

Contract Services Group, Inc.
Standard Specification Document

(Note: See hidden text for notes)

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof mounted façade maintenance equipment.
- B. Electric Operators and Controls.

1.2 RELATED SECTIONS

- A. Section 03300 – Cast in place Concrete: Concrete runways and installation of embedded items.
- B. Section 03400 – Precast Concrete: Structural and Design Engineered concrete anchorage.
- C. Section 05120 – Structural Steel: Structural Steel: Structural support and reinforcing.
- D. Section 05500 – Metal Fabrications: Davit/track support pedestals.
- E. Section 07500 – Membrane Roofing: Flashing and sealing at roof penetrations.
- F. Section 07760 – Roof Pavers: Concrete pavers and ballast material. Pavers and ballast at roof terraces.
- G. Section 08910 – Metal Framed Curtain Wall: Platform stabilization/vertical guide tracks.
- H. Section 16130 – Raceway and Boxes: Empty conduit from control station to operators.
- I. Section 16150 - Wiring Connections: Electrical service to operators.

1.3 REFERENCES

- A. ANSI A1201.1 – Safety requirements for powered platforms for Exterior Building Maintenance.
- B. AISC 303 – Code of standard practice for steel buildings and bridges, including the “commentary” thereto.
- C. AISC 360 – Specifications for structural steel building, load and resistance factor design, including” commentary” thereto.
- D. ASME A120.1-2001 – Safety requirements for powered platforms and travelling ladders and gantries for building maintenance.

E. American National Standards Institute (ANSI): ANSI/IWCA I-14.1 – Window Cleaning Safety 2002.

F. AWS D1.1 – Structural Welding Code, Aluminum.

G. AWS D1.2 – Structural Welding Code.

H. NFPA 70 – National Electric Code.

I. Underwriters Laboratories – UL Listings.

J. California/OSHA Title 8 Articles 5 and 6.

1.4 SYSTEM Description

A. System General:

1. Components constructed of heat-treated aluminum alloy, stainless steel, or hot-dipped galvanized structural steel.
2. Dissimilar metals, when used, protected against electrolytic actions. Connectors shall be stainless steel unless otherwise noted.
3. Use certified welders to make all welds and provide non-destructive testing of all welds.
4. Components in contact with facades and the platform casters to be a non-marking and scuff resistant material.
5. Exterior finish of all roof carriages and all other factory painted assemblies shop painted with machinery enamel, color as directed by the design engineer. All aluminum assemblies natural color; mill finish. All carbon steel components shall be hot-dipped galvanized.
6. Provide mill test reports on wire suspension rope and metals, aluminum or steel, used in the manufacture of the permanently installed components and portable equipment to verify compliance with design and specification requirements.

B. System Components: Major elements of the building façade maintenance system are as follows:

1. Davit Pedestals System and required fastening hardware (roof rigged systems).
2. Davit bases and required fastening hardware.
3. Portable davit sockets, davit arms, davit raising winch, davit transfer winch.
4. Tieback anchors for unscheduled building maintenance.
5. Powered modular stage platform or powered work cage.
6. Portable Wind Anemometer.
7. Platform Intermittent Stabilization anchor, supplied only.
8. Platform Pull-in devices.

1.5 DESIGN/PERFORMANCE REQUIREMENTS

A. General:

1. Design installation to provide continuous contact between the platform and the structure as the platform descends and ascends.
2. Design equipment under the direction of a professional engineer registered in the state where the project is located.
3. Design structural members with a minimum 4:1 safety factor based on ultimate strength and normal operating conditions. All stresses and deflections are limited in accordance with governing codes and regulations.

B. Wind:

1. Design installations to withstand 25 miles per hour wind velocities while being used under normal operations and to be fully operational at wind velocities up to 50 miles per hour.
2. Design installations to withstand 100 miles per hour wind velocity when in their secured stored positions.
3. Exposed areas subjected to wind pressure shall be the total areas of all portions of the exposed parts with no shielding effect of one element by another elsewhere the distance between elements is four times or more than the smaller projected area of the windward element.

C. Performance: Comply with the most stringent requirements of applicable codes and other statutory requirements, including the current requirements of the following:

1. Occupational Safety and Health Act (OSHA): OSHA Part 1910, paragraph 1920.66, "Power Platforms for Exterior Building Maintenance".
2. ANSI/IWCA I-14.1 – Window Cleaning Safety.
4. National Electric Code including UL listed electrical components.
5. American Institute of Steel Construction (AISC): AISC "Load and Resistance Factor Design Specification for Structural Steel Buildings", including the "Commentary" thereto and AISC "Code of Standard Practice for Steel Building and Bridges" including the "Commentary" thereto.
6. American Welding Society (AWS): AWS D 1.1 "Structural Welding Code, Steel", AWS D 1.2 "Structural Welding Code", Aluminum.
7. California/OSHA Title 8 Articles 5 & 6.
8. American Society of Mechanical Engineers (ASME A120.1-2001, Safety Requirements for powered platforms for Building Maintenance.

1.6 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufactures data sheets on each product to be used, including:

1. Description of major items of equipment and catalogue cut sheets.
2. Preparation instructions and recommendations.

3. Storage and handling requirements and recommendations.

C. Shop drawings: Dimensioned shop drawings showing layout, profiles and product components, including anchorage, accessories and finish, and with general arrangement of the equipment and their working positions. Include location and characteristics of required electrical connections.

D. Structural Calculations: Calculations prepared and certified by a Licensed Professional Engineer registered in the state where the project is located. Include design assumptions and method of design including loads imposed on the building structure and curtain wall.

E. Selection Samples: For each finished product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

H. Operation and Maintenance Data: Manuals that are bound and neatly labeled describing operation and maintenance of all equipment installed including cleaning materials and methods and a detailed rescue plan.

1. Provide listing of replacement parts, including identifying numbers and ordering instructions.

2. Provide a sample inspection log for Building Owner's use in recording inspections; include recommended list of daily, weekly, periodic, and bi-annually inspections.

I. Project Record Documents: Submit project as-built drawings showing actual installed locations and configuration, and record specifications documenting all changes to original design criteria, wiring diagrams and other specification requirements.

1.7 QUALITY ASSURANCE

A. Manufacturer/Installer Qualifications: Firm with minimum ten (10) years experience in manufacturing and installing of façade maintenance equipment, with documented experience with installations of type specified.

B. Perform all tests required by local regulatory authorities. Required tests shall be made in the presence of the authorized representative of such local authorities and the Façade Maintenance Equipment manufacturer and installer shall issue a certificate of adequacy for the equipment, installation and testing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect material from exposure to moisture.

C. Store materials in a dry, warm, ventilated weather tight location.

D. Store and dispose of solvent-based material, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 PROJECT CONDITIONS

A. 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 absolute limits.

1.10 COORDINATION

A. Coordinate work with other operations and installation of exterior façade, roof deck, structural supports, embedded anchors and roofing materials to avoid damage to installed material and components.

B. Coordinate with other operations and installation of electrical service and locations of panels.

1.11 MAINTENANCE CONTRACT

A. Provide a one-year equipment maintenance contract for regular maintenance and services up to six times per year.

B. Included an option to renew the Maintenance Contract for an additional three years.

PART 2 PRODUCTS

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A. Substitutions: Permitted if a comprehensive engineering analysis and validation is completed.

B. Requests for substitutions will be considered in accordance with provision of Section 01600.

2.2 DAVIT, PEDESTALS AND FASTENING HARDWARE

A. Hot dip galvanized permanently attached steel davit pedestals shall be supplied for mounting to structure with stainless steel fastening hardware/cast-in-anchor bolt cage (if required). Each pedestal is fitted with a safe attachment point for securing the worker's accurately machined to receive the portable davit socket. It shall be shimmed as necessary during installation to steel/cast-in-anchor bolt cage. Davit base pedestals:

1. Davit Pedestal, Weld to Steel.
2. Davit Pedestal Embedded Anchor Bolt.
3. Davit Pedestal, Thru Bolt.

2.3 DAVIT BASES AND FASTENING HARDWARE (New York Style):

A. Hot dip galvanized permanently attached steel davit bases shall be supplied for mounting to stainless steel fastening hardware. Each base is to be fitted with a safe attachment point for securing the worker's safety line. The davit bases will be accurately machined to receive the portable davit arms. They shall be shimmed as necessary during installation to steel davit pedestals.

B. Sufficient hot dipped galvanized steel davit pedestals are to be supplied and installed by others.

2.4 ROOF DAVITS AND DAVIT BASES

A. Provide two-piece, tip-up, rotate able, mechanically raised, standard aluminum davits. The davits are to be designed to allow workers to mount the maintenance platform outboard over the parapet or railing. Davits to be provided with wheels or a cart for transporting between sockets. In the locations noted, davit arms shall be permanently installed in the sockets and capable of rotating down, with mechanical assist, when not in use.

B. The socket shall be bolted to preset bases. Sockets shall be fabricated from carbon steel and hot-dipped galvanized after fabrications.

C. Bolts, with lock washer and nuts, and other hardware for fastening sockets to the preinstalled pedestals shall be stainless steel. (NY State requires that the hardware used to fasten davit bases to pedestals be stainless steel)

2.5 FLUSH OR PORTABLE DAVIT EQUIPMENT

A. Flush or Portable Davit Bases: Hot dip galvanized steel davit bases shall be supplied for attachment to davit pedestals. The davit sockets are to be accurately machined to receive the portable davit arms. Flush or Portable Davit Bases:

1. Flush Davit Pedestal, Weld To Steel.
2. Flush Davit Pedestal, Embedded Anchor Bolt.
3. Flush Davit Pedestal, Thru Bolt.

B. Portable Davit Arms: Davit arm is comprised of two sections. The vertical mast section is to be constructed from high strength aluminum tubing. At the upper end of the mast an

integral pivot pin with safety toggle facilitates engagement and securing of the horizontal boom portion of the davit boom. The davit boom is to be extruded aluminum complete with trolleys with sealed bearing and position retaining devices.

1. The davit arm mast shall be designed to engage the portable davit base/fixed bases while in the horizontal position. Once the mast is pinned to the portable davit socket/fixed davit bases the boom portion of the arm is attached and then the entire assembly is pivoted in the upright position. Safety pins are to be provided to allow positive engagement with the davit base to secure the davit in its vertical working position.
2. A self-lubricating, upper bearing, roller collar shall be provided on the davit boom to ease boom rotation under all loading conditions.
3. Davit boom and mast shall be designed as separate sections. Carrying handles are to be provided on the davit booms and masts; along with transporting wheels near the base of the davit mast to ease transfer.
4. The davit arms shall be of sufficient height to permit the arms to rotate and land the suspended platform on the roof for transfer to subsequent service drop positions.
5. The davits shall be designed to support a safe working load of 1250 lb (567 kg) per arm. Two davits working to get here shall be rated to support a total of 2500 lb (1134 kg).

C. One portable davit-raising winch shall be supplied to provide a mechanical means for raising the davit arm from a horizontal position to a vertical work position. The manually operated hand winch shall incorporate a load brake system.

2.6 POWERED MODULAR STAGE PLATFORM

A. The self-powered modular stage platform (supported by four wire ropes: 2 primary and 2 secondary) is fabricated of aluminum to give a lightweight and rigid structure. The stage is permanently enclosed to a height of 42 inches (1067mm) with aluminum-perforated sheet. The deck shall consist of aluminum-extruded sections with a non-slip surface surrounded by a six-inch toe-guard on all sides. The two powered end sections of the platform can be attached together by removing the center sections of the stage removing the center sections of the stage to accommodate all required stage lengths to perform stage service drops around the building perimeter. Provide wheels or casters on all platform sections. Safe working load shall be 500 lb (227kg) and shall be exclusive of the weight of the stage and the cables. (Provisions to be made so both powered ends can be used independently as single man work cages).

B. The modular self powered platform 2 foot 6 inch (762 mm) wide by length as required, 500 pound (227kg) capacity for two workers for window cleaning and light building maintenance as indicated on the drawing s and described in the equipment schedule shall be provided.

C. Provide 2-1/2 inches (64 mm) minimum diameter non-marking façade rollers at the inboard side of the platform. The roller assemblies shall be designed to maintain contact with the building facades.

D. Provide traction type electric hoist with dual 5/16 inch (8 mm) wire suspension ropes and associated powered wire winder to prevent the suspension rope tail lines from hanging below the platform. Suspension wire ropes shall be long enough to negotiate the buildings full height at all intended working stations with four (4) full wraps remaining on the wire winder. The secondary wire rope shall pass through an over speed automatically activate should the platform achieve an over speed conditions. Furthermore if failure occurs of one wire rope or suspension attachment the stage platform shall not upset.

E. Operating speed of the platform, during ascent or decent, shall be approximately 35 feet per minute (11 mm/sec).

F. Provide two emergency stop switches, one at each operator's stations that shall stop any further platform travel, up or down, after either is activated.

G. Provide with individual controls for each hoist for raising, lowering and leveling and leveling of the platform.

H. Provide a platform overload and slack wire device at each hoist.

I. Provide an upper travel limit switch at the top fairlead of each hoist with an interlock system to prevent further upward movement in the event the platform contacts the support.

J. The work deck of the platform shall have small openings or holes to allow the passage of air and to prevent uplift of the platform due to wind pressures. Openings shall not allow tools or other normally carried equipment to pass through.

K. Provide a painted metal sign, attached to the platform, stating the maximum load capacity of the platform/system (500 lb (227) kg) Live load).

L. Provide a fire extinguisher mounted on the platform.

M. Provide lower obstruction detectors that will stop any further downward travel after contacting an obstruction from below.

N. Provide a level sensing system that will prevent the platform from being out-of-level.

O. All connectors, bolts, self-locking nuts, washers, etc. shall be stainless steel.

P. Provide a factory installed 5/16-inch (8 mm) diameter horizontal galvanized wire rope safety (static) line at the rear midrail level of the stage platform for the attachment of the lanyards from the worker's fall protection equipment. The static line shall be secured to a structural member of the platform's deck at both ends. The connections shall be capable of sustaining a minimum of 5000 pounds (2268 kg) before failure. Rope clips shall not be used.

Q. Device shall be provided to lower the platform manually, at a controlled rate, in case of an emergency.

R. Power Requirements; 208 VAC, 3 Phase, 60 HZ, 30 AMP. The power locations will be provided during shop drawing submissions. The stage platform is to be powered by a dedicated electrical circuit from power outlets. The electric cord is to be collected in a bin, mounted on the platform.

S. Provide stage tie down anchors. Tie downs shall have a round base, which extends a minimum of eight inches above the roof membrane, for ease of flashing. The anchor eye attachment shall be stainless steel.

T. Provide metal hoist covers.

2.7 SAFETY TIEBACK ANCHORS

A. Tieback Anchors – “U” Bar $\frac{3}{4}$ inch (19mm) 42 ksi yield strength type 304 stainless steel, Pipe Support 4 inches (102 mm) diameter.

B. Fabrication: Take measurements on site as required for correct fabrication and installation. Fabricator shall be responsible for errors in fabrication and for correct fit of window washing systems. Fabricate and assemble in shop to greatest extent feasible. Fabricate for delivery sequence, which will expedite erection and minimize field handling.

1. Roof Mount; tieback anchors, minimum height of 6 inches (152mm) above roof membrane. All anchors shall have a 2-1/2 inches (64mm) inside diameter stainless steel ring for means of attaching a suspension wire rope or safety lifeline. Roof Mounted Tiebacks Anchor:

- a. Tieback Anchor-Weld to Steel
- b. Tieback Anchor-Embedded Anchor Bolt.
- c. Tieback Anchor-Thru Bolt Anchor
- d. Tieback Anchor- Hilti Type Anchor

2. Wall Mount; tieback anchors, with base plate. All anchors shall have a 2-1/2 inch (64mm) inside diameter stainless steel ring for means of attaching a suspension wire rope or safety lifeline. Wall Mounted Tie back Anchor:

- a. Wall Mounted TBA-Embedded Anchor Bolt.
- b. Wall Mounted TBA-Thru Bolt Anchor.
- c. Wall Mounted TBA-Hilti Type Anchor.

3. Flush Roof Mount; tieback anchors, require minimum height of 4 inch (102 mm) roof pavers system. All anchors shall have a 2-1/2 inches (64 mm) inside diameter flame cut ring for means of attaching a suspension wire rope or safety lifeline. Flush Mounted Tieback Anchor:

- a. Flush TBA-Weld to Steel.
- b. Flush TBA-Embedded Anchor Bolt.
- c. Flush TBA –Thru Bolt Anchor.
- d. Flush TBA- Hilti Type anchor.

2.8 DROP THROUGH RIGGING SLEEVES

A. Install the following equipment as specified.

B. Hot dip galvanized permanently attached steel drop through rigging sleeve shall be supplied for mounting to structure with appropriate cast—in-anchor bolt cage (if required). The rigging sleeve shall be accurately machined to receive the portable dual suspension-rigging bracket. A weatherproof cap and tether line shall be required at all drop through rigging sleeve locations. Shimmed as necessary during installation to steel/cast-in-anchor bolt cage.

C. Fabrication – Take measurements on site as required for correct fabrication and installation. Fabricator shall be responsible for errors in window washing systems. Fabricate and assemble in shop to greatest extent feasible. Fabricate for delivery sequence, which will expedite erection and minimize field handling.

1. Roof Mount: Drop through rigging sleeve, minimum height of 6 inches (152 mm) above roof membrane.

2. Wall Mount (Soffit Bent Pipe): Drop through rigging sleeve.

D. Portable Dual Suspension-Rigging Bracket: Hot dip galvanized steel-rigging bracket shall be supplied for attachment of suspension wire ropes.

2.9 PULL UNDER BRACKETS

A. Install the following equipment as specified.

B. Hot dip galvanized permanently attached pull under brackets shall be supplied for mounting to underside of structure with appropriate stainless steel fastening hardware/cast-in-anchor bolt cage (if required). Shimmed as necessary during installation to steel/cast-in-anchor bolt cage.

C. Fabrication: Take measurements on site as required for correct fabrication and installation. Fabricator shall be responsible for errors in fabrication and for correct fit of window washing systems. Fabricate and assemble in shop to greatest extent feasible. Fabricate for delivery sequence, which will expedite erection and minimize field handling.

1. Underside of Roof Mount; pull under brackets, used for mid-air transfer of stage platform under a cantilevered section of the structure.

D. Portable Dual Suspension Pull Over Device; shall be supplied for use with stage platform.

2.10 PORTABLE WIND ANEMOMETER

A. Permanently installed anemometer (roof powered drum hoist only) wired into control circuit to prohibit use when excessive wind speeds are present. Note: Functions that allow the working platform to return to the roof remain operational.

B. Provide a platform mounted wind anemometer and gauge for monitoring the wind velocity during platform use. Reading shall be in miles per hour and operating power shall be from internal turbine or 9-volt dry cell battery.

C. Provide equipment by manufactures, unless other firms can submit a record of experience acceptable to the Design Engineer.

2.11 PLATFORM INTERMITTENT STABILIZATION ANCHOR, SUPPLIED ONLY

A. Install the following equipment as specified.

B. Stabilization Anchors Design:

1. The intermittent stabilization anchors shall be specifically designed to mount to the existing building structure at horizontal intervals equal to the center-to-center distance of the stage platform suspension wire ropes at all required service drop positions. Vertical spacing of the intermittent stabilization anchors shall be 50 ft. (15) center-to-center maximum or every three floors whichever is less. Provide shop drawings indicating location, loads imposed and structural requirements of the intermittent stabilization system. Stabilization anchors shall be installed on buildings with suspension heights exceeding 130 feet (40m), with the first anchor being no more than 50 feet (15m) from the tope of the building.

2. The intermittent stabilization anchors shall be specially designed to mount to the existing building structure at horizontal intervals equal to the center-to-center distance of the stage platform suspension wire rope at all required service drop positions. Vertical spacing of the intermittent stabilization anchors shall be 40 feet (12 m) center-to-center maximum or every three floors whichever is less. Provide shop drawings indicating location, loads imposed and structural requirements of the intermittent stabilization system. Stabilization anchors shall be installed on buildings with suspension heights exceeding 75 feet (23 m), with the first anchor being no more than 40 feet (12 m) from the top of the building.

C. Stabilization Anchors shall withstand 600 lb (272 kg) ultimate pull in any direction:

1. The intermittent stabilization anchor shall be a detent (pin) type.

D. The intermittent stabilization anchor shall be a ¾ inch (19 mm) diameter shoulder bolt (button) type.

1. Provide tie-in lanyards for intermittent stabilization of each of the platform's suspension ropes complete with stainless steel "Quick Connect" devices for attachment to the building anchors.

2. Lanyards shall be galvanized aircraft cable, or equal, with a means of adjustment for length.

3. Lanyards shall be on-piece and stored around the platform fair leads.

2.12 COMMUNICATION EQUIPMENT

A. Communication equipment will be provided for each operator for use in an emergency. The communication equipment shall be Building Owner furnished walkie-talkies.

2.13 POWER REQUIRMENTS

A. Provide electric service as specified in Section 16150.

B. Roof Carriage: Protected mainline power and weatherproof, twist-lock receptacle to suit Roof Carriage power requirement power outlets based upon 208/220 VAC, 3 Phase, 60 HZ, 30 AMP. Electric power is to be provided at designated outlets, each being capable of providing 30 amperes and 460 volts, 60 HZ, three phase, under full loading of the equipment with not more than 3 percent voltage drop at the outlets, or at a value compatible with the proposed equipment.

C. Powered Stage: Protected mainline power and weatherproof, twist-lock receptacle to suit Powered Stage Platform requirement power outlets based upon 230 VAC, 3 Phase, 60 HZ, 30 AMP. Electric power is to be provided at designated outlets, each being capable of providing 30 amperes and 240 volts, 60 HZ, three phase, under full loading of the equipment with not more than 3 percent voltage drop at the outlets, or at a value compatible with the proposed equipment.

1. The outlets on each level of the building shall be on separate circuits from each other and all other equipment. They will contain a separate grounding conductor for an equipment ground. Each outlet will be provided with an adjacent stainless steel strain relief anchor for the strain relief attachment on the traveling cables.

2. Power at electrical outlets shall be available only while the platform is in use and shall not be available at any other time. The circuits to be capable of being locked in the "OFF" position. The switch shall be conveniently located with respect to the primary operating area of the equipment to allow the operators of the equipment access to the switch.

2.14 OUTRIGGER BEAMS

A. Outrigger Beams: Engineered length and size to suit application, equipped with carrying handles.

1. Design to carry minimum rated vertical service load of 1,000 pounds (4.5 kN).
2. Construction: Aluminum I-beams.
3. Galvanized steel I-beams.
4. Construction: Galvanized hollow steel sections.
5. Outboard End: Trolley, with stops to ensure trolley cannot become detached from beam.
6. Outboard End: Friction U-bar.
7. Outboard End: Shackle.
8. Data Plate: Prominently displayed, non-corrodible plate clearly stating:
 - a. Maximum Service Capacity.
 - b. Manufacture's Name.
 - c. Serial No. and Manufacturing Date.

B. Bases and Roof Anchor Piers: Hollow steel sections as specified above, galvanized, with wall thickness and securement to suit application.

C. Bases: Swivel-type beam bases on round hollow steel sections as specified above, galvanized, capable of easily rotating through 360 degrees under load, with connecting pins and safety U-bar as specified above.

D. Beam Dolly: With pneumatic type rubber wheels, sized to suit beam.

1. Material: Galvanized steel.

2. Material: Aluminum

2.15 MONORAILS AND HORIZONTAL TROLLEY RAILS

A. Rail System: Designed to carry minimum vertical service load of 1,000 pounds (4.5 kN).

1. Construction: Aluminum extrusions, ASTM B 221

2. Construction: Cold rolled hollow steel sections, Type 350W with yield strength of 50 Ksi (350MPa) and tensile strength of 65 Ksi (450 MPa), galvanized to ASTM A123/A123M.

3. Finish of Exterior Components: Mill finish

4. Finish of Exterior Components: Anodized

5. Finish of Exterior Components: Galvanized

6. Finish of Exterior Components: Polyester or polyurethane powder coated baked enamel of custom color as directed by Architect.

7. Finish of Exterior Components: Polyester or polyurethane powder coated baked enamel of custom color as directed from manufacture's standard colors.

8. Finish of Exterior Components: Epoxy, factory applied.

9. Finish of Interior Components: Hybrid powder coated.

10. Finish of Interior Components: Enamel, field painted.

11. Data Plate: Prominently displayed, non-corrodible plate clearly stating:

a. Maximum Service Capacity.

b. Manufacture's Name.

c. Serial No. and Manufacturing Date.

2.16 HORIZONTAL CABLE LIFELINES

A. Horizontal Lifeline System: Hands-free cable type.

1. Cable: 5/16 or 1/2 inch (7 or 13 mm) diameter Type 316 stainless steel with minimum breaking strength of 19,125 pounds (85 kN) , complete with permanently swedged cable ends.

2. Data Plate: At cable system entry points, provide prominently displayed non-corrodible data plate clearly stating Maximum Service Capacity and Number of Users.

3. Intermediate Support Brackets: Multi-position Type 316 stainless steel secured using 1/2 inch (13mm) diameter fasteners.

4. Entry/Exit Brackets: Type 316 stainless steel.

5. Connector: Type 316 stainless steel, with automatic connector bypass feature for continuous hands-free operation, and detachability feature for window cleaning operations.

6. Tensioner Units: Type Type 316 stainless steel with polished finish.

7. Harness: Manufacturer's standard hands-free full body harness and lanyard complete with hock absorber.

8. Accessories: Manufacture's standard corner units as required.

B. Horizontal Lifeline System: Double lanyard (DL) cable type.

1. Cable: ½ inch (13mm) diameter galvanized steel with minimum breaking strength of mechanically swaged cable ends.
2. Data Plate: At cable system entry points, provide prominently displayed non-corrodible data plate clearly stating Maximum Service Capacity and Number of Users.
3. Tensioner: Steel turnbuckle, same material as cable.
4. Harness: Manufacture's standard full body harness with double lanyard and shock absorbers.

2.17 ACCESSORIES

A. Provide the following accessories as required for a complete installation.

1. Powered Modular Stage Platform or Powered Work Cage.
2. Portable Wind Anemometer.
3. Platform Intermittent Stabilization Anchors, supplied only.
4. Platform Pull-in Devices.

PART 3 EXECUTION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Design Engineer of unsatisfactory preparation before proceeding.

3.1 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best results for the substrate under the project conditions.

3.2 INSTALLATION

A. Install in accordance with manufacture's instructions.

B. Furnish and install all Façade Maintenance Equipment and components in strict accordance with the approved shop drawings and at such time when construction and finish of adjoining work will permit to avoid delays to the construction process. All equipment shall be secured in place as shown on the approved shop drawings and/or as herein specified by rigid approved methods.

3.3 FIELD QUALITY CONTROL

A. Conduct full live load and operational tests, after completion of the installation. Perform tests under maximum design live loading conditions over the full range of all the building surfaces, in accordance with applicable standards.

B. At a time mutually agreeable to all parties, allow one full day to conduct operational demonstrations for the Building Owner and/or the Building Owner's representative, after completion of the operational tests.

C. Repair or replace any components and correct all deficiencies observed as a result of these tests and demonstrations, and retest to assure compliance with this specification and regulatory requirements.

D. Approvals: Submit documentation required to obtain the necessary approval for the equipment installation from the governing authority for operation of the façade maintenance system. Conduct field operational tests for personnel from the governing authority (separate from the Building Owner's demonstrations.)

E. Provide written certification that all components have been successfully operated, and will perform in accordance with intent of this design.

3.4 INSTRUCTIONS

A. Instruct the Building

Owner's Representatives and selected User Personnel in the proper usage of the equipment. Representative of the manufacturer shall, at time as selected by the Building Owner, spend on man-day as needed at the building furnishing this instruction.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION