SECTION 11 81 29

HORIZONTAL FALL PROTECTION

Display hidden notes to specifier. (Don't know how? [Click Here](https://www.arcat.com/sd/display_hidden_notes.shtml))

*Copyright 2016 - 2021 ARCAT, Inc. - All rights reserved*

\*\* NOTE TO SPECIFIER \*\* 3M Fall Protection Business; horizontal fall protection.  
This section is based on the products of 3M Fall Protection Business, which is located at:3833 Sala WayRed Wing, MN 55066-5005Toll Free Tel: 800-328-6146Tel: 651-388-8282Fax: 651-732-9244Email: [request info (3Mfallprotectionbusiness@mmm.com)](https://arcat.com/rfi?action=email&company=3M%252BFall%252BProtection%252BBusiness&message=RE%253A%2520Spec%2520Question%2520(11016csu)%253A%2520&coid=48354&spec=11016csu&rep=&fax=651-732-9244)  
Web: <https://www.3m.com/3M/en_US/p/c/ppe/fall-protection/i/safety/personal-safety/>   
 [ [Click Here](https://arcat.com/company/3m-fall-protection-business-48354) ] for additional information.  
There are many things to consider when it comes to health and safety in construction. Construction sites constantly change as work progresses, so your fall protection solution must also be versatile. At the same time, contractors need to continually monitor productivity and costs, so construction safety products must also be comfortable, easy to use and economical.  
Whether you work on residential roofs or skyscrapers, you'll find the versatile, economical easy-to-use construction safety equipment you need with DBI-SALA and Protecta.  
Our service doesn't end with the sale. We understand the construction industry and your specialized construction safety product needs. The highly trained professionals at 3M Fall Protection Business educate, train and provide extensive long term support to ensure that all aspects of your construction safety program are successful.

1. GENERAL
   1. SECTION INCLUDES
      1. Fall Protection Horizontal Cable Systems
         1. Rooftop cable. (DBI-SALA RoofSafe Anchor and Cable System)
         2. 8mm Cable. (DBI-SALA 8 mm PHLL Permanent Horizontal Lifeline System)
      2. Fall Protection Horizontal Rail Systems:
         1. Rail system. (DBI-SALA Unirail System)
         2. Rooftop rail. (DBI-SALA RoofSafe Rail System)
         3. Overhead Track. (DBI-SALA Glyde-Saf HD Rail System)
   2. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 07 50 00 - Membrane Roofing.
    2. Section 07 62 00 - Sheet Metal Flashing and Trim.
    3. Section 07 71 13 - Manufactured Copings.
    4. Section 07 72 13 - Manufactured Curbs.
    5. Section 07 91 23 - Backer Rods0 - Joint Sealants.
  1. REFERENCES
     1. American National Standards Institute (ANSI):
        1. ANSI A10.32 - Personal Fall Protection Used in Construction and Demolition Operations.
        2. ANSI Z359.1 - Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components.
        3. ANSI Z359.6 - Specifications and Design Requirements for Active Fall Protections Systems.
     2. ASTM International (ASTM):
        1. ASTM A123 / A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
        2. ASTM A747/A747M - Standard Specification for Steel Castings, Stainless, Precipitation Hardening.
        3. ASTM A36 - Standard Specification for Carbon Structural Steel.
        4. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
        5. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
     3. American Welding Society (AWS):
        1. AWS D1.1/D1.1M - Structural Welding Code - Steel.
     4. CSA Group (CSA):
        1. CSA Z259.16 - Design of Active Fall Protection Systems.
        2. CSA W55.3 - Certification of companies for resistance welding of steel and aluminum.
        3. CSA W59 - Welded steel Construction.
     5. Occupational Safety and Health Administration (OSHA):
        1. OSHA 29 CFR 1926.502 - Fall Prevention Systems and Criteria and Practices.
        2. OSHA 29 CFR 1910.29 General Industry.
  2. SUBMITTALS
     1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
     2. Product Data: Manufacturer's data and product information indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing in sufficient detail that the product complies with the contract requirements.
     3. Shop Drawings: For fabrication showing the complete fall protection system. Layout drawings of each system in relation to the supporting structure indicating the locations of properly labeled components.
     4. Installer's Certification: Furnish proof of installer's current certification approval by manufacturer in the form of the installer's current certificate issued by the manufacture.
     5. Product Certificate: Containing the manufacturer's batch number on each individual component used in the systems.
     6. Qualifications Statement: For engineer performing delegated design.
     7. Systems Manual:
        1. Maintenance Procedures: Including parts list and maintenance requirements for all equipment.
        2. Operation Procedures: Indicating proper use of equipment for safe operation of the systems.
        3. Manufacturer's catalog data indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing sufficient detail that the product complies with the contract requirements.

\*\* NOTE TO SPECIFIER \*\* "Record Documents" and "Record Drawings" are legal terms defined by both AIA and EJCDC in their Contract Forms. These terms should be used rather than a colloquial term, such as "As Builts." If using Contract Forms and General Conditions provided by another organization, use the same terminology as the documents that will govern the work for this project.

* + 1. Record Documents: Include a copy of Record Drawings in the systems manual.
    2. Warranty: Submit manufacturer warranty.
    3. Delegated-Design Submittal: For fall protection system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  1. QUALITY ASSURANCE
     1. Manufacturer Qualifications: Minimum 25-year experience manufacturing similar products.
     2. Installer Qualifications: Minimum 2-year experience installing similar products, authorized, trained, and certified by manufacturer.
     3. Engineer for Delegated Design: Licensed in the jurisdiction and with a minimum of two years engineering fall protection systems.
     4. Coordination: Coordinate the installation of horizontal fall protection system with structural supports and finish materials.

\*\* NOTE TO SPECIFIER \*\* Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project. Delete if not required.

* + 1. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
       1. Finish areas designated by Architect.
       2. Do not proceed with remaining work until workmanship is approved by Architect.
       3. Remodel mock-up area as required to produce acceptable work.
  1. PRE-INSTALLATION MEETINGS
     1. Convene minimum two weeks prior to starting work of this section.
  2. DELIVERY, STORAGE, AND HANDLING
     1. Deliver materials in manufacturer's original unopened packaging. Store materials in original protective packaging. Prevent soiling, physical damage, or moisture.
  3. PROJECT CONDITIONS
     1. If required, coordinate layout and installation of framing and reinforcements for the fall protection system fixings and substrates.
     2. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
  4. SEQUENCING
     1. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
  5. WARRANTY

\*\* NOTE TO SPECIFIER \*\* Coordinate the warranty requirements of this Section with Section

* + 1. Manufacturer's 10-year minimum corrosion resistance and product warranty.

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: 3M Fall Protection Business, which is located at:3833 Sala WayRed Wing, MN 55066-5005Toll Free Tel: 800-328-6146Tel: 651-388-8282Fax: 651-732-9244Email: [request info (3Mfallprotectionbusiness@mmm.com)](https://arcat.com/rfi?action=email&company=3M%252BFall%252BProtection%252BBusiness&message=RE%253A%2520Spec%2520Question%2520(11016csu)%253A%2520&coid=48354&spec=11016csu&rep=&fax=651-732-9244);Web: <https://www.3m.com/3M/en_US/p/c/ppe/fall-protection/i/safety/personal-safety/>
      2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
         1. If the system proposed uses an article, device, material, equipment, form of construction, fixture, or item other than the Basis of Design; provide certification that the proposed item is equal in quality, performance, and appearance, to the item specified.
      3. Source Limitation: Obtain fall protection system and components from a single manufacturer.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. FALL PROTECTION CABLE SYSTEMS; FORCE MANAGEMENT ROOF ANCHOR AND CABLE
     1. Basis of Design: DBI-SALA RoofSafe Anchor and Cable System as manufactured by 3M Fall Protection. Rooftop horizontal cable fall protection system for rooftop maintenance including end anchors, intermediate cable supports, variable cable supports, traveler and corner cable supports as required.
        1. Maximum span of 50 feet (15 m) between anchors and provides continuous hands free access for the user of the roof fall protection system.
        2. Allow for multiple users, based on required system calculations.
        3. Simultaneous Users: Up to 4 per sub span based on system design.
        4. System shall not be used as a tieback anchor for facade maintenance.
     2. Performance Requirements:
        1. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements.
        2. Structural Performance: Fall protection systems shall withstand the effects of loads and stresses within limits and under conditions required by:
           1. CSA Z259.16.
           2. ANSI Z359.6
           3. OSHA 1926.502.
           4. Allow for multiple users, based on required system calculations.
           5. Simultaneous Users: Up to 4 per sub span based on system design.
           6. System capable of spanning 50 feet (15 m) between intermediate supports.
           7. Allowable Force on Structure: 1,686 lbs. (7.5 kN) maximum.
     3. Components:
        1. Cable: 7x7, 5/16-inch (8 mm) 316 Stainless Steel Wire, Breaking Strength 8,542 lbs. (38 kN) minimum.
        2. End Anchorage Connector: 316 Stainless Steel, electro-polished and Lot Numbered.
        3. Tensioner: 180 lbs. (0.8 kN) 316 Stainless Steel.
        4. Dampener: 180 lbs. (0.8 kN) 316 Stainless Steel with thermal cyclic loading.
        5. Intermediate Guide: 316 Stainless Steel, electro-polished.
        6. 90 and 45 Degree Corners: 316 Stainless Steel, electro-polished. Other angles are achieved using Variable Guide, spot welded.
        7. Variable Guide: 316 Stainless Steel, electro-polished, spot welded.
        8. Swage Toggles: 316 Stainless Steel, electro-polished.
        9. Detachable Traveller: 8 mm. ASTM A747/A747M Precipitation Hardening Stainless Steel Casting, electro-polished and numbered. Double Locking for installation and removal, compatible D-ring for use with Snaphook in accordance to ANSI Z359.1.
        10. Finish type for modular end, corner, and intermediate anchors:
            1. Anchorage Baseplates: Anodized aluminum plates designed and tested to be used with modular end, corner and intermediate anchors.

\*\* NOTE TO SPECIFIER \*\* Delete finish type options not required.

* + - * 1. Anodized for standing seam roofs
        2. PVC coated for PVC roofs.
        3. Bitumen for built up roofs.
        4. All membrane for single ply flashed roofs.
    1. Materials:
       1. Primary Cable Assembly Components: Stainless steel, ASTM A666, Type 316.
       2. Aluminum: 6061 aluminum alloy.
       3. Aluminum: 6082 aluminum alloy.
    2. Fabricated Supports:
       1. Carbon steel with corrosion resistant finish. Steel Plates, Shapes.
       2. Bars: ASTM A36 Steel Tubing: ASTM A500, cold formed.
       3. Welding rods and bare electrodes: Select according to AWS specifications or metal alloy welded.
    3. Connectors:
       1. Comply With:
          1. OSHA regulation 1926.502.
          2. ANSI Z359.1.
          3. CSA Z259.12-11.
    4. Fabrication:
       1. Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use.
       2. Shop fabricate required anchorage posts using structural steel with material test certificates for full material traceability.
    5. Welding
       1. AWS structural specification D1.1 by certified welders.
       2. Fabricate joints in a manner to discourage water accumulation.
    6. Swaging:
       1. Swage cable in-line with the anchor point.
       2. Pull Test all Swages as per Manufacturer required specification.
    7. Finishes:
       1. Stainless Steel: Electropolished for corrosion resistance.
       2. Structural Steel: Zinc Galvanized for corrosion resistance.
       3. Aluminum: Anodized.
       4. Aluminum: PVC coated.
    8. Fasteners:

\*\* NOTE TO SPECIFIER \*\* Delete fastener options not required.

* + - 1. Toggle Fixings: Bolt lengths 6-inch (150 mm) x4, 12-inch (300 mm) x4, 20 inch (500 mm) x4, Steel, Zinc Coated, includes cup washer, toggle foot and PVC alignment tube.
      2. Concrete Fixings: lengths 6-inch (150 mm) x4, 12-inch (300 mm) x4, 20 inch (500 mm) x4, Steel, Zinc Coated, includes cup washer, Wedge Anchor foot and PVC alignment tube.
      3. Clamps: Non-penetrative clamping system. May be fitted to a variety of standing seam roof systems.
      4. Rivets: Aluminum, 0.30-inch (7.7 mm) diameter, bulb type, ASTM B221. Single Rivet-shear Strength = 1528.70 lbf (6.8 kN) / Tensile Strength = 1124.04 lbf (5 kN) / Grip 0.04 to 0.37-inch (1 to 9.5 mm) range.
    1. Accessories:
       1. Signage: Signs and system identification tags.

\*\* NOTE TO SPECIFIER \*\* Select only those sections that apply. Insert roofing section number and section title if flashing is specified in the roofing section.

* + - 1. Flashing: Comply with requirements of Section 07 62 00 - Sheet Metal Flashing and Trim "Sheet Metal Flashing and Trim."
      2. Flashing: Comply with requirements of Section 07 71 13 - Manufactured Copings "Roof Specialties."
      3. Flashing: Comply with requirements of Section 07 72 13 - Manufactured Curbs "Roof Accessories."

\*\* NOTE TO SPECIFIER \*\* Insert roofing section number and roofing section title.

* + - 1. Flashing: Comply with requirements of Section \_\_\_\_\_\_\_.
      2. Sealant: Comply with requirements of Section 07 91 23 - Backer Rods "Joint Sealants."

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. FALL PROTECTION CABLE SYSTEMS; RIGID ANCHOR AND CABLE
     1. Basis of Design: DBI-SALA 8 mm Permanent Horizontal Lifeline System as manufactured by 3M Fall Protection. Horizontal cable fall protection system, including end anchors, energy absorbers, intermediate cable supports, and travelers as required.
        1. Allow users to walk uninterrupted the entire length of the system and provide secure anchorage to arrest a fall. System to allow freedom of movement along the cable as it passes by intermediate anchors.
        2. System application below that provide protection for up to a maximum of 4 users per span subject to confirmation through engineering software.

\*\* NOTE TO SPECIFIER \*\* Delete the following options not required.

* + - * 1. floor (low tension typical)
        2. raised floor/rigid post mount (low tension typical)
        3. wall level (low tension typical)
        4. overhead (high tension typical)
      1. Provides continuous hands-free access for the user of the fall protection system.
      2. Maximum span requirements dependent on system application and number of users:

\*\* NOTE TO SPECIFIER \*\* Delete span options not required.

* + - * 1. Single span systems to have a maximum span length up to 200 feet (60 m) for single user or 100 feet (30 m) for multi-users.
        2. Multi-span systems to have a maximum span length up to 150 feet (45 m) for single user or 100 feet (30 m) for multi-users.
        3. Rooftop systems to have a maximum span length up to 50 feet (15 m) for single and multi-users.
      1. Maximum allowable force on end anchors be controlled by Energy Absorption Systems that would be limited to:

\*\* NOTE TO SPECIFIER \*\* Delete tension system option not required.

* + - * 1. Low Tension Systems: 2,500 lbs. (11 kN) - 5,000 lbs. design load (22kN)
        2. High Tension systems: 4,270 lbs. (19 kN) - 8,540 lbs. design load (38kN)
    1. Performance Requirements:
       1. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements "Quality Requirements," to design fall protection system.
       2. Structural Performance: Fall protection systems shall withstand the effects of loads and stresses within limits and under conditions required by:
          1. CSA Z259.16.
          2. ANSI Z359.6
          3. OSHA 1926.502.
          4. Allow for multiple users, based on required system calculations.
    2. Components:
       1. Cable type:
          1. 1x19, 5/16 inch (8 mm) 316 Stainless Steel Wire, Breaking Strength 10,600 lbs. (47 kN).
          2. 7x7, 5/16 inch (8 mm) 316 Stainless Steel Wire, Breaking Strength 8,700 lbs. (38.7 kN).
       2. Structural End Anchors:
          1. Straight Eye: 316 Stainless Steel secured by a single anchor, electro-polished, part and batch numbered with equal to or greater than 10,000 lbs. (45 kN) minimum breaking strength.
          2. Multifix Anchor secured by multiple anchors: 316 Stainless Steel, electropolished, pat and batch numbered with equal to or greater than 10,000 lbs. (45 kN) minimum breaking strength.
       3. Cable End Connections:
          1. Energy Absorbers:

Inline Force Management Energy Absorber 316 Stainless Steel, electropolished. Includes built in thermal cyclic loading and rotation capabilities to increase or decrease systems tension.

Peak force options:

2,500 lbs. (11kN)

4,270 lbs. (19kN)

Peak system tension options:

180 lbs. (0.8kN)

1,124 lbs. (5kN)

Includes end stopper

* + - * 1. Dampeners:

180 lbs. (.8 kN) with built in thermal cyclic loading.

1,125 lbs. (5 kN) with built in thermal cyclic loading

* + - * 1. Swage Connections:

Hex Swage Toggle with 8,540 lbs. (38 kN) minimum breaking strength

Hex Swage Toggle with Shoulder for End Stop with 8,540 lbs. (38 kN) minimum breaking strength.

Hex Swage Tensioner with 180 lbs. (.8 kN) pretension indicator and 8,540 lbs. (38 kN) minimum breaking strength

Hex Swage Tensioner with 1,125 lbs. (5 kN) pretension indicator with 8,540 lbs. (38 kN) minimum breaking strength

* + - 1. Travelers:
         1. Dual Locking Detachable Traveler includes permanent D-ring and 5,000 lbs. (22.2 kN) minimum breaking strength.
         2. Dual Locking Detachable Rolling Traveler with wheels includes permanent D-ring and 5,000 lbs. (22.2 kN) minimum breaking strength.
         3. Non-Removable Overhead Traveler with 316 SS wheels and 5,000 lbs. (22.2 kN) minimum breaking strength.
      2. System Identification Tag with the following:
         1. Installation Date, Installer Name, Contact Information
         2. Minimum Ground Clearance required
         3. Maximum number of users on system
         4. Maximum number of users per span
         5. Next Service Date
         6. Serial number
         7. Maximum arresting force of Lanyards and or SRL's to be used on system
         8. Maximum length of PPE to be used.
         9. Radio Frequency Identification Tag mounting location
      3. Fabricated Supports:
         1. Carbon steel with corrosion resistant finish. Steel Plates, Shapes.
         2. Bars: ASTM A36 Steel Tubing: ASTM A500, cold formed.
         3. Welding rods and bare electrodes: Select according to AWS specifications or metal alloy welded.
      4. Materials:
         1. Primary cable assembly components: Stainless steel, ASTM A666, Type 316.
         2. Aluminum: 6061 aluminum alloy.
         3. Aluminum: 6082 aluminum alloy.
      5. Connectors: Comply with the following.
         1. OSHA regulation 1926.502.
         2. ANSI Z359.1
         3. CSA Z259 .12-11
    1. Fabrication:
       1. Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use.
       2. Shop fabricate required anchorage posts using structural steel with material test certificates for full material traceability.
       3. Welding: AWS structural specification D1.1 by certified welders.
       4. Fabricate joints in a manner to discourage water accumulation.
       5. Swaging:
          1. Swage cable in-line with the anchor point.
          2. Pull Test all Swages as per Manufacturer required specification.
       6. Finishes:
          1. Stainless Steel: Electropolished for corrosion resistance.
          2. Structural Steel: Zinc Galvanized for corrosion resistance.
          3. Aluminum: Anodized.
          4. Aluminum: Powder coated.
    2. Fasteners:
       1. End Anchor Brackets: Minimum Grade A4-70 M16 or 5/8 inch Fasteners should be used to mount End Anchor Brackets to structure at a recommended torque of 37 ft-lbs. (50 Nm) Mounting must support at least twice the load values stated in the manufacture's technical report.
       2. Intermediate Brackets: Minimum Grade A4-70 M12 or 1/2-inch Fasteners should be used to mount Intermediate Brackets to structure at a recommended torque of 37 ft-lbs. (50 Nm). Mounting must support a bracket load of 5,400 lbf (24 kN) perpendicular to the lifeline.
       3. Corner Brackets: Minimum Grade A4-70 M12 (or 1/2 in) Fasteners should be used to mount Corner Bracket to structure at a recommended torque of 44 ft-lbf (50 Nm). Mounting must support bracket load of 8,550 lbf (38 kN) in the plane of the lifeline and a load of 5,400; bf (24 kN) perpendicular to the lifeline. 45 and 90 degrees Corner Brackets are available for internal or external corners on 0.8 kN or 5 kN tensioned systems.
    3. Accessories:
       1. End stopper.
       2. Signage: Signs and system identification tags.

\*\* NOTE TO SPECIFIER \*\* Select only those sections that apply. Insert roofing section number and section title if flashing is specified in the roofing section.

* + - 1. Flashing: Comply with requirements of Section 07 62 00 - Sheet Metal Flashing and Trim "Sheet Metal Flashing and Trim."
      2. Flashing: Comply with requirements of Section 07 71 13 - Manufactured Copings "Roof Specialties."
      3. Flashing: Comply with requirements of Section 07 72 13 - Manufactured Curbs "Roof Accessories."

\*\* NOTE TO SPECIFIER \*\* Insert roofing section number and roofing section title.

* + - 1. Flashing: Comply with requirements of Section \_\_\_\_\_\_\_.
      2. Sealant: Comply with requirements of Section 07 91 23 - Backer Rods "Joint Sealants."

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. FALL PROTECTION RAIL SYSTEMS; ROOFTOP RAIL
     1. Basis of Design: DBI-SALA RoofSafe Rail Permanent Horizontal Lifeline System as manufactured by 3M Fall Protection. Direct to roof, rooftop horizontal rail fall protection system for rooftop maintenance including attachment carriage, clamps, spreader plates, corners, rails, and end stops as required.
        1. Allow users to walk uninterrupted the entire length of system providing secure anchorage to arrest a fall.
        2. Provides continuous hands-free access for the user of the fall protection system.
     2. Performance Requirements:
        1. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements "Quality Requirements," to design fall protection system.
        2. Structural Performance: Withstand effects of loads and stresses within limits and under conditions required by:
           1. CSA Z259.16.
           2. ANSI Z359.6
           3. OSHA 1926.502.
           4. Allow for multiple users, based on required system calculations.
           5. Allowable Force on Rail: 2,700 lbs. (12 kN) maximum based on workers maximum arresting force from their PPE.
     3. Components:
        1. Clamps: Non-penetrative clamping system. May be fitted to a variety of standing seam roof systems.
        2. Spreader Plates: 6082 T6 aluminum plate attached to standing seam or deck with clamps or rivets. Secures rail where system is mounted parallel to the crown.
           1. Length: As required accommodating width of standing seams up to 20 inches (500 mm).
           2. Width: 6.30 inches (160 mm).
           3. Thickness: 0.13 inch (3.4 mm).
        3. End Stops: Extruded aluminum stops including rubber buffers. Secured to rail by screws or plunger pin.
        4. Attachment Carriages: Aluminum attachment carriage with aluminum, nylon coated wheels. Stainless steel shackle with carabiner hook which pivots for any angle connection.
        5. Rivets: Aluminum, 0.30-inch (7.7 mm) diameter, bulb type, ASTM B221.
        6. Rails: Low profile, 6.3 x 1.46 inches (160 x 37 mm), aluminum rail with flat aluminum anchoring plate extruded as one piece in 9 feet-10 inches (3000 mm) lengths.
           1. Requires support fixings every 31.5 inches (800 mm) or less.
        7. Corners
           1. Bend: 90 degree.
           2. Bend: 45 degree.
        8. Fabricated supports: Carbon steel with corrosion resistant finish.
           1. Steel Plates, Shapes, and Bars: ASTM A36.
           2. Steel Tubing: ASTM A500, Grade B or AISI Type 304 or 316.
           3. Welding rods and bare electrodes: Select according to AWS specifications for metal alloy welded.
     4. System Identification Tag with the following:
        1. Installation Date, Installer Name, Contact Information.
        2. Minimum Ground Clearance required.
        3. Maximum number of users on System.
        4. Maximum number of users per span.
        5. Next Service Date.
        6. Serial number.
        7. Maximum Arresting force of Lanyards and or SRL's to be used on system.
        8. Maximum length of PPE to be used.
        9. Radio Frequency Identification Tag mounting location.
     5. Materials:
        1. Stainless steel: ASTM A666, Type 316.
        2. Aluminum: 6061 aluminum alloy.
        3. Aluminum: 6082 aluminum alloy.
     6. Connectors: Comply with the following.
        1. OSHA regulation 1926.502.
        2. ANSI Z359.1
        3. CSA Z259 .12-11
     7. Fabrication:
        1. Fabricate anchoring devices as recommended by manufacturer providing adequate support for intended use.
        2. Shop fabricate required anchorage posts using structural steel with material test certificates for full material traceability.
     8. Welding:
        1. AWS structural specification D1.1 by certified welders.
        2. Fabricate joints in a manner to discourage water accumulation.
     9. Finishes:
        1. Stainless Steel: Electro-polished for corrosion resistance.
        2. Structural Steel: Zinc Galvanized for corrosion resistance.
        3. Aluminum: Anodized.
        4. Aluminum: Powder coated.
     10. Accessories:
         1. Signage: Signs and system identification tags.

\*\* NOTE TO SPECIFIER \*\* Select only those sections that apply. Insert roofing section number and section title if flashing is specified in the roofing section.

* + - 1. Flashing: Comply with requirements of Section 07 62 00 - Sheet Metal Flashing and Trim "Sheet Metal Flashing and Trim."
      2. Flashing: Comply with requirements of Section 07 71 13 - Manufactured Copings "Roof Specialties.
      3. Flashing: Comply with requirements of Section 07 72 13 - Manufactured Curbs "Roof Accessories."

\*\* NOTE TO SPECIFIER \*\* Insert roofing section number and roofing section title.

* + - 1. Flashing: Comply with requirements of Section \_\_\_\_\_\_\_\_.
      2. Sealant: Comply with requirements of Section 07 91 23 - Backer Rods "Joint Sealants."
    1. Fasteners: Support a system load 2 times the maximum design load without failure.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. FALL PROTECTION HORIZONTAL RAIL SYSTEMS; ALUMINUM RAIL
     1. Basis of Design: DBI-SALA UniRail System as manufactured by 3M Fall Protection. Horizontal fall protection system, including attachment carriage, attachment plates, joints, corners, system stops, rail, carriage stops and specialty components for exposed and concealed conditions as required.
        1. Allow users to walk uninterrupted the entire length of the system and provide secure anchorage to arrest a fall. System to allow freedom of movement along the rail and allow carriages to run unhindered.
        2. System to be capable of being mounted at floor level, wall level, and overhead applications and provide protection for multiple users subject to confirmation through engineering analysis.
        3. Provides continuous hands-free access for the user of the fall protection system.
     2. Performance Requirements:
        1. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements0 "Quality Requirements," to design fall protection system.
        2. Structural Performance: Fall protection systems shall withstand the effects of loads and stresses within limits and under conditions required by:
           1. CSA Z259.1.
           2. ANSI Z359.6
           3. OSHA 1926.502.
           4. Allow for multiple users, based on required system calculations.
           5. Allowable Force on Rail: 2,700 lbs. (12 kN) maximum based on workers maximum arresting force from their PPE.
     3. Components
        1. Rail: Low profile, 1.25 inches by 1.25 inches (32 mm by 32 mm), aluminum extrusion, anodized finish.
           1. Lengths: 9 feet -10 inches (3000 mm).
           2. Lengths: 20 feet-0 inches (6096 mm).
        2. Rail Joint: Low profile, aluminum extrusion to connect to rail sections.
           1. Concealed: Low profile, 2.11 x 6.06 inches (53.5 x 154 mm), aluminum extrusion, shall be supported within 7.87 inches (200 mm) by fixing back to the structure.
           2. Side Fixed: Low profile, 5.31 x 6.06 inches (135 x 154 mm), aluminum extrusion, also serves as anchor and is not required to have additional supports.
        3. Corners: Additional bends and forms available to a radius of 7.87 inches (200 mm).
           1. Bend: 90 degree.
           2. Bend: 90 degree external.
           3. Bend: 90 degree internal.
           4. Bend: 45 degree.
           5. Bend: 45 degree external.
           6. Bend: 45 degree internal.
        4. System Stops: Manufacturer's standard stops which prevent rails from coming out of end anchorage bracket.
        5. Molded Ends: Manufacturer's standard molded ends which protect exposed edge of end rails.
        6. Tamper-Proof Carriage Stops: Manufacturer's standard tamper-proof, carriage stops which prevent carriages from coming off the end of the system.
        7. Removable Carriage Stops: Manufacturer's standard tamper-proof, carriage stops which prevent carriages from coming off the end of the system but can be removed to allow the carriages to be taken off.
        8. Attachment Carriages: Manufacturer's standard aluminum attachment carriage with aluminum, nylon coated wheels. A stainless steel shackle with carabiner hook which pivots for any angle connection.
           1. Minimum tensile strength: 3372 lbs. (15 kN).
        9. Rail Fixing Components: Connections as follows:
           1. Material: Aluminum.
           2. Material: Stainless steel.
           3. End Anchors: Manufacturer's standard anchors which secure end of the rail to structure and controls rail movement in the event of a fall.
           4. Intermediate Anchors: Manufacturer's standard anchors which secure rail to structure at intervals to suit work site and structure.
           5. Concealed End Anchors: Manufacturer's standard anchors which secure end of the rail to structure and controls rail movement in the event of a fall.
           6. Concealed Intermediate Anchors: Manufacturer's standard anchors which secure rail to structure at intervals to suit work site and structure.

Anchors are to be tapped.

* + - 1. Fabricated supports: Carbon steel with corrosion resistant finish.
         1. Steel Plates, Shapes, and Bars: ASTM A36.
         2. Steel Tubing: ASTM A500, cold formed.
         3. Welding rods and bare electrodes: Select according to AWS specifications for metal alloy welded.
    1. Materials:
       1. Stainless steel: ASTM A666, Type 316.
       2. Aluminum: 6061 aluminum alloy.
       3. Aluminum: 6082 aluminum alloy.
       4. Connectors: Comply with OSHA regulation 1926.502.
    2. Fabrication:
       1. Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use. Shop fabricate required anchorage posts using structural steel with material test certificates for full material traceability.
       2. Welding: AWS structural specification D1.1 by certified welders.
       3. Fabricate joints in a manner to discourage water accumulation.
       4. Finishes:
          1. Stainless Steel: Electro-polished for corrosion resistance.
          2. Structural Steel: Zinc Galvanized for corrosion resistance.
          3. Aluminum: Anodized.
          4. Aluminum: Powder coated.
    3. Accessories:
       1. Fasteners: Designed to support a load on the system of 2 times the maximum design load without failure.
       2. Signage: Provide signs and system identification tags.

\*\* NOTE TO SPECIFIER \*\* Select only those sections that apply. Insert roofing section number and section title if flashing is specified in the roofing section.

* + - 1. Flashing: Comply with requirements of Section 07 62 00 - Sheet Metal Flashing and Trim "Sheet Metal Flashing and Trim.
      2. Flashing: Comply with requirements of Section 07 71 13 - Manufactured Copings "Roof Specialties."
      3. Flashing: Comply with requirements of Section 07 72 13 - Manufactured Curbs "Roof Accessories."

\*\* NOTE TO SPECIFIER \*\* Insert roofing section number and roofing section title.

* + - 1. Flashing: Comply with requirements of Section \_\_\_\_\_\_\_\_.
      2. Sealant: Comply with requirements of Section 07 91 23 - Backer Rods "Joint Sealants."

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. FALL PROTECTION HORIZONTAL RAIL SYSTEMS; STEEL RAIL
     1. Basis of Design: DBI-SALA Glyde-Saf HD System as manufactured by 3M Fall Protection. Unique enclosed overhead rigid rail track system.
        1. Allows smooth uninterrupted travel for one or two users while working at heights. Eliminates sag distance and reduces overall fall clearance from anchor point to the ground. Can be installed indoors or outdoors.
     2. Performance Requirements:
        1. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements0 "Quality Requirements," to design fall protection system.
        2. Rated to support retractable devices with an average arresting force of 900 lbs. (4 kN).
        3. Structural Performance: Fall protection systems shall withstand the effects of loads and stresses within limits and under conditions required by:
           1. CSA Z259.16.
           2. ANSI Z359.6
           3. OSHA 1926.502.
           4. Allow for multiple users, based on required system calculations and local, regional, and federal design requirements.
           5. Number of Simultaneous Users: 2 maximum per span.
           6. Maximum allowable force on anchors: 3,600 lbs. (16 kN).
     3. Components:
        1. Rail Sections:
           1. High grade steel construction.
           2. Simultaneous Users per span: 2 workers with a maximum weight of 420 lbs. (190.5 kg) per user.
           3. Allowable Span: 50 ft (15.2 m) maximum.
           4. Allowable System length: Unlimited
           5. Allowable Cantilever: 6 ft (1.8 m).
           6. Rail Lengths: 20 ft (6.1 m).
           7. Rail Lengths: 10 ft (3.0 m).
           8. Rail Lengths: 5 ft (1.5 m).
           9. Rail Finish;

\*\* NOTE TO SPECIFIER \*\* Delete rail finish option not required.

Outdoor Version: Coated with black e-coat and yellow powder coat.

Indoor Version: Coated with black e-coat

* + - 1. Trolly Assembly:
         1. High grade steel construction.
         2. Corrosive resistant, zinc plating.
         3. Stainless Steel wheel bearings.
         4. Long lasting nylon wheels for smooth travel.
      2. End Stop Plate Kit:
         1. Kit contains a powder coated plate and mounting hardware for attaching to each end of the rail assemblies.
         2. High grade steel construction.
      3. Seam Kit:
         1. High grade, zinc plated hex head bolts.
         2. High grade, nylon top insert, zinc plated hex nuts.

1. EXECUTION
   1. EXAMINATION
      1. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fall protection equipment.
      2. Proceed with installation only after unsatisfactory conditions have been corrected.
   2. PREPARATION
      1. Coordinate location of fall protection equipment indicated to be attached to structural substrate or surface of roofing system and furnish anchoring devices with templates and diagrams.
   3. INSTALLATION
      1. Only 3M or Certified Installers authorized in writing by 3M Fall Protection may make installation/repairs to this equipment. If the 3M Fall Protection Horizontal Lifeline System has been subject to fall force or inspection reveals an unsafe or defective condition, remove the system from service and contact 3M Fall Protection or a 3M Certified Installer regarding replacement or repair.
      2. Install according to approved shop drawings and manufacturer's instructions. Coordinate with work of other trades.
      3. Install anchorage and fasteners in accordance with manufacturer's recommendations to obtain the allowable working loads published in the product literature and in accordance with this specification.
      4. Exposed work shall be true to line and level with accurate angles, surfaces and with straight square edges. Coordinate anchorage system with supporting structure.
      5. Do not load or stress system until materials and fasteners are properly installed and ready for service.
   4. FIELD QUALITY CONTROL
      1. Provide manufacturer's certified installer to inspect installed fall protection system. Ensure that system components operate as specified.
   5. ADJUSTING
      1. Adjust fall protection components to function smoothly and safely.
   6. CLEANING

\*\* NOTE TO SPECIFIER \*\* Coordinate the cleaning requirements of this Section with Section 01 70 00 Closeout Procedures.

* + 1. Clean the systems metal components with a soft brush, warm water, and a mild soap solution if needed after initial installation.
    2. Ensure all components are thoroughly rinsed with clean water after cleaning.
  1. CLOSEOUT ACTIVITIES

\*\* NOTE TO SPECIFIER \*\* Coordinate the closeout activities requirements of this Section with Sections 01700 "Closeout Procedures" and 01790 "Demonstration and Training."

* + 1. Demonstration: Demonstrate operation of system to Owner's personnel.
       1. Briefly describe function, operation, and maintenance of each component.
    2. Training: Train Owner's personnel on operation and maintenance of system.
       1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
       2. Provide minimum of two hours of training.
       3. Provide training at the lifeline installation site.
       4. Training to take place at the completion of the installation.
    3. Do not use until trained in the use of the system

END OF SECTION