SECTION 05 73 00

ORNAMENTAL ALUMINUM RAILING

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\*\* NOTE TO SPECIFIER \*\* Superior Aluminum Products, Inc.; Ornamental aluminum railing products.
.
This section is based on the products of Superior Aluminum Products, Inc., which is located at:
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Web: [www.superioraluminum.com](http://www.superioraluminum.com)
 [ [Click Here](http://www.arcat.com/arcatcos/cos35/arc35848.html) ] for additional information.
Superior Aluminum's product lines are being continuously improved and refined. When you install our columns, railings, or fence on your property, you can be certain that you are receiving the best possible offering on the market. A key component that sets Superior Aluminum apart from other column, railing, and fence providers is an impeccable record of customer service. From concept design and product selection, to production and delivery, a Superior representative is committed to your satisfaction at every step of the way.
Superior Aluminum employs a team of full time engineers to create CAD drawings of each project. These CAD drawings are followed during manufacturing to create a railing system that ensures a perfect fit for your project, and makes installation simple and efficient while limiting field fabrication.
Superior Aluminum products are designed to meet local, state, and federal building codes, including the Americans with Disabilities Act. Superior columns feature a load-bearing design that will support your structure and keep all parties safe.
Superior Aluminum has been family owned and operated since 1966, now in its 3rd generation of business management. You can be assured that the service you receive from Superior will be second to none, as this longevity is a testament to the dedication and pride we have in our work.
The materials that go into Superior's columns, railings, and fence are sourced from the United States and Canada, as well as recycled content, and the finished products are fabricated and assembled at our manufacturing facility located in Ohio. This means you can be confident in the quality and craftsmanship you receive. This also means that Superior products qualify for LEED MR 4 credits for recycled content and possibly LEED MR5 credit for locally sourced material.

1. GENERAL
	1. SECTION INCLUDES

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

* + 1. Ornamental Aluminum Railing.
		2. Decorative Wire Rope Railing
		3. Aluminum Pipe Railing
	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 Cast-In-Place Concrete: Placement of sleeves cast in concrete.
		2. Section 05 50 00 - Metal Fabrications.
		3. Section 05 51 33 - Metal Ladders
		4. Section 05 73 13 - Glazed Decorative Metal Railings
	1. REFERENCES

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

* + 1. ANSI A1264.1 - Safety Requirements for Workplace Floor and Wall Openings, Stairs, and Railing Systems.
		2. ASTM A 492 - Standard Specification for Stainless Steel Rope Wire
		3. ASTM B 211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, Wire.
		4. ASTM B 247 - Standard Specification for Aluminum and Aluminum Die Forgings, Hand Forgings and rolled Ring Forgings.
		5. ASTM B 429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
		6. ASTM E 935 - Standard Test Methods for Permanent Metal Railing Systems and Rails for Buildings.
	1. DESIGN / PERFORMANCE REQUIREMENTS
		1. Comply with requirements of building authorities having jurisdiction in Project location and the following:
			1. Handrail Standard: ANSI A1264.1
			2. Occupational Safety and Health Administration - 29 CFR 1910.23 - Guarding floor and wall openings.
		2. Structural Performance: Engineer, fabricate, and install handrails, guardrails, and railing systems to withstand, when tested per ASTM E 935, loadings required by applicable building and safety codes but not less than the following:
		3. Design Loads: Design to the following requirements. Concentrated and uniform loading need not be applied simultaneously.

\*\* NOTE TO SPECIFIER \*\* Edit the following paragraphs as required. Superior railings are typically designed for ICBO loadings of 200 pound concentrated and 50 pound uniform, however railings can be fabricated to meet other code loading conditions. Codes vary in method of application and magnitude of load. Governing code should be checked for specific requirements. Horizontal and vertical concentrated load test of railing systems should be conducted in accordance with ASTM E 935.

* + - 1. Uniform load: 50 pounds per foot (74.3 kg/m) applied at the top in any direction..
			2. Concentrated load: 200 pounds (90.6 kg) applied at the top in any direction.
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data: Manufacturer's data sheets on each product to be used, including:
			1. Preparation instructions and recommendations.
			2. Details of material and construction.
			3. Storage and handling requirements and recommendations.
			4. Installation methods and requirements.
		3. Shop Drawings: Submit shop drawings for fabrication and installation of ornamental metalwork. Include plans, elevations and detail sections. Indicate materials, methods, finishes and types of joinery, fasteners, anchorages and accessory items.
		4. Load Tests: Submit test results from ASTM E 935 conducted on the manufacturer's supplied system indicating compliance with required structural loading.

\*\* NOTE TO SPECIFIER \*\* Delete selection samples if colors have already been selected.

* + 1. Selection Samples: For each finish product specified, two complete sets of color charts representing manufacturer's full range of available colors and patterns.
		2. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
		3. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic cleaning and maintenance of all components.
	1. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Minimum 3 years documented experience producing systems specified in this section.

\*\* 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. Note that a mockup will represent an additional cost for the project. Delete if not required.

* + 1. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
			1. Finish areas designated by Architect.
			2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
			3. Refinish mock-up area as required to produce acceptable work.
			4. Accepted mock-ups shall be comparison standard for remaining Work
	1. DELIVERY, STORAGE, AND HANDLING
		1. Store products in manufacturer's unopened, properly labeled, original packaging until ready for installation.
		2. Store components to avoid damage from moisture, abrasion, and other construction activities.
	2. SEQUENCING
		1. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
	3. 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 absolute limits.
		2. Field Measurements: Take measurements of actual dimensions where necessary for fit without gaps. Indicate measurements on shop drawings.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Superior Aluminum Products, Inc., which is located at: 555 E. Main St. P. O. Box 430; Russia, OH 45363; Tel: 937-526-4065; Fax: 937-526-3904; Email: [request info (info@superioraluminum.com)](http://admin.arcat.com/users.pl?action=UserEmail&company=Superior+Aluminum+Products,+Inc.&coid=35848&rep=&fax=937-526-3904&message=RE:%20Spec%20Question%20(05720sap):%20%20&mf=); Web: [www.superioraluminum.com](http://www.superioraluminum.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.
	1. ORNAMENTAL ALUMINUM RAILINGS

\*\* NOTE TO SPECIFIER \*\* Series 9000 Aluminum Railing was developed to meet state, local and federal codes requiring ADA Regulations and Guidelines. The narrowed 2 inch top rail available with Series 9000 allows for a normal grip on ramps, stairs, or on horizontal railing and still maintains a pleasing and aesthetic look. Series 9000 Railing is used on office buildings, commercial applications, hospitals, industrial settings, educational environments, apartments, homes, and more.

* + 1. Guard Rail Series 9000 Heavy-Duty Aluminum Railing: Series 9000 railings run between posts which shall contain machined openings for level applications and mechanical swivel brackets for locations at angles exceeding 10 degrees. Brackets shall not be used to attach railings to posts on level applications utilizing standard components. Pickets shall be 3/4 inch (1.91 cm) square on 4-1/2 inch (11.43 cm) maximum centers, and shall run between the top and bottom rail. Picket fasteners are concealed by a screw cover in matching finish.
			1. Series 9000 Design

\*\* NOTE TO SPECIFIER \*\* Select the rail style required and delete those not required. Note that 2 inch top rail, referenced in all series 9000 specification details as "Standard2 inch Top Rail", is ADA compliant based on industry standard grip ability. Also, Series 500 Pipe Handrail can be utilized as an additional component of the system to meet ADA standards. A 2 inch by 4 inch bottom rail should only be specified for level applications.

* + - * 1. Rail Style A: Single top and bottom rail, two-line railing system.

Top Rail Size

Standard 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

2 inch (5.08 cm) wide by 4 inch (10.16 cm) high top rail.

Bottom Rail Size

Standard 3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high bottom rail.

2 inch (5.08 cm) wide by 4 inch (10.16 cm) high bottom rail.

* + - * 1. Rail Style B: Double top rail and single bottom rail, three-line railing system with opening between top rails.

Top Rail Size

Standard 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high double top rail.

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) high double top rail.

2 inch (5.08 cm) wide by 4 inch (10.16 cm) high double top rail.

Bottom/Mid Rail Size

3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high.

* + - * 1. Rail Style C: Double top rail and single bottom rail, three-line railing system with through pickets between top rails.

Top Rail Size

Standard 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high double top rail.

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) double top rail.

2 inch (5.08 cm) wide by 4 inch (10.16 cm) high) double top rail.

\*\* NOTE TO SPECIFIER \*\* Select post size required and delete the one not required. 2-1/2 inch posts are compatible with both standard 2 inch wide top rail and 2 inch by 4 inch top rail for pocket purposes. With 2-1/2 inch wide top rail, 2-1/2 inch posts will need to utilize concealed brackets to support top rail. 4 inch posts are compatible for pockets with any top rail size.

* + - * 1. Square Posts:

2-1/2 inch (6.35 cm)

4 inch (10.16cm)

\*\* NOTE TO SPECIFIER \*\* Select height required and delete the those not required.

* + - * 1. Height:

Residential: 36 inch (91.44 cm)

Commercial: 42 inch (106.68 cm)

As indicated on the Drawings

* + - * 1. Design

\*\* NOTE TO SPECIFIER \*\* Select the design(s) required from the following 3 paragraphs and delete those not required.

Straight Rail Panel Design: As indicated

Step Rail Panel Design: As indicated

Design: As indicated on the Drawings.

* + - * 1. Cast Ornamentation:

\*\* NOTE TO SPECIFIER \*\* Select ornamentation required and delete those not required. Consult manufacturer's literature for additional selections available. Ring and diamond inserts are utilized for openings between double top rails. Double versions are utilized in the same space when through pickets are also used. Ball caps are utilized in place of standard post caps.

As indicated

Cast X Insert

3-3/4 inch (9.5 cm) OD double ring insert

3-3/4 inch (9.5 cm) OD single ring insert

3-3/4 inch (9.5 cm) cast diamond inset

4 inch (10.16 cm) diameter ball cap for 4 inch (10.16 cm) square post

2-1/2 inch (6.35 cm) diameter ball cap for 4 inch (10.16 cm) square post

Post ball cap for 2-1/2 inch (6.35 cm) post

Other ornamental items as required

* + 1. Guard Rail Series 9100 Architectural Aluminum Railing: Top railings run continuously on top of posts. Posts shall contain machined tops for top rail to set in and machined pockets for center and bottom railing. Brackets shall not be used to attach railing to posts on level applications. Swivel brackets shall be used to attach center and bottom railings to posts on vertically angled applications. Railing transitions to corners or ramps shall contain no interruptions to the top rail. Pickets shall be 3/4 inch (1.91 cm) square on 4-1/2 inch (11.43 cm) maximum centers, and run between the top and bottom rail. Picket fasteners are concealed by a screw cover in matching finish.
			1. Series 9100 Design

\*\* NOTE TO SPECIFIER \*\* Select the rail style required and delete those not required. 2-1/2 inch top rail is the only compatible item with Series 9100 railing. From a grip ability perspective, this top rail does not meet ADA standards. Series 500 Pipe Handrail must be utilized as an additional component of the system in order to meet ADA standards.

* + - * 1. Single top and bottom rail, two-line railing system

Top Rail Size

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

Bottom Rail Size

Standard 3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high bottom rail.

* + - * 1. Double top rail and single bottom rail, three-line railing system with opening between top rails

Top Rail Size

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

Bottom Rail Size

Standard 3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high bottom rail.

* + - * 1. Double top rail and single bottom rail, three-line railing system with through pickets and/or ornamental inserts in opening between top rails

Top Rail Size

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

Bottom Rail Size

Standard 3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high bottom rail.

* + - * 1. Square Posts:

2 inch (5.08 cm)

\*\* NOTE TO SPECIFIER \*\* Select height required and delete the ones not required.

* + - * 1. Height:

Residential: 36 inch (91.44 cm)

Commercial: 42 inch (106.68 cm)

As indicated on the Drawings

* + - * 1. Design

\*\* NOTE TO SPECIFIER \*\* Select the design(s) required from the following 3 paragraphs and delete those not required.

Straight Rail Panel Design: As indicated on the Drawings.

Step Rail Panel Design: As indicated on the Drawings.

Design: As indicated on the Drawings.

* + - * 1. Cast Ornamentation:

\*\* NOTE TO SPECIFIER \*\* Select ornamentation required and delete those not required. Consult manufacturer's literature for additional selections available. Ring and diamond inserts are utilized for openings between double top rails. Double versions are utilized in the same space when through pickets are also used.

As indicated

3-3/4 inch (9.5 cm) OD double ring insert

3-3/4 inch (9.5 cm) OD single ring insert

3-3/4 inch (9.5 cm) cast diamond inset

Other ornamental items as required

* + 1. Guard Rail Series 9900 Heavy-Duty Aluminum Railing: Railings run between posts and contain machined openings for level applications and mechanical swivel brackets for locations at angles exceeding 10 degrees. Brackets shall not be used to attach railings to posts on level applications utilizing standard components. Pickets 1-1/2 inch (3.81 cm) wide by 3/4 inch (1.91 cm) high square on 5-1/4 inch (13.35 cm) maximum centers and run between the top and bottom rail. Picket fasteners are concealed by a crew cover in matching finish.
			1. 9900 Design:

\*\* NOTE TO SPECIFIER \*\* Select the rail style required and delete those not required. 2 inch top rail, referenced in series 9900 specification details as "Standard2 inch Top Rail", is ADA compliant based on industry standard regarding grip ability. Series 500 Pipe Handrail can be utilized as an additional component of the system in order to meet ADA standards. 2 inch by 4 inch bottom rail should only be specified for level applications.

* + - * 1. Rail Style A: Single top and bottom rail, two-line railing system.

Top Rail Size

Standard 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

2 inch (5.08 cm) wide by 4 inch (10.16 cm) high top rail.

Bottom Rail Size

Standard 3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high bottom rail.

2 inch (5.08 cm) wide by 4 inch (10.16 cm) high bottom rail.

* + - * 1. Rail Style B: Double top rail and single bottom rail, three-line railing system with opening between top rails.

Top Rail Size

Standard 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

2 inch (5.08 cm) wide by 4 inch (10.16 cm) high top rail.

Bottom Rail Size

Standard 3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high bottom rail.

* + - * 1. Rail Style C: Double top rail and single bottom rail, three-line railing system with through pickets between top rails.

Top Rail Size

Standard 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

2-1/2 inch (6.35 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

2 inch (5.08 cm) wide by 4 inch (10.16 cm) high top rail.

Bottom Rail Size

Standard 3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high bottom rail.

\*\* NOTE TO SPECIFIER \*\* Select post size required and delete the one not required. Note that 2-1/2 inch posts are compatible with both standard 2 inch wide top rail and 2 inch by 4 inch top rail for pocket purposes. Also with 2-1/2 inch wide top rail, 2-1/2 inch posts will need to utilize concealed brackets to support top rail. 4 inch posts are compatible for pockets with any top rail size.

* + - * 1. Square Posts:

2-1/2 inch (6.35 cm).

4 inch (10.16cm).

\*\* NOTE TO SPECIFIER \*\* Select height required and delete the ones not required.

* + - * 1. Height:

Residential: 36 inch (91.44 cm).

Commercial: 42 inch (106.68 cm).

As indicated on the Drawings.

* + - * 1. Design

\*\* NOTE TO SPECIFIER \*\* Select the design(s) required from the following 3 paragraphs and delete those not required.

Straight Rail Panel Design: on the Drawings.

Step Rail Panel Design: on the Drawings.

Design: on the Drawings.

* + - * 1. Cast Ornamentation:

\*\* NOTE TO SPECIFIER \*\* Select ornamentation required and delete those not required. Consult manufacturer's literature for additional selections available. Ring and diamond inserts are utilized for openings between double top rails. Double versions are utilized in the same space when through pickets are also used. Ball caps are utilized in place of standard post caps.

As indicated

Cast X Insert

3-3/4 inch (9.5 cm) OD double ring insert

3-3/4 inch (9.5 cm) OD single ring insert

3-3/4 inch (9.5 cm) cast diamond inset

4 inch (10.16 cm) diameter ball cap for 4 inch (10.16 cm) square post

2-1/2 inch (6.35 cm) diameter ball cap for 4 inch (10.16 cm) square post

Post ball cap for 2-1/2 inch (6.35 cm) post

Other ornamental items as required.

\*\* NOTE TO SPECIFIER \*\* Edit the following paragraphs as required for the project.

* + 1. Wall Mounted Hand Rail System Style D (with mtg. brackets):
			1. Top Rail Size
				1. Standard Series 9000 Top Rail: 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high top rail.

\*\* NOTE TO SPECIFIER \*\* Select base(s) required and delete those not required. A variety of base options are available to fit any installation requirements. Ornamental Railing can be base mounted with heavy-duty bases, side-mounted with brackets, or embedded into concrete using an elongated post with a cover flange.

* + 1. Base: Size to fit the posts specified
			1. Heavy-Duty Surface Mount Base
			2. Cover Flange for Embedded Posts
			3. Side-Mount Corner Base
			4. Side-Mount Base
			5. As indicated on the Drawings.
	1. DECORATIVE WIRE ROPE RAILINGS

\*\* NOTE TO SPECIFIER \*\* Series 2000 Cable Railing meets state, local and federal codes. High strength stainless steel cables are spaced at 3"centers and tensioned between end posts at 6 foot maximum spacing and supported by intermediate posts at 3.5 foot maximum spacing to minimize deflection. Horizontal aluminum rails attach to posts thru machined openings on level and ramp railing, eliminating the need for brackets. Cable railing provides optimum view in a clean rigid railing.

* + 1. Cable Railing Series 2000: Series 2000 railings run between posts that contain openings for cables. Both end and crossover posts are single posts manufactured utilizing aluminum and capable of withstanding maximum tension levels. Exposed fasteners are concealed by a screw cover of matching finish.
			1. Guard Rail Posts:
				1. Provide 2-1/2 inch (6.35 cm) square end posts and corner posts, as applicable, reinforced for tensioning of cables.
				2. Provide 2 - 1/2 inch (6.35 cm) square crossover posts for positioning of cables and supporting handrails between tensioning posts.
				3. Each post to have pre-drilled holes, spaced 3 inches on center, to accommodate fittings or support the cable.
			2. Top Rail Style:
				1. Size - 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high). Provide screw cover in matching finish to conceal post screws on top rail assemblies.
			3. Cable:
				1. Tension all cables in the guard rail system to a minimum of 250 pounds.
	1. HORIZONTAL PIPE RAILINGS

\*\* NOTE TO SPECIFIER \*\* Series 500 and Series 550 Horizontal Pipe and Pipe Picket Railing were developed to meets state, local and federal codes. Post spacing shall not exceed 6 feet on center. Railings can be manufactured in a manner that fits code requirements in commercial, industrial, or residential settings. Pipe railing can also be manufactured as a strict handrail system, for use directly on a wall (or other existing structure), or in conjunction with either a full pipe guardrail system or full square guardrail system in order to meet code requirements.

* + 1. Horizontal Pipe Rail Guard Railing Series 500: 1-1/2 inch (3.81 cm) Schedule 40 pipe with 1.9 inch (4.83 cm) outside diameter runs between posts and utilizes concealed fasteners. No joints shall be fastened via welding. All top rail shall be continuous through the full length of the system.
			1. Round posts
				1. 1-1/2 inch Schedule 40 pipe (3.81 cm) with 1.9 inch (4.83 cm) outside diameter with reinforcement rebar inserts

\*\* NOTE TO SPECIFIER \*\* Select height required and delete the one not required.

* + - 1. Height:
				1. Residential: 36 inches (91.44 cm)
				2. Commercial: 42 inches (106.68 cm)
				3. As indicated on the Drawings

\*\* NOTE TO SPECIFIER \*\* Select the design(s) required from the following paragraphs and delete those not required. All design styles are available with as little as 2 horizontal lines of pipe and as many as 8 horizontal lines of pipe.

* + - 1. Design
				1. Straight Rail Design: As indicated
				2. Step Rail Design: As indicated
				3. Toe-Plate Design: As indicated
				4. Radius Design: As indicated
				5. As indicated on the Drawing
			2. Component Parts:
				1. Provide all connecting components and fittings as required.
		1. Horizontal Pipe Picket Railing Series 550: 1-1/2 inch Schedule 40 (3.81 cm) pipe with 1.9 inch (4.83 cm) outside diameter run between posts and utilizes concealed fasteners. Pickets are 3/4 inch (1.9 cm) round pipe spaced at 4.5 inch (11.43 cm) on center and run between the top and bottom rail utilizing concealed fasteners. Neither horizontal or vertical components shall be fastened via welding. All top rail shall be continuous through the full length of the system.
			1. Round posts
				1. 1-1/2 inch Schedule 40 pipe (3.81 cm) with 1.9 inch (4.83 cm) outside diameter with reinforcement rebar inserts

\*\* NOTE TO SPECIFIER \*\* Select height required and delete the one not required.

* + - 1. Height:
				1. Residential: 36 inches (91.44 cm)
				2. Commercial: 42 inches (106.68 cm)
				3. As indicated on the Drawings

\*\* NOTE TO SPECIFIER \*\* Select the design(s) required from the following paragraphs and delete those not required. All design styles are available with as little as 2 horizontal lines of pipe and as many as 4 horizontal lines of pipe.

* + - 1. Design
				1. Straight Rail Design: As indicated
				2. Step Rail Design: As indicated
				3. Toe-Plate Design: As indicated
				4. Radius Design: As indicated
				5. As indicated on the Drawing
			2. Component Parts:
				1. Provide components and fittings required.

\*\* NOTE TO SPECIFIER \*\* Series 500 mounted hand rail can be utilized as a standalone handrail structure for a stairway/ramp enclosed by a wall or other similar application. Handrail supplied in matching finish to existing rail if applicable. Delete if not required. Mounted handrail can be specified in conjunction with the following systems in order to meet code requirements:
Series 9000/9100/9900 in a 42 inch high commercial guardrail application (guards must be 42 inches high but handrail must be between 34 inches and 38 inches high)
Series 9000/9900 applications that do not utilize standard top rail and must meet ADA grip-ability requirements
Series 9100 applications that must meet ADA grip-ability requirements
Series 500/550 in a 42 inch high commercial guardrail application (guards must be 42 inches high but handrail must be between 34 inches and 38 inches high)
Any other application where additional attached handrail is required.

* + 1. Series 500 Mounted Hand Rail: 1-1/2 inch (3.81 cm) Schedule 40 pipe with 1.9 inch (4.83 cm) outside diameter. Pipe shall be mounted to wall, railing, or other structure by utilizing mounting plates and run continuously throughout the whole length of handrail system. No components shall be fastened via welding.

\*\* NOTE TO SPECIFIER \*\* Select base(s) required and delete those not required. A variety of base options are available to fit any installation requirements. Series 500/550 Railing can be base mounted with heavy-duty bases, side mounted with brackets, or embedded into concrete using an elongated post with a cover flange.

* + 1. Base: Size to fit the posts specified
			1. Heavy-Duty Surface Mount Base
			2. Cover Flange for Embedded Posts
			3. Side-Mount Corner Base
			4. Side-Mount Base
			5. As indicated on the Drawings.
	1. RAILING MATERIALS

\*\* NOTE TO SPECIFIER \*\* Include the following paragraphs for Decorative Wire Rope railing only. Delete if not applicable.

* + 1. Cable:
			1. Wire Rope:
				1. Type 316 stainless steel wire conforming to ASTM A 492.
				2. Number of wires/strands: 1 x 19.
				3. Diameter: 3/16 inch.
				4. Lay: Right hand ordinary (Regular) equal lay.
			2. Fasteners: Each cable end will be fitted with either a clip-on stop or a tension fitting.
				1. Stainless steel: ASTM A 666, Type 316.
		2. Rail, Post and Pickets: Aluminum extrusions; alloy and temper 6063-T4 or 6063-T6 for rail, posts, and round pickets, and 6063-T5 for square pickets.
			1. Pipe: ASTM B 429.
			2. Tube: ASTM B 211.
		3. Base Flanges, Anchors, and railing accessories: ASTM B 247.
			1. Bases cast from manufacturer's standard A-356-T6, 535, or 713 aluminum alloys or solid extruded 6063 aluminum alloy stock.
			2. Base flanges and railing accessories cast from manufacturer's standard 319, A-356, A-356-T6, 535, or 713 aluminum alloys.
			3. Anchorages: Provide concrete anchorage for fastening and complying with applicable Federal standards. All fasteners used in the system shall be aluminum or stainless steel.
		4. Fasteners: Provide concrete anchorage for fastening and complying with applicable Federal standards. All fasteners used in the system shall be aluminum or stainless steel.
		5. Grout: Non-shrink Portland cement-based hydraulic grout, mixed and applied in accordance with manufacturer's instructions; gypsum based material are not acceptable. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and recommended by manufacturer for exterior use.
	1. FINISH

\*\* NOTE TO SPECIFIER \*\* Select finish required and delete those not required. Note that 1 hour anodizing and brushed anodized finish are only applicable on Series 500/550 pipe railing. Series 500/550 is not available in Brown. Custom colors are available, contact the manufacturer for additional information.

* + 1. Baked on Enamel Colors (AAMA 2603):
			1. White
			2. Black
			3. Light Bronze
			4. Dark Bronze
			5. Sandstone
			6. Almond
			7. Tan
			8. Brown
			9. Green
			10. Custom colors as selected.
		2. Satin Anodized Finish:
			1. 15 Minute: Architectural Clear Anodic Coating, AA-M12C22A21
			2. 60 Minute: Architectural Class I, AA-M12C21A41
			3. Brushed: Architectural Class I, AA-M12C22A41
		3. Duranodic Architectural Hard Coat Anodized Finish, AA-M12C22A42
			1. Dark Bronze
			2. Black
			3. Custom colors as selected.
	1. FABRlCATlON
		1. All components or railing sections shall be fabricated at the manufacturing facility in largest practical site delivery sizes. All components or railing sections shall be fabricated to exact measurements specified through Drawings and field dimensions.
			1. All pipe cuts shall be square and accurate for minimum joint-gap. Cuts shall be clean and free of chamfer, from deburring, nicks and burrs.
		2. If railing is angled horizontally, machine to proper angle into the post.

\*\* NOTE TO SPECIFIER \*\* Select the following paragraph for 9000 and 9100 Series only and delete if not applicable.

* + 1. Fabricate railing system to meet step railing requirements by providing a rectangular hole in bottom rail.

\*\* NOTE TO SPECIFIER \*\* Select the following paragraph for 9000, 9100 and 9900 Series only and delete if not applicable.

* + 1. Fabricate railing system to meet step railing requirements; riser and tread dimensions of the steps.
		2. All posts grouted in concrete to have one nominal 1/4 inch (6.0 mm) nominal diameter weep hole, 1/2 inch (12.0 mm) nominal above post collar, in the plane of the rail
		3. Provide components required for anchorage of framing. Fabricate anchors and related components of material and finish as required, or as specifically noted.
1. EXECUTION
	1. EXAMINATION
		1. Do not begin installation until substrates have been properly prepared.
		2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Clean surfaces thoroughly prior to installation.

\*\* NOTE TO SPECIFIER \*\* Include the following paragraph and coordinate installation as applicable. Delete if not required.

* + 1. Coordinate railing installation with installation of waterproof membrane or coating Specified in Section 07xxx.
		2. Ensure that adjacent surfaces, structures, and finishes are protected from damage by construction activities of this section.
		3. Use wood blocks and padding to prevent damage to railing members and fittings during erection.
		4. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
	1. INSTALLATION
		1. Install in accordance with manufacturer's instructions.
		2. Keep perimeter lines straight, plumb, and level.
		3. Provide grounds, clips, backing materials, adhesives, brackets, anchors, and accessories necessary for a complete installation.
			1. Expansion Bolt Mounting: Anchor through base plates to concrete substrate.
			2. Sleeve Mounting:
				1. Arrange for casting of sleeves or core drill concrete to provide holes for railing uprights.
				2. After setting, fill holes with hydraulic grout; brace members until grout is cured.
			3. Connect railing components in accordance with manufacturer's instructions applicable to the specified system. Tighten all fasteners so that completed railing is rigid and free of play at joints and component attachments.

\*\* NOTE TO SPECIFIER \*\* Include the following two paragraphs for cable rail. Delete if not required.

* + - 1. Do not tension the cables completely until all the cables have been installed between the end posts.
			2. Provide intermediate support posts between end posts and tension cables to maintain a 3 inch (7.62 cm) maximum center to center spacing between cables.

\*\* NOTE TO SPECIFIER \*\* Include the following paragraphs for pipe rail. Delete if not required.

* + - 1. Expansion Joints: Provide expansion joints for continuous spans in excess of 40 feet (12.0 m). Construct joints by deleting structural adhesive from one end of the spliced joint so that it is free to move in or out of the pipe. If a joint is provided every 30 feet (9.0 m), the width of the gap should allow 1/8 inch (3.0 m) expansion for each 40 degrees F (22 degrees C) of expected temperature rise.
	1. ERECTION TOLERANCES
		1. Install railings plumb and level, securely fastened, with vertical members plumb.
			1. Maximum variation from plumb: 1/4 inch (6.0 mm).
			2. Maximum misalignment from true position: 1/4 inch (6.0 mm).
			3. Maximum misalignment between adjacent separated members: 1/8 inch (3.0 mm).
	2. CLEANING
		1. Remove dust or other foreign matter from component surfaces; clean finishes in accordance with AAMA 609 and AAMA 610-02.
	3. PROTECTION
		1. Protect installed products until completion of project.
		2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION