SECTION 11 24 23

WINDOW WASHING SYSTEMS

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\*\* NOTE TO SPECIFIER \*\* Pro-Bel Enterprises Limited; window washing/fall arrest systems.
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This section is based on the products of Pro-Bel Enterprises Limited, which is located at:
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Web: [www.pro-bel.ca](http://www.pro-bel.ca)
 [ [Click Here](http://www.arcat.com/arcatcos/cos39/arc39216.html) ] for additional information.
The Pro-Bel Group of Companies has specialized in the design, manufacture, installation and inspection of window washing/fall arrest systems for over 25 years. We work with architects, general contractors and building owners designing systems that can include tie-back safety anchors, horizontal cable systems, monorail, rigging sleeves, davit bases, davit arms and roof cars. Our systems can be used for fall restraint; fall arrest and/or building maintenance.
We offer a free design service where we design your suspended maintenance equipment to meet all Codes and Standards no matter where the building is located. The system on your building may vary from anchors to powered platforms or require a roof car. We would be happy to make an appointment to come out and see your building to ensure that your system complies with ANSI/IWCA I-14.1 Standard, OSHA and any other State Codes.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Design, supply and installation of window washing systems and suspended maintenance equipment.
	1. RELATED SECTIONS
		1. Section 03 30 00 - Cast-in-Place Concrete.
		2. Section 05 05 23 - Metal Fastenings.
		3. Section 05 50 00 - Metal Fabrications.
		4. Section 07 62 00 - Sheet Metal Flashing and Trim.
		5. Section 08 44 00 - Curtain Wall and Glazed Assemblies.
		6. Section 26 05 00 - Common Work Results for Electrical.
		7. Section 26 27 16 - Electrical Cabinets and Enclosures.

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* 1. REFERENCES
		1. American Institute of Steel Construction (AISC).
			1. AISC S342L - Load and Resistance Factor Design Specification for Structural Steel Buildings (including Supplement No.1).
		2. Aluminum Association (AA).
			1. AA ADM-1 - Aluminum Design Manual.
			2. AA DAF 45 - Designation System for Aluminum Finishes.
		3. American Society of Mechanical Engineers (AMSE).
			1. ASME A120.1 - Safety Requirements for Powered Platforms and Traveling Ladders and Gantries for Building Maintenance.
		4. American National Standards Institute / International Window Cleaning Association (ANSI/IWCA).
			1. ANSI/IWCA I-14.1 - Window Cleaning Safety Standard.
		5. American Welding Society (AWS).
			1. AWS D1.2/D1.2M - Structural Welding Code - Aluminum.
			2. AWS D1.1/D1.1M - Structural Welding Code - Steel.
		6. ASTM International (ASTM).
			1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
			2. ASTM A167 - Specification for Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet and Strip.
			3. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
			4. ASTM A492 - Standard Specification for Stainless Steel Rope.
			5. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
		7. International Code Council (ICC).
			1. International Building Code.
		8. Occupational Safety and Health Administration (OSHA).
			1. OSHA 1910, Subpart D, Walking and Work Surfaces.
			2. OSHA 1910, Subpart F, Appendix C, Personal Fall Arrest Systems.
			3. OSHA Ruling on Window Cleaning by Bosun's Chair.
			4. OSHA 1910.66 Subpart F, Powered Platforms.
		9. National Roofing Contractors Association (NRCA)
			1. The NRCA Roofing and Waterproofing Manual, Fifth Edition.
	2. ACTION SUBMITTALS
		1. General: Submit listed action submittals in accordance with Contract Conditions and Section 01 30 00 - Administrative Requirements.
		2. Shop Drawings: Indicate information on shop drawings as follows:
			1. Submit shop drawings showing complete layout and configuration of window cleaning and suspended maintenance system, including components and accessories.
			2. Indicate design and fabrication details, window "drops", hardware, and installation details.
			3. Include installation and rigging instructions and:
				1. Required restrictive working usage and general safety notes.
				2. Non-restrictive working usage and general safety notes.

\*\* NOTE TO SPECIFIER \*\* Owner or Owner's representative may request either submission of calculations or test reports, or they may require submission of both. Edit the following Paragraph to meet project requirements. Delete if not required.

* + - 1. Ensure Shop Drawings are reviewed by Engineer licensed in State of Project location and submit calculations and test reports to Architect.
		1. Samples as follows: Duplicate 12 inches (305 mm) samples of monorail sections.
	1. INFORMATIONAL SUBMITTALS
		1. Product Data: Manufacturer's data sheets on each product to be used, including:
			1. Preparation instructions and recommendations.
			2. Storage and handling requirements and recommendations.
			3. Installation methods.
		2. Quality Assurance:
			1. 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 specified performance characteristics and criteria and physical requirements.

\*\* NOTE TO SPECIFIER \*\* Include the following Article for projects in California.

* + 1. Operating Procedures Outline Sheet (OPOS):

\*\* NOTE TO SPECIFIER \*\* An OPOS establishes safe window cleaning and exterior maintenance procedures for buildings and structures.

* + - 1. Submit an Operating Procedures Outline System (OPOS) including necessary elements in both pictorial and written form, to instruct employees in safe use of roof supported building maintenance equipment or window cleaning procedures not covered by California Labor Code orders. Ensure that OPOS contains as a minimum, elements as follows:
				1. Isometric or plan view pictorial drawing of building's roof, including building's name, address, and date OPOS was prepared. Ensure drawing is legible and kept with building's written assurance.
				2. Identification of drop zones, recommended drop sequences, scaffold configurations, and specific building maintenance procedures including equipment to be used.
				3. Identification of anchorage points for personal fall arrest systems and building maintenance equipment.
				4. Identification of personal fall protection requirements and procedures for securing equipment.
				5. Identification of dangerous areas on roof by highlighting of "Danger Zone" on pictorial drawing.
				6. Description of means and methods to be used to transfer equipment from drop location or between building levels.
				7. Identification of equipment limitations, load ratings, and special use conditions.
				8. Provisions for pre-operational, operation and maintenance inspections.
				9. Identification of access and egress to work locations and storage area(s) for permanent or transportable building maintenance equipment.
				10. Indication of location and method of stabilization provided for suspended equipment.
				11. Emergency and rescue procedures and means of communications to be used during such procedures.
				12. Method to be used to control employee exposure to falls while in "Danger Zone."

\*\* NOTE TO SPECIFIER \*\* Coordinate Paragraph below with Part 3 Field Quality Requirements Article. Retain or delete as applicable.

* + 1. Manufacturer's field reports as specified.
	1. CLOSEOUT SUBMITTALS
		1. Submit 1-year standard manufacturer warranty documents as specified.
		2. Operation and Maintenance Data: Submit Operation and Maintenance data for installed products in accordance with Section 01 70 00 - Execution and Closeout Requirements.
			1. Include:
				1. Manufacturer's instructions covering maintenance requirements and parts catalog giving complete list of repair and replacement parts with cuts and identifying numbers.
				2. One copy of system Equipment Manual & Inspection Log Book, with "Initial Inspection - Certification for Use" and "Inspection Sign-Off" forms completed.
				3. Two copies of reduced, "as-built shop drawing" showing equipment locations and details. Ensure drawing is posted adjacent exits to roof.
	2. QUALITY ASSURANCE
		1. Qualifications:
			1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
			2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.
		2. Provide window washing equipment components and materials from single manufacturer.

\*\* NOTE TO SPECIFIER \*\* Article below should list obligations for compliance with specific code requirements particular to this section. General statements to comply with a particular code are typically addressed in Contact Conditions and Section 01 40 00 - Quality Requirements. Repetitive statements should be avoided. Current data on building code requirements and product compliance may be obtained from manufacturer technical support specialists.

* + 1. Regulatory Requirements.

\*\* NOTE TO SPECIFIER \*\* Window washing equipment systems must also meet the requirements of building codes and zoning bylaws issued by Federal, State and local government authorities having jurisdiction. Ensure that project specification section reflects the need to meet these requirements. Edit Article below as applicable.

* + - 1. Comply with applicable code of local jurisdiction.
			2. Comply with OSHA regulations as follows:
				1. 1910, Subpart D, Walking and Working Surfaces.
				2. Appendix C to 1910 Subpart F, Personal Fall Arrest Systems.
				3. OSHA Ruling on Window Cleaning by Bosun's Chair.
				4. 1910.66, Subpart F, Powered Platforms.

\*\* NOTE TO SPECIFIER \*\* Include the following Paragraph for projects in California. Delete if not required.

* + - 1. Comply with California State regulations as follows:
				1. Code of Regulations, Title 8 - Industrial Relations, Article 5 (Window Cleaning), Article 6 (Powered Platforms for Exterior Building Maintenance), and Appendix C to Article 6 (Personal Fall Arrest System).
		1. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 30 00 - Administrative Requirements.
	1. DELIVERY, STORAGE AND HANDLING
		1. General: Comply with 01600 - Product Requirements.
		2. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
		3. Delivery:
			1. Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project.
		4. Storage and Protection:
			1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

\*\* NOTE TO SPECIFIER \*\* Modify the requirements below to comply with local code requirements required.

* + 1. Transportation and Handling:
			1. Ensure center of gravity of davits weighing 80 lbs (36.3 kg) or greater remains 36 inches (915 mm) maximum above safe surface while transporting.
			2. Ensure davits requiring 80 lbs (36.3 kg) or greater lifting effort are equipped with are equipped with mechanical means of hoisting into position.
	1. PROJECT AMBIENT CONDITIONS
		1. Installation Location: Assemble and erect components only when temperatures are above 40 degrees F (4 degrees C).
	2. SEQUENCING
		1. Sequence with other Work and Comply with window washing equipment manufacturer's written recommendations for sequencing construction operations.

\*\* NOTE TO SPECIFIER \*\* Coordinate Article below with Contract Conditions and with 01780 - Closeout Submittals.

* 1. WARRANTY
		1. Project Warranty: Refer to Contract Conditions for additional project warranty provisions.
		2. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and does not limit, other rights Owner may have under Contract Documents.

\*\* NOTE TO SPECIFIER \*\* Coordinate Article below with manufacturer's warranty requirements.

* + 1. Warranty: Commencing on date of substantial completion set by Architect.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Pro-Bel Enterprises Limited, which is located at: 765 Westney Rd. S.; Ajax, ON, Canada L1S 6W1; Toll Free Tel: 800-461-0575; Tel: 905-427-0616; Fax: 905-427-2545; Email: [request info (info@pro-bel.ca)](http://admin.arcat.com/users.pl?action=UserEmail&company=Pro-Bel+Enterprises+Limited&coid=39216&rep=&fax=905-427-2545&message=RE:%20Spec%20Question%20(11010pro):%20%20&mf=); Web: [www.pro-bel.ca](http://www.pro-bel.ca)

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Retain Article below for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as "or equal" or "or approved equal" or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining "or equal" products.

* 1. PROPRIETARY PRODUCTS AND SYSTEMS
		1. Manufacturer: Pro-Bel Group of Companies, Phone: (905) 427-0616, USA Toll Free: (800) 461-0575, Fax: (905) 427-2545, E-mail: info@pro-belgroup.com , Internet URL: [www.pro-belgroup.com](http://www.pro-belgroup.com)
	2. DESIGN PERFORMANCE REQUIREMENTS
		1. Design window cleaning and suspended maintenance system to suit project requirements to AISC S342L and as specified.
		2. Locate anchorages to suit suspension equipment specified.
		3. Design anchor components for cleaning and suspended maintenance equipment to ASME A120.1.
			1. Ensure compatibility with industry standard equipment.
			2. Anchorage and anchor components: Designed by Engineer qualified in design of window cleaning and suspended maintenance equipment and licensed in State of Project location.
		4. Design system fall arrest safety anchors and equipment supports to AISC S342L (including supplement No.1) and ANSI/IWCA I-14.1, and as follows:
			1. Comply with OSHA 1910, Subpart F, Appendix C.
			2. Supports for Suspended Platforms including davits, rigging sleeves and monorail:
				1. SEQ CHAPTER 1Safety factor against fracture or detachment: 4 to 1.
				2. Vertical service load: 1000 lbs (4.45 kN) minimum.
				3. Rated load against fracture: 4000 lbs (17.8 kN) minimum.
			3. Fall Arrest Safety Anchors:
				1. Fall arresting force safety factor of 2 to 1 without permanent deformation: 1800 lbs (8.0 kN) minimum.

\*\* NOTE TO SPECIFIER \*\* For projects in California specify fall arrest force against fracture or detachment of 5400 lbs (24 kN) minimum. Delete force not required.

* + - * 1. Fall arrest force against fracture or detachment:

5,000 lbs (22.4 kN) minimum.

5,400 lbs (24 kN) minimum.

* + 1. Trolley Systems: Design, fabricate and finish trolleys to ensure no structural or mechanical deterioration over designed life that could affect security and operation considering permanent exposure to elements.
			1. Provide rotating components with sealed-for-life rolling element bearings protected from environment.
	1. EQUIPMENT

\*\* NOTE TO SPECIFIER \*\* Edit the following list to include only those pieces of equipment that meet the requirements for the project.

* + 1. Provide the following equipment:
			1. SEQ CHAPTER 1Anchors.
			2. Davits.
			3. Outrigger Beams.
			4. Monorails.
			5. Horizontal Trolley Rail Systems.
			6. Permanent Powered Platforms.
			7. Work Cages.
			8. Rigging Sleeves.
			9. Hands-Free Horizontal Lifelines.
			10. Double Lanyard Horizontal Lifeline Systems.
			11. Davit Carriages.
			12. Traveling Gantries.
			13. Rolling Ladders.
			14. Powered Roof Cars.

\*\* NOTE TO SPECIFIER \*\* As well as items listed in the following Article, a complete Anchor system may also include other items listed in the Article titled "Accessories". Edit this section to include those accessories necessary for the project requirements.

* 1. ANCHORS

\*\* NOTE TO SPECIFIER \*\* Delete the following Paragraph for projects in California.

* + 1. Safety U-bars:
			1. U-bar: 0.75 inches (19 mm) minimum diameter material with 1.5 inches (38 mm) eye opening.

\*\* NOTE TO SPECIFIER \*\* Delete the material not required.

* + - 1. Material: Stainless steel to ASTM A276,Type 304 with 35 Ksi (240 MPa) minimum yield strength.
			2. Material: Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M.

\*\* NOTE TO SPECIFIER \*\* Specify safety anchor eye plates for projects in California. Delete if not required.

* + 1. Safety Anchor Eye Plate: Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M.
			1. Plate: 0.875 inches (22 mm) diameter material with 2 inches (50 mm) eye opening.
		2. Hollow Steel Section (HSS) Piers: Mild steel, Type 300W with 50 Ksi (350 MPa) minimum yield strength.
			1. Wall thickness to suit application or as indicated.

\*\* NOTE TO SPECIFIER \*\* Delete metal surface treatments not required.

* + - 1. Hot dipped galvanized to ASTM A123/A123M.
			2. Manufacturer's polyurethane/polyurea coating system.
		1. Plate and other sections: Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength.
			1. Wall thickness to suit application or as indicated.

\*\* NOTE TO SPECIFIER \*\* Delete metal surface treatments not required.

* + - 1. Hot dipped galvanized to ASTM A123/A123M.
			2. Manufacturer's polyurethane/polyurea coating system.

\*\* NOTE TO SPECIFIER \*\* Specify aluminum flashing for BUR or modified bitumen roofs only (membrane above or below insulation). For single ply roofs, refer to roofing membrane manufacturer's written instructions. Specify conformable mastic tape and heat-shrink rubber collar flashing for PBE Series roof anchors (BUR or modified bitumen roofs) or stainless steel cap for Pro-Bel series roof anchors for all roof types.

* + 1. Seamless Spun Aluminum Flashing (for Roof Anchors): To AA ADM-1 Type 6061-T6 alloy and to ASTM B221.

\*\* NOTE TO SPECIFIER \*\* Delete deck flange flashing type not required.

* + - 1. Deck Flange Flashing: Acceptable material: Pro-Bel Group, Aluminum Deck Flange Flashing.
			2. To NRCA Roofing and Waterproofing Manual recommendations.
			3. In accordance with Section 07 62 00 - Sheet Metal Flashing and Trim.
			4. Conformable mastic tape and torch applied heat-shrink rubber collar flashing.
			5. Detachable watertight stainless steel cap.
		1. Miscellaneous Bolts, Nuts and Washers:
			1. Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M.
			2. Stainless steel to ASTM A276, Type 304 with 35 Ksi (240 MPa) minimum yield strength.

\*\* NOTE TO SPECIFIER \*\* As well as items listed in the following Article, a complete Davit system includes some or all of those items listed in the Article titled "Accessories". Edit this section to include those accessories necessary for the project requirements.

* 1. DAVITS
		1. Acceptable Material: Pro-Bel Group, Davit System.

\*\* NOTE TO SPECIFIER \*\* Edit the following Paragraphs to suit project requirements.

* + 1. Davit Booms:

\*\* NOTE TO SPECIFIER \*\* Delete rigging location type not required.

* + - 1. Ground rigged, aluminum sections of engineered length and size to suit application or as indicated, equipped with carrying handles and designed to carry 1000 lbs (4.5 kN) vertical service load, minimum.

\*\* NOTE TO SPECIFIER \*\* Delete outboard end configuration not required.

* + - * 1. Stainless steel rolling trolley on outboard end.
				2. Stainless steel friction trolley on outboard end.
				3. Galvanized fixed shackle on outboard end.
			1. Roof rigged, aluminum sections of engineered length and size to suit application or as indicated, equipped with carrying handles and designed to carry 1000 lbs (4.5 kN) vertical service load, minimum.

\*\* NOTE TO SPECIFIER \*\* Delete outboard end configuration not required.

* + - * 1. Stainless steel rolling trolley on outboard end.
				2. Stainless steel friction trolley on outboard end.
				3. Galvanized fixed shackle on outboard end.
			1. Provide non-corrosive UV resistant data plate stating Maximum Service Capacity of boom, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information prominently displayed.
		1. Davit Masts: Round tubular section capable of rotating through 360 degree with carrying handles and connecting pins.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Material: Aluminum.
			2. Material: Steel.

\*\* NOTE TO SPECIFIER \*\* Maximum allowable weight of davit arm pieces is 80 lbs (36.3 kg) throughout the USA with the exception of projects in California which allows pieces to be 140 lbs (73 kg) without mechanical means of hoisting into position.

* + 1. Davit Arms: Davits to be demountable, portable, capable of being easily and quickly broken down into pieces weighing not more than the following:

\*\* NOTE TO SPECIFIER \*\* Delete maximum weight not required.

* + - 1. 80 lbs (36.3 kg) maximum.
			2. 140 lbs (73 kg) maximum.

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

* + - 1. Ensure davit arm booms equipped with rolling trolleys or friction trolleys have stops to prevent detachment from boom.

\*\* NOTE TO SPECIFIER \*\* For tall davit arms greater than 6 feet (1.83 m) high, specify hoisting winches to safely raise and lower davit arms and dolly wheels to roll davit arms into place. Delete if not required.

* + - 1. Provide hoisting winches and dolly wheels.

\*\* NOTE TO SPECIFIER \*\* U-bar safety (lifeline) anchors secured to davit bases are optional. If lifeline anchors are required farther back on the roof refer to manufacturer's written instructions. Delete if not required.

* + 1. Davit Bases: Round, mild steel, hollow section piers, Type 350W with 50 Ksi (350 MPa) minimum yield strength.

\*\* NOTE TO SPECIFIER \*\* Delete metal surface treatments not required.

* + - 1. Hot dipped galvanized to ASTM A123/A123M]
			2. Manufacturer's polyurethane/polyurea coating system.

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

* + - 1. Provide 0.75 inches (19 mm) diameter U-bar safety anchor, and securement to suit application as indicated or required.

\*\* NOTE TO SPECIFIER \*\* As well as items listed in the following Article, a complete Outrigger Beam system includes some or all of those items listed in the Article titled "Accessories". Edit this section to include those accessories necessary for the project requirements.

* 1. OUTRIGGER BEAMS
		1. Acceptable Material: Pro-Bel Group, Outrigger Beam System.
		2. Outrigger Beam Type: Engineered length and size to suit application as indicated designed to carry 1000 lbs (4.5 kN) vertical service load, minimum.

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

* + - 1. Aluminum "I" beam.
			2. Galvanized steel "I" beam.
			3. Galvanized hollow steel section.

\*\* NOTE TO SPECIFIER \*\* Delete outboard end not required.

* + - 1. Equipped with shackle on outboard end.
			2. Equipped with friction U-bar on outboard end.
			3. Equipped with trolley on outboard end.
			4. Provide non-corrosive UV Resistant data plate stating Maximum Service Capacity of boom, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information prominently displayed.

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

* + - 1. Provide outrigger beams equipped with rolling or friction trolleys with stops to prevent detachment from beam.

\*\* NOTE TO SPECIFIER \*\* Some very long outrigger beams are designed specifically for bosun's chairs with descent control equipment. For this restrictive application, vertical service load will be less than 1000 lbs (4.5 kN). Refer to Pro-Bel's instructions for bosun's chair applications. Delete if not required.

* + - 1. Safety U-bars:
				1. U-bar: 0.75 inches (19 mm) minimum diameter material with 1.5 inches (38 mm) eye opening.

\*\* NOTE TO SPECIFIER \*\* Delete the material not required.

* + - * 1. Material: Stainless steel to ASTM A276,Type 304 with 35 Ksi (240 MPa) minimum yield strength.
				2. Material: Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M.
		1. Outrigger Base/Roof Anchor Hollow Steel Section (HSS) piers: Hollow steel section (HSS) piers: Mild steel, Type 300W with 50 Ksi (350 MPa) minimum yield strength.
			1. Wall thickness to suit application or as indicated.

\*\* NOTE TO SPECIFIER \*\* Delete metal surface treatments not required.

* + - 1. Hot dipped galvanized to ASTM A123/A123M.
			2. Manufacturer's polyurethane/polyurea coating system.
		1. Swivel-type Beam Base: Round hollow section (HSS) piers of mild steel, Type 350W with 50 Ksi (350 MPa) minimum yield strength.
			1. Ensure base allows swivel-type beam to rotate 360 degree under load.

\*\* NOTE TO SPECIFIER \*\* Delete metal surface treatments not required.

* + - 1. Hot dipped galvanized to ASTM A123/A123M.
			2. Manufacturer's polyurethane/polyurea coating system.

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

* + - 1. Provide 0.75 inches (19 mm) diameter U-bar safety anchor, and securement to suit application as indicated or required.
		1. Beam Dolly:

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Galvanized steel with pneumatic type rubber wheels, sized to suit beam as indicated.
			2. Aluminum with pneumatic type rubber wheels, sized to suit beam as indicated.

\*\* NOTE TO SPECIFIER \*\* As well as items listed in the following Article, a complete Monorail system includes some or all of those items listed in the Article titled "Accessories". Edit this section to include those accessories necessary for the project requirements.

* 1. MONORAILS
		1. Acceptable Materials: Pro-Bel Group, Monorail System.
		2. Monorails and Mounting: 50 Ksi (350 MPa) minimum yield strength and 65 Ksi (450 MPa), minimum tensile strength and designed to carry 1000 lbs (4.5 kN) minimum vertical service load.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Aluminum extrusions to ASTM B221.
			2. Cold rolled hollow steel sections, Type 350W, galvanized to ASTM A123/A123M.
		1. Monorail Finish:

\*\* NOTE TO SPECIFIER \*\* Delete exterior finish not required.

* + - 1. Exterior: Aluminum Mill, to AA DAF-45.
			2. Exterior: Aluminum Anodized, to AA DAF-45.
			3. Exterior: Galvanized steel with polyester or polyurethane powder coated baked enamel color, from manufacturer's standard range.
			4. Exterior: Galvanized steel with polyester or polyurethane powder coated baked enamel color, custom color.

\*\* NOTE TO SPECIFIER \*\* Delete interior finish not required.

* + - 1. Interior: Shop applied epoxy.
			2. Interior: Shop applied hybrid powder coated.
			3. Interior: Enamel painted on site.
		1. Capacity/Data Plates: Provide non-corrosive data plate stating Maximum Service Capacity of monorail, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information prominently displayed.
		2. Trolleys: Heavy-duty, Corrosion resistant, weatherproof rollers, 0.625 inches (16 mm) minimum diameter stainless steel U-bar safety anchors to ASTM A276,Type 304 exterior finish.
			1. Interior finish to be powder coated mild steel to match monorail.
			2. Ensure trolleys to run freely under load with minimum discontinuity at rail splices.

\*\* NOTE TO SPECIFIER \*\* Specify end stops to ensure that trolleys cannot become detached. Ensure that the end stops are removable to allow service to the trolleys. Delete if not required.

* + - 1. Provide removable end stops.
		1. Support Brackets: Locate brackets as close to and no greater than 16 inches (400 mm) from monorail joints.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Cantilevered aluminum brackets as indicated in accordance with Section 05 50 00 - Metal Fabrications.
			2. Cantilevered stainless steel brackets as indicated in accordance with Section 05 50 00 - Metal Fabrications.
			3. Cantilevered galvanized steel brackets as indicated in accordance with Section 05 50 00 - Metal Fabrications.

\*\* NOTE TO SPECIFIER \*\* As well as items listed in the following Article, a complete Climbing Monorail system includes some or all of those items listed in the Article titled "Accessories". Edit this section to include those accessories necessary for the project requirements. Delete if not required.

* 1. CLIMBING MONORAILS
		1. Acceptable Material: Pro-Bel Group, Climbing Monorail System.
		2. Monorails and Mounting: 50 Ksi (350 MPa) minimum yield strength and 65 Ksi (450 MPa), minimum tensile strength and designed to carry 1000 lbs (4.5 kN) minimum vertical service load.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Aluminum extrusions to ASTM B221.
			2. Cold rolled hollow steel sections, Type 350W, galvanized to ASTM A123/A123M.
		1. Monorail Finish:

\*\* NOTE TO SPECIFIER \*\* Delete exterior finish not required.

* + - 1. Exterior: Aluminum Mill, to AA DAF-45.
			2. Exterior: Aluminum Anodized, to AA DAF-45.
			3. Exterior: Galvanized steel with polyester or polyurethane powder coated baked enamel color, from manufacturer's standard range.
			4. Exterior: Galvanized steel with polyester or polyurethane powder coated baked enamel color, custom color.

\*\* NOTE TO SPECIFIER \*\* Delete interior finish not required.

* + - 1. Interior: Shop applied epoxy.
			2. Interior: Shop applied hybrid powder coated.
			3. Interior: Enamel painted on site.
		1. Capacity/Data Plates: Ensure non-corrosive data plate stating Maximum Service Capacity of climbing monorail, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information is prominently displayed.
		2. Trolleys: Corrosion resistant, weatherproof electric powered climbing trolleys with heavy-duty rollers and 0.625 inches (16 mm) minimum diameter stainless steel U-bar safety anchors ASTM A276,Type 304 exterior finish.
			1. Interior finish to be powder coated mild steel to match monorail.
			2. Trolleys shall run freely under load with minimum discontinuity at rail splices.

\*\* NOTE TO SPECIFIER \*\* Specify end stops to ensure that trolleys cannot become detached. Ensure that the end stops are removable to allow service to the trolleys.

* + - 1. Provide removable end stops.
			2. Provide locking facility at parking location.
			3. Traversing speed: 20 feet per minute (6 meters per minute).
		1. Drive System: Mechanically positive trolley drive system.
			1. Equip trolleys with 2 power packs employing friction between trolley wheels and track.
			2. Trolleys shall operate safely on wet or frost covered tracks.
			3. Incorporate back slide safety prevention devices to ASME A120.1.
		2. Operation: Provide pendant control including separate, sufficiently long plug-in pendant control to drive trolleys to upper limit when not in use.
			1. Controls: Constant pressure type with "Forward", "Reverse" and "Emergency Stop" buttons.

\*\* NOTE TO SPECIFIER \*\* Delete operation not required.

* + - 1. Operable from platform.
			2. Operable from bosun's chair.
		1. Electrical Busbar System: In accordance with Section16130.
			1. Connect to building power supply in accordance with Section 26 05 00 - Common Work Results for Electrical.
			2. Ensure system has capacity to provide power from climbing monorail.
		2. Automatic Braking System: Provide each trolley with brake to engage whenever power to trolley is interrupted by controls or power failure.
			1. Provide brakes to hold trolley on sloped monorail during operation.
			2. Equip brakes with over speed sensor capable of stopping trolley during over speed or free movement due to failure of drive train system.
		3. Power Supply: Co-ordinate location of receptacles with Section 26 05 00 - Common Work Results for Electrical.
		4. Support Brackets: Locate brackets as close to and no greater than 16 inches (400 mm) from monorail joints.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Cantilevered aluminum brackets as indicated in accordance with Section 05 50 00 - Metal Fabrications.
			2. Cantilevered stainless steel brackets as indicated in accordance with Section 05 50 00 - Metal Fabrications.
			3. Cantilevered galvanized steel brackets as indicated in accordance with Section 05 50 00 - Metal Fabrications.

\*\* NOTE TO SPECIFIER \*\* As well as items listed in the following Article, a complete Rigging Sleeve system includes some or all of those items listed in the Article titled "Accessories". Edit this section to include those accessories necessary for the project requirements. Delete if not required.

* 1. HORIZONTAL TROLLEY RAIL SYSTEM
		1. Acceptable Materials: Pro-Bel Group, Horizontal Trolley Rail System.
		2. Horizontal Rails and Mounting: 50 Ksi (350 MPa) minimum yield strength and 65 Ksi (450 MPa), minimum tensile strength and designed to carry 1000 lbs (4.5 kN) minimum vertical service load.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Aluminum extrusions to ASTM B221.
			2. Cold rolled hollow steel sections, Type 350W, galvanized to ASTM A123/A123M.
		1. Monorail Finish:

\*\* NOTE TO SPECIFIER \*\* Delete exterior finish not required.

* + - 1. Exterior: Aluminum Mill, to AA DAF-45.
			2. Exterior: Aluminum Anodized, to AA DAF-45.
			3. Exterior: Galvanized steel with polyester or polyurethane powder coated baked enamel color, from manufacturer's standard range.
			4. Exterior: Galvanized steel with polyester or polyurethane powder coated baked enamel color, custom color.

\*\* NOTE TO SPECIFIER \*\* Delete interior finish not required.

* + - 1. Interior: Shop applied epoxy.
			2. Interior: Shop applied hybrid powder coated.
			3. Interior: Enamel painted on site.
		1. Capacity/Data Plates: Ensure non-corrosive data plate stating Maximum Service Capacity of trolley rail system, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information is prominently displayed at rail entry system.
		2. Trolleys: Heavy-duty, Corrosion resistant, weatherproof rollers and 0.625 inches (16 mm) minimum diameter stainless steel U-bar safety anchors ASTM A276,Type 304 exterior finish.
			1. Interior finish: Powder coated mild steel to match monorail.
			2. Trolleys shall run freely under load with minimum discontinuity at rail splices.

\*\* NOTE TO SPECIFIER \*\* Specify end stops to ensure that trolleys cannot become detached. Ensure that the end stops are removable to allow service to the trolleys.

* + - 1. Provide removable end stops.

\*\* NOTE TO SPECIFIER \*\* Equipment supports and the structure to which Permanent Powered Platforms are attached must be designed to support the rated working load, which is the combined static weight of the workers, materials, and the total weight of the platform. The support equipment must be designed to support this increased weight. The reactions will have to be adjusted for supports (davits, monorails, outriggers and equipment) to reflect the increased loads. Contact the manufacturer for weights and dimensions of equipment, davits, outriggers and monorails. Delete if not required.

* 1. PERMANENT POWERED PLATFORMS
		1. Acceptable Material: Pro-Bel Group, Permanent Powered Platform.
		2. Suspended Platform: Type 6061-T6 aluminum alloy to ASTM B221, mill and powder coated finished modular platform system to ASME A120.1, engineered length and width to suit application as indicated and based on load bearing frame, with non-slip, aluminum deck, soft rubber wall rollers and caster wheels.
			1. Provide integral, detachable 36 inches (915 mm) long single work cage at one end complete with necessary components to meet project requirements.
			2. Comply with OSHA 1910.66 Subpart F, Powered Platforms.
			3. powerpower
		3. Frame and Rails:

\*\* NOTE TO SPECIFIER \*\* Delete side frame and connecting frame material not required.

* + - 1. Side Frames and Connecting Frames: Structural aluminum.
			2. Side Frames and Connecting Frames: Galvanized mild steel.
			3. Side Frames and Connecting Frames: Powder coated steel.
			4. Guard rails and guard rails posts: Square, thick wall aluminum extrusions with rails 36 inches (915 mm) minimum, above deck level at working side of platform, 42 inches (1067 mm) at non-working side.
			5. Include 3.5 inches (90 mm) high toe-board around circumference of platform with spaces between toe-board and top guardrails covered with expanded aluminum screen.

\*\* NOTE TO SPECIFIER \*\* Front side of platform is the side facing the building.

* + - * 1. SEQ CHAPTER 1Leave space between intermediate guardrail and top guardrail open without aluminum screen at front side of platform.
		1. Stirrups: Fitted with manufacturer's standard hoist unit, top limit switch assembly, striker plate, and high "fair lead".

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Material: Structural aluminum.
			2. Material: Galvanized mild steel.
			3. Material: Powder coated steel.

\*\* NOTE TO SPECIFIER \*\* To ensure that drums wind evenly and prevent loose wires from jamming, specify wire winders with drums built into the stirrups.

* + - 1. Wire winders:

\*\* NOTE TO SPECIFIER \*\* Delete operation not required.

* + - * 1. Electric powered
				2. Passive type]

\*\* NOTE TO SPECIFIER \*\* Delete drum not required.

* + - * 1. Single drum built into stirrups.
				2. Twin drum built into stirrups.
				3. Capacity: As required to suit project requirements.
				4. Dimensions: As required to suit project requirements.
		1. Cable Storage Bin: Include cable storage bin on rear guard rail.
			1. Capacity: As required to suit project requirements.
			2. Dimensions: As required to suit project requirements.
		2. Safety Controls:
			1. Electro mechanical overload system: Integral with each hoist preset to safe working load plus 25% minimum, and designed to operate limit switch and cut power supply if platform overloads.
			2. Include upper limit switch assembly at each stirrup top and ensure system cuts electric power supply when switch contacts striker plate on suspension rope at top limit of travel.
			3. Lower limit trip bar assembly: Hinged aluminum bar at each end of platform working face underside.
				1. Design to ensure limit switch interrupt electric power supply to both hoists if bar is pushed upwards by obstruction on building facade during descent. Ensure system continues to allow platform to operate in upward direction.
		3. Main and Auxiliary Control Boxes: Include electric control gear for both hoists and wire winder motors contained in central control box and mounted on rear guardrail. Include components as follows:

\*\* NOTE TO SPECIFIER \*\* Edit the following list to suit project requirements.

* + - 1. Switches marked "UP/DOWN" and "HOLD TO RUN".
			2. Hoist selector switch marked "LEFT/RIGHT/BOTH".
			3. Bottom trip bar over-ride button.
			4. Emergency stop button.
			5. Platform self-leveling system.
			6. Power "ON" indicator light.
			7. Three phase protection and light indicator.
			8. Locking facility on main switch.
			9. Hand wheel for manual hoist operation.
			10. Watertight electrical "quick" connections.
		1. Hoist Unit: Power platform using two UL listed traction type hoists with features as follows:

\*\* NOTE TO SPECIFIER \*\* Edit the following list to suit project requirements.

* + - 1. 30 amp 230 volt 60 Hertz hoist with lift capacity to suit platform weight and live load.
			2. 35 feet per minute (10.7 meters per minute) minimum speed.
			3. Slack rope safety device acting on safety rope.
			4. Electro mechanical overload system.
			5. Electro mechanical main brake.
			6. "No Power" controlled emergency descent system.
			7. Hoist protection cover.

\*\* NOTE TO SPECIFIER \*\* Specify HBL2620SW, NEMA No. L6-30R only if the powered platform is rental and not a permanent installation. Delete power protection not required.

* + - 1. Main line power protection: HBL2720SW, NEMA No.15-30R.
				1. Acceptable material: Hubbell Twist-Lock 230 volts, 3 phase, 60 Hertz, 30 amps receptacle .
			2. Main line power protection: HBL2620SW, NEMA No. L6-30R.
				1. Acceptable material: Hubbell Twist-Lock 230 volts, 3 phase, 60 Hertz, 30 amps receptacle .

\*\* NOTE TO SPECIFIER \*\* Specify four wire ropes for buildings over 300 feet (91.4 m) high. If two wire ropes are specified, separate lifeline anchors are required for workers. See Pro-Bel Safety & Tie-back Anchors literature for specific requirements.

* + 1. Steel Wire Rope:

\*\* NOTE TO SPECIFIER \*\* Delete number of wire rope not required.

* + - 1. Ensure platform is complete with two, 6 x 19 Seale and IWRC, 0.3125 inches (8 mm) minimum diameter galvanized high tensile steel wire ropes, length to suit project requirements.
			2. Ensure platform is complete with four, 6 x 19 Seale and IWRC, 0.3125 inches (8 mm) minimum diameter galvanized high tensile steel wire ropes, length to suit project requirements.
			3. Ensure each rope include 3 lbs (1.4 kg) minimum safety hook with thimble talurit clamp and brazed "bullet-end".
		1. Electrical Supply Cable: Fit trailing supply cable with cable support clamp and CEE plug for connection to central control box. and supplied with cable support clamp.

\*\* NOTE TO SPECIFIER \*\* Specify electrical supply cables for buildings over 350 feet (107 m) high to be equipped with reinforced core. Delete length not required.

* + - 1. SEQ CHAPTER 1Electrical supply cables: 100 feet (30 m) long with reinforced core.
			2. SEQ CHAPTER 1Electrical supply cables: 400 feet (120 m) long with reinforced core.
		1. Powered Platform Accessories:

\*\* NOTE TO SPECIFIER \*\* Edit the following list to suit project requirements.

* + - 1. Portable fire extinguisher securely attached to platform.
			2. Water container attached to rear guard rail.
			3. Electric power tool receptacle on central control box.

\*\* NOTE TO SPECIFIER \*\* See Pro-Bel literature on Code Requirements for specified item here.

* + 1. Powered Platform Stabilization (Tie-In Guides):
			1. Continuous stabilization: Provide guide roller/sliding shoe assembly at each end of bottom of platform designed to provide continuous engagement between platform and internal tracks.
				1. Co-ordinate design with curtain wall manufacturer to ensure smooth operation.
				2. Internal track tie-in guides: Opening 1 inch (25 mm) minimum with 2.5 by 2.5 inches (64 x 64 mm) minimum inside dimensions. Design tracks to ensure platform trolleys can be inserted from top and bottom of building.
			2. Intermittent stabilization anchor buttons: Buttons - Stainless steel, 1.5 inches diameter by 0.1875 inches (38 mm diameter by 5 mm) thick with Allen head recess, with threaded stainless steel building anchor insert of size and configuration to suit building facade. Include sufficient quantity of stainless steel stabilizer ties.
				1. Acceptable material: Pro-Bel Group, Stainless Steel Stabilization Buttons.
				2. Working load: To AISC S342L, 300 lbs (1.33]kN) minimum.
				3. Load against fracture or detachment: To AISC S342L, 600 lbs (2.67 kN) minimum.

\*\* NOTE TO SPECIFIER \*\* If the building has been designed with davit bases to suit roof rigged davit arms, locate buttons/detent pins every third floor or 50 feet (15.3 m) whichever is less in line with davit base suspension points. Note that New York Department of Labor recommends 40 feet (12.2 m) maximum.

* + - * 1. Locate buttons in line with davit base suspension points.

\*\* NOTE TO SPECIFIER \*\* Delete spacing not required.

Every third floor.

40 feet (12.2 m) maximum.

50 feet (15.3 m) maximum.

\*\* NOTE TO SPECIFIER \*\* Specify detent pins only where flush building appearance is critical. Delete if not required.

* + - 1. Detent pins: Stainless steel tie handles with spring loaded ball lock to suit building facade. Include sufficient quantity of [stainless steel] stabilizer ties.
				1. Acceptable material: Pro-Bel Group, Stainless Steel Detent Pins.

\*\* NOTE TO SPECIFIER \*\* Delete size not required.

* + - * 1. Size: 0.3125 inch (8 mm) diameter.
				2. Size: 0.375 inch (10 mm) diameter.
				3. Working load: To AISC S342L, 300 lbs (1.33 kN) minimum.
				4. Load against fracture or detachment: To AISC S342L, 600 lbs (2.67 kN) minimum.

\*\* NOTE TO SPECIFIER \*\* If the building has been designed with davit bases to suit roof rigged davit arms, locate buttons/detent pins every third floor or 50'-0" (15.3 m) whichever is less in line with davit base suspension points. Note that New York Department of Labor recommends 40 feet (12.2 m) maximum.

* + - * 1. Locate detent pins in line with davit base suspension points.

\*\* NOTE TO SPECIFIER \*\* Delete spacing not required.

Every third floor.

40 feet (12.2 m) maximum.

50 feet (15.3 m) maximum.

\*\* NOTE TO SPECIFIER \*\* Delete the following Article if a single work cage is included as part of the Permanent Powered Platform previously specified.
\*\* NOTE TO SPECIFIER \*\* Equipment supports and the structure to which Single Work Cages are attached must be designed to support the rated working load which is the combined static weight of the workers, materials, and the total weight of the work cage. The support equipment must be designed to support this increased weight. The reactions will have to be adjusted for supports (davits, monorails, outriggers and equipment) to reflect the increased loads. Contact the manufacturer for weights and dimensions of equipment, davits, outriggers and monorails.

* 1. SINGLE WORK CAGE
		1. Acceptable Material: Pro-Bel Group, Single Work Cage.
		2. Work Cage: Type 6061-T6 aluminum alloy to ASTM B221, mill and powder coated finished modular platform system to ASME A120.1, 36 inches (915 mm) long, width to suit application as indicated and based on load bearing frame, with non-slip, aluminum deck, soft rubber wall rollers and caster wheels.
			1. Comply with OSHA 1910.66 Subpart F, Powered Platforms.
		3. Frame and Rails:

\*\* NOTE TO SPECIFIER \*\* Delete side frame and connecting frame material not required.

* + - 1. Side Frames and Connecting Frames: Structural aluminum.
			2. Side Frames and Connecting Frames: Galvanized mild steel.
			3. Side Frames and Connecting Frames: Powder coated steel.
			4. Guard rails and guard rails posts: Square, thick wall aluminum extrusions with rails 36 inches (915 mm) minimum, above deck level at working side of platform, 42 inches (1067 mm) at non-working side.
			5. Include 3.5 inches (90 mm) high toe-board around circumference of platform with spaces between toe-board and top guardrails covered with expanded aluminum screen.

\*\* NOTE TO SPECIFIER \*\* Front side of platform is the side facing the building.

* + - * 1. SEQ CHAPTER 1Leave space between intermediate guardrail and top guardrail open without aluminum screen at front side of platform.
		1. Stirrups: Fitted with manufacturer's standard hoist unit, top limit switch assembly, striker plate, and high "fair lead".

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Material: Structural aluminum.
			2. Material: Galvanized mild steel.
			3. Material: Powder coated steel.

\*\* NOTE TO SPECIFIER \*\* To ensure that drums wind evenly and prevent loose wires from jamming, specify wire winders with drums built into the stirrups.

* + - 1. Wire winders:

\*\* NOTE TO SPECIFIER \*\* Delete operation not required.

* + - * 1. Electric powered
				2. Passive type]

\*\* NOTE TO SPECIFIER \*\* Delete drum not required.

* + - * 1. Single drum built into stirrups.
				2. Twin drum built into stirrups.
				3. Capacity: As required to suit project requirements.
				4. Dimensions: As required to suit project requirements.
		1. Cable Storage Bin: Include cable storage bin on rear guard rail.
			1. Capacity: As required to suit project requirements.
			2. Dimensions: As required to suit project requirements.
		2. Safety Controls:
			1. Electro mechanical overload system: Integral with each hoist preset to safe working load plus 25% minimum, and designed to operate limit switch and cut power supply if platform overloads.
			2. Include upper limit switch assembly at each stirrup top and ensure system cuts electric power supply when switch contacts striker plate on suspension rope at top limit of travel.
			3. Lower limit trip bar assembly: Hinged aluminum bar at each end of platform working face underside.
				1. Design to ensure limit switch interrupt electric power supply to both hoists if bar is pushed upwards by obstruction on building facade during descent. Ensure system continues to allow platform to operate in upward direction.
		3. Main and Auxiliary Control Boxes: Include electric control gear for both hoists and wire winder motors contained in central control box and mounted on rear guardrail. Include components as follows:

\*\* NOTE TO SPECIFIER \*\* Edit the following list to suit project requirements.

* + - 1. Switches marked "UP/DOWN" and "HOLD TO RUN".
			2. Hoist selector switch marked "LEFT/RIGHT/BOTH".
			3. Bottom trip bar over-ride button.
			4. Emergency stop button.
			5. Platform self-leveling system.
			6. Power "ON" indicator light.
			7. Three phase protection and light indicator.
			8. Locking facility on main switch.
			9. Hand wheel for manual hoist operation.
			10. Watertight electrical "quick" connections.
		1. Hoist Unit: Power platform using 2 UL listed traction type hoists with features as follows:

\*\* NOTE TO SPECIFIER \*\* Edit the following list to suit project requirements.

* + - 1. 30 amp 230 volt 60 Hertz hoist with lift capacity to suit platform weight and live load.
			2. 35 feet per minute (10.7 meters per minute) minimum speed.
			3. Slack rope safety device acting on safety rope.
			4. Electro mechanical overload system.
			5. Electro mechanical main brake.
			6. "No Power" controlled emergency descent system.
			7. Hoist protection cover.

\*\* NOTE TO SPECIFIER \*\* Specify four wire ropes for buildings over 300 feet (91.4 m) high. If two wire ropes are specified, separate lifeline anchors are required for workers. See Pro-Bel Safety and Tie-back Anchors literature.

* + 1. Steel Wire Rope:

\*\* NOTE TO SPECIFIER \*\* Delete number of wire rope not required.

* + - 1. Ensure platform is complete with two, 6 x 19 Seale and IWRC, 0.3125 inches (8 mm) minimum diameter galvanized high tensile steel wire ropes, length to suit project requirements.
			2. Ensure platform is complete with four, 6 x 19 Seale and IWRC, 0.3125 inches (8 mm) minimum diameter galvanized high tensile steel wire ropes, length to suit project requirements.
			3. Ensure each rope include 3 lbs (1.4 kg) minimum safety hook with thimble talurit clamp and brazed "bullet-end".
		1. Electrical Supply Cable: Fit trailing supply cable with cable support clamp and CEE plug for connection to central control box.

\*\* NOTE TO SPECIFIER \*\* Specify electrical supply cables for buildings over 350 feet (107 m) high to be equipped with reinforced core. Delete length not required.

* + - 1. SEQ CHAPTER 1Electrical supply cables: 100 feet (30 m) long with reinforced core.
			2. SEQ CHAPTER 1Electrical supply cables: 400 feet (120 m) long with reinforced core.
		1. Powered Platform Accessories:

\*\* NOTE TO SPECIFIER \*\* Edit the following list to suit project requirements.

* + - 1. Portable fire extinguisher securely attached to platform.
			2. Water container attached to rear guard rail.
			3. Electric power tool receptacle on central control box.
	1. SEQ CHAPTER 1RIGGING SLEEVES
		1. Acceptable Material: Pro-Bel Group, Steel Rigging Sleeves.
		2. Hollow Steel Section (HSS) Sleeves: Mild steel, Type 300W with 50 Ksi (350 MPa) minimum yield strength.

\*\* NOTE TO SPECIFIER \*\* Delete metal surface treatments not required.

* + - 1. Hot dipped galvanized to ASTM A123/A123M.
			2. Manufacturer's polyurethane/polyurea coating system.
			3. Wall thickness to suit application as indicated with 6 inches (150 mm) inside diameter.
			4. Wall mounted rigging sleeves: Fabricate with flip-up hinged door to accommodate push/pull outrigger.

\*\* NOTE TO SPECIFIER \*\* To protect suspension or safety lines from chafing specify smooth radius bends for curved rigging sleeves.

* + - 1. Curved rigging sleeves: Provide bend finished with smooth radius.
		1. Straight Suspension Bars: Hot-dip galvanized to ASTM A123/A123M, 0.75 inch (19 mm) minimum diameter mild steel with 35 Ksi (240 MPa) minimum yield strength.

\*\* NOTE TO SPECIFIER \*\* As well as items listed in the following Paragraph, a complete Hands-Free Horizontal Lifeline system includes some or all of those items listed in the Article titled "Accessories". Edit this section to include those accessories necessary for the project requirements.

* 1. HANDS-FREE HORIZONTAL LIFELINE
		1. Acceptable Material: Pro-Bel Group, Hands-Free Horizontal Lifeline System.
		2. Stainless steel to ASTM A492, Type 316, 0.3125 inch (8 mm) minimum diameter cable, 9127 lbs (40 kN) minimum breaking strength with permanently swedged cable ends.
		3. Data Plate: Ensure non-corrosive data plate stating Maximum Service Capacity of cable, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information is prominently displayed at cable system entry points.
		4. Standard Intermediate Support Brackets: Stainless steel to ASTM A167, Type 316, multi-position, with reinforcing end caps and suitable for installation at any height.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Secure using 0.5 inch (13 mm) minimum diameter stainless steel fasteners.
			2. Secure using 0.5 inch (13 mm) minimum diameter galvanized fasteners.

\*\* NOTE TO SPECIFIER \*\* Specify mobile intermediate support brackets when project requires working on both sides of a sloped roof at the ridge point. Delete if not required.

* + 1. Mobile Intermediate Support Brackets: Multi position, stainless steel to ASTM A167, Type 316, multi-position, with reinforcing end caps and suitable for installation at any height.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Secure using 0.5 inch (13 mm) minimum diameter stainless steel fasteners.
			2. Secure using 0.5 inch (13 mm) minimum diameter galvanized fasteners.

\*\* NOTE TO SPECIFIER \*\* Specify corner units as needed to meet project requirements.

* + 1. Corner Units: 90 degree and 135 degree flexible corner units, as required, from manufacturer's standard components to meet project requirements.
		2. End Terminal Hardware: Stainless steel swedged termination at one end and stainless steel tensioner with shock absorber at other end to meet project requirements.
		3. Lanyard Cable Runner: Stainless steel to ASTM A167, Type 316 with automatic runner bypass for continuous "hands-free" operation.
			1. Ensure lanyard can be inserted or removed anywhere on cable.
		4. Harness: Manufacturer's standard full body harness and lanyard with shock absorber.

\*\* NOTE TO SPECIFIER \*\* As well as items listed in the following Paragraph, a complete Double Lanyard Lifeline system includes some or all of those items listed in the Article titled "Accessories". Edit this section to include those accessories necessary for the project requirements.

* 1. DOUBLE LANYARD HORIZONTAL LIFELINE SYSTEM
		1. Acceptable Material: Pro-Bel Group, Double Lanyard Horizontal Lifeline System.
		2. Stainless steel to ASTM A492, Type 316, 0.3125 inch (8 mm) minimum diameter cable, 9127 lbs (40 kN) minimum breaking strength.

\*\* NOTE TO SPECIFIER \*\* Delete end method not required.

* + - 1. With permanently swedged cable ends.
			2. With mechanically swedged cable ends.
		1. Data plate: Ensure non-corrosive data plate stating Maximum Service Capacity of cable, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information is prominently displayed at cable system entry points.
		2. Tensioner: Stainless steel turnbuckle to ASTM A167, Type 316.
		3. Harness: Manufacturer's standard full body harness with double shock absorber lanyard.
	1. DAVIT CARRIAGES
		1. Acceptable Material:

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

* + - 1. Pro-Bel Group, Electrically Powered Davit Carriage.
			2. Pro-Bel Group, Manually Operated Davit Carriage.
		1. Carriages: Mounted on horizontal rails, with two piece tip-up davit arm system operating on trolleys.
			1. Raise and lower carriage using portable winch.
			2. Ensure davit arms can be locked into position.
		2. Stability Factor:

\*\* NOTE TO SPECIFIER \*\* Delete method of verifying stability not required.

* + - 1. Calculate while considering suspended platform is in most outboard traversing positions for traversing, operating and storage.
			2. Test while considering suspended platform is in most outboard traversing positions for traversing, operating and storage.
			3. Obtain system stability by attachment to structural supports and track system, as follows:
				1. Horizontal traversing stability factor: 4 to 1 minimum including impact effect when using 10 psf (0.479 kPa) minimum wind load applied to equipment.
				2. SEQ CHAPTER 1Ensure equipment can withstand wind loads expected in geographic area of project. Maximum wind velocity: 100 mph (61 kph).
			4. Submit reports in accordance with Contract Conditions and Section 01 30 00 - Administrative Requirements.

\*\* NOTE TO SPECIFIER \*\* Specify safety enclosures or guards at all moving parts to prevent accidental personnel contact with moving parts or pinch points. delete type not required.

* + 1. Safety Guards:
			1. Include enclosures at moving parts.
			2. Include guards at moving parts.
		2. Track Works: Mild steel, Type 350W with 50 Ksi (350 MPa) minimum yield strength.

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

* + - 1. Hot dipped galvanized to ASTM A123/A123M.
		1. Work Station Markings: Identify each work station location by:

\*\* NOTE TO SPECIFIER \*\* Delete positioning method not required.

* + - 1. Markings on tracks.
			2. Indexing vanes.
			3. Positioning switches.

\*\* NOTE TO SPECIFIER \*\* Include the following Paragraph only if electric powered davit carriages are used.

* + 1. Controls: Continuous pressure, weatherproof electric controls and operating devices.

\*\* NOTE TO SPECIFIER \*\* Retain both locations if required. Delete control location not required.

* + - 1. Locate on carriage.
			2. Locate on working platform.
			3. Ensure single operating device can simultaneously move multiple carriages.
			4. Include lock out feature of operating devices other than device in use.
			5. Ensure carriages operate only when:
				1. Platform is located at uppermost position of travel and is not in contact with building face or fixed vertical stabilizer guides.
				2. Platform is at innermost position on davit arms.
				3. Protective devices and interlocks are in position for traversing.
		1. Electrically Operated Carriage Speed: 39.33 feet per minute (12 meters per minute) maximum.
		2. Electrically Operated Carriage Accessories:

\*\* NOTE TO SPECIFIER \*\* Edit the following list to suit project requirements.
\*\* NOTE TO SPECIFIER \*\* Specify an automatically applied braking system to prevent unintentional traversing of the powered davits.

* + - 1. Auto brakes: Include automatically applied braking system.

\*\* NOTE TO SPECIFIER \*\* Specify a key lockout system to prevent unauthorized use of the davit carriages.

* + - 1. Key lockout system

\*\* NOTE TO SPECIFIER \*\* Specify interlock devices on carriages and power cord reel to prevent undue strain on power cord and to prevent cord from being trapped between the carriage wheels and tracks.

* + - 1. Power cord interlocks.

\*\* NOTE TO SPECIFIER \*\* Specify the Pro-Bell davit carriage which meets project requirements.

* 1. TRAVELING GANTRY
		1. Gantry:

\*\* NOTE TO SPECIFIER \*\* Delete operation not required.

* + - 1. Operation: Manually operated to suit profile of interior atrium. Geared crank handle, mild steel hot-dip galvanized to ASTM A123/A123M.
			2. Operation: Electric powered to suit profile of exterior atrium.
			3. Operation: Manually operated to suit profile of interior atrium. Geared crank handle, mild steel hot-dip galvanized to ASTM A123/A123M.
			4. Operation: Electric powered to suit profile of exterior atrium.
		1. Gantry Platform: Type 6061-T6 aluminum alloy to ASTM B221, mill and powder coated finished modular platform system to ASME A120.1, engineered length and width to suit application as indicated and based on load bearing frame rated for two person operation, with non-slip, aluminum deck, soft rubber wall rollers and caster wheels.
			1. Provide integral, detachable 36 inches (915 mm) long single work cage at one end complete with necessary appurtenances to meet project requirements.
			2. Comply with OSHA 1910.66 Subpart F, Powered Platforms.
			3. Ensure gantry will not rack or twist during use.
			4. Include locking facility at each workstation and in parking location.
			5. gantrygantry
		2. Frame and Rails:

\*\* NOTE TO SPECIFIER \*\* Delete side frame and connecting frame material not required.

* + - 1. Side Frames and Connecting Frames: Structural aluminum.
			2. Side Frames and Connecting Frames: Galvanized mild steel.
			3. Side Frames and Connecting Frames: Powder coated steel.
			4. Guard rails and guard rails posts: Square, thick wall aluminum extrusions with rails 42 inches (1067 mm) above deck level.

\*\* NOTE TO SPECIFIER \*\* Delete protection not required.

* + - 1. Include localized stainless steel fall protection anchors.
			2. Include "dogline" for securing lifelines.
			3. Include spring loaded, sliding/retractable gates.
		1. Monorail tracks and Supports: As specified in this section.
		2. Large Diameter Wheels:

\*\* NOTE TO SPECIFIER \*\* Delete construction not required.

* + - 1. Construction: Nickel cadmium plated steel with sealed ball bearings.
			2. Construction: Stainless steel with sealed ball bearings.
		1. Interior trolleys:

\*\* NOTE TO SPECIFIER \*\* Delete construction not required.

* + - 1. Stainless steel to ASTM A276, Type 304 with heavy-duty rollers. Designed for straight and radius rails as required. Provide means for servicing, repair or replacement of trolleys as necessary.
			2. Powder coated mild steel with heavy-duty rollers. Designed for straight and radius rails. Provide means for servicing, repair or replacement of trolleys as necessary.

\*\* NOTE TO SPECIFIER \*\* Specify safety enclosures or guards at all moving parts to prevent accidental personnel contact with moving parts or pinch points.

* + 1. Safety Guards:

\*\* NOTE TO SPECIFIER \*\* Delete safety protection not required.

* + - 1. Include enclosures at moving parts.
			2. Include guards at moving parts.
		1. Controls: Locate continuous pressure, weatherproof, electric type controls and operating devices on working platform.

\*\* NOTE TO SPECIFIER \*\* Specify an automatically applied braking system to prevent unintentional traversing of the working platform.

* + - 1. Include automatically applied braking system.

\*\* NOTE TO SPECIFIER \*\* Specify a key lockout system to prevent unauthorized use of the gantry.

* + - 1. Include key lockout system.
		1. Gantry Traversing Speed: 39.33 feet per minute (12 meters per minute) maximum.
	1. ROLLING LADDERS
		1. Acceptable Material: Pro-Bel Group, Aluminum Rolling Ladder.
		2. Ladder: Type 6061-T6 aluminum alloy to ASTM B221 and to ASME A120.1, designed to support two workers weighing 250 lbs (113 kg) minimum each.
			1. Size: 27 inches (686 mm) wide by 30 inches (762 mm) deep with serrated step rungs and 36 inches (915 mm) high guardrails.

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

* + - 1. Ladder Finish: Mill.
			2. Ladder Finish: Clear anodized.
			3. Ladder Finish: Polyester powder coated baked enamel to AA DAF-45.
			4. Ladder Finish: Polyurethane powder coated baked enamel to AA DAF-45.

\*\* NOTE TO SPECIFIER \*\* Delete color not required.

* + - 1. Color: From manufacturer's standard range.
			2. Color: Custom color.

\*\* NOTE TO SPECIFIER \*\* Specify spring release brakes to assist in positioning ladder at work locations or parking and locking at the end of the building to prevent inadvertent movement due to wind.

* + 1. Brakes: Spring release type.
		2. Fall Protection: Include continuous fall arrest system on both sides of ladder.
		3. Pipe or I-Beam Tracks:

\*\* NOTE TO SPECIFIER \*\* Delete material type not required.

* + - 1. Type 6061-T6 aluminum alloy to ASTM B221, mill and powder coated finished modular platform system to ASME A120.1.
			2. Type 300W Mild steel with 50 Ksi (350 MPa) minimum yield strength.

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

* + - * 1. Hot-dip galvanized to ASTM A123/A123M.
		1. Manual Traversing Ladder Force: 11.2 pound- force (50 Newtons) maximum.

\*\* NOTE TO SPECIFIER \*\* Specify guide rollers to ensure that ladder maintain adequate clearance from building facade.

* + 1. Guide Rollers: Adjustable, anti-crabbing, anti-lift type acting on top track.
			1. Flanged support rollers not acceptable.
			2. Ensure rotating components include sealed for life rolling element bearings protected from environment.

\*\* NOTE TO SPECIFIER \*\* If safe access other than a horizontal lifeline is to be used, specify it in the following Paragraph.

* + 1. Safe Access: Include safe access to ladder using horizontal lifeline.

 SEQ CHAPTER 1\*\* NOTE TO SPECIFIER \*\* Items from the following list should be included with the equipment specified in this section to ensure the various systems are complete. Follow manufacturer's recommendations and edit the list of "Accessories" to suit project requirements.

* 1. ACCESSORIES

\*\* NOTE TO SPECIFIER \*\* Equipment supports and the structure to which Bosun's Chairs are attached must be designed to support the rated working load which is the combined static weight of the workers, materials, and the total weight of the bosun's chair. The support equipment must be designed to support this increased weight. The reactions will have to be adjusted for supports (davits, monorails, outriggers and equipment) to reflect the increased loads. Contact the manufacturer for weights and dimensions of equipment, davits, outriggers and monorails.

* + 1. SEQ CHAPTER 1Motorized Bosun's Chair:
			1. Acceptable material: Pro-Bel Group, Motorized Bosun's Chair Model H400.
			2. Chair Framework: High quality structural steel with shot blasted powder coated finish, foldable upper frame with removable water buckets and holders.
				1. Overall dimensions: 51 inches (1285 mm) long by 43 inches (1132 mm) wide by 71 inches (1810 mm) high.
				2. Rated load: 200 lbs (90 kg) minimum.
				3. Weight (without wires, electrical cable and rated load): 370 lbs. (168 kg).

\*\* NOTE TO SPECIFIER \*\* Delete finish color not required.

* + - * 1. Finish: Blue.
				2. Finish: As scheduled.
			1. Chair Components: Include components as follows:

\*\* NOTE TO SPECIFIER \*\* Edit the following list to suit project requirements.

* + - * 1. Traction hoist.
				2. Type 3 overspeed safety brake and bracket.
				3. Overload assembly.
				4. Top limit switch.
				5. Wall rollers.
				6. Caster wheels.
				7. Safety belt.
				8. Powered twin wire reeler assembly.
				9. Water buckets and holders.
				10. Adjustable foot support.
				11. Control station.
			1. Suspension: Galvanized steel wire ropes, 0.375 inch (8.3 mm) minimum diameter, 284 psi (1960 n per mm 2) tensile strength.
				1. Wire breaking load: 5.395 ton-force (48 kN) minimum.
				2. Reeler capacity: 131 feet (40 meters).
			2. Hoist:
				1. Lifting capacity: 882 lbs (400 kg) minimum.
			3. Speed: 28 feet per minute (8.5 meters per minute) minimum.

\*\* NOTE TO SPECIFIER \*\* Delete power supply not required.

* + - 1. Power supply: Single phase, 220/240 volts.
			2. Power supply: Three phase, 380/440 volts.
			3. Control voltage, 24 volts AC.
		1. Tethers: Secure pins and loose pieces with 0.125 inch (3 mm) stainless steel cable with easily inserted lead connectors.

\*\* NOTE TO SPECIFIER \*\* Specify aluminum flashing for BUR or modified bitumen roofs only (membrane above or below insulation). For single ply roofs, refer to roofing membrane manufacturer's written instructions. Specify conformable mastic tape and heat-shrink rubber collar flashing for PBE Series roof anchors (BUR or modified bitumen roofs) or stainless steel cap for Pro-Bel series roof anchors for all roof types.

* + 1. Seamless Spun Aluminum Flashing (for Roof Anchors): To AA ADM-1 Type 6061-T6 alloy and to ASTM B221.

\*\* NOTE TO SPECIFIER \*\* Delete deck flange flashing type not required.

* + - 1. Deck Flange Flashing: Acceptable material: Pro-Bel Group, Aluminum Deck Flange Flashing.
			2. To NRCA Roofing and Waterproofing Manual recommendations.
			3. In accordance with Section 07 62 00 - Sheet Metal Flashing and Trim.
			4. Conformable mastic tape and torch applied heat-shrink rubber collar flashing.
			5. Detachable watertight stainless steel cap.
		1. Manufacturer's polyurethane/polyurea coating system: 0.09375 inch (2.4 mm) minimum thickness, black colored, two-component TPU polyurethane/polyurea coating system.

\*\* NOTE TO SPECIFIER \*\* If project requirements include the use of the TPU polyurethane/polyurea coating system, specify Pro-Bel Protex as the acceptable material. If this coating is not to be used, delete the following Paragraph.

* + - 1. Acceptable material: Pro-Bel Group, Pro-Bel Protex.
	1. ELECTRICAL REQUIREMENTS

\*\* NOTE TO SPECIFIER \*\* Except where specified elsewhere for powered platforms and hoists use the following Paragraph for electrical requirements.

* + 1. Receptacles: Waterproof, independently protected main line power receptacles rated 208 volts, 3 phase, 60 Hertz, 30 amperes.
			1. Acceptable material: Hubbell Twist-Lock.
		2. Ensure main line power is located 100 feet (30 m) maximum from powered window washing equipment.
		3. Ensure power outlets experience 3% maximum voltage drop under full load.

\*\* NOTE TO SPECIFIER \*\* Use wall and roof anchors as a means of supporting main line electrical cables and taking the strain form connectors and the cable itself.

* + 1. Cable Wall and Roof Anchors:
			1. Acceptable material: Pro-Bel Group, Wall and Roof Anchors.

\*\* NOTE TO SPECIFIER \*\* Delete the following Article in its entirety if the project does not include roof cars.

* 1. POWERED ROOF CARS

\*\* NOTE TO SPECIFIER \*\* A roof car should be provided whenever it is necessary to move a working platform horizontally to or from a working or storage position. Edit the list of Roof Cars below to specify the one which best suits the project requirements. Delete all other Roof Cars from the list.

* + 1. Roof Car: Electric powered, supported on hard rubber tired wheels operating on reinforced concrete bearing or similar surface cast on top of roof finish in accordance with Section 03 30 00 - Cast-in-Place Concrete.
			1. Acceptable material: Pro-Bel Group, Model PT 3008 Fully Balanced Trackless Trolley.
			2. Ensure roof trolley is guided by L-shaped steel angle fixed to concrete runway in accordance with Section 03 30 00 - Cast-in-Place Concrete.
			3. Steel base frame and suspension jib: Capable of 360 degree slewing (rotating) and luffing (up and down).
		2. Roof Car: Electric powered, fully balanced, on freestanding, twin track, galvanized I-beam work track system supported by galvanized steel crossbeams over support foot assemblies.
			1. Acceptable material: Pro-Bel Group, Model FS-3000 Free Standing Trolley.
			2. Mount system on reinforced [concrete pads] [sleepers] bedded on top of roof finish in accordance with Section 03 30 00 - Cast-in-Place Concrete.
			3. Weight balance ratio: As approved by authorities having jurisdiction.
			4. Steel base frame and suspension jib with luffing (up and down) capability.
		3. Roof Car: Electric powered with trolleys supported on four wheel assemblies operating on galvanized track mounted on concrete piers and cross rails, as indicated, cast into roof slab in accordance with Section 03 30 00 - Cast-in-Place Concrete.
			1. Acceptable material: Pro-Bel Group, Model RA-3004 Roof Anchored Trolley.
			2. Steel base frame and suspension jib: Capable of 360 degree slewing (rotating) and luffing (up and down).
		4. Roof Car: Electric powered with trolleys supported on four wheel assemblies operating on galvanized track mounted on concrete piers and cross rails, as indicated, cast into roof slab in accordance with Section 03 30 00 - Cast-in-Place Concrete.
			1. Acceptable material: Pro-Bel Group, Model RA 3006 Roof Anchor Trolley with Jib End Pantograph Assembly.
			2. Steel base frame and [telescoping] suspension jib: Capable of 360 degree slewing (rotating) and luffing (up and down).
			3. Ensure pantograph assembly remains horizontal when inclination of jib changes.

\*\* NOTE TO SPECIFIER \*\* To provide added access to the platform, specify that the upper turret connection be rotated 90 degrees.

* + - 1. Ensure connection to upper turret is rotated 90 degrees.
		1. Roof Car: Electric powered with trolleys supported on four wheel assemblies operating on galvanized track.
			1. Acceptable Material: Pro-Bel Group, Model RA-T09 Roof Anchored Trolley with Short Single Telescopic Jib.

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

* + - 1. Mounting of Track: Concrete piers cast into roof slab.
			2. Mounting of Track: Crossrails cast into roof slab.

\*\* NOTE TO SPECIFIER \*\* Telescoping jib is standard with this model.

* + - 1. Steel base frame and telescoping suspension jib: Capable of 85 degree slewing (rotating) in each direction.

\*\* NOTE TO SPECIFIER \*\* To provide added access to the platform, specify that the upper turret connection be rotated 90 degrees.

* + - 1. Ensure connection to upper turret is rotated 90 degrees.
		1. Roof Car: Electric powered with trolleys supported on four wheel assemblies operating on galvanized track mounted on concrete piers cast into roof slab in accordance with Section 03 30 00 - Cast-in-Place Concrete.
			1. Acceptable material: Pro-Bel Group, Model RA/22.5 Special Type/Long Reach.
			2. Steel base frame and long reach suspension jib: Capable of 360 degree slewing (rotating) capability and luffing (up and down).
			3. Ensure pantograph assembly remains horizontal when inclination of jib changes.

\*\* NOTE TO SPECIFIER \*\* To provide added access to the platform, specify that the upper turret connection be rotated 180 degrees.

* + - 1. Ensure connecting upper turret and suspension beam assembly allow platform to rotate 180 degrees.
		1. Roof Car: Electric powered with twin track trolley supported on four wheel assemblies operating on galvanized lower I-beam and upper galvanized steel channel track and mounted onto structural parapet wall.
			1. Acceptable material: Pro-Bel Group, Model WA 3007 Parapet Mounted with Twin Track Trolley and Single Jib.
			2. Steel base frame and long reach suspension jib: Capable of 360 degree slewing (rotating) capability and luffing (up and down).
		2. Platform: 82.25 inches (2.7 meters) long, Type 6061-T6 aluminum alloy to ASTM B221, mill and powder coated finished modular platform system to ASME A120.1, engineered length and width to suit application as indicated and based on load bearing frame, with non-slip, aluminum deck, soft rubber wall rollers and caster wheels.
			1. Suspension system: 2 primary wire ropes and 2 safety wire ropes operating at hoist speed of 29.5 feet per minute (9 meters per minute) maximum.
			2. Ensure platform hoist system is designed for horizontal travel with 39.33 feet per minute (12 meters per minute) maximum traversing speed.
		3. Roof Car Controls as follows:
			1. Key operated power supply "On/Off" control mounted on trolley.
			2. Key operated traversing operation control:

\*\* NOTE TO SPECIFIER \*\* Delete mounting not required.

* + - * 1. Mounted on trolley.
				2. Mounted on push button pendant control suspended from jib head.
				3. Ensure movement control push buttons require continuous finger pressure to operate.
				4. Include "Emergency Stop" push button at each control position.
			1. House main electrical control panel in key secured weatherproof compartment on rear of base frame.
				1. Include ground protection unit within panel.
			2. Attach platform electrical power supply cable to trolley jib head.
				1. Include cable storage compartment fitted to platform.
			3. Ensure other device controls are locked when traversing control at location is used.
			4. Ensure roof car operates only under conditions as follows:
				1. Platform is located at its uppermost position of travel; is not in contact with building face; and is not in contact with fixed vertical stabilizer guides located building facade.
				2. Protective devices and interlocks are in position for traversing.

\*\* NOTE TO SPECIFIER \*\* Edit the following list of roof car accessories to meet project requirements.

* + 1. Roof Car Accessories:
			1. Roof Trolley: Steel fabrication, shot blasted, hot zinc sprayed and blue color, powder coated.
			2. Lower Base Frame Assembly: Heavy duty steel box section with wheel unit bearing housings incorporated into frame.
				1. Include attachment points for slewing assembly.

\*\* NOTE TO SPECIFIER \*\* Hydraulic cylinder is optional. Delete if not required.

* + - 1. Upper Base Frame Assemblies: Heavy duty steel box sections [with attachment points for hydraulic cylinder jib assembly].

\*\* NOTE TO SPECIFIER \*\* Optional hydraulic cylinder allows the jib assembly to be luffed from the maximum to the minimum working positions as shown on manufacturer's drawings. Delete if not required.

* + - 1. Jib Assembly: Heavy duty steel box section.
				1. Provide attachment points for hydraulic cylinder as indicated.
				2. Provide slewing bearing at jib end.
				3. Jib luffing speed: 10.25 feet per minute (3 meters per minute) minimum.
				4. Standard forward reach: 60 inches (1500 mm) minimum.
			2. Slewing Assembly: Attach to upper and lower base frame.
				1. Ensure 360 degree powered rotation using electric geared motor transmission with push buttons controls from either control station.
				2. Slewing speed: 0.5 rpm minimum.

\*\* NOTE TO SPECIFIER \*\* Luffing assembly is optional. Delete if not required.

* + - 1. Luffing Assembly: Heavy duty, double acting, hydraulic cylinder with electrically operated power pack including hydraulic tank, filter, pressure relief valve, motorized pump unit and solenoid operated directional control valves.
				1. System working pressure range: 1200 to 1500 psi (8274 to10 342 kPa).

\*\* NOTE TO SPECIFIER \*\* For added safety, fit an Anti-Pipe Burst valve to base of hydraulic cylinder to lower the jib assembly at a controlled rate in the event of an hydraulic pipe failure. Incorporate hydraulic power pack within the trolley base frame. Delete if not required.

* + - * 1. Include anti-pipe burst valve.
			1. Supply Cable Reeling Drum: Fit roof trolley with spring loaded reeling drum capable of automatically reeling electrical power supply cable in and out between roof power sockets and trolley.
				1. Capacity: 65 feet (20 m) minimum.
			2. Stability: Include roof car continuous stabilization
				1. Determine overturning moment as 125 percent rated load, plus maximum dead load plus prescribed wind load.
			3. Roof car access: Include safe access to roof car and from roof car to working platform in accordance with manufacturer's written recommendations.
			4. Storage: include provisions to secure roof car in stored position using tie-down anchors in accordance with manufacturer's written recommendations.
				1. Ensure cars subject to wind forces are stored in accordance with ASME A120.1.
			5. Track works: Mild steel, Type 350W with 50 Ksi (350 MPa) minimum yield strength

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

* + - * 1. Hot dipped galvanized to ASTM A123/A123M.
1. EXECUTION
	1. INSTALLERS
		1. Provide experienced and qualified technicians to carry out erection, assembly and installation of window washing and suspended maintenance equipment system.
			1. Do steel welding to AWS D1.2/D1.2M.
			2. Do aluminum welding to AWS D1.1/D1.1M.
		2. Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions and Pro-Bel Group technical data sheets.
	2. EXAMINATION
		1. Site Verification of Conditions:
			1. Verify that substrate conditions which have been previously installed under other sections or contracts are acceptable for product installation in accordance with manufacturer's instructions prior to installation of window washing equipment.
			2. Inform Architect of unacceptable conditions immediately upon discovery.
			3. Proceed with installation only after unacceptable conditions have been remedied.
	3. PREPARATION
		1. Verify structure or substrate is adequate to support complete window washing equipment system.
		2. Verify structural steel to receive safety anchors has adequate bearing surface as indicated on shop drawings and has 100 percent welds between anchors and structural steel.
	4. INSTALLATION

\*\* NOTE TO SPECIFIER \*\* Co-ordinate installation with the manufacturer's written installation
details and instructions.

* + 1. Coordinate window washing equipment work with work of other trades, for proper time and sequence to avoid construction delays.
		2. Install window washing equipment plumb and level in accordance with manufacturer's written instructions.
		3. SEQ CHAPTER 1[Mechanically fasten anchors in accordance with manufacturer's recommendations and in accordance with Section 03 30 00 - Cast-in-Place Concrete.
		4. Accurately fit and align, securely fasten and install free from distortion or defects.
		5. Deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal and vandalism.

\*\* NOTE TO SPECIFIER \*\* Use the following Paragraph for all pipe and I-beam tracks for monorails, carriages, gantries and ladders.

* + 1. Track Works: Install tracks straight, true and level, with 0.125 inch (3 mm) maximum step deviation and in accordance with manufacturer's written instructions.
		2. Rolling Ladder: Ensure rolling ladder is positioned parallel to building elevation with 12 inches (305 mm) minimum clearance between rear side of ladder and building facade.
			1. Maintain clearance by means of roller guides on ladder end.
		3. Roof Car Runways: Install runways, concrete piers, cross rails and sleepers in cast-in-place concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.
	1. FIELD QUALITY CONTROL

\*\* NOTE TO SPECIFIER \*\* Use the following Paragraphs when manufacturer's field services are desired to verify the quality of the installed components. Establish the number and duration of periodic site visits required by the Manufacturer and specify below. Consult with the Manufacturer for services required. Delete if field services are not required.

* + 1. Manufacturer's Field Services: Have manufacturer's technical representative schedule site visits to review work as follows:
			1. After delivery and storage of products.
			2. When preparatory work for which work of this Section depends is complete, but before installation begins.
			3. During Installation:
				1. Weekly.
				2. 2 times during progress of work at 25% and 60% of completion.
			4. Upon completion of work, after cleaning is carried out.
		2. Testing: Test On Site 100 percent of anchors relying upon chemical adhesive fasteners using load cell test apparatus in accordance with manufacturer's written recommendations.
	1. ADJUSTMENT
		1. Lubricate moving parts to operate smoothly and fit accurately.
		2. Complete "Initial Inspection - Certification for Use" form included in Equipment Manual and Inspection Log Book provided by manufacturer.
	2. FINAL CLEANING
		1. Do cleanup in accordance with Section 01 70 00 - Execution and Closeout Requirements.
		2. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.
	3. PROTECTION
		1. Protect installed product from damage during construction.
		2. Repair or replace damage to adjacent materials caused by window washing equipment installation.
	4. MAINTENANCE
		1. Include complete maintenance on window washing equipment for 12 months after date of acceptance by Architect.
		2. Regularly and systematically examine, clean, adjust and lubricate moving parts.

\*\* NOTE TO SPECIFIER \*\* Delete schedule not required.

* + - 1. Schedule: Weekly.
			2. Schedule: Semi-monthly.
			3. Schedule: Monthly.
		1. Repair or replace parts of window washing equipment whenever required due to defect and normal wear and tear.
			1. Use only standard parts of product line of manufacturer of window washing equipment.
			2. Maintain locally adequate stock of parts for replacement or emergency purposes.
			3. Provide personnel to perform work under supervision and in direct employ of window washing equipment system manufacturer or manufacturer's licensed agent.
			4. Perform work during regular trade working hours satisfactory to Architect.
			5. Provide emergency call-back at no extra cost and ensure fulfillment of maintenance and emergency service without undue loss of time to Architect.
			6. Ensure that maintenance personnel register with designated building personnel at time of inspections and maintenance.

END OF SECTION