

## **SECTION 05 73 16 – CABLE RAILING**

### **PART 1 – GENERAL**

- A. Stainless Steel Cable and fittings for Railing infill and Systems.

#### **Section 1.02 RELATED SELECTIONS**

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 04 40 00 – Stone Assemblies
- C. Section 05 51 00 - Metal Stairs.
- D. Section 05 52 17 - Roof Fall Protection.
- E. Section 05 71 00 - Decorative Metal Stairs.
- F. Section 06 43 13 - Wood Stairs.

#### **Section 1.03 REFERENCES**

- A. ASTM A36 - Carbon Structural Steel.
- B. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- C. ASTM A108 - Steel Bars, Carbon, Cold Finished, Standard Quality.
- D. ASTM A276 - Stainless Steel Bars and Shapes.
- E. ASTM A312 - Seamless and Welded Austenitic Stainless Steel Pipes.
- F. ASTM A314 - Stainless Steel Billets and Bars for Forging.
- G. ASTM A320 - Alloy Steel Bolting Materials for Low-Temperature Service.
- H. ASTM A479 - Stainless and Heat-Resisting Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels.
- I. ASTM A492 – Specification for Stainless Steel Wire Rope.
- J. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- K. ASTM A554 - Welded Stainless Steel Mechanical Tubing.
- L. ASTM A582 - Free-Machining Stainless and Heat-Resisting Steel Bars.
- M. ASTM B211 - Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
- N. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- O. SAE/AMS QQ-S-763 - Steel Bars, Wire Shapes, and Forgings; Corrosion-Resistant.]

#### **Section 1.04 DESIGN REQUIREMENTS**

- A. Cable railing system, including top rail, bottom rail, end posts, intermediate posts, intermediate cable braces, cables, and cable hardware shall be designed to conform to building codes and loading requirements.
  - 1. Cable railing system shall withstand a minimum concentrated load of \_\_\_\_\_ pounds (\_\_\_\_\_ kilograms) applied from any direction, at any point on the railing.
  - 2. Cable railing system shall withstand a minimum uniform load of \_\_\_\_\_ pounds per square foot (\_\_\_\_\_ kilograms per square centimeter), applied vertically down and horizontally, but not simultaneously, on top rail.
- B. Intermediate posts and cables shall be designed for a minimum uniform load of \_\_\_\_\_ pounds per square foot (\_\_\_\_\_ kilograms per square centimeter) over gross area of cable railing system of which they are part. Reactions due to this loading need not be added to loading specified for main supporting members of cable railing system.
- C. Railing frame components and cable hardware shall be designed to withstand loads encountered without excessive deflection or distortion when cables are tensioned to required amounts to conform to building codes.

#### **Section 1.05 SUBMITTALS**

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Include for each product to be used:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Available colors, styles, patterns and textures.
- C. Shop Drawings:
  - 1. Submit fabricator's shop drawings showing sizes, dimensions, details, and installation of railing frame components, intermediate cable braces, cables, cable hardware, and grommets.
  - 2. Show details of anchoring cable railing system to mounting surface.
- D. Material Samples: Submit samples of the following:
  - 1. Railing frame components by fabricator.
  - 2. Intermediate cable braces by fabricator.
  - 3. Cables by manufacturer or fabricator.
  - 4. Cable hardware by manufacturer or fabricator.
  - 5. Grommets by manufacturer or fabricator.
- E. Sustainable Design Submittals:
  - 1. Regional Materials: State distance from point of manufacture (fabrication) to Project site.
  - 2. Recycled Materials: State percentage of recycled content and whether content is post-consumer or pre-consumer.

#### **Section 1.06 QUALITY ASSURANCE**

- A. Single Source Responsibility: Single source shall provide all components required to install the cable railing system.

- B. Manufacturers Qualifications: Minimum five years' experience in producing cable assemblies of the type specified.
- C. Fabricator's Quality Assurance: Fabricator shall certify that all materials comply with the requirements of this section and are suitable for the intended application.
- D. Mockup:
  - 1. Size: Minimum \_\_\_ feet long x full height.
  - 2. Show: Guard railing components, accessories, attachments, and finishes].
  - 3. Locate as instructed by the Architect.
- E. Pre-Installation Meeting: Convene a pre-installation meeting approximately two weeks before start of construction of railing frame component mounting surfaces. Require attendance of parties directly affecting work of this section, including Contractor, Architect, Fabricator, and Installer. Review the following:
  - 1. Specific method of installation of railing frame components into mounting surfaces.
  - 2. Installation, adjusting, cleaning, and protection of cable railing system.
  - 3. Coordination with other work.
- F. Carbon Steel: Minimum \_\_\_ percent recycled content; post-consumer plus one-half pre-consumer.
- G. Stainless Steel: Minimum \_\_\_ percent recycled content; post-consumer plus one-half pre-consumer.

#### **Section 1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to site with labels or other markings clearly identifying the products and contractor or fabricator.
- B. Store materials in a clean, dry area, away from exposure to the weather until they are ready for installation.
- C. Protect materials while handling to avoid damage during installation.

#### **Section 1.08 WARRANTY**

- A. Provide manufacturer's standard warranty for each product indicated.

### **PART 2 PRODUCTS**

#### **Section 2.01 MANUFACTURERS**

- A. Acceptable Manufacturer for cable and cable hardware components: R & B Wagner, Inc (Wagner Companies) 10600 West Brown Deer Road, Milwaukee WI 53224 Tel: (888)-243-6914. Tel: (414)-214-0444. Fax: (414)-214-0450. Email: [rfq@mailwagner.com](mailto:rfq@mailwagner.com). Web: [www.wagnercompanies.com](http://www.wagnercompanies.com)  
[www.shopwagner.com](http://www.shopwagner.com)
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
- D. Provide all cable, materials, fittings and components from a single manufacturer.

#### **Section 2.02 RAILING FRAME COMPONENTS**

- A. Framing: Round Pipe.
  - 1. Material: Carbon Steel, ASTM A53, Grade A. Minimum tensile strength of 48,000 pounds per square inch (3375 kg/sq. cm).
  - 2. Material: Stainless Steel, ASTM A312, Type 304L or 316L. Minimum tensile strength of 70,000 pounds per square inch (4921 kg/sq. cm).
- B. Framing: Structural Tubing.
  - 1. Style: Square.
  - 2. Style: Round.
  - 3. Material: Carbon Steel, ASTM A500, Grade A. Minimum tensile strength of 45,000 pounds per square inch (3164 kg/sq. cm).
  - 4. Material: Stainless Steel, ASTM A554, Type 304 or 316. Minimum tensile strength of 70,000 pounds per square inch (4921kg/sq. cm).
- C. Post Mounting:
  - 1. Floor Plate.
  - 2. Fascia Plate.
  - 3. 6 inch (152mm) extension into concrete.
  - 4. As noted on the Contract Drawings.
- D. Intermediate Rail Braces for railings with vertically oriented cables:
  - 1. Materials: 0.625 inch (16 mm) diameter x 0.120 (4 mm) wall thickness 4130 chrome/moly tubing.
  - 2. Materials: 0.625 inch (16 mm) diameter x 0.120 (4 mm) wall thickness seamless stainless steel tubing.
  - 3. Spacing: Maximum 26 inches (660 mm) on center between end and/or intermediate posts.
  - 4. Spacing: As noted on the Contract Drawings.
- E. Intermediate Cable Braces:
  - 1. Type: Single piece.
  - 2. Size: 1/4-inch x 1 inch (6.4 mm x 25.4 mm).
  - 3. Spacing: Maximum 48 inches (1219 mm) on center between end and/or intermediate posts.
  - 4. Spacing: As noted on the Contract Drawings.
  - 5. Material: Cold formed steel.
  - 6. Material: Stainless steel.
- F. Cable Grommets: For prevention of abrasion of intermediate posts, end posts, and cable braces bored for cables.

1. Material: Black, UV-resistant Delrin or approved equal.

### Section 2.03 CABLES AND CABLE HARDWARE

- A. Cables.
  1. Material: 1 x 19 Type 316 stainless steel strand, left-hand lay, per dimensional properties contained in MIL-DTL-87161.
  2. Finish: Mill.
  3. Finish: PVC coated.
    - a. Color: \_\_\_\_\_.
    - b. Color as specified on the drawings.
  4. Diameter: 1/8 inch (3.2 mm) diameter cable with a minimum breaking strength of 1780 pounds (807.39 kilograms).
  5. Diameter: 3/16 inch (4.8 mm) diameter cable with a minimum breaking strength of 4000 pounds (1814.37 kilograms).
  6. Diameter: 1/4 inch (6.4 mm) diameter cable with a minimum breaking strength of 6900 pounds (3129.79 kilograms).
  7. Diameter: 5/16 inch (8 mm) diameter cable with a minimum breaking strength of 10600 pounds (4808.08 kilograms).
  8. Diameter: 3/8 inch (9.6 mm) diameter cable with a minimum breaking strength of 14800 pounds (6713.17 kilograms).
  9. Orientation: Horizontal.
  10. Orientation: Slope parallel to stair pitch.
  11. Orientation: Vertical
  12. Orientation: As indicated on the Contract Drawings.
  13. Spacing: \_\_\_ inches (\_\_\_mm) on center.
  14. Spacing: As indicated on the Contract Drawings.
- B. Cable Hardware Components.
  1. Material: Stainless steel, ASTM A276 and A479, SAE/AMS QQ-S-763, Type 316.
  2. Type: Swageless hardware wherever practical.
  3. Type: Hardware substantially concealed inside end posts where practical.
  4. Type: As indicated on the contract drawings.
  5. Type: Most economical combinations of fittings that are practical.
  6. Type: Tensioned Fittings:
    - a. Fitting: Invisiware Receiver.
    - b. Fitting: Adjust-A-Jaw Tensioner.
    - c. Fitting: Adjust-A-Body with Threaded Eye Tensioner.
    - d. Fitting: Adjust-A-Body with Threaded Bolt Tensioner.
    - e. Fitting: Adjust-A-Body with Hanger Bolt Tensioner.
    - f. Fitting: Adjust-A-Body with Concrete Bolt Tensioner.
    - g. Fitting: Receiver with Push-Lock Stud Swageless Tensioner.
  7. Type: Non-Tensioned Fittings:
    - a. Fitting: Invisiware Radius Ferrule.
    - b. Fitting: Clip-on-Stop.
    - c. Fitting: Fixed Jaw.
    - d. Fitting: Push-Lock Swageless Fitting.
    - e. Fitting: Push-Lock with Threaded Eye Swageless Fitting.
    - f. Fitting: Pull-Lock Swageless Fitting.

### Section 2.04 FINISHES

- A. Steel Finishes:
  1. Finish: Mill.
  2. Finish: Primed.
  3. Finish: Primed and painted.
  4. Finish: Powder coated.
  5. Color: \_\_\_\_\_.
  6. Color: As selected by Architect from Manufacturer's standard color offerings.
  7. Apply final finish before installation of cable hardware and cables.
- B. Stainless Steel Finishes:
  1. Finish: #4 Satin.
  2. Finish: #8 Polished.

## PART 3 EXECUTION

### Section 3.01 EXAMINATION

- A. Examine areas to receive new cable railing system. Notify Architect if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

### Section 3.02 INSTALLATION

- A. Install cable railing system in accordance with manufacturer's instructions at locations indicated on the drawings.

- B. Install cable railing system plumb, level, square, and rigid.
- C. Anchor cable railing system to mounting surface as indicated on the drawings.
- D. Install wood frame railing components in accordance with Section 06 43 13 - Wood Stairs, Wood Stairs and Railings.
- E. Use manufacturer's supplied cable hardware.
- F. Terminate and tension cables in accordance with manufacturer's instructions.
- G. Tension cables to a minimum of 225 pounds (103 kilograms) each in sequence in accordance with manufacturer's instructions.
- H. Ensure cables are clean, parallel to each other, and without kinks or sags.
- I. Replace defective or damaged components as directed by Architect.
- J. Repair damaged factory-applied finish as directed by Architect.

**Section 3.03 ADJUSTING AND TENSIONING**

- A. Adjust cables and cable hardware as required to provide properly installed cable railing system as directed by Architect.

**Section 3.04 CLEANING**

- A. Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to handover.
- B. Clean cables thoroughly in accordance with manufacturer's instructions to remove residual lubricants.
- C. Clean surfaces with soap and water or commercially available stainless steel cleaners.
- D. Do not use abrasive cleaners or metal/steel wool type pads.

**Section 3.05 PROTECTION**

- A. Protect cable railing system and finish from damage during construction.
- B. Repair or replace damaged products before Substantial Completion.