts of all snug-tightened joints shall not be untightened or become loose by hand inspection without using any tools. Each loose nut shall be re-tightened.

The Contractor shall conduct his or her own quality control and regular inspection of the contract work. Smoking in any antenna field is prohibited.

### **Installation of shim steel plates to fill each gap between the steel support and the bottoms of the concrete counterweight**

The Contractor is required to install shim plates to fill all gaps between the steel support and the concrete counterweight. The work includes design, fabrication, and installation of the shim plates. All inserted shim steel plates shall be sized adequately to cover full surfaces of the counterweight steel support with positive and secure bolt connections to the steel support. They are required to be in full contact with the steel support and the bottoms of the counterweight that match the original design intention. Do not over install shim plates that will produce excessive slacks in any halyards of the counterweight and will generate negative impact to the functions of the antennas.

The Contractor is required to include the details of the shim plates in the submittals and seek Government's review and approval prior to steel fabrication.

**Removal of six cracked concrete counterweight blocks (damaged by 2004 typhoon, 150 mph wind) and installation of six reinforced concrete counterweight blocks.**

The Contractor is required to remove total six cracked concrete counterweight blocks (damaged by 2004 typhoon, 150 mph wind, see Photo No. 29 and 30) and install total six Government supplied reinforced concrete counterweight blocks. All six cracked concrete counterweight blocks are located among 13 antennas at Tinian site. The work includes remove and disposal of the damaged concrete counterweight blocks and installation of the reinforced concrete counterweight blocks. The Contractor is required to work with the Station manager or AR/CO to accurately identify all six cracked concrete counterweight blocks.

**Completely replace three buckled or damaged steel supporting structures of concrete counterweight (damaged by 2004 typhoon, 150 mph wind)**

The Contractor is required to properly remove and dispose of the existing damaged steel structures that support the concrete counterweight and install the replacements of the steel structures with minimum 1 inch diameter x 4 inch embedment stainless wedge anchors.

The Contractor is required to include the design and details of the steel angles of L5x5 and their connections in the submittals and seek Government's review and approval prior to steel fabrication.

**QUALITY CONTROL AND INSPECTION**

The Contractor shall conduct independent inspection for all complete repair work. The Contractor's inspectors must climb antenna towers to conduct independent and comprehensive inspection for all complete repairs on each antenna tower. All deficiencies shall be fixed and re-inspected prior to Government final acceptance inspection.

The Contractor is required to provide the Government with an advance notice of not less than 45 working days for the final acceptance inspection at each site. The Contractor shall coordinate with the Government for final acceptance inspection and shall promptly fix all identified deficiencies at each site.

To easily identify newly installed structural fasteners and members and to speed up the Government inspection, all newly installed structural fasteners and members that replace the corroded ones shall be properly marked as follows by the Contractor prior to Government inspection. The Contractor shall:

- Apply red color Latex (water emulsion) coating on full head surface and full nut surface of each newly installed structural fasteners.
- Apply red color Latex (water emulsion) coating forming a strip of 3 inches wide and about 12 inches away from each end of the newly installed members

The Contractor may consider applying red color coating on fasteners in the shop prior to material shipping.

## **INSPECTION AND ACCEPTANCE**

The Government will perform inspection for the contract work during the installation or after the completion of the contract work. The Contractor shall coordinate with Government's inspection and take prompt actions to correct all identified deficiencies discovered by the Government.

## **CLEANUP**

The Contractor shall remove all debris, equipment, and material from the site and restore the sites to their pre-work condition after completion of the work.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.



Photo No. 1, Corroded Structural Fasteners on Tower Leg Flanges, Tinian Site

Notes:

1. All bolts on this tower leg flange connection are considered severely corroded, and they are given the priority to be replaced.
2. The Contractor shall use this example and apply similar logic and judgment in determination and to prioritize the replacements of the corroded structural fasteners. Start with the replacement of the most severely corroded fastener first. Generally, steel corrosions are more severe with the increase of elevation.

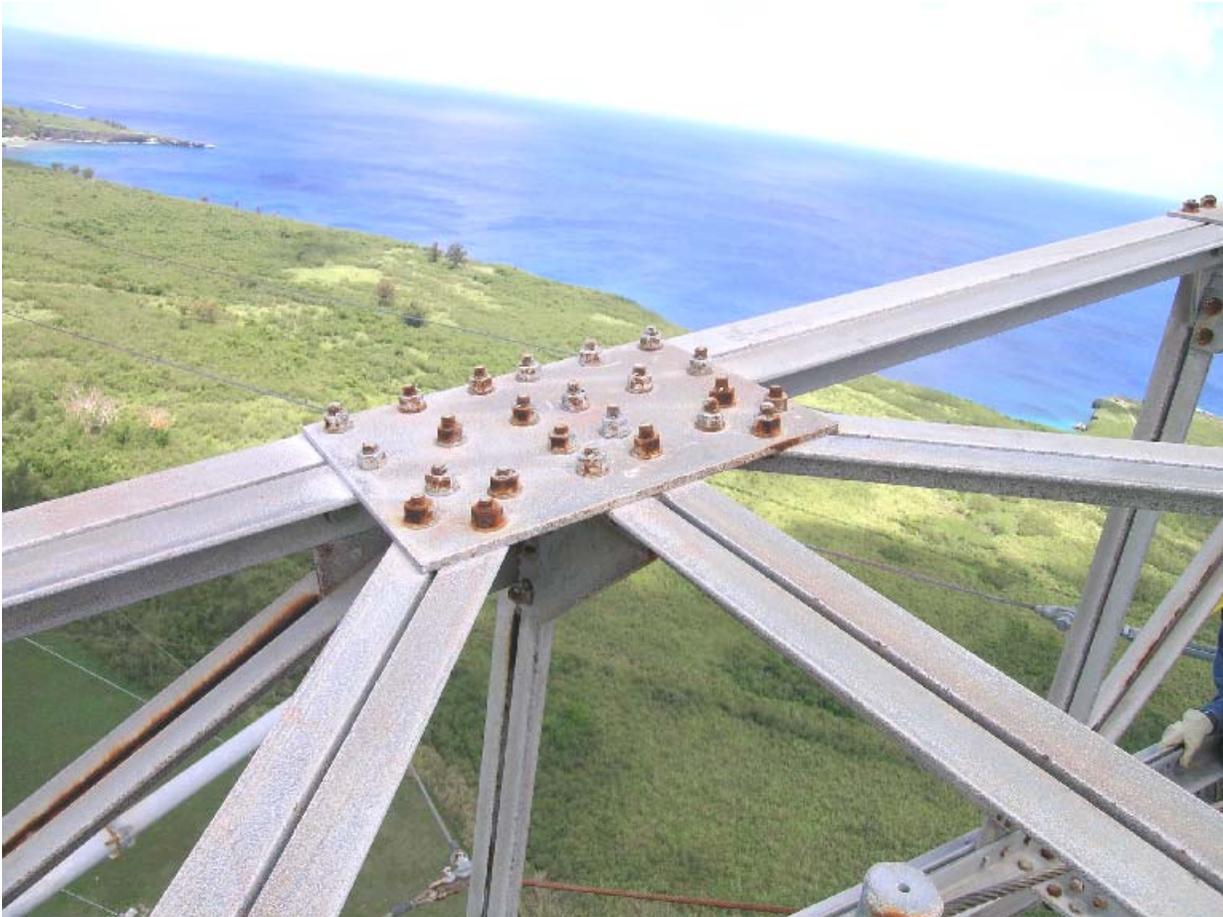


Photo No. 2, Corroded Structural Fasteners on Outrigger Structures, Tinian Site

Notes:

1. Most bolts if not all at this connection on are considered severely corroded, and they are given the priority to be replaced.
2. The Contractor shall use this example and apply similar logic and judgment in determination and to prioritize the replacements of the corroded structural fasteners. Start with the replacement of the most severely corroded fastener first. Generally, steel corrosions are more severe with the increase of elevation.



Photo No. 3, Corroded Structural Fasteners on Tower Bracing Connections, Tinian Site

Notes:

1. All bolts on this connection are considered severely corroded, and they are given the priority to be replaced.
2. The Contractor shall use this example and apply similar logic and judgment in determination and to prioritize the replacements of the corroded structural fasteners. Start with the replacement of the most severely corroded fastener first. Generally, steel corrosions are more severe with the increase of elevation.



Photo No. 4, Corroded Guardrails including posts on Platforms of Outrigger Structures, Tinian Site

Note:

The Contractor is required to replace all corroded guardrails including posts and fasteners. Steel ropes are stainless steel type and need not be replaced if no damaged is observed after inspection. If stainless steel ropes are damaged, they shall be replaced as work of the base award.



Photo No. 5, Corroded Guardrails including posts on Platforms of Outrigger Structures, Tinian Site

**Note:**

The Contractor is required to replace all corroded guardrails including posts and fasteners. Steel ropes are stainless steel type and need not be replaced if no damaged is observed after inspection. If stainless steel ropes are damaged, they shall be replaced as work of the base award.



Photo No. 6, Corroded Grating Support, Tinian Site

Notes:

1. The Contractor is required to replace each corroded grating supporting steel.
2. Antenna tower designation is unknown.



Photo No. 7, Corroded Fittings, Tinian Site



Photo No. 8, Corroded Fittings, Tinian Site



Photo No. 9, Corroded Bolts on Sheave Assemblies, Tinian Site

Notes:

1. All corroded bolts including beveled washers and nuts on this steel support of the sheave assembly are given the priority to be replaced.
2. The Contractor shall apply similar logic and judgment in determination and to prioritize the replacements of the corroded fasteners from similar support of the sheave assemblies.



Photo No. 10, Platforms (Catwalk) on Self-supporting Towers, Saipan Site

**Note:**

The Contractor is required to completely replace each platform/catwalk on the three self-supporting antenna towers.



Photo No. 11, Platforms (Catwalk) on Self-supporting Towers, Saipan Site

**Note:**

The Contractor is required to completely replace each platform/catwalk on the three self-supporting antenna towers.



Photo No. 12, Platforms (Catwalk) on Self-supporting Towers, Saipan Site

**Note:**

The Contractor is required to completely replace each platform/catwalk on the three self-supporting antenna towers.



Photo No. 13, Platforms (Catwalk) on Self-supporting Towers, Saipan Site

Note:

The Contractor is required to completely replace each platform/catwalk on the three self-supporting antenna towers.



Photo No. 14, Platforms (Catwalk) on Self-supporting Towers, Saipan Site

**Note:**

The Contractor is required to completely replace each platform/catwalk on the three self-supporting antenna towers.



Photo No. 15, Platforms (Catwalk) on Self-supporting Towers, Saipan Site

**Note:**

The Contractor is required to completely replace each platform/catwalk on the three self-supporting antenna towers.



Photo No. 16, Platforms (Catwalk) on Self-supporting Towers, Saipan Site

**Note:**

The Contractor is required to completely replace each platform/catwalk on the three self-supporting antenna towers.



Photo No. 17, Platforms (Catwalk) on Self-supporting Towers, Saipan Site

**Note:**

The Contractor is required to completely replace each platform/catwalk on the three self-supporting antenna towers.



Photo No. 18, Corroded Fasteners on Antenna Tower, Saipan Site

Notes:

1. Corroded bolts as shown are given the priority to be replaced.
2. The Contractor shall use this example and apply similar logic and judgment in determination and to prioritize the replacements of the corroded structural fasteners.



Photo No. 19, Corroded Grating on Guyed Towers, Saipan Site



Photo No. 20, Corroded Sheave Assemblies, Saipan Site



Photo No. 21, Corroded Sheave Assemblies, Saipan Site



Photo No. 22, Corroded Sheave Assemblies, Saipan Site



Photo No. 23, Corroded Sheave Assemblies, Saipan Site

Si



Photo No. 24, Corroded Sheave Assemblies, Saipan Site



Photo No. 25, Corroded Fittings, Saipan Site



Photo No. 26, Corroded Fittings, Tinian Site



Photo No. 27, Corroded Sheave Assemblies, Tinian Site



Photo No. 28, Buckled Steel Stand of Concrete Counterweight, Tinian Site

End of Section

## SECTION 05121

### REPLACEMENTS OF THE EXISTING CLIMBING LADDERS ON ANTENNA TOWERS

#### GENERAL

This section describes work (work of the base award) of replacements of the existing climbing ladders on Antenna Tower No. A and B at Saipan site and Antenna Tower No. 1-13 at Tinian site. See Photo No. 1-12 for illustration. All replacements of the existing climbing ladders shall be properly designed, fabricated, supplied, and be installed at their original attachments of antenna tower faces or inside of the antenna towers. The Contractor shall coordinate the work with all other Sections and shall comply with requirements of all other Sections as required. The Contractor is responsible and is required to field verify all dimensions prior to construction. All removed steel and fasteners are prohibited to be reused.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.

#### **Work at Saipan Site:**

From two guyed tower A and B the Contractor is required to remove and properly dispose of the existing internal mounted steel climbing ladders including direct ladder supporting members that are attached to the towers. The Contractor shall preserve and reinstall the recently installed fall arrest protective systems on the replacements of the climbing ladders on these two guyed towers with new fasteners.

The Contractor is required to design, fabricate, supply, and install the zinc galvanized steel climbing ladders on entire height of Antenna Tower No. A and B at Saipan site. See Photo No. 1-3 similar. Only one climbing ladder, top to bottom, is required for each tower. For climbing ladder illustrations, see figure No. 2, similar and Table No. 1.

#### **Work at Tinian Site:**

From Antenna Tower 1-13 the Contractor is required to remove and properly dispose of the existing face mounted steel climbing ladders and the deteriorated existing fall arrest protective systems.

The Contractor is required to design, fabricate, supply, and install the zinc galvanized steel climbing ladders on entire height of Antenna Tower No. 1-13 at Tinian site. See Photo No. 1-3 similar. Only one climbing ladder, top to bottom, is required for each tower. Steel climbing ladders are required to accommodate the existing rest platforms that are on some antenna towers. In such cases, each entire climbing ladder will consist of two offsetting segments to accommodate the existing rest platform. For complete climbing ladder illustrations, see figure No. 1, and 2, Table No. 2, and the as-built drawings as attached in Section J of the RFP.

The Contractor is required to design, fabricate, supply, and install a fall arrest protective system on each climbing ladder that is installed on Antenna Tower No. 1-13 at Tinian site. See Section 05122 Personal Fall Arrest Protective System.

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

### OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR)

### TELECOMMUNICATION INDUSTRY ASSOCIATION

TIA-222-G (2006) Structural Standard for Antenna Supporting Structures and Antennas

### AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC ASD Manual (1989) Manual of Steel Construction Allowable Stress Design

AISC ASD/LRFD Vol II (1992) Manual of Steel Construction Vol II: Connections

AISC Design Guide No. 10 (1989) Erection Bracing of Low-Rise Structural Steel Frames

AISC FCD (1995a) Quality Certification Program

AISC LRFD Vol I (1995) Manual of Steel Construction Load & Resistance Factor Design, Vol I: Structural Members, Specifications & Codes

AISC LRFD Vol II (1995) Manual of Steel Construction Load & Resistance Factor Design, Vol II: Structural Members, Specifications & Codes

AISC Pub No. S303 (2000) Code of Standard Practice for Steel Buildings and Bridges

### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M	(2002), Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2004), Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 242/A 242M	(2000) High-Strength Low-Alloy Structural Steel
ASTM A 307	(2000) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(2000) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 325M	(2000) High-Strength Bolts for Structural Steel Joints (Metric)
ASTM A 36/A 36M	(2000a) Carbon Structural Steel
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(1999) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 514/A 514M	(2000) High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
ASTM A 529/A 529M	(2000) High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 53/A 53M	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 563	(2000) Carbon and Alloy Steel Nuts
ASTM A 563M	(2000) Carbon and Alloy Steel Nuts (Metric)
ASTM A 6/A 6M	(2001) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 618	(1999) Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing

ASTM A 780	(2001) Standard Practice of Repair of Damaged and Uncoated Areas of Hot-dip Galvanized Coatings
ASTM A 992/A 992M	(2000) Steel for Structural Shapes For Use in Building Framing
ASTM F 436	(2000) Hardened Steel Washers
ASTM F 436M	(1993) Hardened Steel Washers (Metric)
ASTM F 844	(2000) Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F 959	(1999a) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
ASTM F 959M	(1999a) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners (Metric)
ASTM F 1554-99	Standard Specifications for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength

#### AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code – Steel
----------	--

#### ASME INTERNATIONAL (ASME)

ASME B18.21.1	(1999) Lock Washers (Inch Series)
---------------	-----------------------------------

#### Research Council on Structural Connections (RCSC)

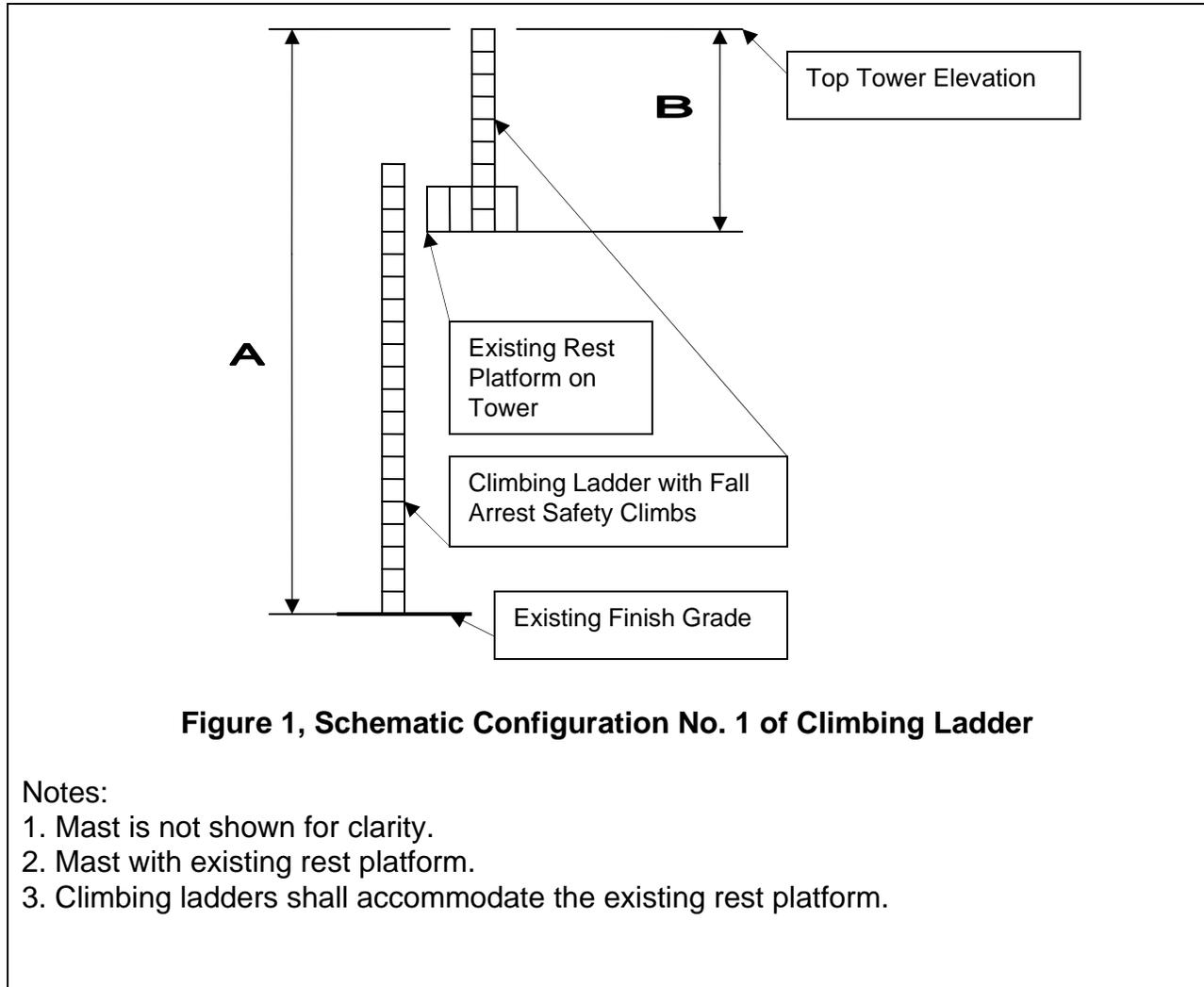
RCSC	(2004) Specification for Structural Joints Using ASTM A325 or A490 Bolts
------	--

### PERFORMANCE REQUIREMENTS

Figure 1, Figure 2, Table No. 1, Table No. 2, and the photos are provided below or near the end of the Section for reference and help understand general requirements of the configurations of the existing and the new climbing ladders. They are not intended to be used directly for steel fabrication without Contractor's field verification.

Prior to steel fabrication, the Contractor is required to conduct a thorough field investigation to verify and obtain all dimensions, field conditions, and to identify offsets

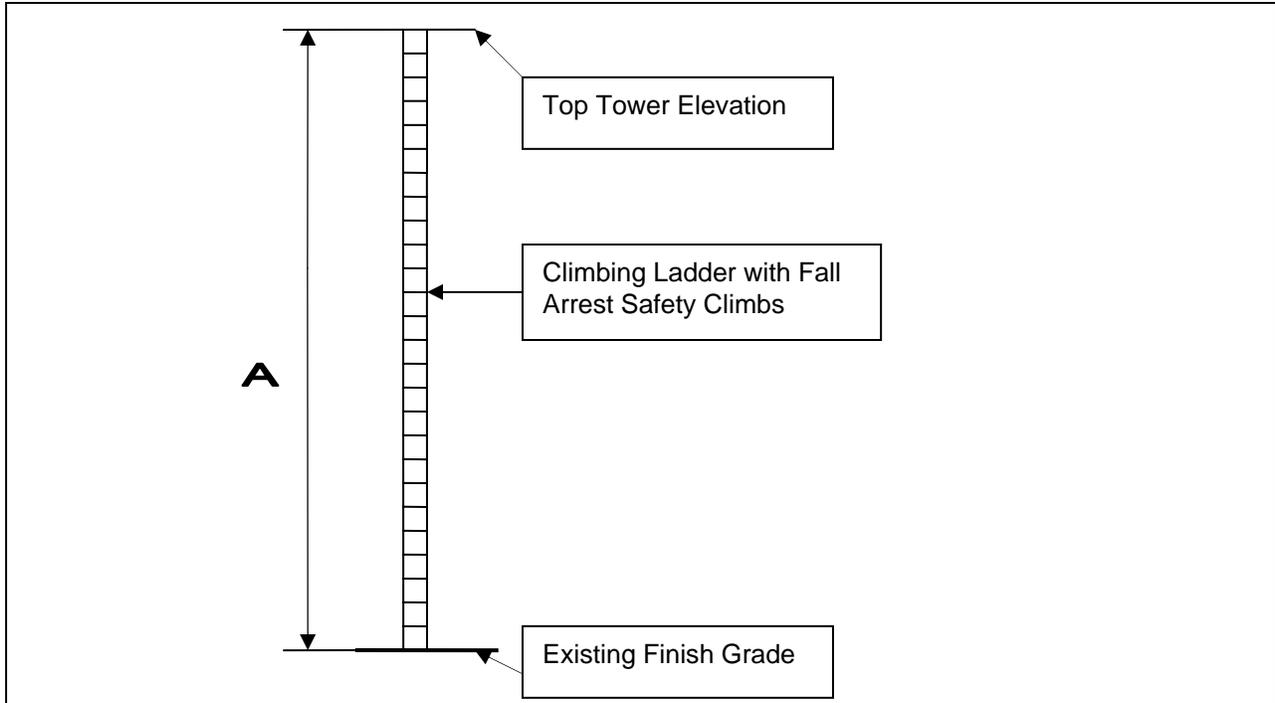
required for the zinc galvanized steel climbing ladders in order to accommodate any existing rest platforms and the outrigger structures on Antenna Tower 1-13.



**Figure 1, Schematic Configuration No. 1 of Climbing Ladder**

Notes:

1. Mast is not shown for clarity.
2. Mast with existing rest platform.
3. Climbing ladders shall accommodate the existing rest platform.

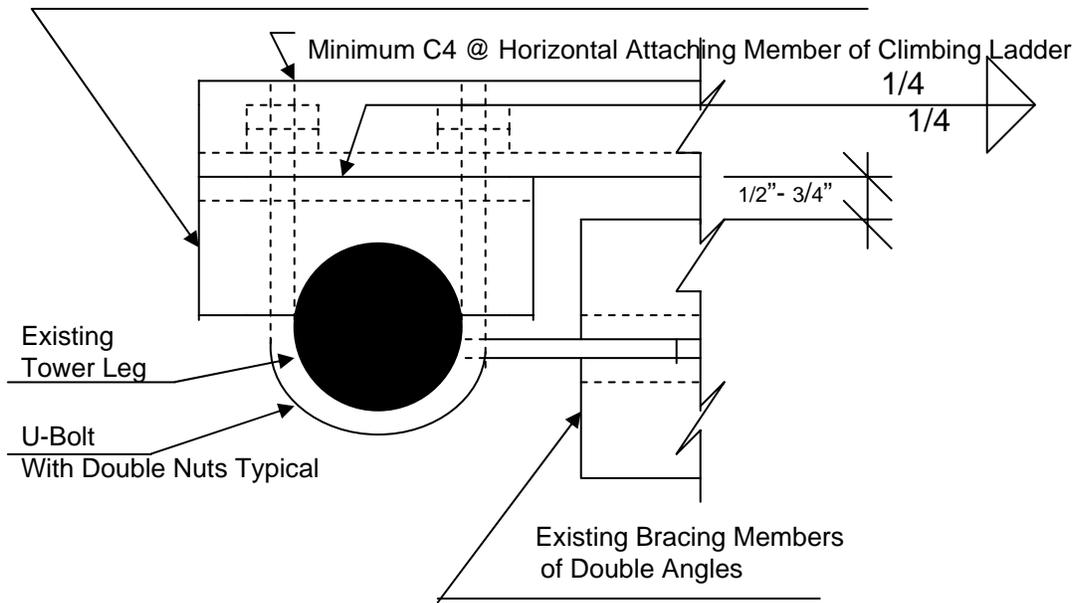


**Figure 2, Schematic Configuration No. 2 of Climbing Ladder**

**Notes:**

1. Mast is not shown for clarity.
2. Mast without existing rest platform.

Minimum C6 with Arch Notch to tightly Fit on the Existing Tower Leg, Typ



**Detail No. 1, Plan View of Connection Detail (Not to Scale)**

**Table No. 1, Guyed Tower No. A and B at Saipan Site**

Antenna Tower Designation	Estimated Mast Width x Tower Height (Dimension A), ft	Climbing Ladder Configuration Type No 1 or 2	Estimated Dimension B, ft
Guyed Tower No. A	5' x 167'	Type No. 2	N/A
Guyed Tower No. B	5' x 167'	Type No. 2	N/A

## Notes:

- All dimensions are estimated per field observation. They are not actual measurements and shall not be used directly for steel fabrication without field verification.
- The Contractor is responsible and is required to field verify all dimensions prior to construction.

**Table No. 2, Antenna Tower No. 1-13 at Tinian Site**

Antenna Tower Designation	Estimated Mast Width x Tower Height (Dimension A), ft	Climbing Ladder Configuration Type No 1 or 2	Estimated Dimension B, ft
No. 1	5' x 237'-11 ¼"	Type No. 2	N/A
No. 2	6' x 428'-10"	Type No. 1	42
No. 3	6' x 428'-10"	Type No. 1	22
No. 4	6' x 428'-10"	Type No. 1	42
No. 5	5' x 237'-11 ¼"	Type No. 1	32
No. 6	6' x 312'-4 3/8"	Type No. 1	37
No. 7	6' x 312'-4 3/8"	Type No. 2	N/A
No. 8	6' x 297'-7 1/4"	Type No. 1	42
No. 9	5' x 172'-9"	Type No. 2	N/A
No. 10	6' x 176'-5 1/8"	Type No. 2	N/A
No. 11	6' x 312'-4 3/8"	Type No. 1	47
No. 12	6' x 318'-11 3/8"	Type No. 2	N/A
No. 13	6' x 215'-7"	Type No. 2	N/A

## Notes:

- All dimensions are estimated per field observation. They are not actual measurements and shall not be used directly for steel fabrication without field verification.
- The Contractor is responsible and is required to field verify all dimensions prior to construction.

All replacements of the existing climbing ladders shall be zinc galvanized steel climbing ladders that must be designed and fabricated in accordance with the project criteria, TIA-222-G, and applicable OSHA regulations regarding the fixed climbing ladders in Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR).

In addition, each steel climbing ladder is to be required to meet or exceed the following criteria as well:

- Minimum concentrated live load: 300 lbs
- Minimum two riggers with a live load of 600 lbs shall be considered per ladder section
- Minimum steel thickness: 3/8 inch. Side rails: 3/8 inch thick flat bars minimum
- Side rail spacing: 16 inches
- Rung diameter: 3/4 inch
- Rung Spacing: 12 inches
- Ladder section length: not greater than 20 ft.
- Horizontal attaching members of the climbing ladders to the tower legs:
  - ❖ Use minimum channel C4 @ 10 ft or less on center (OC) with minimum 3/4 inch diameter zinc galvanized steel U-bolts with double nuts connecting to tower legs. If channels do not interfere with any existing bracing members of the towers.
  - ❖ If channels interfere with any existing bracing members of the towers, refer to Detail No. 1, Plan View of Connection Detail on page 6 to gain needed space to clear the interference. Use minimum channel C4 @ 10 ft or less on center (OC) with minimum 3/4 inch diameter zinc galvanized steel U-bolts with double nuts connecting to tower legs.
  - ❖ It is the Contractor's responsibility to review, identify all interference and fabricate all proper steel connection details. All welding shown in the Detail No. 1 must be performed in the shop by the qualified welders and be properly inspected and tested. Field welding will not be permitted.

Each horizontal attaching member is required to support loads of dead load + live load of 600 lbs minimum.

- Ladder bottom shall be securely anchored to the existing tower base concrete foundation. Use minimum one 3/4" x 3 inches embedment galvanized steel mechanical wedge anchor per side rail.
- Use minimum 3/8" thick steel plates with minimum 3/4" diameter high strength ASTM A325 bolts to connect side rails of each ladder sections with joint type of snug-tightened joint, typical.
- Clearance between each climbing ladder and its tower face: The distance from the centerline of rungs to the nearest permanent object in back of the ladder (antenna tower face) shall be 7 inches typical, except that when unavoidable obstructions are encountered, minimum clearances as shown in figure D-3 shall be provided.

## Minimum Ladder Clearances

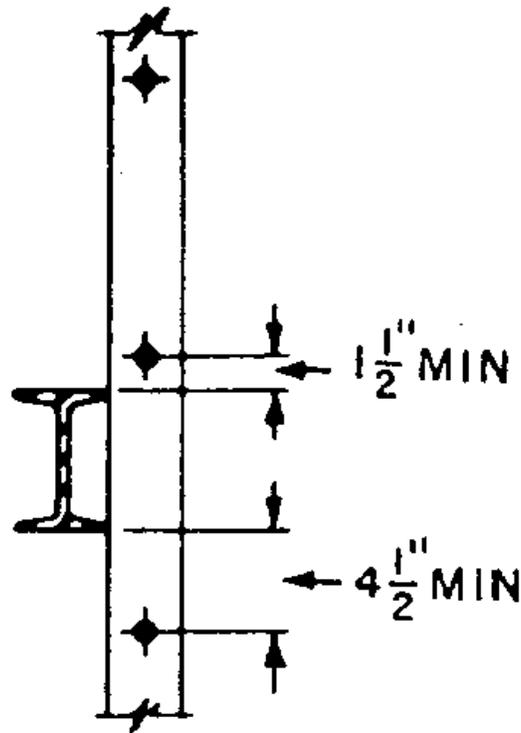


FIGURE D-3.—Clearance for Unavoidable Obstruction at Rear of Fixed Ladder

See Section 05055 Metal Work for additional requirements.

### SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals with a "FIO" designation are submitted for information only.

1. **Structural Design Calculations and Drawings of Steel Climbing Ladders (G, five sets)**

The Contractor is required to submit the structural design of steel climbing ladders. The submittal shall include structural calculations, material mechanical specifications, member sizes, bolt sizes and connection types, connection details, ladder plans, sections, and elevations. Welds shall be designed and be indicated in accordance with AWS D1.1. The design calculations and drawings shall be stamped by a licensed professional civil or structural engineer who is currently registered in any one of 50 States of the United States.

**2. Working Plan (G, five sets)**

The Contractor shall submit a working plan that includes and reflects coordination with the Government and the IBB Saipan Tinian Station broadcasting schedule, construction schedule, descriptions of how work will be performed on site, a personal safety plan which describes accident prevention procedures, a fire prevention plan which describes fire prevention procedures, training and equipment such as quantities of fire extinguishes to be provided on site, and a RF safety plan which describes how all workers on site monitor and safe guard each other against potential excessive RF exposure, name, experience and qualification of the project manager and the site supervisor.

**3. Certificates (FIO, five sets)**

Copies of AWS certificates of the welders

**4. Zinc Coating Repair Material (G, five sets)**

Material specifications and instructions of application.

**STORAGE**

Material shall be properly stored in areas that are designated by IBB Station management and be properly protected without directly contacting to the ground and be properly covered against rain.

**PRODUCTS**

**STRUCTURAL STEEL AND FASTENERS**

All steel shapes, plates, and bars shall conform to ASTM A36 ( $F_Y = 36$  ksi). Dual certified steel conforming to ASTM A36 ( $F_Y = 36$  ksi) and A572 Grade 50 ( $F_Y = 50$  ksi) is acceptable.

High strength bolts, nuts, and washers:

Bolts: ASTM A325 type 1; Nuts: ASTM A563DH; Washers: ASTM F436-1. When high strength bolts are used for bearing type connections with snug tightened connection, helical spring-lock washers ASME B18.21.1 shall be used under the bolt heads.

U-bolts, nuts and washers:

U-bolts: ASTM A307 Grade C,  $f_y = 36$  ksi min.; Nuts: ASTM A563A Heavy Hex; Washers: ASTM F844.

**FABRICATION FINISHES**

All climbing ladders shall be hot-dip zinc galvanized in accordance with ASTM A 123/A 123M.

All steel fasteners including high strength bolts, nuts, washers, u-bolts shall be hot-dip zinc galvanized in accordance with ASTM A 153/A 153M.

## Repair of Zinc-Coated Steel Surfaces

Zinc galvanized finish could be damaged due to rough handling during shipping or installation. The Contractor is required to repair all damaged zinc galvanized coating surfaces of steel and steel fasteners with qualified zinc coating repair material that meets or exceeds the requirements of ASTM A 780 -01, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings for repairing the damaged zinc galvanized steel surfaces. Zinc coating repair material that does not meet or is lack of proof to meet the requirements of ASTM A780 will not be permitted to be used at sites.

The Contractor may consider using the following qualified zinc coating repair material for repairing the damaged zinc coating steel surfaces:

- ZRC® Cold Galvanizing Compound or
- ZRC Galvilite®

ZRC Corporate Headquarters  
145 Enterprise Drive  
Marshfield, MA 02050 USA

Phone:(781)319-0400  
Toll-Free:(800)831-3275  
Fax: (781) 319-0404

## EXECUTION

### STEEL FABRICATION

Steel fabrication shall be performed in accordance with TIA-222-G and AISC ASD Manual. Fabrication and assembly shall be conducted in the fabrication shop to the greatest extent possible. Sharp edges on the side rails of the climbing ladders shall be removed to smooth by grinding or sanding.

Prior to zinc galvanization, all steel surfaces shall be properly prepared. Dirt and dust on steel surfaces shall be removed. Rust on steel shall be removed. Sharp edges of steel shall be removed by grinding or sanding. Weld with sharp projections and weld spatters that are loosely bonded to the weld or steel surfaces shall be scraped or ground from the surfaces. The Contractor shall consider using power tools such as grinders, sanders, wire brushers, chipping hammers or needle guns for steel surface preparation.

The Government will reject poor steel surface finish such as steel surface with sharp edges, weld with sharp projections, or weld spatters that are loosely bonded to the weld.

See Section 05055 for additional requirements of metal work or steel fabrication.

### INSTALLATION

To avoid and minimize any disruption to the ongoing Government facility operation and broadcasting, the Contractor shall coordinate with the Government and IBB Station

management for construction activities prior to construction. Unapproved disruption will not be accepted. Unapproved working schedules or schedule changes will not be accepted. The Contractor's site supervisor shall remain at job site during the construction activities.

Each section of the climbing ladders shall be accurately aligned within respective industry tolerances, Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR), TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas, and AISC ASD Manual of Steel Construction Allowable Stress Design. Install and inspect high strength bolts in accordance with RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Bolt connection type shall not be changed without AR/CO's approval.

Do not attach the horizontal supporting members of the climbing ladders directly against the existing utility lines or similar lines on the tower legs. Coordinate with the Station to clear the lines without causing any damage and properly install the horizontal supporting members of the climbing ladders.

Each bottom of the climbing ladder shall be securely anchored to the existing tower base concrete foundation.

Smoking in any antenna field is prohibited.

### **INSPECTION AND ACCEPTANCE**

Prior to Government's final acceptance inspection, the Contractor shall conduct his own quality control and installation inspection and shall inspect each installed climbing ladder and fix all identified deficiencies. The Contractor shall coordinate with Government's inspection and take prompt actions to correct all identified deficiencies discovered by the Government.

### **CLEANUP**

The Contractor shall remove all debris, equipment, and material from the site and restore the sites to their pre-work condition after completion of the work.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.



Photo No. 1, Uncoated Climbing Ladder

Note:

Replacements of the existing climbing ladders on antenna towers at Saipan and Tinian sites shall be similar to the one that is shown in Photo No. 1-3.



Photo No. 2, Uncoated Climbing Ladder

**Note:**

Replacements of the existing climbing ladders on antenna towers at Saipan and Tinian sites shall be similar to the one that is shown in Photo No. 1-3.



Photo No. 3, Uncoated Climbing Ladder

**Note:**

Replacements of the existing climbing ladders on antenna towers at Saipan and Tinian sites shall be similar to the one that is shown in Photo No. 1-3.



Photo No. 4, Typical Existing Climbing Ladder Base, Tinian Site



Photo No. 5, Existing Climbing Ladders, Tinian Site



Photo No. 6, Existing Climbing Ladders, Tinian Site



Photo No. 7, Existing Climbing Ladders, Tinian Site



Photo No. 8, Existing Utility Lines Attached to the Tower Legs, Tinian Site

Note: Do not directly attach the horizontal supporting members of the climbing ladders against the existing utility lines or similar lines on the tower legs. Coordinate with the Station to clear the lines without causing any damage and properly install the horizontal supporting members of the climbing ladders. See Photo below, similar.

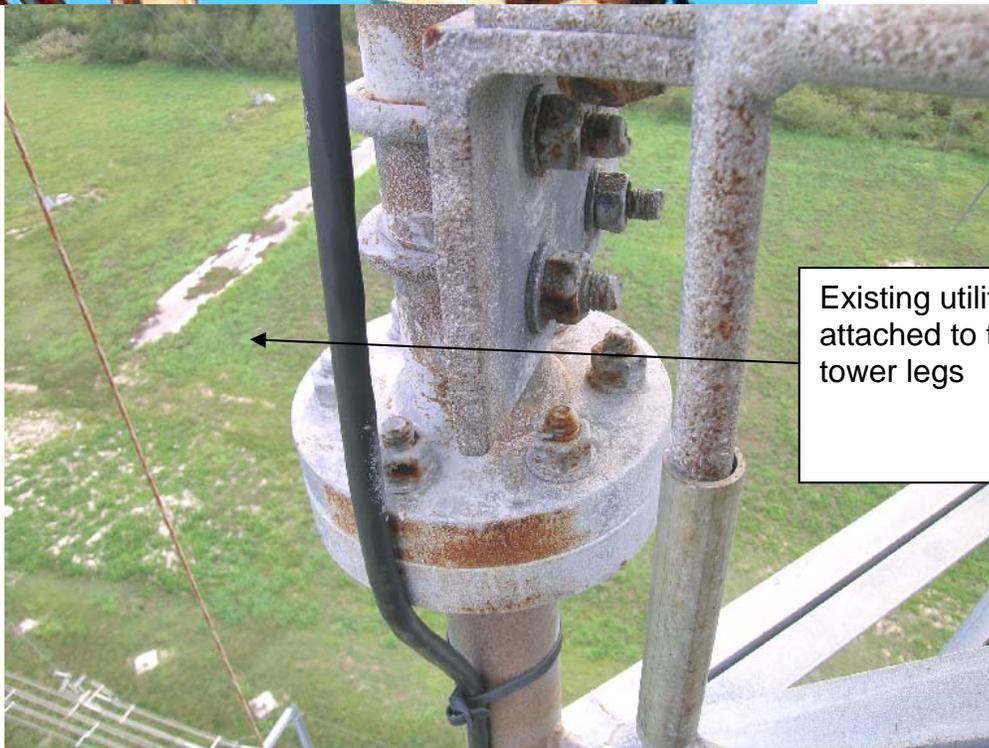


Photo No. 9, Existing Utility Lines Attached to the Tower Legs, Tinian Site

Note: Do not directly attach the horizontal supporting members of the climbing ladders against the existing utility lines or similar lines on the tower legs. Coordinate with the Station to clear the lines without causing any damage and properly install the horizontal supporting members of the climbing ladders.



Photo No. 10, Internal Climbing Ladders, Saipan Site



Photo No. 11, Internal Climbing Ladders, Saipan Site



Photo No. 12, Internal Climbing Ladders, at Saipan Site

End of Section

## **SECTION 05122**

### **PERSONAL FALL ARREST PROTECTIVE SYSTEM**

#### **GENERAL**

This section describes the work (work of the base award) of design, fabrication, supply, and installation of personal fall arrest protective systems - flexible cable systems on new face-mounted climbing ladders on Antenna Tower No. 1-13 at Tinian site. The Contractor is also required to reinstall the existing personal fall arrest protective systems on the new climbing ladders on two guyed Antenna Tower No. A and B with new fasteners at Saipan site.

Each personal fall arrest protective system to be supplied and installed shall cover entire tower height, top to bottom. Depending on antenna tower configurations, some towers will require two segments of climbing ladders to cover entire tower height in order to accommodate the existing rest platforms. Each segment of the climbing ladder is required to be installed with an independent and complete personal fall arrest protective system. See Section 05121 for climbing ladder schematic configurations.

The Contractor shall coordinate the work of this Section with all other Sections and shall comply with requirements of all other Sections as required. The Contractor is responsible and is required to field verify all dimensions prior to construction.

The Contractor shall not damage, change, remove, and replace any existing structural component or member of antenna towers at Saipan and Tinian sites.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.

#### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

#### **OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)**

Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR)

## TELECOMMUNICATIONS INDUSTRY ASSOCIATION

TIA-222-G (2006) Structural Standard for Antenna Supporting Structures and Antennas

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC ASD (1989), Allowable Strength Design, Ninth Edition  
AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 (2000) Structural Welding Code – Steel

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M (2004), Standard Specification for Carbon Structural Steel

ASTM A 475 (2003), Standard Specification for Zinc-Coated Steel Wire Strand

ASTM B 633 (1998), Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

ASTM A 123/A 123M (2002), Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 153/A 153M (2004), Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 780 (2001), Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM B 103/B 103M (1998e2), Standard Specification for Phosphor Bronze Plate, Sheet, Strip, and Rolled Bars.

## PERFORMANCE REQUIREMENTS

Each personal fall arrest protective system - flexible cable system is required to fully comply with TIA-222-G and Part 1910 Occupational Safety and Health Standards, Part 1926 Safety and Health Regulations for Construction and CPL 02-01-036 Interim Inspection Procedures During Communication Tower Construction Activities of 29 Code of Federal Regulations (CFR). In case of any discrepancy, comply with the most stringent or conservative requirements. The Contractor is required to consider a live load of one rigger (weight + hand tools = 300 lbs min) who is supported within any locations of the personal fall arrest protective system - flexible cable system. The Contractor is responsible for determining the proper and reasonable live load of one rigger. The live load shall not be less than 300 lbs.

The Contractor shall supply and properly install the following manufacturer's personal fall arrest protective systems - flexible cable systems on all specified antenna towers. These systems have been evaluated, accepted, and installed on several antenna towers at Saipan site. Other-than-specified personal fall arrest protective systems are not considered and accepted for this project.

Specified personal fall arrest protective system for this project:

Product Name: LAD-SAF Flexible Cable System  
Ladder Safety Systems  
(Page 46-47 of DBI SALA Catalog, 2003)

Manufacturer: DBI/SALA, 3965 Pepin Avenue,  
Red Wing, MN 55066-1837

Tel. No. (800) 328-6146  
Web site: [www.salagroup.com](http://www.salagroup.com)

Unless otherwise noted, as minimum, each LAD-SAF Flexible Cable System shall consist of, but is not limited to:

1. Shock-absorbing device of top bracket assembly at top of ladder. Top shock-absorbing device shall be below the existing lightning rod, typical. The shock-absorbing device is extended about 3 ft beyond the top of each fixed ladder according to the manufacturer.

The Contractor is required to modify and design the connections of tubing steel of each top bracket assembly as shown in Figure No. 1 below by welding steel plates 3/8 inch thick min. to the tubing steel instead of using clamping plates as recommended by the manufacturer. Minimum three steel plates with proper spacing are required to be welded on the tubing steel for each top bracket assembly. The Contractor is responsible for the design of the modification of the connections and the design shall comply with the performance requirements.

This modification applies to all personal fall arrest protective systems at Tinian site, but it does not apply to the two reinstallations of the personal fall arrest protective systems at Saipan site.

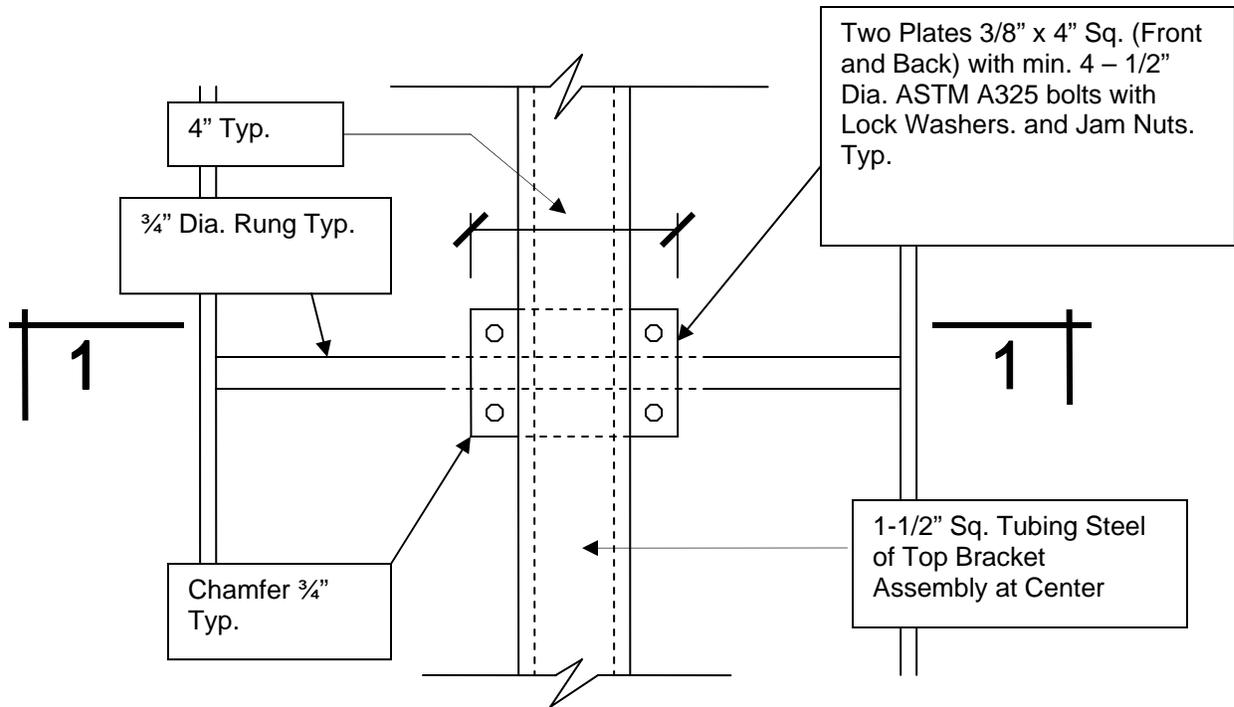
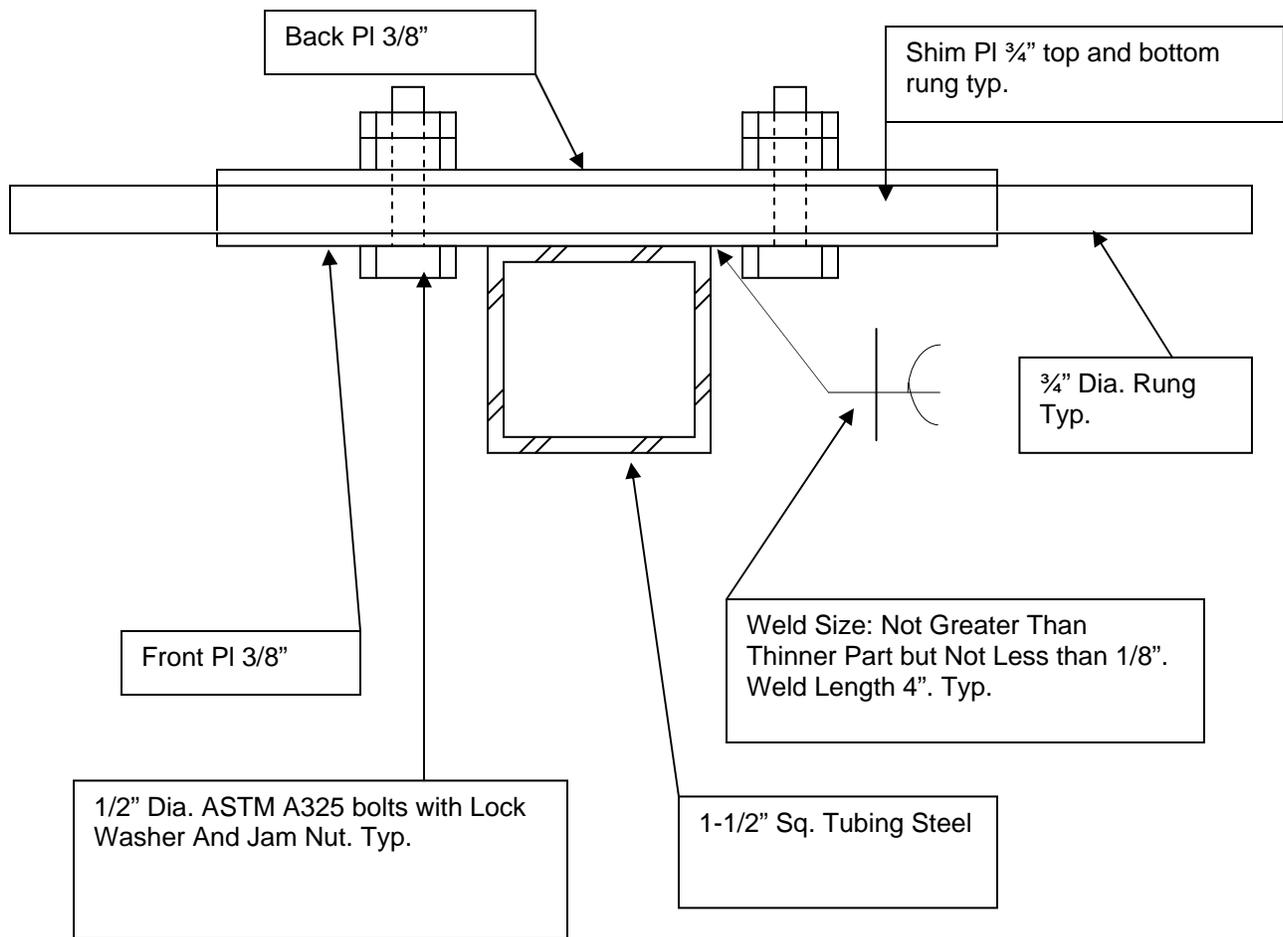


Figure No. 1, Typical Connection Modification of Tubing Steel of Top Bracket Assembly (not to scale)

Notes:

1. All high strength bolts as shown in Figure No. 1 are defined as snug-tightened joints. Snug-tightened joints require jam nuts and helical spring-lock washers ASME B18.21.1 to be used and be installed. Nuts of all snug-tightened joints shall not be untightened or become loose by hand inspection without using any tools. Each loose nut shall be re-tightened.
2. Use and install two shim plates (Each PI 3/4" x 1-5/8" x 4" with two bolt holes) above and below rung to fill the space between the front and back plates, typical.



Section 1-1 (not to scale)

Figure No. 1, Typical Connection Modification of Tubing Steel of Top Bracket Assembly

3. Tension-indicating bottom bracket.
4. Detachable swiveling LAD-SAF safety sleeve with a Saflok carabiner 6116502. Total 10 required for this project. The Government determines that it is not necessary for each LAD-SAF Flexible Cable System to be equipped with a detachable swiveling; therefore, the Contractor is required to supply 10 total detachable swiveling LAD-SAF safety sleeves (Part No. 6116502) with attached 10 total self closing and locking Saflok carabiners.
5. 3/8-inch diameter ASTM A 475 zinc-coated steel 7-wire strand, grade Extra High-Strength of 15.4 kips minimum breaking strength. The protective coating requirements for the wire strand shall comply with Class A (extra galvanized) zinc-coated for steel wires as shown in Table 2 of ASTM A 475. The steel wire strand shall run through entire length of the fixed climbing ladder. In length splice connection of any steel wire strand will not be permitted. The Contractor is responsible for field verification of steel wire strand length on each fixed climbing ladder. The Contractor shall expect minor length variations of each existing fixed

- climbing ladder.
6. Non-metallic steel wire strand guides installed per manufacturer's instructions or not greater than 20 ft on center.
  7. The LAD-SAF Flexible Cable System shall be bolted to each fixed ladder. Field welding on any component of the LAD-SAF Flexible Cable System on any structural component and/or member of tower on site will not be permitted.
  8. Ladder gate is not required. No spare part is required.
  9. Under normal usage, each LAD-SAF Flexible Cable System shall not require any scheduled maintenance.

## **SUBMITTALS**

Government approval is required for submittals with a "G" designation; submittals with a "FIO" designation are submitted for information only.

### **1. Structural Design Calculations and Drawings (G, five sets)**

The Contractor is required to submit the structural design and drawings of the specified modification of the connections of tubing steel for each top bracket assembly. The submittal shall include structural calculations, dead load, live load, material mechanical specifications, member sizes, steel u-bolt sizes, and connection details. Welds shall be designed and be indicated in accordance with AWS D1.1. The design calculations and drawings shall be stamped by a licensed professional civil or structural engineer who is currently registered in any one of 50 States of the United States.

### **2. Product Data (FIO, five sets)**

The Contractor is required to submit manufacturer's installation and user Instructions, maintenance instructions or manuals, product specifications, certificates of compliance and certificates of warranties.

### **3. Certificates (FIO, five sets)**

Copies of AWS certificates of the welders

### **4. Working Plan, (G, five sets)**

The Contractor is required to submit a working plan that includes and reflects coordination with the Government and the IBB Saipan Tinian Station broadcasting schedule, construction schedule, descriptions of how work will be performed on site, a personal safety plan which describes accident prevention procedures, a fire prevention plan which describes fire prevention procedures, training and equipment such as quantities of fire extinguishes to be provided on site, and a RF safety plan which describes how all workers on site monitor and safe guard each other against potential excessive RF exposure, name, experience and qualification of the project manager and the site supervisor.

### **5. Zinc Coating Repair Material (G, five sets)**

Material specifications and instructions of application

## **WARRANTY**

Each personal fall arrest protective system-flexible cable system installed shall carry a warranty of one year against material and/or workmanship defects.

## **STORAGE**

Material shall be properly stored in areas that are designated by IBB Station management and be properly protected without directly contacting to the ground and be properly covered against rain.

## **PRODUCTS**

### **MATERIALS**

All steel shapes, plates, and bars shall conform to ASTM A36 ( $F_Y = 36$  ksi). Dual certified steel conforming to ASTM A36 ( $F_Y = 36$  ksi) and A572 Grade 50 ( $F_Y = 50$  ksi) is acceptable. Structural Tubing shall conform to ASTM A500 Grade B. Phosphor Bronze shall conform to ASTM B103/B103 M Copper Alloy C51000.

U-bolts, nuts and washers:

U-bolts: ASTM A307 Grade C,  $f_y = 36$  ksi min.; Nuts: ASTM A563A Heavy Hex;

Washers: ASTM F844.

### **FABRICATION FINISHES**

All steel shall be hot-dip zinc galvanized in accordance with ASTM A 123/A 123M.

All steel fasteners including high strength bolts, nuts, washers, u-bolts shall be hot-dip zinc galvanized in accordance with ASTM A 153/A 153M.

#### **Repair of Zinc-Coated Steel Surfaces**

Zinc galvanized finish could be damaged due to rough handling during shipping or installation. The Contractor is required to repair all damaged zinc galvanized coating surfaces of steel and steel fasteners with qualified zinc coating repair material that meets or exceeds the requirements of ASTM A 780 -01, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings for repairing the damaged zinc galvanized steel surfaces. Zinc coating repair material that does not meet or is lack of proof to meet the requirements of ASTM A780 will not be permitted to be used at sites.

The Contractor may consider using the following qualified zinc coating repair material for repairing the damaged zinc coating steel surfaces:

- ZRC® Cold Galvanizing Compound or
- ZRC Galvilite®

ZRC Corporate Headquarters  
145 Enterprise Drive  
Marshfield, MA 02050 USA

Phone:(781)319-0400  
Toll-Free:(800)831-3275  
Fax: (781) 319-0404

## **EXECUTION**

### **STEEL FABRICATION**

Steel fabrication shall be performed in accordance with TIA-222-G and AISC ASD Manual. Fabrication and assembly shall be conducted in the fabrication shop to the greatest extent possible. Sharp edges on the steel plates shall be removed to smooth by grinding or sanding. Chamfer 3/4 inch at each corner of steel plates.

Prior to zinc galvanization, all steel surfaces shall be properly prepared. Dirt and dust on steel surfaces shall be removed. Rust on steel shall be removed. Sharp edges of steel shall be removed by grinding or sanding. Weld with sharp projections and weld spatters that are loosely bonded to the weld or steel surfaces shall be scraped or ground from the surfaces. The Contractor shall consider using power tools such as grinders, sanders, wire brushers, chipping hammers or needle guns for steel surface preparation.

The Government will reject poor steel surface finish such as steel surface with sharp edges, weld with sharp projections, or weld spatters that are loosely bonded to the weld.

See Section 05055 for additional requirements of metal work or steel fabrication.

### **INSTALLATION**

- A. To avoid and minimize any disruption to the ongoing Government facility operation and broadcasting, the Contractor shall coordinate with the Government and IBB Station management for construction activities prior to construction. Unapproved disruption will not be accepted. Unapproved working schedules or schedule changes will not be accepted. The Contractor's site supervisor shall remain at job site during the construction activities.
- B. The Contractor shall install personal fall arrest protective systems - flexible cable systems on fixed climbing ladders at sites in accordance with the complete manufacturer's written instructions. Partial compliance will not be permitted and accepted.
- C. Smoking in any antenna field is prohibited.

### **INSPECTION AND ACCEPTANCE**

Prior to Government's final acceptance inspection, the Contractor shall conduct his own

quality control and installation inspection and shall inspect each installed climbing ladder and fix all identified deficiencies. The Contractor shall coordinate with Government's inspection and take prompt actions to correct all identified deficiencies discovered by the Government.

**CLEANUP**

The Contractor shall remove all debris, equipment, and material from the site and restore the sites to their pre-work condition after completion of the work.

All photos, reports, as-built drawings, and schematic drawings are provided for information only. They shall neither be used for any other purpose nor be used to substitute the required Contractor's field verification.

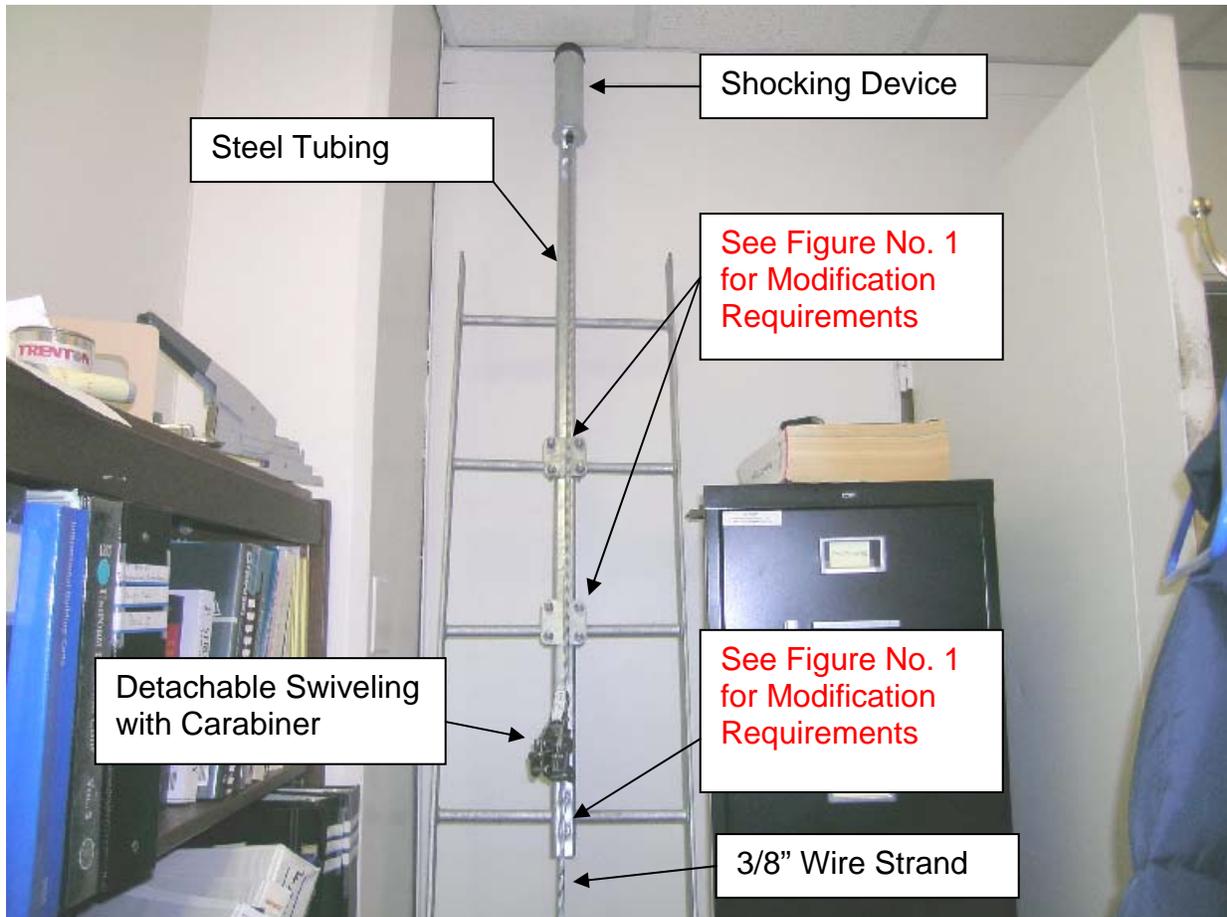


Photo No. 1, Top Bracket Assembly of the LAD-SAF Flexible Cable System

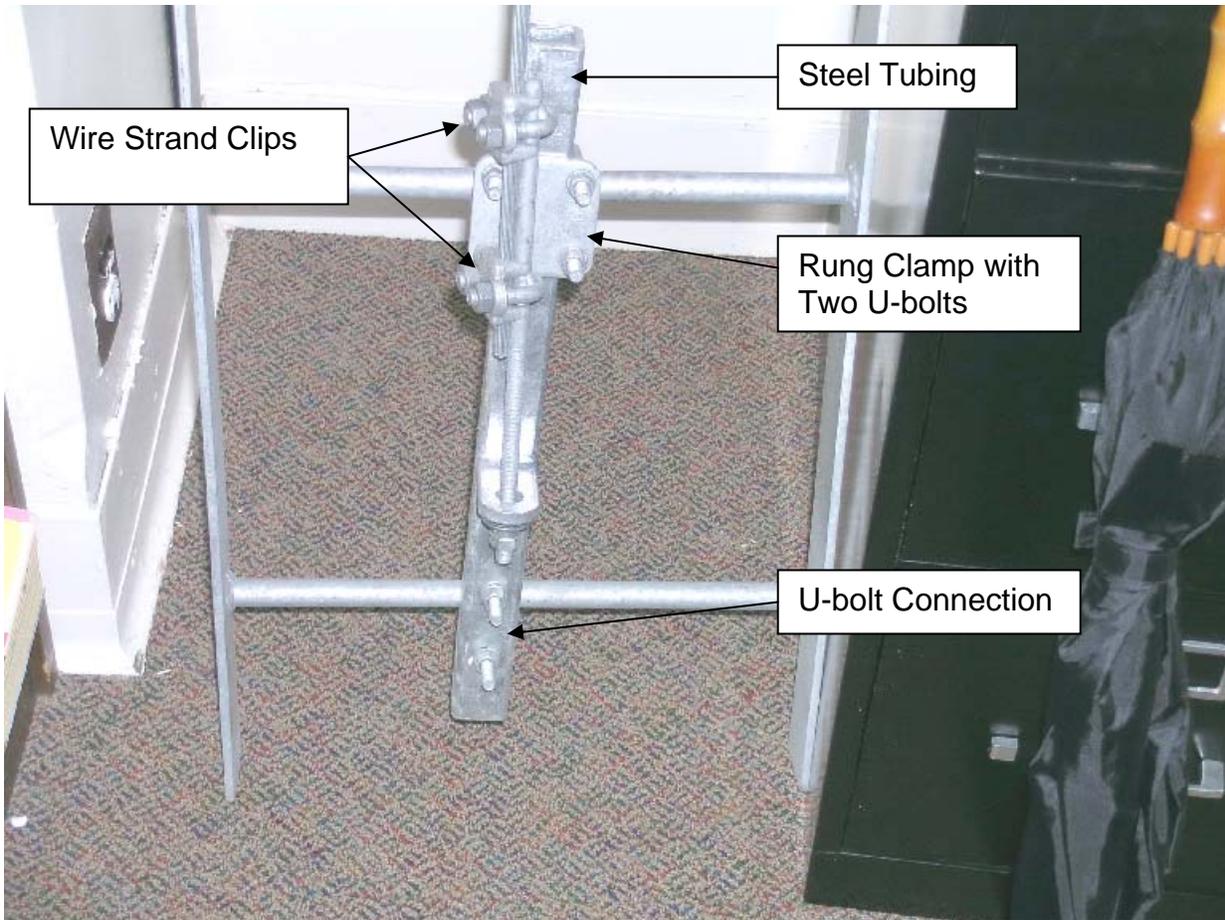


Photo No. 2, Bottom Bracket Assembly of the LAD-SAF Flexible Cable System

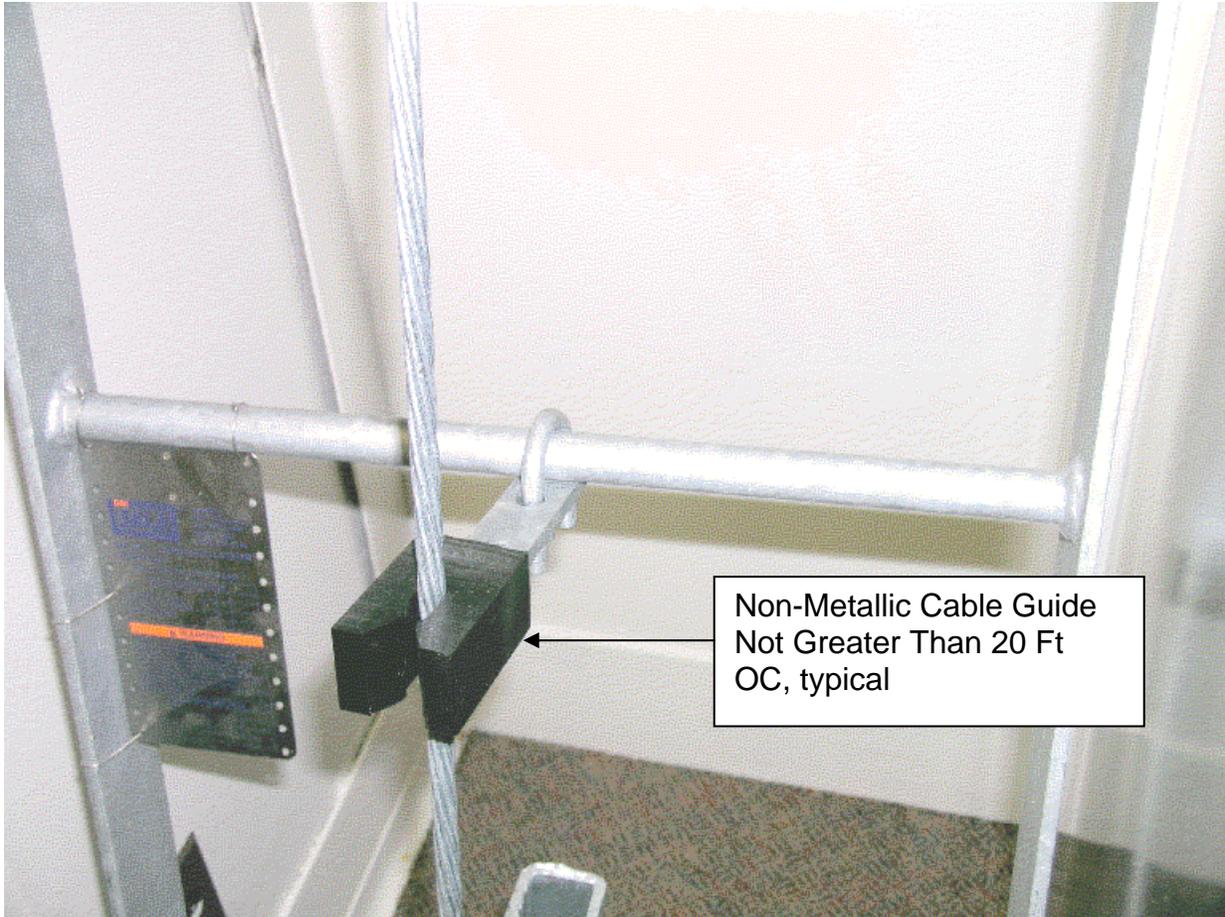


Photo No. 3, Typical Non-Metallic Cable Guide of the LAD-SAF Flexible Cable System

END OF SECTION