SECTION 05 73 00

ORNAMENTAL HANDRAILS AND RAILINGS

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\*\* NOTE TO SPECIFIER \*\* Stainless Cable & Railing Inc.; metal and wood railings with cable infill.  
This section is based on the products of Stainless Cable & Railing Inc., which is located at:  
4055 S. Grant St.  
Washougal, WA 98671  
Toll Free Tel: 888-686-7245 (RAIL)  
Fax: 888-686-7245  
Email: [request info (sales@stainlesscablerailing.com)](https://arcat.com/rfi?action=email&company=Stainless%252BCable%252B%252526%252BRailing%252BInc.&message=RE%253A%2520Spec%2520Question%2520(05720scr)%253A%2520&coid=46637&spec=05720scr&rep=&fax=888-686-7245)  
Web: <http://stainlesscablerailing.com>   
 [ [Click Here](https://arcat.com/company/stainless-cable-railing-inc-46637) ] for additional information.  
Stainless Cable & Railing Inc. manufactures quality exterior and interior cable railing systems distributed across North America. We are focused in providing "off the shelf" aluminum and stainless steel railing solutions for the architect/designer, as well as offering custom designed fabrication services to meet your specific needs. If you need any assistance specifying cable railing for your next project, please give us a call at 888-686-7245 (RAIL).

1. GENERAL
   1. SECTION INCLUDES

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

* + 1. Aluminum railings with cable infill.
       1. Round aluminum handrails.
    2. Steel railings with cable infill.
    3. Stainless steel railings with cable infill.
    4. Wood railings with cable infill.
  1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 30 00 - Cast-in-Place Concrete.
    2. Section 03 62 13 - Non-Shrink Grouting.
    3. Section 03 63 00 - Epoxy Grouting.
    4. Section 05 12 13 - Architecturally-Exposed Structural Steel Framing.
    5. Section 05 15 13 - Aluminum Wire Rope Assemblies.
  1. REFERENCES

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

* + 1. American National Standards Institute (ANSI):
       1. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.
    2. American Welding Society (AWS):
       1. AWS Specifications for Welding Rods and Bare Electrodes.
    3. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
    4. ASTM International (ASTM):
       1. ASTM A36 - Carbon Structural Steel.
       2. ASTM A47 - Specification for Ferritic Malleable Iron Castings.
       3. ASTM A48 - Specification for Gray Iron Castings.
       4. ASTM A53 - Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless.
       5. ASTM A269 - Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
       6. ASTM A276 - Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
       7. ASTM A312 - Specification for Seamless and Welded Austenitic Stainless Steel Pipe.
       8. ASTM A500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
       9. ASTM A512 - Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing.
       10. ASTM A525 - Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
       11. ASTM A526 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
       12. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
       13. ASTM A1264-1 - Safety Requirements for Workplace Floor and Wall Openings, Stairs and Railing Systems
       14. ASTM B221 Specification for Aluminum-Alloy Bars, Rods, Wires, Shapes and Tubes.
       15. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
       16. ASTM E894 - Standard Test Methods for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
       17. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
       18. ASTM E985 - Specification for Permanent Metal Railing Systems and Rails for Buildings.
    5. General Service Administration (GSA) Federal Specifications (FS):
       1. QQ-S-766 - Stainless Steel, Class 302 or 304.
       2. FS-TT-P-641 - Primer Coating, Zinc Dust/Zinc Oxide (for Galvanized Surfaces).
       3. FS-TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.
    6. Green Globes Rating System.
    7. International Code Council (ICC):
       1. International Building Code (IBC).
       2. International Residential Code (IRC).
    8. Military Specifications (MIL):
       1. MIL-C-5688 - Pre-Stretching and Proof-Testing of Wire Rope Assemblies.
       2. MIL-P-1144 - Pipe, Corrosion Resistant, Stainless Steel, Seamless or Welded.
       3. MIL-P-25995 - Pipe, Aluminum Alloy, Drawn or Extruded.
       4. MIL-R-36516 - Rail, Restraint.
       5. MIL-W-87161 - Wire Strand, Non-Flexible, for Aircraft Control. Oil Free Condition.
    9. National Association of Architectural Metal Manufacturers (NAAMM) and National Ornamental and Miscellaneous Metals Association (NOMMA):
       1. NAAMM Metal Finishes Manual.
    10. National Association of Architectural Metal Manufacturers (NAAMM):
        1. NAAMM Pipe Railing Manual.
        2. NAAMM Metal Stair Manual.
    11. National Association of Home Builders (NAHB):
        1. Model Green Home Building Guidelines.
    12. National Association of Home Builders' Research Center (NAHBRC):
        1. Review of Fall Safety of Children between the Ages of 18 Months and 4 Years in Relations to Guards and Climbing in the Built Environment.
    13. National Fire Protection Association (NFPA):
        1. 101 - Life Safety Code.
    14. Institute of Building Sciences (IBS):
        1. IBS Metric Guide for Federal Construction.
    15. U.S. Green Building Council:
        1. The Leadership in Energy and Environmental Design (LEED) Green Building Rating System.
  1. DEFINITIONS
     1. Refer to definitions in ASTM E985 for railing-related terms that apply to this Section.
  2. PERFORMANCE REQUIREMENTS
     1. General: Handrails and railings shall withstand structural loading as determined by allowable design working stresses of materials.

\*\* NOTE TO SPECIFIER \*\* Verify structural loads are applicable in the jurisdiction of the project.

* + 1. Structural Performance: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stress of materials for handrails, railings, anchors, and connections.
       1. Components and installation shall be in accordance with state and local code authorities.
       2. Components and installation shall follow current ADA and ICC/ANSI A117.1 guidelines.
       3. Top Rail: Shall withstand the following loads.
          1. Concentrated load of 200 lbf (0.89 kN) applied at any point and in any direction.
          2. Uniform load of 50 lbf-ft. (0.07 kN-m) applied horizontally and concurrently with uniform load of 100 lbf-ft. (0.14 kN-m) applied vertically downward.
          3. Concentrated and uniform loads above need not be assumed to act concurrently.
       4. Handrails Not Serving as Top Rails: Shall withstanding the following loads.
          1. Concentrated load of 200 lbf (0.89 kN) applied at any point and in any direction.
          2. Uniform load of 50 lbf-ft. (0.07 kN-m) applied in any direction.
          3. Concentrated and uniform loads above need not be assumed to act concurrently.
       5. Guard Infill Area: Shall withstand the following loads.
          1. Concentrated horizontal load of 200 lbf (0.89 kN) applied to 1 square foot (0.09 m2) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area. Loads need not be assumed to act concurrently with loads on top rails in determining stress on guard.
    2. Thermal Movements: Handrails and railings shall allow for movements resulting from 120 deg F (49 deg C) changes in ambient and 180 deg F (82 deg C) surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
    3. Corrosion Resistance: Separate incompatible materials to prevent galvanic corrosion.
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
     2. Product Data: Submit manufacturer's data sheets on each product to be used, including, but not limited to, the following:
        1. Preparation instructions and recommendations.
        2. Storage and handling requirements and recommendations.
        3. Installation methods.
        4. Grout, anchoring cements and paint products.
     3. Shop Drawings: Submit shop drawings showing fabrication and installation of handrails and railings. Include plans, elevations, sections, details, and attachments to other work.
        1. Provide setting diagrams for installation of anchors, location of pockets, weld plates for attachment of rails to structure, and blocking for attachment of wall rail.
        2. Indicate all required field measurements to be held.
        3. Indicate materials, sizes, styles, fabrication, anchorage and installation details for railing system and infill.

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

* + - 1. Signed and Sealed Shop Drawings to be provided by a Registered Professional Engineer registered in the jurisdiction of the project.
    1. Certifications:
       1. Furnish certification that all components and fittings are furnished by the same manufacturer or approved by the primary component manufacturer.

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

* + - 1. Furnish certification that components were installed in accordance to the manufacturer's engineering data to meet the specified design loads.
    1. Samples:
       1. Post and rail sections, minimum 4 inch (100 mm) long piece of each type.
       2. lnfill Cable: Minimum 8 inch (200 mm) long piece with end fittings.
       3. Verification Samples: For each type of exposed finish required, prepared on components indicated below and of same thickness and metal indicated for the work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
          1. 6 inches (152 mm) long sections of each different linear railing member, including handrails and top rails.
    2. Quality Control Submittals:
       1. Certificates: Submit certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).

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

* + 1. LEED Submittals: Submittals that are required to comply with requirements for LEED certification include, but shall not be limited to, the following:
       1. Recycled Content: Provide product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
       2. Regional Materials: Provide product data for regional materials indicating location and distance from the Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
  1. QUALITY ASSURANCE
     1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of aluminum handrails and railings of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of 5 years.
     2. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.
     3. Installer Qualifications: Minimum 2 years experience installing similar systems.

\*\* NOTE TO SPECIFIER \*\* Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
       1. Install one complete railing including infill panel at location selected by Architect.
       2. Obtain Architect's approval prior to installing additional railings.
       3. Refinish mock-up area as required to produce acceptable work.
       4. Approved sample may remain as part of completed work.
    2. Pre-Installation Meeting:
       1. Prior to the beginning of work, conduct a pre-job conference at the job site.
       2. Provide seven calendar days advance written notice ensuring the attendance by competent authorized representatives of the fabricator, building owner's representative, architect and subcontractors whose work interfaces with the work of this section.
       3. Review the specifications to determine any potential problems, changes, scheduling, unique job site conditions, installation requirements and procedures and any other information pertinent to the installation.
       4. Record the results of the conference and furnish copies to all participants.
  1. DELIVERY, STORAGE, AND HANDLING
     1. Store products in manufacturer's unopened packaging until ready for installation.
  2. PROJECT CONDITIONS
     1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
  3. WARRANTY
     1. Special Warranty: Provide manufacturer's standard form outlining the terms and conditions of their standard Limited Warranty:
        1. Cable and Connectors: 10 year limited warranty against defects in materials and workmanship.
        2. Paint Finish on Aluminum Extrusions and Components: 10 year limited warranty against cracking, flaking, blister, and peeling.
     2. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
  4. EXTRA MATERIALS
     1. Provide one approximately 3 ounce (85 grams) can, of touch-up paint per 100 feet (30.5 m) of each color of railing as applicable.

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: Stainless Cable & Railing Inc., which is located at:  
         4055 S. Grant St.  
         Washougal, WA 98671  
         Toll Free Tel: 888-686-7245 (RAIL)  
         Fax: 888-686-7245  
         Email: [request info (sales@stainlesscablerailing.com)](https://arcat.com/rfi?action=email&company=Stainless%252BCable%252B%252526%252BRailing%252BInc.&message=RE%253A%2520Spec%2520Question%2520(05720scr)%253A%2520&coid=46637&spec=05720scr&rep=&fax=888-686-7245);Web: <http://stainlesscablerailing.com>

\*\* 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 \*\* Delete if not required.

* 1. ALUMINUM RAILINGS WITH CABLE INFILL
     1. Aluminum Railings with Cable Infill.

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

* + - 1. Mounting: Top (Deck) Mounted Posts.
      2. Mounting: Side (Fascia) Mounted Posts.
      3. Mounting: Core Mounted Posts.

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

* + - 1. Rail Height: 36 inches (914 mm).
      2. Rail Height: 42 inches (1067 mm).

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

* + - 1. Top Rail Type: Aluminum Rectangular.
      2. Top Rail Type: Aluminum Shaped.
      3. Top Rail Type: Aluminum Post-To-Post (stand alone).
      4. Top Rail Type: Wood.
      5. Top Rail Type: Aluminum Post-To-Post as support profile for Wood.
      6. Foot Rail / Handrail Type: Aluminum Post-To-Post (stand alone).

\*\* NOTE TO SPECIFIER \*\* The following two paragraphs are for Top (Deck) Mounted Posts. Delete if not required.

* + - 1. Base Plate: 5.25 x 5.25 x 0.35 inches (133 x 133 x 9 mm) minimum.
      2. Anchor Bolts:

\*\* NOTE TO SPECIFIER \*\* Delete anchor bolts not required.

* + - * 1. 3/8 inch (9.5 mm) diameter Redhead ITW wedge, with minimum 4 inch embedment.
        2. 3/8 inch (9.5 mm) diameter Redhead LDT (SLDT-3816), with minimum 4 inch (102 mm) embedment.
        3. 1/2 inch (12.7 mm) diameter Redhead SRM-38 or similar, with minimum 4 inch (102 mm) embedment.

\*\* NOTE TO SPECIFIER \*\* The following two paragraphs are for Side (Fascia) Mounted Posts with brackets. Delete if not required.

* + - 1. Bracket Size: 4.01 x 6.75 x 0.39 inches (102 x 171 x 10 mm) minimum.
      2. Fasteners:

\*\* NOTE TO SPECIFIER \*\* Delete anchor bolts not required.

* + - * 1. 4 Anchor Bolts: 3/8 inch (9.5 mm) diameter Redhead ITW wedge, with minimum 4 inch embedment.
        2. 4 Anchor Bolts: 3/8 inch (9.5 mm) diameter Redhead LDT, with minimum 4 inch (102 mm) embedment.
        3. 4 Lag Screws: 3/8 inch (9.5 mm) diameter lag screw, with minimum 5 inch (127 mm) embedment.

\*\* NOTE TO SPECIFIER \*\* The following paragraph is for Side (Fascia) Mounted Posts without brackets. Delete if not required.

* + - 1. Fasteners:

\*\* NOTE TO SPECIFIER \*\* Delete anchor bolts not required.

* + - * 1. 2 Anchor Bolts: 1/2 inch (12.7 mm), 7 inches (178 mm) apart, with minimum 4 inch embedment.
        2. 2 Lag Screws: 1/2 inch (12.7 mm), 7 inches (178 mm) apart, with minimum 6 inch (152 mm) embedment.
        3. 2 Thru Bolts: 1/2 inch (12.7 mm) diameter hex bolt.

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

* + - 1. Color: Black.
      2. Color: Bronze.
      3. Color: Clay.
      4. Color: Natural.
      5. Color: White.
    1. Square Extruded Aluminum Components: Provide manufacturer's standard extruded aluminum components as follows:
       1. Intermediate Post (Standard): 2.362 inches (60 mm) by 2.362 inches (60 mm) with radiused corner, 0.2 inch (5 mm) wall thickness.

\*\* NOTE TO SPECIFIER \*\* The following paragraph is for Top (Deck) Mounted posts. Delete if not required.

* + - 1. Terminal (Standard) Post: 2.362 inches (60 mm) by 2.362 inches (60 mm) with radiused corners, 0.2 inch (5 mm) wall thickness on two opposing sides and 0.28 inch (7 mm) wall thickness on two other sides.

\*\* NOTE TO SPECIFIER \*\* For Side (Fascia) Mounted posts, select one of the following two paragraphs. Delete options not required.

* + - 1. Terminal (Swageless) Post: 0.20 inch (5 mm) wall thickness.
      2. Terminal (Tensioner) Post: 0.24 inch (6 mm) wall thickness.

\*\* NOTE TO SPECIFIER \*\* Delete cable assembly not required.

* + - 1. Cable Assemblies: 1/8 inch (3 mm) 1x19 fittings to be sized according to cable diameter. Fittings shall be 316 measure grade stainless.
      2. Cable Assemblies: 3/16 inch (4.8 mm) 1x19 fittings to be sized according to cable diameter. Fittings to be 316 measure grade stainless.

\*\* NOTE TO SPECIFIER \*\* Delete top rail not required.

* + - 1. Top Rail: Cable View Rectangular Top Rail, rectangular cross section 3-1/8 inch by 2-1/4 inch (80 by 57.5 mm) by .09449 inch (2.4 mm) thick extruded aluminum.
      2. Top Rail: Cable View Shaped Top Rail, rectangular cross section 3-1/2 inch by 1-3/4 inch (90 by 48 mm) by .09449 (2.4 mm) thick extruded aluminum.
      3. Top Rail: Cable View Top Rail, Post-To-Post profile 1-7/8 inch by 1-3/16 inch (50 by 30 mm) by .07874 inch (2.0 mm) thick extruded aluminum.
      4. Top Rail: Cable View Top Rail, Post-To-Post profile 1-7/8 inch by 1-3/16 inch (50 by 30 mm) by .07874 inch (2.0 mm) thick extruded aluminum as support profile for \_\_" x \_\_" Wood Top Rail.
      5. Foot Rail / Handrail: Post-To-Post profile 1-7/8 inch by 1-3/16 inch (50 by 30 mm) by .07874 inch (2.0 mm) thick extruded aluminum.
      6. End Caps: Aluminum end caps for exposed open ends of rails, tubes, and profiles.

\*\* NOTE TO SPECIFIER \*\* This handrail was specifically designed to be sleek, graspable, and ADA-compliant. Round shape looks minimal and is comfortable to grasp. Perfect for any staircase or incline. Delete if not required.

* + 1. Round Aluminum Link Handrail Components: Provide manufacturer's standard extruded aluminum components as follows:
       1. Handrail: ADA-Compliant. Easily graspable.
       2. Custom Elbows: Available for unique changes in direction. Effortlessly handles changes in direction for winding stairs or inclines.
       3. Mounting: To walls and/or flat post faces, or any other flat surface using wall brackets.
       4. Components:
          1. Aluminum Link Handrail: Diameter: 1.50 inch (38.1 mm) Outside diameter. Wall Thickness: 0.125 (3.18 mm). Standard Length: 20 ft ( mm).

\*\* NOTE TO SPECIFIER \*\* Custom corner elbows are available. Delete options not required.

* + - * 1. Welded Corner Elbows: 90 degree. Diameter: 1.50 inch (38.1 mm) Outside diameter. Wall Thickness: 0.125 (3.18 mm).

Elbow Length from Weld Seam: 12 inch (305 mm).

Color to match handrail.

* + - * 1. Welded Corner Elbows: 135 degree. Diameter: 1.50 inch (38.1 mm) Outside diameter. Wall Thickness: 0.125 (3.18 mm).

Elbow Length from Weld Seam: 12 inch (305 mm).

Color to match handrail.

* + - * 1. Welded Corner Elbows: \_\_\_\_\_ degree. Diameter: 1.50 inch (38.1 mm) Outside diameter. Wall Thickness: 0.125 (3.18 mm).

Elbow Length from Weld Seam: 12 inch (305 mm).

Color to match handrail.

* + - * 1. Wall Bracket or Post-Mount Saddle Bracket: Cast aluminum. Cradles handrail, firmly anchoring it against any flat surface.

Bracket Spacing: 48 inch (1219 mm).

Color to match handrail.

* + - * 1. End Cap: Extruded aluminum and aluminum plate welded assembly. Made to press fit into ends of handrails.

Color to match handrail.

* + - * 1. Wall Return: 90 degree. Diameter: 1.50 inch (38.1 mm) Outside diameter. Wall Thickness: 0.125 (3.18 mm).

Seals open ends of handrail per most residential handrail building codes. Use to complete your aluminum handrail.

Long Leg Length from Weld Seam: 12 inch (305 mm).

Short Leg Length from Weld Seam: 3.07 inch (78 mm).

Color to match handrail.

* + - * 1. End Loop: Used to complete aluminum handrails. 180 degrees. Diameter: 1.50 inch (38.1 mm) Outside diameter. Wall Thickness: 0.125 (3.18 mm).

Overall Length: 24 inches (610 mm). ends are to be cut to size at the job site.

* + - * 1. Splice: Small, grooved tube tightly grips the insides of handrail for a secure hold. Connects straight, corner, and end pieces of handrail.

Material: Extruded aluminum.

Allows for especially long or winding handrails.

Economic, light-weight material.

* + 1. Aluminum Material:

\*\* NOTE TO SPECIFIER \*\* Delete alloy and temper not required.

* + - 1. Extruded Pipe: Alloy 6061-T6, ASTM B221.
      2. Extruded Pipe: Alloy 6005-T52, ASTM B221.
      3. Extruded Pipe: Alloy 6063-T6, ASTM B221.

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

* + - 1. Extruded Bars, Shapes and Mouldings: Alloy 6063-T6, ASTM B221.
      2. Extruded Bars, Shapes and Mouldings: Alloy 6005-T5, ASTM B221.
      3. Castings: Almag 35, ASTM B26.
    1. Aluminum Finish: NAAMM/NOMMA Metal Finishes Manual. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

\*\* NOTE TO SPECIFIER \*\* Delete finishes and color option not required. Custom colors are available.

* + - 1. Powder Coat Finish: AA-C12-C42-R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply manufacturer's standard baked powder coat finish. Comply with coating manufacturer's written instructions for cleaning, surface preparation, pretreatment, and application.
         1. Color: As selected by Architect from manufacturer's full range.
         2. Color: Black. Power coat.
         3. Color: Bronze. Power coat.
         4. Color: Natural. Power coat.
         5. Color: White. Power coat.
         6. Color: \_\_\_\_\_\_.
      2. Polyester Powder Coating: 3.0 mil (0.076 mm). Comply with AAMA 2604, including, but not limited to, average film thickness. Subject to compliance with requirements, provided by the following product: 1) "TIGER DRYLAC SERIES 38" Powder Coatings,
         1. Color: As selected by Architect from manufacturer's full range.
         2. Color: \_\_\_\_\_\_.
      3. Clear Anodized Finish: AA-M10-C22-A31 (204R1).

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

* 1. STEEL RAILINGS WITH CABLE INFILL
     1. Steel Railings with Cable Infill.

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

* + - 1. Mounting: Top (Deck) Mounted Posts.
      2. Mounting: Side (Fascia) Mounted Posts.
      3. Mounting: Core Mounted Posts.

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

* + - 1. Rail Height: 36 inches (914 mm).
      2. Rail Height: 42 inches (1067 mm).

\*\* NOTE TO SPECIFIER \*\* When using vertical cable railing, top and bottom rails should be specified with the thicker components. Delete type not required.

* + - 1. Cable Railing System: Horizontal.
      2. Cable Railing System: Vertical.

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

* + - 1. Posts: Steel Round.
      2. Posts: Steel Square.
      3. Posts: Steel Rectangular.

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

* + - 1. Top Rail Type: Steel Square.
      2. Top Rail Type: Steel Round.
      3. Top Rail Type: Wood.
      4. Foot Rail Type: Steel Square.
      5. Foot Rail Type: Steel Round.
    1. Steel Components: Provide manufacturer's standard components as follows:
       1. Material: Carbon steel.

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

* + - 1. Braces: Intermediate Rail Braces.

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

* + - 1. Braces: Intermediate Cable Braces:
         1. Type: Single piece.
         2. Size: As indicated on Drawings.

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

* + - * 1. Spacing: Maximum 60 inches (1524 mm) on center.
        2. Spacing: As indicated on Drawings.
      1. Cable Grommets:
         1. Material: Ultraviolet-resistant Delrin or equivalent.
         2. Prevent abrasion of intermediate posts, end posts, and cable braces bored for cables.
         3. Color: Black.
    1. Steel Material:

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

* + - 1. Pipe: ASTM A53.

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

* + - 1. Tubing: ASTM A500.
      2. Tubing: ASTM A501.
      3. Tubing: ASTM A512.
      4. Bars and Shapes: ASTM A36.
      5. Castings: Malleable Iron ASTM A47 or A48.
      6. Castings: Ductile Iron ASTM A47 or A48.
      7. Castings: Grey Iron ASTM A47 or A48.
    1. Steel Finish: NAAMM/NOMMA Metal Finishes Manual.

\*\* NOTE TO SPECIFIER \*\* Delete surface prep not required.

* + - 1. Surface Preparation: Remove mill scale, rust and dirt following SSPC SP2 for hand cleaning.
      2. Surface Preparation: Remove mill scale, rust and dirt following SSPC SP3 for power tool cleaning.

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

* + - 1. Hot Dipped Galvanizing: Sheet products shall be galvanized in accordance with ASTM A525 and ASTM A526.

\*\* NOTE TO SPECIFIER \*\* Insert galvanized coating weight required.

* + - * 1. Minimum coating weight \_\_\_\_\_\_ oz/sq. ft.
        2. Touch up for Galvanized Surfaces: Use paint primer FS-TT-P-645.

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

* + - 1. Zinc Rich Primer: Minimum one coat of rust-inhibitive primer FS-TT-P-641 Zinc Dust-Zinc Oxide Primer Coating (for Galvanized Surfaces).

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

* + - 1. Primer: Minimum one coat of rust-inhibitive primer FS-TT-P-645 Alkyd Type, Zinc Chromate, Paint Primer.

\*\* NOTE TO SPECIFIER \*\* Insert type and color of factory applied paint finish. Delete if not required.

* + - 1. Painted finish shall be \_\_\_\_\_\_ type and \_\_\_\_\_\_ color.

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

* 1. STAINLESS STEEL RAILINGS WITH CABLE INFILL
     1. Stainless Steel Railings with Cable Infill.

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

* + - 1. Mounting: Top (Deck) Mounted Posts.
      2. Mounting: Side (Fascia) Mounted Posts.
      3. Mounting: Core Mounted Posts.

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

* + - 1. Rail Height: 36 inches (914 mm).
      2. Rail Height: 42 inches (1067 mm).

\*\* NOTE TO SPECIFIER \*\* When using vertical cable railing, top and bottom rails should be specified with the thicker components. Delete type not required.

* + - 1. Cable Railing: Horizontal.
      2. Cable Railing: Vertical.

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

* + - 1. Posts: Steel Round.
      2. Posts: Steel Square.
      3. Posts: Steel Rectangular.

\*\* NOTE TO SPECIFIER \*\* Below fastener type is for round post. Delete if not required.

* + - 1. Fasteners: 4 Anchor Bolts: 3/8 inch (9.5 mm) diameter Redhead ITW wedge, with minimum 8 inch (203 mm) embedment.

\*\* NOTE TO SPECIFIER \*\* Below fastener list is for square post. Delete if not required.

* + - 1. Fasteners:

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

* + - * 1. 3/8 inch (9.5 mm) diameter Redhead ITW wedge, with minimum 4 inch (102 mm) embedment.
        2. 3/8 inch (9.5 mm) diameter Redhead LDT (SLDT-3816), with minimum 4 inch (102 mm) embedment.
        3. 3/8 inch (9.5 mm) diameter lag screw, with minimum 8 inch (203 mm) embedment.
        4. 3/8 inch (9.5 mm) diameter through bolt, with minimum 6 inch (152 mm) wood blocking.

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

* + - 1. Top Rail Type: Steel Square / Rectangular.
      2. Top Rail Type: Steel Round.
      3. Top Rail Type: Wood.
      4. Foot Rail / Handrail Type: Steel Square / Rectangular.
      5. Foot Rail / Handrail Type: Steel Round.
    1. Stainless Steel Components: Provide manufacturer's standard components as follows:

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

* + - 1. Round Intermediate Post: 2 inch (51 mm) OD diameter x 0.065 inch (1.65 mm) thickness, type 316 stainless steel welded tubing.
      2. Round Terminal Post: 2 inch (51 mm) OD diameter x 0.157 inch (4.00 mm) thickness, type 316 stainless steel welded tubing.
      3. Square Intermediate Post: 2 x 2 inch (51 x 51 mm) x 0.079 inch (2.00 mm) wall thickness, type 316 stainless steel.
      4. Square Terminal Post: 2 x 2 inch (51 x 51 mm) x 0.197 inch (5.00 mm) wall thickness, type 316 stainless steel.

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

* + - * 1. Spacing: Maximum 30 inches (762 mm) on center between end and intermediate posts.
        2. Spacing: As indicated on Drawings.

\*\* NOTE TO SPECIFIER \*\* Delete cable assembly not required.

* + - 1. Cable Assemblies: 1/8 inch (3 mm) 1x19 fittings to be sized according to cable diameter. Fittings, type 316 measure grade stainless.
      2. Cable Assemblies: 3/16 inch (5 mm) 1x19 fittings to be sized according to cable diameter. Fittings, type 316 measure grade stainless.

\*\* NOTE TO SPECIFIER \*\* Delete base plate not required.

* + - 1. Round Base Plate: 4-1/2 inch (114 mm) diameter by 0.35 inch (8.9 mm) minimum, type 316 stainless steel.
      2. Square Base Plate: 4 x 4 inch (102 x 102 mm) x 0.1118 inch (8.9 mm) minimum, type 316 stainless steel.

\*\* NOTE TO SPECIFIER \*\* Delete top rail not required.

* + - 1. Top Rail Type: Round 2 inch (51 mm) OD diameter x 0.065 inch (1.65 mm) thickness, type 316 stainless steel welded tubing.
      2. Top Rail Type: Rectangular 0.5 x 2 inch (13 x 51 mm) x 0.079 inch (2.0 mm) wall thickness, type 316 stainless steel.
      3. Foot Rail / Handrail Type: Round 1.5 inch (38 mm) OD diameter x 0.065 inch (1.65 mm) thickness, type 316 stainless steel welded tubing
      4. Foot Rail / Handrail Type: Rectangular 0.5 x 2 inch (13 x 51 mm) 0.079 inch (2.0 mm) wall thickness, type 316 stainless steel.
      5. End Caps: Stainless steel end caps for exposed open ends of rails, tubes, and profiles.

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

* + - 1. Intermediate Cable Braces:
         1. Type: Single piece.
         2. Size: As indicated on Drawings.

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

* + - * 1. Spacing: Maximum 60 inches (1524 mm) on center.
        2. Spacing: As indicated on Drawings.
      1. Cable Grommets:
         1. Material: Ultraviolet-resistant Delrin or equivalent.
         2. Prevent abrasion of intermediate posts, end posts, and cable braces bored for cables.
         3. Color: Black.
    1. Stainless Steel Material:

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

* + - 1. Stainless Steel: Type 302.
      2. Stainless Steel: Type 304.
      3. Stainless Steel: Type 316.
      4. Stainless Steel: Type 316L.
      5. Stainless Steel: Type 304L.
      6. Bar: ASTM A666.

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

* + - 1. Pipe and Tubing: ASTM A269.
      2. Pipe and Tubing: ASTM A312.
      3. Cable: MIL-W-87161, Type II, Composition B.
      4. Cable Hardware: ASTM A276 and A479, SAE/AMS QQ-S-766, Type 316.
      5. Finish: Mechanical finish AISI as indicated.
    1. Stainless Steel Finish: NAAMM/NOMMA Metal Finishes Manual.
       1. Stainless Steel: No. 4 satin finish.

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

* 1. WOOD RAILINGS WITH CABLE INFILL
     1. Wood Railings with Cable Infill:

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

* + - 1. Mounting: Top (Deck) Mounted.
      2. Mounting: Side (Fascia) Mounted Posts.

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

* + - 1. Rail Height: 36 inches (914 mm).
      2. Rail Height: 42 inches (1067 mm).

\*\* NOTE TO SPECIFIER \*\* When using vertical cable railing, top and bottom rails should be specified with the thicker components. Delete type not required.

* + - 1. Horizontal Cable Railing System.
      2. Vertical Cable Railing System.

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

* + - 1. Posts: Wood Round.
      2. Posts: Wood Square.
      3. Posts: Wood Rectangular.

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

* + - 1. Top Rail Type: Wood Rectangular.
      2. Top Rail Type: Aluminum Post-To-Post as support profile for Wood.
      3. Top Rail Type: Aluminum Post-To-Post (stand alone).
      4. Top Rail Type: Stainless Steel Round.
      5. Foot Rail / Handrail Type: Aluminum Post-To-Post (stand alone)
      6. Foot Rail / Handrail Type: Stainless Steel Round.
    1. Wood: Provide manufacturer's standard components as follows:

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

* + - 1. Balau Mahogany Post: 3.5 x 3.5 inches (89 x 89 mm), engineered.
      2. Western Red Cedar Post (4x4): 4 x 4 inches (102 x 1023 mm), 1.31 inch (33.3 mm) wall thickness, hollow center, engineered.
      3. Western Red Cedar Post (6x6): 6 x 6 inches (152 x 152 mm), 1.31 inch (33.3 mm) wall thickness, hollow center, engineered.

\*\* NOTE TO SPECIFIER \*\* Delete cable assembly not required.

* + - 1. Cable Assemblies: 1/8 inch (3 mm) 1x19 fittings to be sized according to cable diameter. Fittings shall be 316 measure grade stainless.
      2. Cable Assemblies: 3/16 inch (5 mm) 1x19 fittings to be sized according to cable diameter. Fittings, type 316 measure grade stainless.

\*\* NOTE TO SPECIFIER \*\* Delete top rail not required.

* + - 1. Balau Mahogany Top Rail (2x4): Rectangular cross section 2 x 4 inches (51 x 102 mm).
      2. Balau Mahogany Top Rail (5/4x4): Rectangular cross section 1.25 x 4 inches (32 x 102 mm) (to be mounted on 1-7/8 x 1-3/16 inch (48 x 30 mm) extruded aluminum Post-to-Post Handrail).
      3. Balau Mahogany Top Rail (5/4x6): Rectangular cross section 1.25 x 6 inches (32 x 152 mm) (to be mounted on 1-7/8 x 1-3/16 inch (48 x 30 mm) extruded aluminum Post-to-Post Handrail).
      4. Ipe Brazilian Walnut Top Rail (2x4): Rectangular cross section 2 x 4 inches (51 x 102 mm).
      5. Ipe Brazilian Walnut Top Rail (5/4x4): Rectangular cross section 1.25 x 4 inches (32 x 102 mm) (to be mounted on 1-7/8 x 1-3/16 inch (48 x 30 mm) extruded aluminum Post-to-Post Handrail).
      6. Ipe Brazilian Walnut Top Rail (5/4x6): Rectangular cross section 1.25 x 6 inches (32 x 152 mm) (to be mounted on 1-7/8 x 1-3/16 inch (48 x 30 mm) extruded aluminum Post-to-Post Handrail).
      7. Alaskan Yellow CedarTop Rail (2x4): Rectangular cross section 2 x 4 inches (51 x 102 mm).
      8. Alaskan Yellow Cedar Top Rail (5/4x4): Rectangular cross section 1.25 x 4 inches (32 x 102 mm) (to be mounted on 1-7/8 x 1-3/16 inch (48 x 30 mm) extruded aluminum Post-to-Post Handrail).
      9. Alaskan Yellow Cedar Top Rail (5/4x6): Rectangular cross section 1.25 x 6 inches (32 x 152 mm) (to be mounted on 1-7/8 x 1-3/16 inch (48 x 30 mm) extruded aluminum Post-to-Post Handrail).
      10. Western Red Cedar Top Rail (2x4) (clear, mixed, or tight-knot grain): Rectangular cross section 2 x 4 inches (51 x 102.
      11. Western Red Cedar Top Rail (2x6) (clear, mixed, or tight-knot grain): Rectangular cross section 2 x 6 inches (51 x 152 mm).
      12. Western Red Cedar Top Rail (5/4x4) (clear, mixed, or tight-knot grain): Rectangular cross section 1.25 x 4 inches (32 x 102 mm) (to be mounted on 1-7/8 inch by 1-3/16 inch (48 x 30 mm) extruded aluminum Post-to-Post Handrail).
      13. Western Red Cedar Top Rail (5/4x6) (clear, mixed, or tight-knot grain): Rectangular cross section 1.25 x 6 inches (32 x 152 mm) (to be mounted on 1-7/8 x 1-3/16 inch (48 x 30 mm) extruded aluminum Post-to-Post Handrail).
    1. Wood Material:

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

* + - 1. Balau Mahogany: E4E (eased 4 edges) and S4S (sanded 4 sides), Architectural Grade Heartwood, Clear Vertical Grain.
      2. Ipe Brazilian Walnut: E4E (eased 4 edges) and S4S (sanded 4 sides), Architectural Grade Heartwood, Clear Vertical Grain.
      3. Alaskan Yellow Cedar: E4E (eased 4 edges) and S4S (sanded 4 sides), Architectural Grade Heartwood, Clear Vertical Grain.
      4. Western Red Cedar: E4E (eased 4 edges) and S4S (sanded 4 sides), Architectural Grade Heartwood,
         1. 3 Grain Options:

Clear Vertical Grain

Mixed Grain

Tight-Knot Grain

* + 1. Wood Finish:

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

* + - 1. Natural finish, no applied finish.
      2. Stained finish, color as selected by Architect.

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

* 1. CABLE RAILING COMPONENTS
     1. Cables:
        1. Material: 1 x 19, Type 316 stainless steel strand, left-hand lay, per dimensional properties contained in MIL-DTL-87161.

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

* + - 1. Finish: Mill.
      2. Finish: PVC coated, color to be selected from manufacturer's standards.

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

* + - 1. Diameter: 1/8 inch (3 mm), minimum breaking strength of 1,780 pounds.
      2. Diameter: 3/16 inch (5 mm), minimum breaking strength of 4000 pounds.
      3. Diameter: 1/4 inch (6 mm), minimum breaking strength of 6,900 pounds.
      4. Diameter: 5/16 inch (8 mm), minimum breaking strength of 10,600 pounds.
      5. Diameter: 3/8 inch (10 mm), minimum breaking strength of 14,800 pounds.

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

* + - 1. Spacing: Maximum 3 inches (76 mm) on center.
      2. Spacing: As indicated on Drawings.
      3. Cable Hardware Components:
         1. Material: Stainless steel, ASTM A276 and A479, SAE/AMS QQ-S-763, Type 316.
         2. Include washers, nuts, end caps and any accessory items as recommended by manufacturer for installation conditions or as shown on Drawings.

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

* + - * 1. Type: Use swageless hardware wherever practical.
        2. Type: Use hardware substantially concealed inside end posts wherever practical.
        3. Type: Use most economical combinations of fittings practical.
        4. Type: Use fittings as indicated on Drawings.

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

* + - * 1. Factory Assembly: Factory Threaded Tensioner/Factory. Threaded Terminal/Acorn Nut, Hex Nut, & Stainless Washer or Cable Quick Nut & Cover.
        2. Field Assembly: Field Threaded Tensioner/Field. Threaded Terminal/Acorn Nut, Hex Nut, & Stainless Washer or Cable Quick Nut & Cover.
        3. Cable Quick Lock Swageless Assembly Type 1: Field Threaded Tensioner/Cable Quick Lock Swageless Receiver/Cable Quick Nut Connector/Cable Quick Nut & Cover.
        4. Cable Quick Lock Swageless Assembly Type 2: Cable Quick Lock Swageless Receiver/Terminal Hex Bolt/Cable Quick Receiver & Stud.
        5. Low Profile Assembly: Cable Quick Terminal/Terminal Hex Bolt/Cable Quick Receiver & Stud.
        6. Fine-Line Ball Assembly: Fine-Line Ball Turnbuckle/Swage Ball End.
        7. Fine-Line Button Assembly: Fine-Line Button Turnbuckle/Swage Ball End.
        8. Fine-Line Lag Assembly: Fine-Line Lag Turnbuckle/Swage Lag End.
        9. Fine-Line Jaw-Wood Assembly: Fine-Line Jaw Turnbuckle/Fixed Jaw Clevis.
        10. Fine-Line Jaw-Metal Assembly: Fine-Line Jaw Turnbuckle/Fixed Jaw Clevis/Threaded Eye.
        11. Fine-Line Jaw-Eye Assembly: Fine-Line Jaw Turnbuckle/Fixed Jaw Clevis/Surface Mount Eye.
        12. Fine-Line Drill & Tap Assembly: Fine-Line Jaw Turnbuckle/Swage Stud.
        13. Classic Ball Assembly: Classic Ball Turnbuckle/Swage Ball End.
        14. Classic Button Assembly: Classic Button Turnbuckle/Swage Button End.
        15. Classic Jaw Assembly: Classic Jaw Turnbuckle/Swage Jaw End.
        16. Surface Mount Toggle Assembly: Surface Mount Toggle Turnbuckle/Surface Mount Toggle End
        17. European Jaw Assembly: European Jaw Turnbuckle/European Jaw End
        18. Custom configuration: Tensioning End \_\_\_\_\_\_ Non-Tensioning End\_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Check governing codes for dimensional and structural requirements. Delete brackets not required.

* + 1. Handrail Brackets
       1. Aluminum; cast: SC&R No. \_\_\_\_\_\_\_\_.
       2. Stainless Steel; cast: SC&R No. \_\_\_\_\_\_\_.
    2. Fasteners:
       1. Handrail Anchors: Select fasteners of type, grade and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
       2. Handrail and Railing Component Anchors: Use fasteners fabricated from same basic metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
          1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are standard fastening method for handrail and railing indicated.
          2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
       3. Cast-in-Place and Post Installed Anchors: Provide anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four items the load imposed when installed in concrete, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
          1. Cast-in-place anchors.
          2. Chemical anchors.
          3. Expansion anchors.
    3. Grout and Anchoring Cement:
       1. Non-Shrink, Non-Metallic Grout: Provide premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
       2. Interior Anchoring Cement: Provide factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at project site to create pourable anchoring, patching and grouting compound. Use for interior applications only.
  1. FABRICATION
     1. Fabricate handrails and railings by connecting members with railing manufacturer's standard concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
     2. Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
     3. Provide inserts and other anchorage devices to connect handrails and railings to concrete or masonry. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
     4. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
     5. Cut, reinforce, drill, and tap components as indicated on the Drawings to receive finish hardware, screws, and similar items.
     6. Close exposed ends of railing members with prefabricated end fittings.
     7. Provide mounted handrail wall returns at wall ends unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6 mm) or less.

1. EXECUTION
   1. EXAMINATION
      1. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
         1. Examine substrates to receive anchors verifying that locations of concealed reinforcements have been clearly marked for the Installer. Locate reinforcements and mark locations if not already done.
         2. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.
   2. PREPARATION
      1. Coordinate setting drawings, diagrams, templates, instructions, and directions for installing anchors, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the Project site.
   3. INSTALLATION
      1. General: Install components in accordance with manufacturer's instructions and in proper relationship with adjacent construction.
         1. Fitting: Fit exposed connections together to form tight, hairline joints.
         2. Cutting and Placement: Set handrails and railings accurately in location, alignment, and elevation measured from established lines and levels and free from rack.
            1. Do not weld, cut, or abrade coated or finished surfaces of railing components that are intended for field connection by mechanical or other means without further cutting or fitting.
            2. Align rails so variations from level or parallel alignment do not exceed 1/4 inch in 12 feet (1.6 mm per m).
            3. Provide manufacturer's proprietary system to evacuate entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources, in order to prevent water from entering the concrete slab. In lieu of the manufacturer's proprietary system, if acceptable to the Architect, provide another means to evacuate the entrapped water, i.e., a weep hole and epoxy fill system ("drill-and-fill").
            4. Anchor posts in concrete with pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, solidly fill annular space between post and sleeve with non-metallic, non-shrink grout, mixed and placed to comply with anchoring material manufacturer's directions.
            5. Anchor posts in concrete by forming or core drilling holes not less than 5 inches (127 mm) deep and 3/4 inch (19 mm) greater than outside diameter of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-metallic, non-shrink grout, mixed and placed to comply with anchoring material manufacturer's directions.
            6. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8 inch (3 mm) buildup, sloped away from post.
            7. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
            8. Adjusting: Adjust handrails and railings before anchoring to ensure alignment at abutting joint's space posts at interval indicated, but not less than required to achieve structural loads.
            9. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.
      2. Non-Welded Railings Connections: Use mechanical joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings.
      3. Metal Interaction:
         1. When aluminum components come into contact with dissimilar metals, surfaces shall be kept from interacting through painting the dissimilar metal with a heavy coat of a proper primer. The use of plastic grommets and/or PVC sleeves is encouraged to prevent contact between stainless steel cables and aluminum hole edges.
         2. When aluminum components come into contact with cement or lime mortar, exposed aluminum surfaces shall be painted with water-white methacrylate lacquer.
   4. ADJUSTING AND CLEANING
      1. Touch-Up Painting: Immediately after erection, and abraded areas of shop paint, and appoint exposed areas with same material.
      2. Passivation: Immediately after erection, spray passivation solution on stainless steel frame pieces and cables to restore protective layer. Use Rust Rescue in marine environments for additional protection.
      3. Cleaning: Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit or provide new units.
   5. PROTECTION
      1. Provide final protection and maintain conditions in a manner acceptable to the Installer that shall ensure that the aluminum handrails and railings shall be without damage at time of Substantial Completion.
      2. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.
      3. Protect stainless steel from corrosion and staining by applying passivation solution following installation and periodically thereafter. Use Rust Rescue in addition to passivator in marine environments.
      4. Protect wood products from fading, checking, splitting, etc. with proper end grain sealant and oil treatment.

END OF SECTION