SECTION 05721
ALUMINUM HANDRAILS AND RAILINGS

****NOTE TO SPECIFIER** S.T.A.R.** pre-engineered handrail systems.
This section is based on Aluminum Handrails and Railings manufactured by East & West Aluminum Craft., which is located at the following address:
7465 Conway Ave
Burnaby B.C.
Canada V5E 2P7
Tel: (800) 661-2773
Fax: (604) 438-4021
e-mail: info@starrail.com
S.T.A.R. aluminum railing systems are pre-engineered for use on new and retro-fit projects. The systems' infill areas accommodate pickets or safety glass (tempered or laminated). Components are versatile and interchangeable for varying site conditions. Aluminum components are coated with a durable powder-coated finish and are available in the manufactures standard and custom colors. Custom fabrication is also available. S.T.A.R. products are pre-engineered to meet rigid North American building code requirements and **SECTION 05721 – ALUMINUM HANDRAILS AND RAILINGS.**
USA

PART 1 GENERAL

1.1 SECTION INCLUDES

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

- **a.** Exterior guardrails at balconies
- **b.** Exterior railings at exterior stairs
- **c.** Exterior guardrails and secondary handrails at exterior stairs
- **d.** Exterior guardrails at ramps
- **e.** Other_____

1.2 RELATED SECTIONS

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

- **a.** Section 03300 – Cast-In-Place Concrete: Requirements for placement of anchors or sleeves in concrete.
- **b.** Section 05520 – Handrails and Railings: Metal handrails other than those specified in this section.
- **c**. Section 05522 – Glass Railing: Tempered glass railing systems
- **d**. Section 06114 – Wood Blocking and curbing: Blocking and handrail support
- **e**. Section 06200 – Finish Carpentry: Wood handrails
- **f**. Section 08800 – Glazing: Glass baluster infill.
- **g**. Other:_____

1.3 REFERENCES

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

- **a.** ANSI/CABO A11 – American National Standard for Building and Facilities; Providing Accessible and Usable Buildings and Facilities, Council of American Building Officials.
- **b.** ASTM B 221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
- **c**. ASTM E 935 – Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for buildings.
- **d.** ASTM E 985 – Specification for Permanent Metal Railing and Rails for Buildings.
- **e.** ANSI Z 97.1 – Glazing Materials used in Building Safety Performance Specifications and Method of Test.

f. AAMA 2604-American Architectural Manufactures Association: Voluntary specifications Performance Requirements and test procedures for high performance organic coatings on aluminum extrusions and panels

g. 2015 IBC – International Building Code

h. 2015 IRC - International Residential Code

i. Other_____

1.4 DESIGN REQUIREMENTS

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

a. Design, fabricate and install handrail and railing systems in accordance with ASTM E 985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935.

b. Railing assembly and attachments shall be capable of resisting the following loads:

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1. **Top Rail**

a. Concentrated load of 200 lbs applied at any point in any direction

b. Uniform load of 50 lbs. per linear foot

c. Concentrated load need not be assumed to act concurrently with uniform loads.

2. Handrails not serving as top rails

a. Concentrated load of 200 lbs. per lineal ft applied in any direction

b. Uniform load of 50 lbs. per linear foot applied in any direction

c. Concentrated load need not be assumed to act concurrently with uniform loads.

d. Other_____

2. Infill area of guardrail system

a. Capable of withstanding a load of 50 lbs applied horizontally on an area of 1 sq ft

b. Load is not to be assumed to act concurrently with loads on top rails of railing systems in determining stress on guards.

c. The required safety factor for glass used in handrails and guards is 4

d. The required safety factor for assemblies is 2.5.

e. Other_____

1.5 SUBMITTALS

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

a. Submit under provisions of Section 01300.

b. Product Data: Submit manufacturer's product data for each product required, including installation requirements.

c. Shop Drawings: Provide complete details of entire railing system showing layout, components, fasteners and anchors.

d. Selection samples: Color charts consisting of two complete sets of color chips representing manufacturer's full range of available finishes, and colors for initial color selection.

e. Verification Samples:

1. 12" long picket railing assembly in color specified

2. 12" long glass railing assembly in color specified

3. Other:_____

f. Provide manufactures standard independent test reports supporting load test **r**equirements.

g. Provide project specific sealed stamped independent test reports supporting load test requirements from licensed engineer in which state the project in installed

h. Other_____

1.6 QUALITY ASSURANCE

****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.**

A. Mock-Up: Provide mock-up using acceptable products and manufacturer approved installation methods. Verify owner and architect's acceptance of finish color and workmanship standard.

1. Install one railing section of each type required: Location and quantity of mock-up shall be approved by the Architect.

2. Maintenance: Maintain mock-up during construction for workmanship comparison.

****NOTE TO SPECIFIER** Delete one of the following two choices for final disposition of mock-up. Incorporation requires.**

3. Removal: Remove and legally dispose of mock-up when no longer needed.

4. Incorporation: Incorporate mock-up into final construction

1.7 STORAGE AND PROTECTION

a. Store material protected from exposure in a dry, clean location away from uncured concrete, masonry, mortar, stucco and painting operations.

1.8 PROJECT CONDITIONS

a. Verify actual dimensions by field measurement before fabrication.

****NOTE TO SPECIFIER:**** ***CAUTION!*** Where field measurements cannot be made without delaying work, the manufacturer will require guaranteed dimensions from the contractor in writing prior to proceeding with fabrication.

b. Coordinate field measurements and fabrication schedules with construction progress to avoid delays.

PART 2 PRODUCTS

2.1 MANUFACTURERS

a. Acceptable Manufacturer: STAR Systems International Ltd , 7465 Conway Avenue ,Burnaby BC Canada V5E 2P7
Tel. (800) 661-2773 Fax. (604) 438-4021; e-maill: info@starrail.com web site: www.starrail.com

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

b. Substitutions: Not Permitted.
c. Requests for substitutions will be considered in accordance with provisions of Section 01600

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2.2 MATERIALS

****NOTE TO SPECIFIER**** There are two basic rail styles available.

The most common system is the "Classic" rail design; the system offers a continuous uninterrupted top rail running over the 2" support posts below. The system has two standard infill options. OPTION 1 is a picket infill and OPTION 2 is a safety glass infill.

Alternatively we offer our "Colonial" rail design, the systems top rail terminates into 2 ¾" newel posts that protrudes above the top rail. The system has two standard infill options. OPTION 3 is a picket infill and OPTION 4 is a safety glass infill.

Refer to STAR product catalogue or the manufactures web site for additional information. Multiple options are available for the guardrail infill types, as well as custom guardrail fabrication. Contact STAR for additional choices and for technical support

A. STAR " CLASSIC" Aluminum Guardrail Systems

Option 1-Aluminum Picket **S.T.A.R. CLASSIC Guardrail System**: Components fabricated of extruded aluminum in accordance with ASTM B 221.

NOTE System features a continuous top rail running over top of posts mechanically fastened below. The standard rail offering has a picket infill 5/8" x 5/8" x.050 wall thickness running between the top and bottom horizontal members. Rails with horizontal mid rail option and optional infill designs are available, contact STAR for additional information

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1. **Top Rail Style: Alloy 6005-T5 or equivalent / Typical top rail wall thickness .070**
   a. 2" high X 2 ½" wide Square picket top rail profile (standard-deck rail profile).
   b. 1 7/8" high X 1 7/8" wide Square picket top rail profile (standard stair rail profile)
   c. Standard stair rail with secondary handrail (refer to STAR product catalogue)
   d. Other:_____

2. **Bottom Rail: Alloy 6005-T5 or equivalent / Typical top rail wall thickness .070**
   a. Rectangular 1" inches high by 1 ½" inches wide
   b. Other:_____

3. **Picket (Baluster) between top and bottom rails , Alloy 6005-T5 or equivalent**
   a. Square 5/8" X 5/8" X .050 wall thickness
   b. Square ¾" X ¾" x .062 wall thickness
   c Rectangular 5/8" X 1 ½". X .050 wall thickness
   d. Other:_____

4. **Posts: Alloy 6061–T6 or equivalent/ Typical post wall thickness .125**
   - **a.** 2" x 2" x.125 posts with welded top and bottom connection sleeves mechanically field attached to horizontal rail members (standard).
   - **b.** other:_____

Option 2-Aluminum STAR CLASSIC Safety Glass Guardrail System: Components fabricated of extruded aluminum in accordance with ASTM B 221

NOTE System features a continuous top rail running over top of posts mechanically fastened below
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1. **Top Rail Style: Alloy 6005-T5 or equivalent / Typical top rail wall thickness .070**
   - a. 2" high X 2 ½" wide Square picket top rail profile (standard-deck rail profile).
   - b. 1 7/8" high X 1 7/8" wide Square picket top rail profile (standard stair rail profile)
   - c. Standard stair rail with secondary handrail (refer to STAR product catalogue)
   - d. Other:_____

2. **Bottom Rail: Alloy 6005-T5 or equivalent / Typical top rail wall thickness .070**
   - **a.** Rectangular 1" inches high by 1 ½" inches wide
   - **b.** Other:_____

3. **Glass Infill Barrier**

   - **a.** Tempered Glass: Clear ¼" (6mm) thick conforming to ANSI Z 97.1
   - **b.** Tempered Glass: Tinted_____color, ¼" (6mm) thick conformation to ANSI Z 97.1
   - **c.** Other_____

4. **Posts: Alloy 6061-T6 or equivalent/ Typical post wall thickness .125**
   - **a.** 2" x 2" x.125 posts with welded top and bottom connection sleeves mechanically field attached to horizontal rail members (standard).
   - **b.** other:_____

B. STAR "COLONIAL " Aluminum Guardrail Systems

Option 3-Aluminum Picket **STAR COLONIAL Guardrail System**: Components fabricated of extruded aluminum in accordance with ASTM B 221.

NOTE System features a rail running between a post to post system with newel posts protruding above top rail interrupting top rail. The standard rail offering has a picket infill 5/8" x 5/8" x.050 wall thickness running between the top and bottom horizontal members. Rails with horizontal mid rail option and optional infill designs are available, contact STAR for additional information

1. **Top Rail Style: Alloy 6005-T5 or equivalent / Typical top rail wall thickness .070**
   - a. 2" high X 2 ½" wide Square picket top rail profile (standard-deck rail profile).
   - b. 1 7/8" high X 1 7/8" wide Square picket top rail profile (standard stair rail profile)
   - c. Standard stair rail with secondary handrail (refer to STAR product catalogue)
   - d. Other:_____

2. **Bottom Rail: Alloy 6005-T5 or equivalent / Typical top rail wall thickness .070**
   - **a.** Rectangular 1" inches high by 1 ½" inches wide

b. Other:_____

3. **Picket (Baluster) between top and bottom rails , Alloy 6005-T5 or equivalent**
   a. Square 5/8" X 5/8" X .050 wall thickness
   b. Square ¾" X ¾" x .062 wall thickness
   c Rectangular 5/8" X 1 ½". X .050 wall thickness
   d. Other:_____

4. **Posts: Alloy 6061-T6 or equivalent / Typical wall thickness .080**
   a. 2 ¾" X 2 ¾" .080 posts with welded top and bottom connection sleeves mechanically field attached to horizontal rail members (standard)
   b. other:_____

Option 4-**Aluminum Tempered STAR Colonial Glass Guardrail System: Components fabricated of extruded aluminum in accordance with ASTM B 221** .

NOTE System features a rail running between a post to post system with newel posts protruding above top rail interrupting top rail.

1. **Top Rail Style: Alloy 6005-T5 or equivalent / Typical top rail wall thickness .070**
   a. 2" high X 2 ½" wide Square picket top rail profile (standard-deck rail profile).
   b. 1 7/8" high X 1 7/8" wide Square picket top rail profile (standard stair rail profile)
   c. Standard stair rail with secondary handrail (refer to STAR product catalogue)
   d. Other:_____

2. **Bottom Rail: Alloy 6005 -T5 or equivalent / Typical top rail wall thickness .070**
   a. Rectangular 1" inches high by 1 ½" inches wide
   b. Other:_____

3. **Glass Infill Barrier**

   a. Tempered Glass: Clear ¼" (6mm) thick conforming to ANSI Z 97.1
   b. Tempered Glass: Tinted_____color, ¼" (6mm) thick conformation to ANSI Z 97.1
   c. Other_____

4. **Posts: Alloy 6061-T6 or equivalent / Typical wall thickness .080**
   a. 2 ¾" X 2 ¾" .080 posts with welded top and bottom connection sleeves mechanically field attached to horizontal rail members (standard)
   b. other:_____

5. **Mounting System**: Anchoring system capable of withstanding structural design load stated.
****NOTE TO SPECIFIER**** Identify mounting system or systems. If more than one system is required, show the location on the drawings.

   a. Posts surface-mounted to substrate with bottom plates. Base plate detail to be specified on final shop drawings (standard).
   b. Post fascia-mounted to outer deck surface (optional).
   c. Posts core mounted to substrate using non-corrosive non-shrink grout recommended by grout manufacturer for interior and exterior applications (optional).

6. Post Spans:

NOTE TO SPECIFIER Maximum post spans will vary depending on job site conditions. Never span more than 5'6" on center between railing posts. Railings longer than 12' in length will require reduced spans consult a design professional, professional engineer or your STAR representative for additional information.

a. _____" maximum post spans

7. Guardrail termination at wall columns:

a. Connect to building walls or support columns at top and bottom locations (and any applicable mid-rail locations) using top and bottom sleeve connectors.

b. Post to be used at railing termination points such as building walls or support columns in addition to top sleeve connectors to the building and / or columns to reduce guardrail deflection.

c. Freestanding end post at termination points such as building walls or support columns'

d. Other: _____

8. Fasteners:

a. Rail frame assembled using standard stainless steel fasteners to assemble rail frame.

b. Rail frame assembled using custom color matching stainless steel fasteners

c. Other _____.

9. Anchors

a. Rail base anchor to be stainless steel as recommended by the manufacturer

b. Other:_____

2.3 FABRICATION

NOTE TO SPECIFIER Select assembly method required from the following two paragraphs. Delete the paragraph not requited

a. Posts for aluminum guardrail system with baluster (pickets) shall not exceed ___ inches O.C.

b. Posts for aluminum tempered glass guardrail systems shall not exceed ___ inches O.C

c. Assembly Methods

1. Posts to be mechanically connected to components in the field in accordance with the manufacturers instructions.

d. Supply components required for anchorage of fabrications. Fabricate anchors and related components of stainless steel.

e. Exposed mechanical fastenings: Pan-head screws or bolts; unobtrusively located, consistent with design of components, and manufacture recommended installation methods except where specifically noted otherwise.

f. Use external sleeves and fittings for transitional connections.

g. Typical top rail splices shall be accomplished by inserting top rail into external sleeve over post locations and securing by means of stainless screw or acceptable method.

h. Close exposed ends of handrail with end caps.

i. Accurately form components to suit field conditions.

2.4 FINISH

****NOTE TO SPECIFIER** Select one of the coating system required below. Standard finish is electrostatically applied powder coated finish in the color selections noted below to comply with AAMA-2604 specifications. Alternative powder coated finishes and custom colors are available at a additional cost and longer lead times. Optional high performance coating meeting AAMA-2605 are available and is usually recommended in high UV, extreme environmental and coastal conditions is available at a additional cost and longer lead times .**

1. Powder coated finish to comply with AAMA-2604 specification. Color to be (insert color name from list below here) as selected from manufactures standard color offerings . No substitutes permitted.

****NOTE TO SPECIFIER** Select one of the following color selections from list below and insert in bullet # 1 above**

a. Color to be selected from manufactures standard color selections:

1. White
2. Black
3. Textured Black
4. Oil Rub Bronze (Textured)
5. Tundra
6. Sandalwood
7. Ontario Gray
8. Fence Green
9. Rideau
10. Bronze
11. Balsa Beige
12. Electric Grey
13. Anodized Aluminum

2. Powder coated finish to comply with AAMA-2604 specification. Custom color to be specified by owner's representative or architect from manufactures full range for color and gloss including custom colors. No substitutes permitted

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****NOTE TO SPECIFIER** Optional High performance finishes are available for high UV, extreme environmental and coastal conditions . Additional costs and longer lead times will apply for selections noted below.**

3. High performance finish – Powder coated finish to comply with AAMA 2605 specifications. Custom color to be specified by owner's representative or architect, from manufactures full range for color and gloss including custom colors. No substitutes permitted.

4. Other_____

PART 3 Execution

3.1 Examination

a. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

b. Verify that surfaces are properly prepared to receive installation of guardrails.

3.2 Installation

a. Install handrail and railings to systems in accordance with the approved shop drawings and the manufacturer's installation instructions. Maintain 42" minimum rail height and follow surface slope unless otherwise noted.
b. Provide anchors, plates, angles required for mounting railings.
c. Install components plumb and level, accurately fitted, free from distortion or defects
d. Prevent galvanic action by insulating metals and other materials from direct contact with incompatible materials. Coat concealed surfaces of aluminum alloys that will be in contact with grout, concrete, masonry, wood or dissimilar metals with a heavy coat of bituminous paint or neoprene gaskets.
e. Anchor railings securely to structure. Conceal bolts and screws whenever possible.

3.3 Adjusting and Cleaning

a. Verify that guardrail is plumb and rigidly secured to substrate; make any adjustments required.
b. Clean areas of installation and handrail components, using materials and methods recommended by manufacturer. Remove from project site packaging and debris caused by installation.

END OF SECTION