SECTION 118129 - FACILITY FALL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Tie Back Anchors
2. Rooftop Fall Protection System.

B. Related Sections include the following:

1. Section 051200 Structural Steel Framing

1.2 REFERENCE STANDARDS

A. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coating son Iron and Steel Products; American Society for Testing and Materials.

B. ASTM B221/B221M – Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; American Society for Testing and Materials.

C. AWS D1.1/D1.1M – Structural Welding Code – Steel; American Welding Society

D. AWS D1.1/D1.1M – Structural Welding Code – Aluminum; American Welding Society

E. ANSI ASSE Z359 – Fall Protection Code; American Society of Safety Engineers.

1.3 REGULARTORY REQUIREMENTS

A. OSHA 1910 Subpart D – Walking Working Surfaces; Occupational Health and Safety Administration.

B. All other applicable codes both federal, local, and IBC provisions in 1015.6.

1.4 COORDINATION

A. The drawings in general delineate the Scope of Work. The ultimate design, layout, fabrication and engineering shall be the sole responsibility of the contractor.

B. Provide Design Builder with final layouts, design, details and loads to be integrated into the contract documents. Provide coordination and location of fall protection and fall restraint anchors attached to structural roof framing through metal deck and concrete decks. Furnish anchoring devices with templates, diagrams, and instructions for installation.

C. Contractor is responsible for acquiring approval from the local authority, as required.

D. Coordinate the installation with work of other installers.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review required testing, inspecting, and certifying procedures.

1.6 ACTION SUBMITTALS

A. Pre-contract submittals to be provided with proposal and qualifications package.

B. Proposal drawings delineating proposed devices and anchors indicating proof of protection requirements according to ANSI Z359.1 or a Certification of the Design Drawings that they meet protection requirements per ANSI Z359.1

C. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes devices and anchors.
2. Include manufacturer's specifications and installation instructions.

D. Qualifications package including:

1. Company background
2. List of main subcontractors and local agents
3. Reference list of similar projects
4. Certificate of Insurance
5. Contractor license number
6. Financial Statement.

E. Shop Drawings: For fall protection and fall arrest safety anchors.

1. Include plans, elevations, sections, and attachment details.
2. Include drawings of the overall plans to show the locations of fall arrest safety anchors.
3. Include details drawn at large scale. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of anchors and each field connection.
4. Include all necessary restrictive and non-restrictive working usage notes and general safety notes.
5. Show details of flashing and waterproofing of fall arrest safety anchors.
6. Shop drawings to be signed and sealed by a Professional Engineer registered in the State of Texas qualified to design and engineer fall arrest and fall protection systems.

F. Fabrication Engineering and Design Submittal: For fall restraint and fall arrest, including analysis data signed and sealed by the qualified professional engineer licensed in the State of Texas responsible for their preparation.

1. Indicate compliance with the standards referenced in article "Performance Requirements."
2. Verification of design loads and reactions at structural components and assemblies.

G. Submit proof of certification for all workers performing welding either in factory or on site.

H. Inspection Log Book: Submit at closeout with Initial Inspection – Certification for Use and Inspection Sign-Off forms completed.

I. Operations and Maintenance Manual: Comply with ANSI ASME A120.1 Mandatory Appendix I Operating Manual Layout

1. Submit prior to acceptance testing and commissioning verification.

1.7 INFORMATIONAL SUBMITTALS

A. As-Built Shop Drawings: Submit (3) three, half-sized, hard copies of As-Built Shop Drawings for each building showing anchor layouts and anchor details. Shop drawings to include restrictive and non-restrictive working / usage notes and general safety notes. Provide labeled, moisture protected cover/storage for (1) copy at permanent location near each exit onto roof. Third copy to be placed in building management office.

B. Equipment Manual and Safety Inspection Log Book: Upon completion of installation, provide an Equipment Manual and Safety Inspection Log Book for yearly inspections.

C. Weld Inspection Documentation: Submit weld inspection reports for all welds including shop and field welds. Weld inspection reports shall be in accordance with AWS D1.0.

D. Load Test Data: Submit load test data verifying all anchors successfully withstood a test load equal to two times the rated load of the equipment after installation.

E. Certification of Compliance: Upon completion of installation, inspection, and load testing, provide a certificate of compliance sealed by a qualified licensed professional engineer registered in State of Texas, stating that all façade access equipment is in compliance with the standards referenced in article "Performance Requirements."

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: Included in maintenance manuals.

1.9 QUALITY ASSURANCE

A. Manufacturer: Provide all fall arrest safety anchors of a single manufacturer with a minimum of 5 years experience specializing in the design, fabrication, and installation of permanent façade access equipment including components similar to those specified herein.

1. Insurance: Manufacturer is required to maintain specific liability insurance (products and completed operations insurance) in an amount not less than $5,000,000, to cover the failure of fall arrest safety anchors.

B. Engineer Qualifications: Professional engineer licensed in the State of Texas and experienced in providing engineering services of the kind indicated that have resulted in the successful installation of fall arrest and protection similar in material, design, and extent to that indicated for this Project.

C. Welding: Perform welding using only AWS certified welders. Comply with the following welding codes:

1. AWS D1.1 "Structural Welding Code – Steel."
2. AWS D1.2 "Structural Welding Code – Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.10 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver anchors and components packaged to provide protection during transit and job storage.

PART 2 - **PRODUCTS**

2.1 **MANUFACTURERS**

A. Basis-of-Design Product: The design for Fall Arrest and Fall Protection is based on products indicated in other Part 2 articles. Subject to compliance with requirements, provide the named product or an approved equal product by another qualified manufacturer, including but not limited to the following:

1. Pro-Bel Group, Ltd.
2. Summit Anchor Co.
3. Tractel Ltd.

2.2 **PERFORMANCE REQUIREMENTS**

A. Fabrication Engineering and Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to façade access equipment.

B. Design, furnish, and install all fall arrest safety anchors; and all components in compliance with all applicable OSHA, DFW, and International Building Code standards, to provide adequate attachment means suited to current practices that are compatible with industry standards. In addition, comply with applicable requirements of the following:

1. Appendix C to OSHA Standard 1910.66 Subpart F, "Personal Fall Arrest System."
2. OSHA Standard 1910.66 Subpart D, "Walking - Working Surfaces."
3. AISC "Load and Resistance Factor Design Specification for Structural Steel Buildings."
4. AISI "Specification for Design of Cold-Formed Steel Structural Members" including 1986 and 1989 Addenda.
5. Aluminum Association publication No. 30, "Specification for Aluminum Structures."

C. Structural Performance: Fabricate and install the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections:

1. Fall Arrest Safety Anchors: Fabricate and install to withstand a minimum static working load of 1,000 lbf. in any direction, and a minimum vertical impact load of 1,800 lbf.. Fabricate and install to withstand a minimum load of 5,000 lbf. in any direction without detachment, fracture, or failure.

    a. Design fall arrest safety anchors with a total safety factor of not less than 4 to 1 against overturning moment. Do not reduce safety factor where manufacturer's standard exceeds specified minimum.

2.3 **FALL ARREST SAFETY ANCHORS**

A. Roof Mounted Fall Arrest Safety Anchors: Provide roof mounted fall arrest safety anchors consisting of 1-1/2-inch inside diameter stainless steel safety "U" bar welded to galvanized steel support tubes with steel plate caps that are welded to steel base plates. Hot dip galvanize all components after fabrication.

1. Exposed Anchors: Provide exposed fall arrest safety anchor as follows, unless otherwise indicated:

   a. Basis-of-Design Product for Steel Supporting Structure for Roofs: Pro-Bel Group, Ltd.; Pro-Bel Safety Anchor Model #PBE75-S (Weldment).

2. Anchorage: Anchor fall arrest safety anchors to structure to support indicated loads. Fabricate according to locations and details shown on the Drawings.

   a. Steel Supporting Structure for Roofs: Fabricate fall arrest safety anchors for welding directly to structural steel beams.

3. Welding: Provide fall arrest safety anchors of all welded construction. Make all welds employing certified welders in accordance with AWS D1.0, "Code for Welding in Building Construction" latest edition of American Welding Society. All welds shall be inspected by an AWS CWI.

4. Anchorage: Anchor fall arrest safety anchors to structure to support indicated loads. Fabricate according to locations and details shown on the Drawings.

   a. Steel Supporting Structure for Roofs: Fabricate fall arrest safety anchors for welding directly to structural steel beams.
   b. Metal Roof Deck with Concrete Fill Supporting Structure: Fabricate fall arrest safety anchors for through bolting directly to metal roof deck with concrete fill.
   c. Steel Supporting Structure for Walls: Fabricate fall arrest safety anchors for welding directly to structural steel beams or columns. Provide galvanized steel extension pier where indicated.

5. Welding: Provide fall arrest safety anchors of all welded construction. Make all welds employing certified welders in accordance with AWS D1.0, "Code for Welding in Building Construction" latest edition of American Welding Society. All welds shall be inspected by an AWS CWI.

2.4 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

D. Steel Tubing: ASTM A 500, cold-formed steel tubing, weight required by structural loads.

E. Steel Pipe: ASTM A 53/A 53M, weight required by structural loads.

2.5 FASTENERS

A. General: Provide Type 304 stainless-steel or hot-dipped galvanized steel fasteners for exterior use. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

   1. Provide hot-dip galvanized bolts and nuts.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

D. Plain Washers: Round, ASME B18.22.1.

1. Provide hot-dip galvanized washers.

2.6 MISCELLANEOUS MATERIALS

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

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.7 FABRICATION, GENERAL

A. Shop Fabrication: Fabricate building maintenance equipment in the shop. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

D. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure building maintenance equipment rigidly in place and to support indicated loads.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.9 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize all ferrous metal items and fasteners to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

2.10 STAINLESS-STEEL FINISHES

A. Grind and polish surfaces to produce manufacturer's standard uniform, polished finish, free of cross scratches.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Install anchors at locations indicated, in strict accordance with manufacturer's approved shop drawings and written recommendations.

B. Field Welding: Comply with the following requirements:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. All field welds shall be inspected by an AWS CWI.

3.2 INSTALLATION OF FALL ARREST SAFETY ANCHORS

A. Steel Supporting Structure for Roofs: Anchor fall arrest safety anchors to steel structure by welding directly to structural steel members as shown on the Drawings.

B. Roof Flashing: Refer to Section 075216 "Modified Bituminous Membrane Roofing" for installation of roof flashings.

3.3 FIELD QUALITY CONTROL

A. All anchors shall be inspected, load tested, and certified for use with suspended scaffolding under the supervision of a registered professional engineer before being placed into service.

B. Load Testing:
1. The load testing procedure shall be prescribed, in writing, by a registered professional engineer.
2. The load tests shall be performed by qualified persons under the direction of a registered professional engineer.
3. All anchors shall be load tested to 2,500 lbf.
4. The load and deflection shall be measured during load testing to verify no plastic deformation.
5. Damage to equipment or damage to the building structure from load testing shall be reported to the building owner immediately.
6. A qualified licensed professional engineer registered in the State of Texas shall certify the load testing results.
7. All load and deflection measuring equipment used shall be calibrated at least annually and calibration records shall be available.

C. Repair, replace or modify defective installations not conforming to any part of the specification.

D. Provide certification of compliance stamped by a State of Texas licensed professional engineer verifying system is ready for use.

3.4 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

3.5 EQUIPMENT DEMONSTRATION

A. Perform full live load operational demonstration at all anchors to demonstrate the system's ability to provide access to all locations.

B. Provide equipment operation training to facilities maintenance staff to ensure system users are knowledgeable in the use and limitations of fall arrest and fall protection systems.

END OF SECTION