MIDWEST	EAST	CENTRAL	WEST	MOUNTAIN
24400 Sperry Drive	350 Green Oaks Pkwy	1976 Innerbelt Business Center Drive	28258 Avenue Stanford	875 S 600 W
Westlake, OH 44145	Holly Springs, NC 27540	Overland, MO 63114	Valencia, CA 91355	Heber City, UT 84032
(800) 504-4016	(866) 387-9965	(314) 942-8786		

Web: https://www.fallprotect.com/

SECTION 11 81 29.13 - RIGID ANCHOR HORIZONTAL LIFELINE

VERSION NO.	DATE	"RELEASED FOR…."	DESCRIPTION OF ADDITIONS / DELETIONS / CHANGES / UPDATES / & CLARIFICATIONS
1	10-30-2023	1ST REVIEW	NEW SECTION
2			
3			

TIPS:

To view/hide non-printing Editor's Notes that provide guidance for editing:
Word 365 and recent versions: Select Home/Font and check/uncheck Hidden in the Effects group.
Word legacy versions: Select Tools/Options and check/uncheck Hidden Text in the Formatting Marks group.

WHAT MANNER OF FALL PROTECTION SHOULD BE PROVIDED? Step one is to determine, for the structure or area in question, whether fall protection will be provided via a "Travel Restraint System" or a "Fall Arrest System." The main difference between "travel restraint" and "fall arrest" is that travel restraint stops people from accessing or approaching a fall hazard through a tie off system, while fall arrest allows a fall to occur but arrests and minimizes injury in the event of a fall. Additionally, exterior Building Maintenance (EBM) anchorage systems are required when façade access such as window washing, caulking, or other maintenance activities are to be accomplished using suspended access via powered platform and/or RDS (Rope Descent System)

WHO IS RESPONSIBLE FOR FALL PROTECTION: Building owners, employers, workers, architects and engineers all have their respective duties and responsibilities.

✍ **Building Owners** are responsible for fall protection if they hire someone to work at height. This happens more often than you'd think. The frequency of cleaning, maintenance and repair work at height is often underestimated. As the owner of a building, you are responsible for the work that is done on your building. Therefore, building owners are advised to ensure that the appropriate safety measures are taken, and that workers observe the applicable regulations for the use of fall protection equipment.

Per 29 CFR § 1910.27(b)(1)(i) - Before any rope descent system is used, the building owner must inform the employer, in writing that the building owner has identified, tested, certified, and maintained each anchorage so it is capable of supporting at least 5,000 pounds (2,268 kg), in any direction, for each employee attached. The information must be based on an annual inspection by a qualified person and certification of each anchorage by a qualified person, as necessary, and at least every 10 years.

Per 29 CFR § 1910.27(b)(1)(i) - The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE).

✍ **Employers** are responsible for the safety of their employees. They are also expected to make sure that all employees possess the skills and knowledge needed to use the equipment the correct way. This also applies to interns, temporary workers or third-party workers under the supervision of an employer. See 29 CFR § 1926.501 - Duty to have fall protection

✍ Qualified Person is responsible for supervising the design, selection, installation, use and inspection of certified anchorages and horizontal lifelines.

✍ Competent Person is responsible for the immediate supervision, implementation and monitoring of the fall protection program.

Authorized person means a person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or locations at the jobsite

✍ **Employees** - It is mandatory for employees to make use of fall protection equipment. They are also expected to assess their own safety in a particular situation. Among other things, this means they have to inspect the equipment before using it. If something is not in good condition, they must cease to use the equipment. When in doubt, they are required to report the situation to their supervisor, to rule out the possibility of work at height being executed in an unsafe manner.

✍ **Architects** should develop, in coordination with the Owner and structural and specialty fall protection engineers, a preliminary design layout that is in compliance with applicable Building Codes, OSHA Regulations, and industry standards for suspended facade access and fall protections systems that will best suit the building facade access and/or fall protection requirements and that are safe, functional and compliant. One of the most important aspects of personal fall protection systems is fully planning the system "before" it is put into use. Probably the most overlooked component is planning for suitable anchorage points. Such planning should ideally be done before the structure or building is constructed so that anchorage points can be incorporated during construction for use later for window cleaning or other building maintenance. If properly planned, these anchorage points may be used "during" construction, as well as afterwards.

✍ **Structural Engineer of Record**: Building structural engineer should design roof and wall structures to accommodate added loads imposed by rigid anchor horizontal lifeline system that is integrated into the building structure. Specialty fall protection engineers are best equipped to perform final design of rigid

anchor horizontal lifeline system in a design/build capacity. Depending on the scope of the project and the qualifications of the engineer, this party may act as the Fall Protection Engineer (see below).

✍ **Fall Protection Engineer**: Qualified by OSHA and ANSI z359.6 to supervise the design, selection, installation, use and inspection of fall protection systems.

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes the following a horizontal cable lifeline system secured to rigid rooftop anchors for fall protection.

B. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Coordinate related work required to make a complete installation. Delete sections that do not apply to Project; add other sections as required. Be sure that structural design includes live and dead loads and safety factors for this equipment. Also consider suspension point locations, architectural obstructions, maintenance access to roof areas, hot and cold water supply for window washing, power supply, and method of hoisting and installation of equipment.

If including Section Numbers with or instead of Titles, below is MasterFormat Section Number 03 30 00.

1. Div. 03 Section "CAST-IN-PLACE CONCRETE" for embedment of anchorage devices in concrete structure.

If including Section Numbers with or instead of Titles, below are MasterFormat Section Numbers 03 41 00 and 03 45 00.

2. Div. 03 Section "PRECAST CONCRETE" for embedment of anchorage devices in pre-cast concrete members.

If including Section Numbers with or instead of Titles, below is MasterFormat Section Number 05 12 00.

3. Div. 05 Section "STRUCTURAL STEEL FRAMING" for steel structural members to which anchorage devices are to be attached.

If including Section Numbers with or instead of Titles, include appropriate numbers and titles below.

4. Div. 07 Roofing Sections for coordination of flashing of roof-mounted anchorage and supports.

If including Section Numbers with or instead of Titles, below is MasterFormat Section Number 07 62 00.

5. Div. 07 Section "SHEET METAL FLASHING AND TRIM" for coordination of flashing of roof-mounted anchorage and supports.

1.03 REFERENCES

A. Abbreviations and Acronyms:
   1. HLL: Horizontal lifeline.
   2. PFPE: Personal fall protection equipment.

B. Definitions: Definitions in OSHA 29 CFR 1910 and 1926 including their subparts apply to this Section.

Below are some definitions in OSHA 29 CFR 1910 and 1926 that are pertinent to this Section but need not be repeated herein.

Anchorage means a secure point of attachment for lifelines, lanyards or deceleration devices devices, and which is independent of the means of supporting or suspending the employee. - APPENDIX C TO § 1910.66

Personal fall arrest system means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. As of January 1, 1998, the use of a body belt for fall arrest is prohibited. - APPENDIX C TO § 1910.66

Personal fall protection system means a system (including all components) an employer uses to provide protection from falling or to safely arrest an employee's fall if one occurs. Examples of personal fall protection systems include personal fall arrest systems, positioning systems, and travel restraint systems.

Lifeline means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall protection system to the anchorage. - APPENDIX C TO § 1910.66

Travel restraint (tether) line means a rope or wire rope used to transfer forces from a body support to an anchorage or anchorage connector in a travel restraint system.

Travel restraint system means a combination of an anchorage, anchorage connector, lanyard (or other means of connection), and body support that an employer uses to eliminate the possibility of an employee going over the edge of a walking-working surface.

Safety factor means the ratio of the design load and the ultimate strength of the material.

Note: Travel restraint systems allow users to approach fall hazards without falling over a dropoff. If a travel restraint system is used, there is no need to provide for prompt rescue under §1926.502(d)(20), since there would not be an arrested fall. ANSI Z359.2 prohibits travel restraint systems on sloped roofs with slope over 4:12.

   1. [**Travel Restraint System**]: A system, consisting of a combination of an anchorage, anchorage connector, lanyard (or other means of connection), and body support that an employer uses to eliminate the possibility of an employee going over the edge of a walking-working surface. A Travel Restraint System is arranged so that a worker is allowed to approach fall hazards yet is prevented from falling over a dropoff.

Note: When use of a travel restraint system is not feasible, a fall arrest system must be used and engineered so if a user falls, the system will promptly arrest or stop the fall. A fall arrest system further requires provision for prompt rescue under §1926.502(d)(20).

2. [**Fall Arrest System**]: A system used to arrest an employee in a fall from a working level. A fall arrest system exposes a worker to a fall, but arrests or stops the fall within specified parameters.
3. Anchorage, as used in this Section, means a secure point of attachment for lifelines, lanyards, or deceleration devices, which is independent of the means of supporting or suspending an employee or worker.
4. Anchor, as used in this Section, means a fastener or fastening device used to secure an anchorage or other component of the fall protection system to the structure.
5. Competent Person:
   a. As defined in 29 CFR 1910.140(b) as "a person who is capable of identifying existing and predictable hazards in any personal fall protection system or any component of it, as well as in their application and uses with related equipment, and who has authorization to take prompt, corrective action to eliminate the identified hazards."
6. Qualified Person:
   a. As defined in 29 CFR 1910.140(b) as "a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project."

C. Reference Standards: Perform Work per standards specified and as follows unless modified by requirements in the Contract Documents.

Include the following Paragraph only when cost of acquiring specified standards is justified. Retain first option for paid or free subscription access. Retain second option when a physical copy on site is required.

1. American National Standards Institute (ANSI)/The American Society of Safety Professionals (ASSP):
   a. ANSI/ASSP Z359.6 - Specifications and Design Requirements for Active Fall Protection Systems."

In 1988, the ANSI Z359 Fall Protection Committee was chartered to develop the first consensus standard. In 1992, ANSI Z359.1 - Safety Requirements for Personal Fall Arrest Systems, Systems and Components was published. It was developed to provide standard safety requirements for personal fall arrest systems, subsystems, and components. The purpose of these ANSI safety standards was to provide guidance in regards to the design of fall protection systems and the variety of equipment used in the industry. The standard was revised in 2007 in conjunction with American Society of Safety Engineers (ASSE). ANSI and ASSP have continued to work together with other industry leaders and government agencies to keep the standard of fall protection updated. The standard is constantly evolving and has added separate sections to address different parts of the Fall Protection Code. The following are a list of the current sections::
ANSI/ASSP Z359.0-2012 - Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ANSI/ASSP Z359.1-2016 - The Fall Protection Code - Digital Only
ANSI/ASSP Z359.2-2017 - Minimum Requirements for a Comprehensive Managed Fall Protection Program
ANSI/ASSP Z359.3-2017 - Safety Requirements for Lanyards and Positioning Lanyards
ANSI/ASSP Z359.4-2013 - Safety Requirements for Assisted-Rescue and Self-Rescue Systems,

Subsystems and Components
ANSI/ASSP Z359.6-2016 - Specifications and Design Requirements for Active Fall Protection Systems
ANSI/ASSP Z359.7-2011 - Safety Requirements for Assisted Rescue and Self Rescue Systems, Subsystems, and Components
ANSI/ASSP Z359.11-2014 - Safety Requirements for Full Body Harnesses
ANSI/ASSP Z359.12-2009 - Connecting Components for Personal Fall Arrest Systems
ANSI/ASSP Z359.13-2013 - Personal Energy Absorbers and Energy Absorbing Lanyards
ANSI/ASSP Z359.14-2014 - Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
ANSI/ASSP Z359.15-2014 - Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems
ANSI/ASSP Z359.16-2016 - Safety Requirements for Climbing Ladder Fall Arrest Systems
ANSI/ASSP Z359.18-2017 - Safety Requirements for Anchorage Connectors for Active Fall Protection Systems

2. Occupational Safety and Health Administration (OSHA):
   a. OSHA 29 CFR 1910, "Occupational Safety and Health Standards."
      1) OSHA 29 CFR 1910, Subpart D "Walking and Working Surfaces."
   b. OSHA 29 CFR 1926, "Safety and Health Regulations for Construction."
      1) OSHA 29 CFR 1926, Subpart M "Fall Protection."

Delete the following paragraph and subparagraphs below if NOT in California.

3. [**State of California Regulations: Code of Regulations, Appendix C to Article 6 (Personal Fall Arrest System).**]

Retain below for Sustainable Design projects.

4. U.S. Green Building Council (USGBC) - Leadership in Energy and Environmental Design (LEED) (http://www.usgbc.org/):
   a. USGBC-LEED [**v4**] for [**Building Design and Construction (BD+C)**] [**Interior Design and Construction (ID+C)**] [**Building Operations and Maintenance (O+M)**] [**Neighborhood Development (ND)**] [**Building Design and Construction: Homes and Midrise (BD+C)**] Reference Guide.

1.04 ADMINISTRATIVE REQUIREMENTS

Insert agenda items below not listed in Div. 01 Section "Project Meetings."

A. Coordination:
   1. Coordinate layout and installation of work of this Section with interfacing and adjoining work and other Sections affecting or affected by work of this Section for proper sequencing of each installation.
   2. Furnish setting drawings, diagrams, templates and installation instructions to other Sections.
   3. Furnish inserts and anchoring devices which need to be preset and built into structure to appropriate trade. Supply on timely basis to avoid delay in Work.
   4. Instruct other trades of proper location and position.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Include rated capacities; operating weights; furnished specialties; and accessories.

B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of rigid anchor horizontal lifeline systems, as well as procedures and diagrams.
   1. Show complete layout and configuration of rigid anchor horizontal lifeline systems including all components and accessories.
   2. Clearly indicate design and fabrication details and installation details.
   3. Include plans, elevations, sections, details, and attachments to other Work
   4. Include installation and rigging instructions and all necessary Restrictive and Non-Restrictive Working Usage Notes and General Safety Notes.
   5. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Retain "data" below unless project engineers specifically request "calculations."

C. Delegated-Design Submittal: Include design [**data**] [**calculations**] for rigid anchor horizontal lifeline systems for which design is assigned to Contractor.
   1. Indicate working and ultimate loads for each item of rigid anchor horizontal lifeline systems.
   2. Indicate design loads imposed on building structure at points of support.

ICC 2015 IBC 107.3.4.1 reads:

"Deferral of any submittal items shall have the prior approval of the building official. The registered design professional in responsible charge shall list the deferred submittals on the construction documents for review by the building official."

DEFERRED SUBMITTAL (def): Those portions of the design that are not submitted at the time of the application and that are to be submitted to the building official within a specified period.

Deferred Submittals shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the building official with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the deferred submittal documents have been approved by the building official.

1.06 INFORMATIONAL SUBMITTALS

A. Manufacturers' instructions for each product.

Retain below for Sustainable Design projects.

B. Sustainable Design [**LEED**] Submittals:

1. [**<insert requirements or reference to Division 01 Sections as required>**]

Only retain last option below if Contractor or manufacturer selects testing agency or if Contractor is required to provide services of a qualified testing agency in "Field Quality Control" Article.

C. Qualification Statements for[**manufacturer,**] [**installer,**] [**welders,**] [**design professional,**] [
   1. Include manufacturer's approval for installer.
   2. Include list of past Projects and contacts evidencing compliance with specified qualifications.

1.07 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For rigid anchor horizontal lifeline systems, subsystems, and equipment to include in operation and maintenance manuals.
   1. Requirements for personal fall protection including complete instructions for users and building maintenance personnel for the safe and proper use, operation, and maintenance of the equipment specified.
   2. Provisions for pre-operational, operation, and maintenance inspections. Include a Log Book outlining mandatory annual inspection requirements that are in accordance with ANSI and OSHA Regulations and Industry Standards.
   3. Plan view drawing of the building's roof, including the building name and address.
      a. Show rigid anchor horizontal lifeline system layout and details of the roof and [**exterior building maintenance**]fall protection systems.
      b. Identify anchorage points for personal fall arrest systems.
      c. Identify load ratings of each item of rigid anchor horizontal lifeline system equipment including special use conditions.

The following paragraph applies only to California. Delete if not required.

4. [**An Operating Procedures Outline System (OPOS) for all procedures not covered by the California Labor Code orders. Indicate date the OPOS was prepared on isometric or plan view drawing.**]

Retain below if required by authorities having jurisdiction.

B. [**Regulatory agency approvals for use of rigid anchor horizontal lifeline systems.**]

1.08 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer Qualifications: Minimum [**10**] years experience
      a. Company: One specializing in the design, fabrication and installation of rigid anchor horizontal lifeline systems specified in this Section and whose products have a record of successful in-service performance.

Verify manufacturer insurance requirements with Owner.

      b. Manufacturer shall maintain specific liability insurance (products and completed operations) in the amount of [**$2,000,000.00**] to protect against product/system failure.
   2. Installer Qualifications: Minimum [**5**] years experience

a. Company: A firm or individual certified, licensed, or otherwise qualified or employed by rigid anchor horizontal lifeline system manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
b. Project Experience: Minimum [**5**] years experience on at least [**5**] projects of similar nature in past [**5**] years.
c. Staff: Employ a competent foreman who is a Competent Person as defined in 29 CFR § 1926.32(m) and who is a certified installer to supervise Work of this Section. Foreman shall be present whenever Work is in progress.

3. Welder Qualifications: Welders must be qualified to applicable AWS Standards for each type of weld required.

Retain "Testing Agency Qualifications" Paragraph below if Contractor or manufacturer selects testing agency or if Contractor is required to provide services of a qualified testing agency in "Field Quality Control" Article.

4. Design Professional Qualifications:
   a. Professional engineer [**employed by the rigid anchor horizontal lifeline system manufacturer and**] experienced in design and engineering of rigid anchor horizontal lifeline system, its application and safety requirements, [**licensed**] [**or**] [**registered**] in jurisdiction in which Project is located, and who assumes responsibility for the following:
      1) Preparation of comprehensive engineering analysis data.
      2) Preparation of engineering calculations.
      3) Preparation of shop drawings and other submittals.

Below may include lab or field testing for compliance.

      4) Testing program development.
      5) Review and corroborate comments from Architect and other reviewers on delegated-design submittals and address required changes in their design.

B. Certifications:

1910.27(b)(1)(i) now requires that before “employers use a rope descent system, the building owner must inform the employer in writing that the building owner has identified, tested, certified, and maintained each anchorage so it is capable of supporting 5,000 pounds (2268 kg) in any direction, for each worker attached”.

Building owners had until fall of 2017 to ensure all of your anchorage is capable of supporting 5,000 pounds (2268 kg) in any direction for each attached worker. The only way to definitively make this determination is to pull test each anchorage.

1. Inspection certificates[**and use permits**] for rigid anchor horizontal lifeline systems.

Normally retain first option below if manufacturer or supplier will perform preconstruction testing. Retain second option if Owner will perform testing.

1.09 DELIVERY, STORAGE, AND HANDLING

Retain this article only if providing detailed requirements that apply to Work of this Section and that supplement general provisions in Section 016000 "Product Requirements."

A. Delivery Requirements: Deliver materials in manufacturer’s undamaged packaging, complete with installation instructions.

1.10 WARRANTY

A. Manufacturer's Standard Warranty: Manufacturer will warrant the products specified below, to operate properly, if the rigid anchor horizontal lifeline system is inspected annually by the manufacturer or a certified representative.
   1. Warranty Periods from date of Substantial Completion:

Edit below to retain only those components intended for installation on this Project.

      a. Rooftop Rigid Anchors: 10 years.
      b. Rooftop Horizontal Lifelines: 10 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Retain "Manufacturers" Paragraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

A. Manufacturers: Subject to compliance with requirements, [**provide products as furnished by the following**]
   1. Diversified Fall Protection.
   2. Substitutions [**will**] [**will not**] be considered. Comply with provisions of Div. 01 Section "SUBSTITUTION PROCEDURES."

B. Project Source Limitations: Obtain each variety of fall protection equipment, whether specified in this Section or in other Sections, through one source from a single manufacturer who is capable of showing prior successful production of units similar to those required for entire Project

2.02 DESCRIPTION

Suspended Access Fall Arrest Systems, are designed to provide two independent tie-off points required to support a suspended worker - one for the boatswain's chair or other worker support device and the other as the workers safety line. Suspended access fall arrest systems are typically used by window cleaners and other maintenance trades that need to access exterior building façades. Suspended access systems include anchorage points and may include davits, rigging sleeves, monorails, and outrigger beams.

Rooftop Access: Travel restraint and fall arrest systems allow workers to traverse rooftops or similar elevated areas while maintaining 100 percent tie-off to an OSHA and ANSI compliant system. Rooftop access systems are typically needed by trades who perform routine maintenance of roof-based equipment such as HVAC equipment, communication equipment, security cameras, gutters, solar

panels, skylights, and lighting, or use by trades performing window cleaning or façade maintenance, allowing them to be safely tied to an anchorage point while rigging, prior to performing their descents.

A. Rigid anchor horizontal lifeline systems consist of the following permanently installed equipment with required attachment devices and accessories for attachment of personal fall arrest systems.
   1. Stanchion post type rigid anchors mounted to roof structure.
   2. Brackets as required for negotiating corners in lifelines.
   3. Horizontal cable lifelines with in-line energy absorbers, end anchors, and tensioning devices.
   4. Latchways for attachment of personal fall protection lanyards.

B. Product Options: Drawings [**may**] indicate suggested locations[**, profiles, and dimensional requirements**] of rigid anchor horizontal lifeline systems and are based on the specific system indicated. Final locations shall be determined according to rigid anchor horizontal lifeline system manufacturer's design requirements.
   1. If modifications are proposed, submit, with Shop Drawings, comprehensive explanatory data to Architect for review.

Retain applicable standards below.

C. Regulatory Requirements: Provide rigid anchor horizontal lifeline systems, supports, and anchorage designed and constructed to suit building configuration and in accordance with the Contract Documents and applicable regulations and codes.
   1. Comply with the following ANSI/ASSP regulations:
      a. ANSI/ASSP Z359.18 "Safety Requirements for Anchorage Connectors for Active Fall Protection Systems "Part of The Fall Protection Code."

ANSI/IWCA I-14.1 Window Cleaning Safety Standard requires fall protection whenever a worker must travel within 6 feet of a vertical drop. Fall protection may be in the form of a code-compliant guardrail or parapet. When such code-compliant perimeter guarding does not exist and cannot be installed, a horizontal Travel Restraint cable system may be the best option for providing fall protection.

      b. ANSI/IWCA I-14.1 "Window Cleaning Safety Standard."

Coordinate the code citations below with State and local requirements. The first set is U.S. OSHA regulations for all States except New York and California, which have more stringent regulations.

   2. Comply with the following OSHA regulations:
      a. OSHA 29 CFR 1910, Subpart D "Walking and Working Surfaces."
      b. OSHA 29 CFR 1926, Subpart M "Fall Protection."

Delete the following paragraph and subparagraphs below if NOT in California.

   3. [**Comply with State of California regulations: Code of Regulations, Appendix C to Article 6 (Personal Fall Arrest System).**]

2.03 PERFORMANCE / DESIGN CRITERIA

A. Delegated Design: Professional design services are specifically required of Contractor. Engage a qualified design professional to design rigid anchor horizontal lifeline system, using performance requirements and design criteria specified herein.

1. Design Criteria:
   a. Rigid anchor horizontal lifeline systems shall comply with current applicable federal, OSHA, ANSI, and state regulations and standards.
   b. Design anchorage components, using proper engineering principles, to provide adequate attachment to building; ensure compatibility with industry standard equipment.

Retain below for suspended access work.

   c. For suspended access work, locate anchorages to suit suspension equipment that will be used on the structure with respect to items such as reach, rigging, spacing, roof [**and other elevated**]edge conditions, and similar items. Locate anchorages so lines don't exceed 15 degrees from perpendicular to the building edge that is serviced.
   d. Design rigid anchor horizontal lifeline systems to accommodate structural movement, movement within system, movement between system and support components, dynamic loading and release of loads, and deflection of structural support, without detriment to durability or performance, without damage to support structure.
   e. Design rigid anchor horizontal lifeline systems and provide clearances that will allow for installation tolerances, and expansion and contraction of adjacent building materials.
2. Structural Performance Criteria: Provide rigid anchor horizontal lifeline system, including anchorages, complying with specific performance and design criteria indicated, capable of withstanding, without failure, the effects of gravity loads and in-use loads and stresses under conditions indicated or reasonably anticipated. Include necessary modifications to meet required criteria.
   a. Contract Documents may indicate certain performance requirements, features, and primary components required, but do not cover details of design and construction, and do not purport to identify nor solve problems of thermal or structural movement, anchorage, or moisture disposal. Requirements shown by details are intended to establish basic locations and dimension of rigid anchor horizontal lifeline systems.
   b. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
   c. Compliance with requirements of authorities having jurisdiction is the responsibility of Contractor.

2.04 RIGID ANCHORAGE

1910.21(b) Definitions. Anchorage means a secure point of attachment for equipment such as lifelines, lanyards, deceleration devices, and rope descent systems.

Per 29 CFR § 1926.502(d)(15) - Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (2268 kg) per employee attached, or shall be designed, installed, and used as follows:
1926.502(d)(15)(i) - as part of a complete personal fall arrest system which maintains a safety factor of at least two; and
1926.502(d)(15)(ii) - under the supervision of a qualified person.

A. Design Criteria: Design anchorages used for attachment of personal fall arrest equipment to resist the following maximum static load in any direction without detachment or fracture occurring.
   1. Safety Factor: 2:1

ANSI Anchorage Types:
- Type A: An anchorage connector (other than a Type D or T anchorage connector) designed for an active fall protection system.
- Type T: An anchorage connector designed to support a suspended component/tie-back line or for an active fall protection system.
- Type D: An anchorage connector designed to allow deformation or movement when arresting a fall with the purpose of absorbing fall energy and reducing the strength requirements of the anchorage to which it is attached. Deformation may be permanent or temporary. In some cases, these anchorage connectors may not be suitable for work positioning, rescue, rope access, and suspended component/tie-back because of their low serviceability load rating. Also, travel restraint may be acceptable based on the serviceability rating and deformation limits of the individual product.

Per 29 CFR § 1926.502(d)(15), Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (2268 kg) per employee attached

For static strength testing, both Type A and Type T anchorage must withstand a minimum 5,000 pounds (2268 kg) load. Type D anchorage must withstand a static load between 2,700 pounds (1224 kg) and 5,000 pounds (2268 kg), and their deformation must be measured so that it may be accounted for in fall clearance calculations.
Note: Above assumes a combined person and tool weight of less than 310 lbs (140 kg) - additional restraint is required for heavier weights.

For dynamic strength testing, both Type A and Type T anchorage must not allow a 282 pounds (127 kg) test weight to impact the ground when dropped with a 3 ft (0.91 m) free fall, while Type D anchorage must do the same but with a 6 ft (1.83 m) free fall.

Delete one of the two options in the following subparagraph. The first is OSHA's requirement; the second applies to California only.

   2. Type A and Type T Anchorages: [**5,000 pounds (2268 kg)**] [**5,400 pounds (2249 kg)**].
   3. [**Positioning Type Anchorages: 3,000 pounds (1361 kg).**]

B. Roof-Mounted Rigid Anchorage: Stanchion post type with closed "loop" opening factory-welded to top of stanchion post for attachment of horizontal lifelines. Factory-weld base plates of thickness and with means of securement to comply with design criteria.

Select loop size desired from the following two subparagraphs. 2 inch option applies to California projects.

   1. Loop: 3/4 inch (19 mm) inside diameter forged, galvanized steel with [**1-1/2 inch (38 mm)**] [**2 inch (50.8 mm)**] opening loop.
   2. Stanchion Post: Galvanized steel pipe, with wall thickness to comply with design criteria.

For steel roof decks, retain one of the following three options.

   3. Base: [**Open ended post for direct-welded attachment to structural member**] [**Galvanized steel base plate factory-welded to bottom of stanchion post for field-welding to building structural member**] [**Galvanized steel base plate factory-welded**

to bottom of stanchion post for bolting around (wrapping) building structural member].

For concrete roof decks, retain one of the following three options. Rooftop Anchor, Inc. suggests Hilti 304 or 316 SS HAS-R stainless steel rods set with HT-HY 200Epoxy Adhesive - verify with Structural Engineer in Responsible Charge.

4. Base: Galvanized steel base plate factory welded to bottom of stanchion post [**with cast-in-place anchors for embedding in concrete deck**] [**for epoxy anchor attachment to concrete deck**] [**for through-bolting to concrete deck**].

For wood roof decks, retain one of the following two options.

5. Base: Galvanized steel base plate factory welded to bottom of stanchion post for [**screw-fastening to wood framing**] [**bolting through wood deck**].

Rooftop Anchor, Inc. steel and concrete deck products are available in 12, 15, 18, 21, 24 inch (305, 380, 456, 533, 609 mm)heights and custom heights. Wood deck anchorage products are available in 12, 15, 18 inch (305, 380, 456 mm) heights.

6. Minimum Post Height Above Roof Surface: Sufficient to allow [**8 inch (203 mm)**] [**12 inch (304 mm)**] high roof flashing and seal around stanchion. Depth of roofing materials is to be provided by General Contractor in coordination with roofing contractor's tapered insulation shop drawings.

Select one of the following three post finishes

7. Steel Finish: [**Thermal diffusion galvanized**] [**Hot-dip galvanized**].
8. Stainless Steel Finish: As fabricated.

2.05 HORIZONTAL LIFELINES

1910.66(d) Lifeline means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

1910.140(c)(11)(ii) Is part of a complete personal fall arrest system that maintains a safety factor of at least two.

Designer/Specifier must decide if lifeline system is for "travel restraint" (to eliminate a fall possibility) or "fall arrest" (which allows a fall but arrests the fall to minimize injury). See discussion in TIP at beginning of this Section.

A. Design Criteria: Design as part of a complete [**travel restraint**] [**fall arrest**] system as follows:
   1. Safety Factor: 2:1

Select number of users as required below.

2. The horizontal lifeline shall be designed for [**one**] [**two**] [**three**] users, each using an energy absorbing lanyard which limits the force applied to the horizontal lifeline to 1,350 lbs (6005 N) (or as designated by the Qualified Fall Protection Engineer, not to exceed 1,800 lbs (8006 N)).Design trolleys to ensure no occurrence of structural or mechanical

deterioration during designed life of system that could affect security and operation considering permanent exposure to elements.

B. Horizontal Cable Lifeline System: Hands-free fixed cable type for rooftop installation. Design system for [**travel restraint**] [**fall arrest**] purposes and install to allow users to walk uninterrupted the entire length of the system and provide secure anchorage to arrest a fall. System shall allow attachment [**at any point along the cable without the need for an entry/exit terminal**] [**at the entry/exit terminal**] and enable freedom of movement along the cable as it passes by stanchion anchor points.
   1. Basis of Design System: Rigid Anchor Horizontal Lifeline System by Diversified Fall Protection.
   2. Cable: ASTM A492 316 stainless steel wire rope, 7 x 7 type; 5/16 inch (7.94 mm) diameter
      a. Fixed End Anchorage: Permanently swaged 316 stainless steel swage and clevis terminations.
         1) Basis of Design Product: 85391-00 by Diversified Fall Protection.
      b. Tensioning End Anchorage for Forged Eye Anchors: Permanently swaged 316 stainless steel swage and clevis terminations.
         1) Basis of Design Product: 37502-00 by Diversified Fall Protection.
      c. Left Hand Threaded Swage: 316 stainless steel swage cable end terminations.
         1) Basis of Design Product: 85162-00 by Diversified Fall Protection.
      d. Turnbuckle Body: 316 stainless steel.
         1) Basis of Design Product: 85050-00 by Diversified Fall Protection.
   3. Intermediate Hanger Brackets: 5/16 inch (8 mm) 316 stainless steel, electropolished for connecting cable to stanchion eyes.
      a. Basis of Design Product: 85041-00 by Diversified Fall Protection.
   4. Corner and Curve Transitions: 316 stainless steel, electropolished, [**90 degree**] [**variable 0 to 80 degree**] type.

First option below is for 90 degree corners. Second option below is for variable 0 to 80 degree corners.

      a. Basis of Design Product: [**65018-00**] [**85130-00**] by Diversified Fall Protection.
   5. Horizontal Inline Energy Absorber: 5,000 lb (11 kN) cpacity installed inline at cable terminations, 316 stainless steel.
      a. Basis of Design Product: 37500-00 by Diversified Fall Protection.
   6. Traveler Latchway Device: 316 stainless steel casting, electropolished and serial numbered; with eye designed for attachment to cable [**at any point**] [**at the entry/exit terminal**] and to move along cable without requiring removal as post stanchions are crossed.

2.06 SAFETY SIGNAGE AND DATA PLATES

A. Safety Signage: Removable, non-fading, non-corrosive, multi-language, legible, preprinted metal or plastic label. Include the following information:
   1. The words “DANGER. Fall Protection Must be Used Beyond this Point.”

B. Allowable Load Data Plates: Permanent, non-fading, non-corrosive, legible, preprinted metal or plastic labels complying with ANSI Z359.18. Omit for rigid anchorages. Include the following information on data plates:
   1. Maximum rated service or working load capacity and maximum number of users per device or system.

2. Manufacturer's name, address, phone number, web address, , and system serial number(s), and date of installation.
3. Other pertinent information.
4. Permanently attach to each major component of rigid anchor horizontal lifeline systems so labels will be visible to anyone seeking to use anchorage.

C. Service Labels: Removable, non-fading, non-corrosive, multi-language, legible, preprinted metal or plastic label at each overhead horizontal track system and horizontal lifeline system. Include the following information on service labels:
1. Installer's name, phone number, and date of original installation.
2. Date of latest inspection and certification.
3. System capacity.
4. Manufacturer’s name, address, phone number, web address, and date of installation.
5. Attach labels in manner to prevent unintentional removal

2.07 STAINLESS STEEL MATERIALS

Retain next two paragraphs below if any of the following was retained above and specified to be made of stainless steel:
Alternating tread ladders
Ships' ladders
Grating

Usually retain Type 304 in first two paragraphs below; Type 316 is better for corrosive environments. The difference between 316 and 316L stainless steel is that 316L has a 0.03 max carbon and is good for welding whereas 316 has a mid range level of carbon. Both 316 alloys contain molybdenum, which also makes them more corrosion resistant. Even greater corrosion resistance is delivered by 317L, in which molybdenum content increases to 3 to 4% from the 2 to 3% found in 316 and 316L.

A. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A 240M or ASTM A666, [**Type 304**] [**Type 316**] [**Type 316L**].

B. Stainless Steel Bars and Shapes: ASTM A276, [**Type 304**] [**Type 316**] [**Type 316L**] with minimum yield strength of 35 ksi.

C. Stainless Steel Tubing: ASTM A554, [**Grade MT 304**] [**Grade MT 316L**].

Below is available in 3-wire, 7-wire, and 19-wire lays and in Types 302, 304, 305, 316, and variations. Sizes range from 13/64 to 3/8 in 3-wire, 7/32 to 1/2 in 7-wire, and 3/8 to 7/8 inch in 19-wire.

D. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A368, Type 316.
1. Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

E. Cast Stainless Steel: ASTM A747/A747M precipitation hardened casting.

2.08 FASTENERS

A. General: Select fasteners and anchors for type, grade, and class required. Unless otherwise indicated, provide fasteners as follows:

The three options below are listed best, better, good for exterior use.

Usually retain Type 304 stainless; retain Type 316 if required for corrosive environments.

ASTM F2329 specifies avg hot-dip zinc thickness of 0.0020" (50 microns).

ASTM B633 electro-deposited zinc coating classes (Service Condition = SC) - ASTM F1941 uses same designations but doesn't mention Service Conditions:
Fe/Zn 5 = SC 1 (mild) at 5 micron thickness
Fe/Zn 8 = SC 2 (moderate) at 8 micron thickness
Fe/Zn 12 = SC 3 (severe) at 12 micron thickness
Fe/Zn 25 = SC 4 (very severe) at 25 micron thickness

1. Material for exterior [**and interior**]locations in contact with stainless steel: Type [**304**] [**316**] stainless-steel fasteners.
2. Material for exterior locations exposed to weather: [**Type** [**304**] [**316**] stainless steel fasteners] [**hot-dip galvanized fasteners per ASTM F2329**] service condition].
3. Material for interior locations or where below roof flash point: [**Hot-dip galvanized fasteners per ASTM F2329**] [**Zinc-plated fasteners with coating per ASTM B 633, Class Fe/Zn**]

Retain Group 1 option in first paragraph below for use with Type 304; retain Group 2 option for use with Type 316.

B. Stainless Steel Bolts and Nuts: ASTM F593 [**regular**] [**heavy**] hexagon-head annealed stainless steel bolts; with ASTM F594 hex nuts; and, where indicated, flat washers; Alloy [**Group 1**] [**Group 2**].

C. Stainless Steel Washers: ASTM A240/A 240M, [**Type 304**] [**Type 316**] and ANSI B18.22.1, Type A Plain.

D. High-Strength Steel Bolts and Nuts: ASTM A325, Type 3 regular hexagon-head bolts; with ASTM A563, Grade C3 hex nuts; and, where indicated, flat washers.

E. Steel Bolts and Nuts: ASTM A307, Grade A regular hexagon-head bolts; with ASTM A563 hex nuts; and, where indicated, flat washers.

F. Post-Installed Anchors: Torque-controlled expansion anchors **or chemical anchors** designed for and recommended by anchorage manufacturer for conditions encountered.

2.09 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.10 STEEL AND IRON FINISHES

ThermaGalv™ Thermal Diffusion Galvanizing provides the same cathodic protection as HDG without the need for inefficient processing facilities that are damaging to the environment. ThermaGalv™ carries the same warranty as hot-dip products while allowing more control over application quality and delivery timelines.

Currently ThermaGalv™ is only offered for rigid anchors.

A. Thermal Diffusion Galvanizing: Proprietary, factory-applied, thermal diffusion coating applied per AWS C2.2, 1967 Edition "Recommended Practices for Metallizing with Aluminium and Zinc for Protection of Iron and Steel" and providing the same warranty and corrosion protection as hot-dip galvanizing.
   1. Basis of Design Product: ThermaGalv™ by Rooftop Anchor, Inc.
   2. Substitutions will [**not**] be considered.

Hot-Dip Galvanization (HDG) has been the standard for corrosion protection in manufacturing but cannot be done in-house, is labor intensive, has a high energy requirement, represents a large carbon footprint which is hard on the environment, and it requires shipping products from manufacturer to galvanizer and back.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

Retain subparagraph below if galvanized items are painted.

   1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

C. Pigmented Organic Finish: Manufacturer's standard [**powder coat**] comparable in performance to AAMA 621 coatings.
   1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   2. Color: [**High visibility yellow**] [**As selected from manufacturer's full range**].

PART 3 - EXECUTION

3.01 INSTALLERS

Under most standard forms of contract, any installer who can perform the work as specified is acceptable. The two primary reasons to list names of installers are (1) to contractually limit the Contractor's options and (2) to give the Contractor the information necessary to find an installer who can do the work specified. Examples of work that might require limiting the Contractor's options are historical restoration work, testing and balancing of mechanical systems, and special finishes where an unusually high level of workmanship is required. When using this Article, coordinate its use with Part 1 Article "Qualifications." If installer names are listed, use the Article "Substitution Limitations" to define the purpose of the installer list. The term "Installers" may be replaced by "Applicators," "Erectors," or "Constructors," as appropriate to the operation to be performed.

Retain "Installers" Paragraph below if a list of preapproved firms is used as a quality-control procedure. Retain first or second option if additional firms will not be considered; retain third option if they will. If retaining third option, include procedure for approving other firms in the Instructions to Bidders.

The term "Installers" may be replaced by "Applicators," "Erectors," or "Constructors," as appropriate to the operation to be performed.

A. Installer List: Installation contractor shall be trained or qualified by the manufacturer.

See association member lists for names of potential firms.

3.02 EXAMINATION

A. Verification of Conditions:[**<insert as required>**]

1. Examine roofs and other mounting surfaces for suitable conditions where rigid anchor horizontal lifeline systems will be installed for compliance with requirements for, installation tolerances, operational clearances, and other conditions affecting performance of work.
2. Verify that structural members to which anchorage is to be attached have adequate bearing surface required to ensure proper attachment per manufacturer's requirements.

Delete subparagraph below if not required.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 PREPARATION

A. Coordinate location of rigid anchor horizontal lifeline systems indicated to be attached to permanent structure elements and provide appropriate anchoring devices with installation templates, diagrams, and manufacturer's instructions.

3.04 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions and recommendations, referenced standards, requirements of authorities having jurisdiction, and approved submittals.

B. Securely and rigidly install products in place to obtain the required working loads without exceeding allowable loads for each rigid anchor horizontal lifeline system component.

C. Install terminal stanchion posts with eye parallel with cable. Install intermediate stanchion posts with eye perpendicular to cable.

D. Field Welding: Welding methods shall comply with AWS D1.1. After installation, clean and paint as necessary any field welds with cold galvanizing compound to prevent corrosion.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where post stanchions are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

1. Install fasteners in accordance with fastener manufacturer's recommendations to obtain the allowable working loads published in their product literature.

Retain first option below to allow for future intentional removal of bolts.

2. [**Apply thread-locking fluid or deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal or vandalism at pedestrian accessible equipment.**]

F. Coordinate installation of flashed roof anchorage with roofing trades to ensure a roofing manufacturer-approved, water-tight flashing method is used.

3.05 REPAIR

Div. 01 Section "Execution" covers general requirements for repairing, replacing, or restoring defective and damaged new and existing work other than operating products, systems and equipment.

Describe how existing work is to be repaired and/or restored.

A. Repairing Damaged Finishes: Immediately after installation, clean **field welds and/or** abraded and other areas where coatings are damaged.
   1. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.
   2. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish per manufacturer's written instructions.

3.06 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:

Delete the option in the following paragraph if the manufacturer is also the installer.

1. Require product manufacturers to provide field surveillance of the installation of their products and to [**observe installation of equipment and**]assist in Owner's demonstration and training.

Delete subparagraph below if the manufacturer is also the installer.

2. Monitor and report installation procedures, and unacceptable conditions.
3. Engage manufacturer's Qualified Person to perform field tests and inspections and to prepare test reports.

B. Testing Services: Testing and inspecting of completed installations of rigid anchor horizontal lifeline systems shall take place in successive stages as rigid anchor horizontal lifeline system is installed. Do not proceed with work for the next area until test results for previously completed applications of work show compliance with requirements.
   1. Prepare a written report to Contractor with copy to Architect and Owner including the date and results of the inspection, the signature of the person who performed the inspection, and the number, or other identifier, of the building support structure and equipment which was inspected.

C. Do not load or stress system until materials and fasteners are properly installed and ready for service.

D. Field Tests: Test using load cell test apparatus in accordance with applicable OSHA and ANSI requirements, supervising engineer, and manufacturer’s recommendations.
   1. Test 100 percent of anchorage that rely on chemical adhesive fastening.

Serviceability load testing is not required for Type A anchorage by ANSI Z359.

2. Test Type T anchorage by applying the greater of twice the working load or 2,500 pounds (1134 kg), applied at up to 900 pounds (408 kg) per minute and maintained for at least 3 minutes.
3. Test Type D anchorage by applying the greater of twice the working load or 450 pounds (204 kg), applied gradually over at least 1 minute and maintained for at least 3 minutes.
4. Test tension of cable lifelines using a calibrated tension meter.

E. Field Inspections:
1. Inspect each anchorage attachment to building structure for proper installation.

F. Remove and replace work where test results indicate that it does not comply with specified requirements.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

H. Do not allow use of rigid anchor horizontal lifeline systems until users have been trained in the use of the systems.

3.07 ADJUSTING

A. Verify that products have been installed in accordance with manufacturer's instructions.

B. Adjust rigid anchor horizontal lifeline system components to function smoothly and safely and as necessary to ensure compliance with reference standards.

C. Correct component deficiencies to assure compliance prior to Substantial Completion

3.08 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate function, operation, maintenance, and safety procedures for rigid anchor horizontal lifeline systems.

State requirements for demonstrating, instructing, and training Owner on sequence of operations, general facility operation, and facility maintenance procedures.

State requirements of the installer or manufacturer to demonstrate the proper operation of equipment.

State requirements of the installer or manufacturer to train the Owner's personnel in the operation and maintenance of equipment for ongoing facility management and maintenance.

B. Training: Train Owner's personnel in proper use and maintenance of rigid anchor horizontal lifeline system.
1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

3.09 PROTECTION

A. Protect roof surfaces from damage during installation.

3.10 RECERTIFICATION AGREEMENT

A. Agreement: Furnish a proposal to Owner for an annual recertification program per the manufacturers recommendations.
   1. Furnish proposal in the form of a standard yearly agreement.
   2. State services, obligations, conditions, and terms for agreement period and for future renewal options.

END OF SECTION 11 81 29.13