

SPECIFICATION

SPEC NOTE: This basic guide specification (Section 11010 - Window Washing Systems) is devoted exclusively to traveling gantry systems (permanent platforms on rails) and rolling ladders and is written in accordance with the CSI/CSC Three Part Section Format. It must be adapted to suit the requirements of individual projects. Square brackets [] indicate choice, alternatives, data required or need for the specifier to make a decision.

PART 1 - GENERAL

1.01 General Requirements

- A. Comply with the conditions of the Contract and Division 1 - General Requirements.

1.02 Section Includes

- A. Work of this section includes the design, supply and installation of window cleaning/suspended maintenance equipment.

1.03 Related Sections

- A. Unloading and hoisting of equipment to roof Section [01500]
- B. Cast-in-place concrete, including installation of embedded items Section [03300]
- C. Precast concrete Section [03400]
- D. Structural Steel Section [05120]
- E. Open Web Steel Joists Section [05210]
- F. Metal Deck Section [05310]
- G. Catwalks Section [05516]
- H. Roofing Section [07500]
- I. Flashing Section [07600]
- J. Sealants Section [07900]
- K. Rigging access doors in walls Section [08111]
- L. Hot & Cold water supply, faucets and drain at [every] roof level Section [15400]
- M. Three phase 230 volt 60 Hertz service at every roof level Section [16050]

SPEC NOTE: Re 1.03.O. For electric powered gantries, specify independent protected main line power and weatherproof Hubbell twist-lock receptacle (HBL2720SW, NEMA NO. L15-30R), each to provide 230 volts, 3 phase, 60 HZ, 30 amperes under full loading current of the equipment with not more than 3% voltage drop at the platform. A separate stand alone transformer for the window cleaning equipment may be required. Power to be located no more than 100'-0" (30 m) from window cleaning/ suspended maintenance location. Pro-Bel wall or roof anchors may be employed for strain relief. Contact Pro-Bel for requirements.

- O. Weatherproof power supply outlets with strain relief anchors Section [16132]

1.04 References

- A. AISC S342L-1993, with Supplement No.1 "Load and Resistance Factor Design Specification for Structural Steel Buildings".
- B. AISI SG-971-1996, with 2000 Supplement "Specification for Design of Cold-Formed Steel Structural Members".
- C. Aluminum Association AA ADM-1-Aluminum Design Manual, 2000 and AWS D1.2-97 Structural Welding Code - Aluminum.

- D. AWS D1.1-2000 Structural Welding Code - Steel.

- E. ANSI/IWCA I-14.1-2001 Window Cleaning Safety Standard (International Window Cleaning Association).

1.05 Design Requirements

- A. Design window cleaning/suspended maintenance system to suit building and in accordance with plans, specifications, standards, and regulations/codes contained in section 1.04 and 1.08.
- B. Locate anchorages to suit suspension equipment which will be used on the building with respect to items such as reach, rigging, spacing, roof edge condition and similar items.
- C. Design all anchor components to provide adequate attachment to the building and suited to current window cleaning/suspended maintenance practices. Ensure compatibility with industry standard equipment.
- D. Ensure all anchor components conform to proper engineering principles and have been designed by a Professional Engineer qualified in the design of window cleaning/suspended maintenance equipment, its application and safety requirements.
- E. Design system fall arrest safety anchors and equipment supports to comply with the following structural requirements:
 - 1. Supports for Suspended Platforms: permanently installed support equipment and the structure to which they are attached to be designed for static working load to suit platform weight and live load.
 - 2. Fall Arrest Safety Anchors: designed to resist a 5,000 lb. (22.2 kN) load in any direction without detachment or fracture occurring. To avoid deformation under normal usage, anchors are to be generally designed to resist a 1,000 lb. (4.5 kN) static working load in any direction.
 - 3. Ensure design of primary support equipment is capable of sustaining without failure at least four times the maximum static working load applied or transmitted to the components, i.e. a 4 to 1 stability factor.

1.06 Shop Drawings and Engineering Certification

- A. Submit shop drawings showing complete layout and configuration of gantry window cleaning/ maintenance system, including all components and accessories. Clearly indicate design and fabrication details, glazed areas, hardware, and installation details.
- B. Shop drawings to include installation and rigging instructions and all necessary Restrictive and Non-Restrictive Working Usage Notes and General Safety Notes.
- C. Shop drawings to be reviewed by a professional engineer, and upon request, complete with calculations or test reports.

1.07

Qualifications

- A. Manufacturer: Work of this Section to be executed by manufacturer specializing in the design, fabrication and installation of window cleaning/ suspended maintenance systems having a minimum of 5 years documented experience.

- B. Loading and safety assurance: Work of this Section to meet the requirements of governing codes and jurisdiction and to comply with properly engineered loading and safety criteria for the intended use.

- C. Insurance: Manufacturer to carry specific liability insurance (products and completed operations) in the amount of \$5,000,000.00 + to protect against product/system failure.

- D. Welding to be executed by welders certified in accordance with AWS requirements.

1.08 Regulatory Requirements

SPEC NOTE: Re 1.08.A. Specify for all States other than New York and California.

- A. Comply with the following OSHA regulations:
 - 1. 1910, Subpart F (Powered Platforms).
 - 2. Appendix C to 1910 (Personal Fall Arrest Systems).

Spec Note: Re 1.08.B and 1.08.C. Specify for New York State or California only as applicable.

- B. Comply with the following New York State regulations:
 - 1. Department of Labor Advisory Standard 101 - Construction, Operation and Maintenance of Suspended Scaffolds Used for Window Cleaning and Light Maintenance.
 - 2. Advisory Standard 111 - Hoisting Machines Used for Suspended Scaffolds.
 - 3. Department of Labor Industrial Code Rule 21 - Protection of Persons Employed at Window Cleaning - Structural Requirements, Equipment and Procedures.

- C. Comply with the following California State regulation:
 - 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).

1.09 Maintenance Data

- A. Submit 1 copy of system Equipment Manual & Inspection Log Book, with "Initial Inspection - Certification for Use" and "Inspection Sign-Off" forms completed.
- B. Submit 2 copies of a reduced plastic laminated as-built shop drawing showing equipment locations and details. This drawing is to be posted near exits onto the roof.

PART 2 - PRODUCTS

2.01 Manufacturer

- A. This specification is based on systems currently being manufactured by PRO-BEL ENTERPRISES LTD., Toll free: 1-800-461-0575, Telephone: 905-427-0616, Fax: 905-427-2545, info@pro-bel.ca.



- B. Other manufactured products meeting this specification may be substituted provided that manufacturers show proof of product insurance. Equipment details to be approved by the architect and/or consultant. Companies, such as miscellaneous metal fabricators, who are not normally engaged in the design and manufacture of window cleaning equipment are not permitted to bid.

2.02 Equipment

Spec Note: List type and quantity as required.

- A. [_____]
B. [_____]
C. [_____]

2.03 Materials (Gantry Systems)

SPEC NOTE: Delete items not required.

- A. Operation: [Manually operated][electric powered] to suit profile of [interior] [exterior] atrium.
- B. Gantry platform: Type 6061 - T6 mill finished aluminum alloy to ASTM B221-2000 fabricated modular platform system of engineered length and width to suit application, based on load bearing frame with non-slip aluminum deck and rated for two-man operation. Design to ensure that gantry will not rack or twist during use. Platform to have locking facility at each workstation and in parking location. System entry points to be equipped with prominently displayed, non-corrosive data plate clearly stating maximum service capacity.
- C. Guardrails: side frames and connecting frames to be structural aluminum or galvanized mild steel; guardrails to be square, thick wall aluminum extrusions with rails a minimum of 42" (1067 mm) above deck level and typically equipped with either localized stainless steel fall protection anchors or a "dogline" for securing lifelines, and spring loaded, sliding/retractable gates, where applicable.
- D. Pipe or I-beam monorail tracks: Type 6061-T6 mill finished aluminum alloy to ASTM B221-2000. Tracks to run horizontally along the full width of the atrium, and be straight, true and level, with a step deviation of less than 1/8" (3 mm).
- E. Large diameter wheels: nickel cadmium plated steel or stainless steel complete with sealed ball bearings.
- F. Monorail supports, plate and all other sections: mild steel, Type 300W with yield strength of 44 Ksi (300 Mpa), hot-dip galvanized to ASTM A123/A123M-2002.
- G. Interior trolleys: Type 304 stainless steel or powder coated mild steel with heavy duty rollers. Designed for straight or radiused rails. Provide

means for servicing, repair or replacement of trolleys as necessary.

- H. Safety Guards: provide enclosures or guards to prevent accidental personnel contact with moving parts or pinch points.

- I. Securement bolts: mild steel, Type 300W with yield strength of 44 Ksi (300 Mpa), hot-dip galvanized to ASTM A123/A123M-2002.

- J. Miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 44 Ksi (300 MPa), hot-dip galvanized to ASTM A123/A123M-2002 or Type 304 stainless steel with yield strength of 35 Ksi (240 MPa).

- K. Controls: for electric powered gantries, locate operating devices on working platform. Controls to be of continuous pressure weatherproof electric type. Provide key lockout for power supply to prevent unauthorized use and automatically applied braking system to prevent unintentional traversing of platform.

- L. Traversing speed: the maximum rated speed at which powered gantries may be moved in a horizontal direction is to be 50'-0" (15.24 m / minute).

- M. Manual operation: geared crank handle, mild steel hot-dip galvanized to ASTM A123/A123M-2002.

2.04 Materials (Rolling Ladders)

- A. Ladder: designed to support two workers at 250 lbs. (113 kg) load each; fabricated using aluminum extrusions to ASTM B221-2000 "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

- B. Ladder Finish: exterior finish to be [mill] [clear anodized], [polyester or polyurethane powder coated baked enamel of color as selected from manufacturer's standard colors or custom color].

- C. Size: 2'-3" (686 mm) nominal width x 2'-6" (762 mm) nominal depth with step rungs serrated for grip without discomfort to hand, and guardrails 3'-0" (915 mm) high.

- D. Brakes: spring release type for positioning ladder at work location or parking and locking at the end of the building elevation to prevent inadvertent movement due to wind.

- E. Fall protection: continuous fall arrest system on both sides of ladder.

- F. Clearance: position ladder parallel to building elevation with 12" (305 mm) clearance between rear side of ladder and building facade which is to be maintained by the roller guides at the ends of the ladder.

- G. Operation: provide for manual traversing of ladder using a force not to exceed 11.2 pound-force (50 Newtons).

- H. Guide rollers: adjustable, anti-crabbing and anti-lift type acting on the top track to locate and guide the ladder along the elevation. Flanged support rollers not acceptable. All rotating components to have sealed for life rolling element bearings protected from the environment.

- I. Safe access: provide safe access to ladder(s) via a horizontal lifeline or other means of fall protection.

2.05 Fabrication

- A. General:
1. Fabricate work true to dimension, square, plumb, level and free from distortion or defects detrimental to appearance and performance.
2. Grind off surplus welding material and ensure exposed internal and external corners have smooth lines.

PART 3 - EXECUTION

3.01 Examination

- A. Examine surfaces and areas upon which the work of this Section depends. Report to the Contractor in writing, defects of work prepared by other trades and other unsatisfactory site conditions which would cause defective installation of products, or cause latent defects in workmanship and function.

- B. Verify site dimensions.

- C. Commencement of work will imply acceptance of prepared work.

3.02 Installation

- A. Install equipment in accordance with approved shop drawings and manufacturer's recommendations.

- B. Co-ordinate installation with work of related trades.

- C. Install all work true, level, tightly fitted and flush with adjacent surfaces as required.

SPEC NOTE: Re 3.02.D. Specify for furnish only projects if required.

- D. Manufacturer to assist and/or supervise installation of window cleaning/suspended maintenance equipment installed by others.

3.03 Final Adjusting and Inspection

- A. Adjust and leave equipment in proper working order.

- B. Complete "Initial Inspection - Certification for Use" form included in Equipment Manual & Inspection Log Book.

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THE SUSPENDED EQUIPMENT EXPERTS

DESCRIPTION

Gantry systems (permanent platforms on rails) are employed for working over exterior glass when all other conventional means of performing window cleaning/suspended maintenance cannot be used. Similarly, interior gantries can be designed for servicing the inside of atrium structures.

Gantries are typically custom fabricated using aluminum, in a wide range of designs to satisfy virtually any shape, building access requirement, or color. Generally, gantry platforms are rolling fabrications that traverse on aluminum pipe or I-beam monorail track and are available with manual or motorized operation. The illustrations on page GS-3 are only a few of the many custom model variations available.

USE

Generally, gantries are used for safe access to and maintenance of difficult-to-reach interior or exterior areas of buildings.

Ideal for exterior applications where it is necessary for window cleaners to avoid walking on glass, and for glass replacement.

For interior window cleaning and servicing of lighting, sprinklers, air distribution equipment, ductwork, and similar building elements.



This assembly and installation photo shows the arched free-standing 65'-0" (19.8 m) rolling aluminum gantry shown in place on the cover photo. It has been painted to match the color of the atrium. Pro-Bel installers assembled the sectional gantry on the ground and used a crane to lift it into position. Pike Street Canopy, Seattle, Washington State Convention and Trade Center.

FEATURES

System versatility: Gantry systems are available to suit any aesthetic requirement, building configuration, glazing angle/shape, interior/exterior application, in either manual or automatic systems.

All corrosion resistant materials: exterior components are aluminum or hot dipped galvanized steel. All other components e.g. plates, bolts, pins, trolleys, and miscellaneous items are hot dipped galvanized steel, stainless steel, aluminum, or nickel cadmium plated. All exterior supports are hot dipped galvanized steel. Large diameter wheels are plated or stainless steel complete with sealed ball bearings that allow platforms to move easily.

Finish options: In addition to mill and anodized finishes, exterior aluminum is available with polyester or polyurethane powder coated baked enamel paint finish, color as selected from manufacturer's standard colors, or custom color if desired; interior aluminum or steel paint finishes are offered in epoxy or hybrid powder coated finish, or alternatively may be enamel painted on site.

Standards conformance: All gantries and related equipment including trolleys comply with OSHA and ASME/ANSI/

IWCA safety requirements for window cleaning, and various other materials standards.

Engineer certified: OSHA requires that gantries be designed by or under the direction of a registered professional engineer experienced in such design. Pro-Bel gantry performance is based on data derived from independent testing and/or engineering calculations.

Compatible with roofing: an important consideration in the design of Pro-Bel systems is the need to maintain the long term watertight integrity of the building. Pro-Bel products are designed with a full understanding of reliable flashing/sealing techniques to satisfy virtually any roof condition.

Sole responsibility: Pro-Bel provides complete primary equipment and fall protection products/systems from concept to the supply and installation of same, including annual inspection.

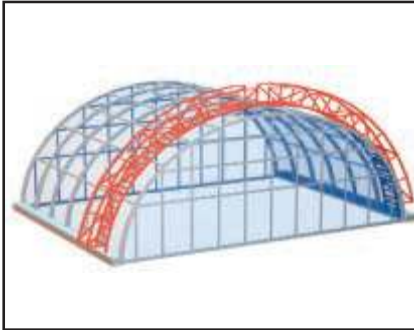
Specific liability insurance: All Pro-Bel gantry installations automatically carry \$5,000,000.00 + coverage against product/system failure (over 5000 projects successfully completed to date).



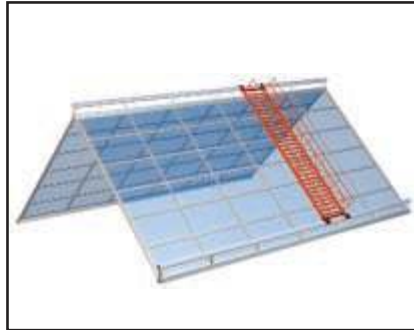
Example of aluminum inclined exterior horizontal rolling gantry system. Pro-Bel gantries typically travel on pipe or I-beam monorail tracks and are available with manual or motorized operation. Terminal 3, Pearson International Airport, Toronto, Ontario.

Primary Suspension Equipment

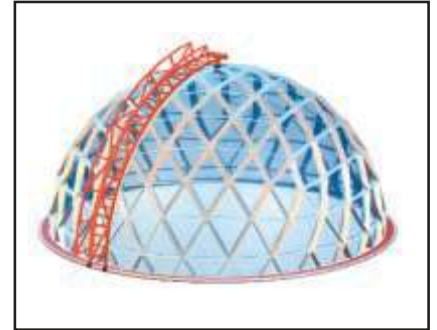
TYPES OF GANTRIES



Arched Gantry



Inclined (or vertical) Gantry



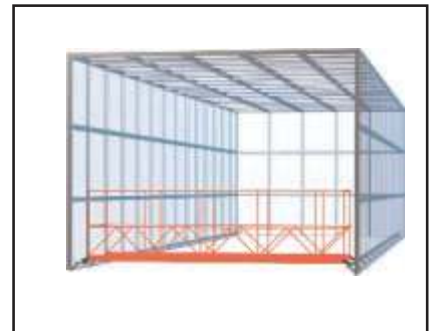
Dome-Type (or Conical) Ladder Gantry



Telescoping Gantry



Scissor Platform Gantry



Traveling Deck Gantry

MATERIALS/FABRICATION

Gantry platform: Type 6061-T6 mill finished aluminum alloy to ASTM B221-2000 modular platform system to ASME A120.1-2000 of engineered length and width to suit application, based on load bearing frame with non-slip aluminum deck. Designed to ensure that gantry will not rack or twist during use. System entry points are equipped with prominently displayed, non-corrosive data plate clearly stating maximum service capacity.

Guardrails: Side frames and connecting frames are structural aluminum or galvanized mild steel; guard rails are square, thick wall aluminum extrusions with rails a minimum of 42" (1067 mm) above deck level. Rails are typically equipped with either localized stainless steel fall protection anchors or a "dogline" for securing lifelines, and spring loaded, sliding/retractable gates.

Pipe or I-beam monorail track: Type 6061-T6 mill finished aluminum alloy, fabricated to ASTM B221-2000 "Standard specification for Aluminum and Aluminum

Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes".

Large diameter wheels: Nickel cadmium plated steel or stainless steel complete with sealed ball bearings.

Monorail supports, plate and all other sections: Mild steel, Type 300W with yield strength of 44 Ksi (300 Mpa), hot-dip galvanized to ASTM A123/A123M-2002.

Interior trolleys: Type 304 stainless steel or powder coated mild steel with heavy-duty rollers. Designed for straight or radiused rails.

Securement bolts: Mild steel, Type 300W with yield strength of 44 Ksi (300 Mpa), hot-dip galvanized to ASTM A123/A123M-2002.

Miscellaneous bolts, nuts and washers: Mild steel, Type 300W with yield strength of 44 Ksi (300 Mpa), hot-dip galvanized to ASTM A123/A123M-2002 or Type 304 stainless steel with yield strength of 35 Ksi (240 Mpa).

FREE DESIGN SERVICE

The selection of window cleaning equipment is a performance oriented and highly specialized area. Also the issues of fall protection and fall arrest are serious concerns with OSHA inspection authorities. Interpreting the myriad of OSHA standards, including the separate requirements of various states, and proposed changes, is a daunting task at best.

Each building is different, requiring an individual technical approach and a time commitment beyond the scope of most professional offices. Even with a high degree of knowledge and the best of intentions, the planning process can go askew. It is for these reasons that Pro-Bel provides architects and engineers with a FREE DESIGN SERVICE, and to ensure that Pro-Bel Window Cleaning/Suspended Maintenance Systems are properly specified and installed.

AVAILABILITY AND COST

Pro-Bel window cleaning/suspended maintenance safety systems are distributed throughout the United States, Canada and Internationally.

Budget pricing is provided on a project-to-project basis for both materials and installation, or materials only. See "Technical Consultation" below.

TECHNICAL CONSULTATION

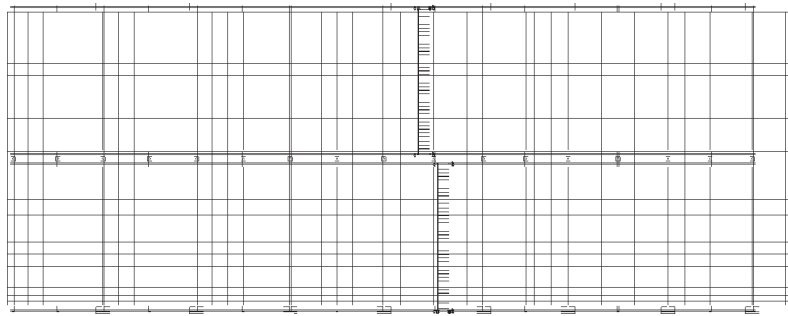
Pro-Bel Enterprises Limited provides a complete technical consultation service, available to architects, consultants, engineers, contractors, and building owners. Without obligation, Pro-Bel will provide interested parties with a proposed window cleaning/suspended maintenance design concept to OSHA requirements, including anchor and equipment locations, securement, roofing details, and specifications.

Simply provide the following information:

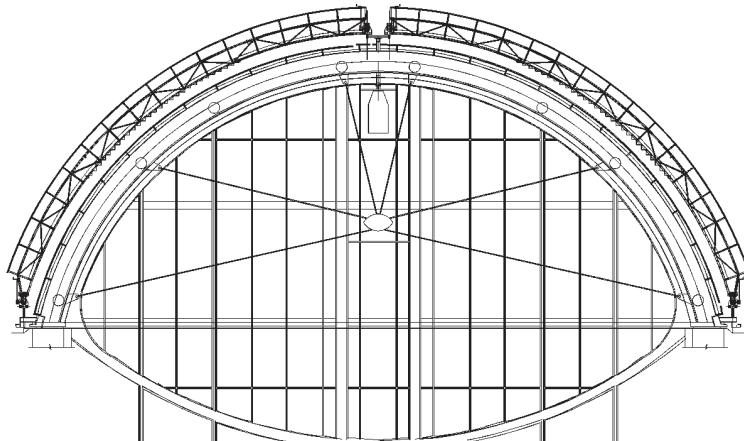
- roof plans (architectural and structural)
- building elevations
- typical floor plans
- section drawings showing parapet walls or roof edge condition and mechanical room walls; and
- any other drawings pertinent to window cleaning/suspended maintenance requirements

Pro-Bel will review drawings and provide one or more concepts as required with respect to equipment, tie-back methods and similar options.

In addition, Pro-Bel Enterprises Limited will provide budget pricing for window cleaning/suspended maintenance systems contingent upon design acceptance between Pro-Bel and the architect/owner for the proposed project.



PLAN VIEW OF PIKE STREET CANOPY AND GANTRY



SECTION DETAIL OF PIKE STREET CANOPY AND GANTRY