

SECTION 11 81 29 - FACILITY FALL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes fall protection systems.
- B. See the drawings for types and locations of fall protection systems required for this project.
- C. Related Requirements:
 - 1. Section 01 40 00 "Quality Requirements."
 - 2. Section 05 12 00 "Structural Steel Framing" and Section 05 40 00 "Cold Formed Metal Framing" for supporting framing for fall protection systems.
 - 3. Section 06 16 00 "Sheathing."
 - 4. Section 05 50 00 "Metal Fabrications."
 - 5. Section 07 54 23 "TPO Roofing" for flashing closures.
 - 6. Division 7 Sections as applicable

1.2 COORDINATION

- A. Coordinate required structural supports for fall protection systems and for their attachment.
- B. Coordinate installation of fall protection systems with ~~new~~-roofing systems and applicable Division 07 sections~~Sections~~.

1.3 SUBMITTALS

- A. Product Data. Submit product data, including manufacturer's technical data sheet, instruction manual, and manufacturer's recommended inspection and maintenance log.
- B. Shop Drawings: Indicate information on the shop drawings as follows:
 - 1. Show locations of all fall protection systems, connection requirements, loads, and other pertinent information required for fabrication, coordination, and installation.
 - 2. Clearly indicate design and fabrication details, plans, elevations, components profiles and sizes, hardware, and installation details.
 - 3. Fully detail all anchors and connections to structure.
 - 4. Include all necessary restrictive and non-restrictive, working, usage notes, and general safety notes.
 - 5. Indicate design and fabrication details, hardware, and installation details.
 - 6. Include installation and rigging instructions.
- C. Delegated-Design Submittal: For fall protection components indicated to comply with performance requirements and design criteria, include analysis data signed and sealed by the professional engineer responsible for their preparation.
- D. Quality Assurance Submittals:

1. Field-Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
2. Certificates: Product certificates signed by manufacturer certifying materials comply with the specified performance characteristics and criteria and physical requirements.
3. Manufacturer's installation instructions.
4. Certificate from the manufacturer demonstrating that the installers are currently qualified to install the required products in the project location.
5. Degree or professional certificate of the qualified person for fall protection conferring that qualification.

E. Closeout Submittals:

1. Operation and Maintenance Data: Submit operation and maintenance data for installed products in accordance with Division 1 requirements. Include the following:
 - a. One copy of system equipment manual.
 - b. Two copies of reduced as-built shop drawing showing equipment locations and details. Ensure drawing is posted adjacent to exits to roof.
 - c. Show all components of the system and the engineered, stamped drawings and calculations.
 - d. Certifications and calculations for any manufactured steel parts and fasteners, and the loads calculated for each cable run.
 - e. Minimum required safety equipment accessories needed by users to properly connect to each system.
 - f. List of products as noted but not limited to:
 - 1) Fall protection system.
 - 2) Flexible cable safety system.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project and authorized by manufacturer.
2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.

B. Regulatory Requirements: Comply with the following:

1. OR-OSHA regulations as adopted by Oregon Administrative Rules (OAR), Chapter 437, Division 2 as follows:
 - a. Part 1910, Subpart D, Walking and Working Surfaces.
 - b. Part 1910, Subpart I, Personal Protective Equipment.
 - 1) Appendix C to subpart I, Person Fall Protection Systems Non-Mandatory Guidelines.
 - 2) Appendix D to Subpart I, Test Methods and Procedures for Personal Fall Protection Systems Non-Mandatory Guidelines.
2. ANSI Z359 Fall Protection Code.

C. Design Engineering shall comply with applicable portions of the following publications:

1. AISC: S342L, S335, S329, and S303.
 2. AISI: Sg-671.
- D. Professional engineers designing and supervising the installation of fall protection systems shall meet the definition of a Qualified Person for Fall Protection below.
- E. Qualified Person for Fall Protection: A person with a recognized degree or professional certificate and with extensive knowledge, training, and experience in the fall protection and rescue field who is capable of designing, analyzing, evaluating, and specifying fall protection and rescue systems to the extent required in accordance with ANSI/ASSE Z359 Fall Protection Code.
- F. Welders: Performed by welders qualified to work in the state in which the project is located.
1. Steel: AWS D1.1/D1.1M.
 2. Aluminum: AWS D1.2/ D1.2M.
 3. Stainless Steel: AWS D1.6/D1.6M

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Delivery: Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project.
- C. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
- D. Transportation and Handling: Comply with manufacturer's written instructions.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
1. Locate concealed framing, blocking, and reinforcements that support fall protection by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.
 2. Locate drain bodies and scuppers, including roofing penetrations.

1.6.1.7 WARRANTY

- A. Submit fall protection system installer's warranty, covering the work of this section. Warranty shall include all components for the system with regard to defects related to installation and shall be for a period of 2 years from the date of substantial completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 35 25 "Delegated Design Requirements", to design fall protection systems and attachment to building construction.
1. Design supplemental structural backup required for installation, including joist framing and structural steel members.
 - a. ~~For products requiring 5/8-inch plywood substrates, design~~ Design additional sheet and plate backup anchoring below to supplement anchoring to or through roof deck.
 2. Design above roof deck wood blocking to supplement fall protection hardware.
 - a. Wood blocking to be fire- and preservative-treated.
 - b. Use galvanized or stainless fasteners in treated wood.
 3. Design anchorage to solid building construction. Use structural thermal break material where anchors or other system components are penetrating roof system substrate board.
 - a. Structural thermal break material to match thickness of roof system substrate board in Section 07 54 23.
- B. System Requirements:
1. Design baseplate attachment with thermal break.
 2. Fall protection cable systems shall be designed for two simultaneous users.
 3. Dynamic reactions shall be generated for all intermediate and end supports of the fall protection system.
 4. Fall protection systems shall safely resist the dynamically applied loads while maintaining a safety factor of two against failure.
 5. Prior to design of the fall protection system, the existing structure shall be inspected to ensure that it is sufficient to support the fall protection system and imposed loads.
 6. Exterior, weatherproof, post-supported cable run fall protection systems permitting the free movement, without disconnection, of up to two simultaneous users, that when loaded from a fall reduce overall stresses placed on the post attachment and underlying structure by tipping over.
 7. System shall permit and be engineered for the independent connection of snap hooks, large locking hooks, or carabiners, directly to cable in a fall protection configuration.
 8. In addition to compliance with the performance specification of the OSHA and ANSI Z359 fall protection code and other ANSI specifications cited herein, the fall protection systems shall:
 - a. Consist of long-span, multi-span horizontal lifelines.
 - b. Have a detachable lanyard coupler that permits the user to attach or detach anywhere along the cable length.
 9. Wood shall be separated from metal decking using flexible flashing or roof system vapor retarder.
- C. Design fall arrest safety anchors to AISC S342L (including supplement No. 1) and comply with (OAR) Chapter 437, Division 2 Part 1910, Subpart I, Personal Protective Equipment.
- D. Layout:

1. High Roof: Locate fall anchors equally spaced, at maximum 20 foot spacing east-to-west in center of roof between north-south edges, starting at 10-feet from east and west ends. ~~Maintain 3 feet from penetrations including roof drains.~~
2. Low Roof: Fall anchors with lifeline.
 - a. Locate anchors ~~offset south from centered~~ of roof and drains between north-south edges, locate 10-feet from east and west ends and maximum 20-feet between; with horizontal lifeline between anchor points.
3. Maintain 3 feet from roof penetrations including but not limited to roof drains and scuppers.
4. Where required for attachments of anchors to structural framing, locate fall anchors over intersections of structural steel beams with minimum of one beam intersection perpendicular to perimeter beams.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain all components of fall protection systems and accessories from a single manufacturer.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include:
 1. 3M DBI-SALA.
 2. Honeywell.
 3. Or approved equal.

2.3 MATERIALS

- A. Metal:
 1. Stainless Steel: ASTM A 666, Type 304 or 316.
 2. Galvanized Steel: Comply with Section 05 50 00.
- B. Cable, end brackets, splices, intermediate supports, turnbuckles, lanyard coupler devices, and cable terminations shall be as recommended by fall protection system manufacturer.
 1. Provide stainless steel Type 316 or 304.

2.4 PRODUCTS

- A. Provide the following products or approved equal:
 1. Fall Anchors: 3M RoofSafe Anchor or Honeywell Miller Fusion Roof Anchor Posts.
 - a. Designed for permanent installation.
 - b. Baseplate: Sized for supporting construction, joist through wood decking.
 - 1) Substrate: Plywood roof deck.
 - 2) Separate galvanized finishes from treated plywood with vapor retarder in Section 07 54 23 or separator in Section 06 10 53.
 2. Lifeline: For low roof.
 - a. Honeywell Miller ShockFusion Horizontal Lifeline.
 - b. 3M Uni 8 Horizontal Lifeline System.
- B. Accessories: As required for complete installation.

1. Fasteners: Hot-dipped galvanized or stainless steel.
2. Provide all manufacturer's hardware required for operation and attachment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that substrate conditions which have been previously installed are acceptable for product installation in accordance with manufacturer's instructions prior to installation of fall protection systems.
- ~~B. Verify structure or substrate is adequate to support complete fall protection system.~~
- ~~C. Verify that structural steel to receive safety anchors has adequate bearing surface as indicated on shop drawing and has continuous welds between anchors and structural steel.~~
- ~~B-D.~~ Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- ~~A. Verify structure or substrate is adequate to support complete fall protection system.~~
- ~~B. Verify that structural steel to receive safety anchors has adequate bearing surface as indicated on shop drawing and has continuous welds between anchors and structural steel.~~
- ~~A. Separate dissimilar metals and materials using flexible flashing or other materials approved by Architect for use.~~
- ~~B. Layout fall protection system.~~

3.3 INSTALLATION

- A. Mechanically fasten anchors in accordance with manufacturer's recommendations and according to approved Shop Drawings.
- B. Accurately fit and align, securely fasten, and install free from distortion or defects.
- C. Deform threads of tail end or anchor studs after nuts have been tightened to prevent accidental removal and vandalism.

3.4 FIELD QUALITY CONTROL

- A. Coordinate with the manufacturer prior to and during installation to ensure proper installation. Provide manufacturer's certification for installation.
- B. The Owner will engage an approved third-party testing agency to provide the special inspection and testing of all fall protection assemblies.
- C. Test and inspection reports will be submitted by the third-party testing agency to the Owner and the Contractor.
- D. Fall protection will be considered defective if it does not pass tests and inspections, and shall be replaced at no added cost to the Project and Owner.

3.5 ADJUSTMENT

- A. Lubricate moving parts to operate smoothly and fit accurately in accordance with the manufacturer's recommendations.

3.6 FINAL CLEANING

- A. Perform final cleaning.
- B. Upon completion, remove surplus and excess materials, rubbish, tools, and equipment.

3.7 PROTECTION

- A. Repair damage to adjacent materials caused by fall protection system installation.

3.8 TRAINING

- A. Provide training for the fall protection system in accordance with Division 1.

END OF SECTION