

**Pacific Stair Corporation Standard Specifications**  
**Section 05-5100**



**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Design build steel stairs and landings
- B. Embedded weld connections
- C. Related supports and connections
- D. Handrails and guardrails
- E. Wall rails with brackets
- F. Exit control gates

**1.02 REFERENCES**

- A. **ASTM A6/A 6M** - Standard specification for general requirements for rolled structural steel bars, plates, shapes, and sheet piling; 2006.
- B. **ASTM A36/A 36M** - Standard specification for carbon structural steel; 2005.
- C. **ASTM A53/A 53M** - Standard specification for pipe, steel, black and hot-dipped, zinc coated welded and seamless.
- D. **ASTM A 153/A 153M** - Standard specification for zinc coating (hot dip) on iron and steel hardware; 2005.
- E. **ASTM A307** - Standard specification for common steel bolts. Minimum tensile strength 60 ksi.
- F. **ASTM A 325** - Standard specification for structural bolts, steel, heat treated, 120/105 ksi minimum tensile strength; 2006.
- G. **ASTM A 325M** - Standard specification for structural bolts, steel, heat treated 830MPa tensile strength (metric); 2005.
- H. **ASTM A1044 / A1044M-05** - Standard specification for steel stud assemblies for shear reinforcement of concrete (Embedded weld connections).
- I. **ASTM A500** - Standard specification for cold-formed welded and seamless carbon steel structural tubing in rounds and shapes; 2003.
- J. **ASTM A501** - Standard specification for hot-formed welded and seamless carbon steel structural tubing; 2001 (Re-approved 2005).
- K. **ASTM A513** - Standard specification for electric-resistance-welded carbon and alloy steel mechanical tubing.

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- L. **ASTM A1011 / A1011M** - Standard specification for steel, sheet and strip, hot rolled, carbon structural, high-strength low alloy, high-strength low-alloy with improved formability, and ultra-high strength.
- M. **ASTM A653 / A653M** - Standard specification for steel sheet zinc-coated (galvanized) or zinc-iron alloy coated (galvannealed) by the hot-dip process; 2006a (metal decking).
- N. **ASTM E985** - Standard specification for permanent metal railing systems and rails for buildings; 2000 (re-approved 2006).
- O. **AWS A2.4** - Standard welding symbols for welding, brazing, and nondestructive examination; American Welding Society; 2007.
- P. **AWS D1.1 / D1.1M** - Structural Welding Code – Steel – American Welding Society; 2006.
- Q. **SSPC-Paint 15** - Steel joist shop primer; Society for Protective Coatings; 1999 (Ed. 2004).
- R. **SSPC-SP 2** - Hand tool cleaning; Society for Protective Coatings; 1982 (Ed. 2004).
- S. **RR-G-1602D** - Federal specification for safety grating.

**1.03 RELATED SECTIONS**

- A. **SECTION 03300** - Cast in place concrete; Poured treads and landings.
- B. **SECTION 05120** - Structural steel; Stair system supports.
- C. **SECTION 05500** - Metal Fabrications; miscellaneous metals and fabrications.
- D. **SECTION 09900** - Paints and Coatings; Field applied finishes.
- E. **SECTION 055119** - Metal Grating Stairs.

**1.04 DESIGN REQUIREMENTS**

**Please note: The design criteria shown below complies with most jurisdictions, however due to some areas having more stringent codes please verify compliance.**

- A. **Stair systems** are designed and fabricated to support a uniform live load of 100 lbs/sq. foot and a concentrated load of 300 lbs. with a deflection of stringer or landing framing not to exceed L/240 or 1/4 inch whichever is less.
- B. **Handrail and guardrail systems** are designed and fabricated to the following specifications:
  - 1. Uniform load of 50 lb/f. applied in any direction.
  - 2. Concentrated load of 200 lb/f. Applied in any direction.
  - 3. Uniform and concentrated loads are not assumed to act concurrently.

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- C. **Infills of guards are** designed to withstand a load of 50 lbs. applied horizontally on an area of one square foot. Infill loads and other loads are not assumed to act concurrently.
- D. **Seismic Performance:** Stair systems are designed, tested, and fabricated to resist seismic events in compliance with ASCE 7-02 Section 9.5.2.8, and IBC section 1617.3 allowable story drift. (download test results at [http://www.pacificstair.com/story\\_drift.html](http://www.pacificstair.com/story_drift.html))

**1.05 SUBMITTALS**

- A. **Shop drawings** will be stamped by a licensed professional engineer licensed in the state where project is located.
- B. **Shop drawings** will indicate profiles, sizes, connection details, anchorage and sizes of fasteners. Shop drawings will also include elevations and sections.
- C. **Submittals** will include structural calculations stamped by a licensed professional engineer.

**1.06 REGULATORY REQUIREMENTS**

- A. **All components** will meet or exceed the requirements of ADA, OSHA, UBC, IBC, and/or local code requirements.

**1.07 QUALITY ASSURANCE**

- A. **Manufacturer** to have a minimum of ten years of documented experience in the design, engineering, fabrication and installation of the products specified in this section.
- B. **Embedded** weld connections to be welded by certified welders, and inspected by an independent testing laboratory.

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**PART 2 PRODUCTS**

**2.00 PRODUCTS**

- A. **Stair assemblies** to include the following; metal framing, hangers, struts, railings, clips, brackets, bearing plates and other components necessary to support and anchor stairs and platforms to the supporting structure.
- B. **Components** will be joined by welding unless otherwise indicated.
- C. **Connections** will be used to maintain the structural value of joined pieces.
- D. **Stairs** will be assembled to the greatest possible extent.
- E. **Cutting**, drilling and punching to be done cleanly and accurately. Burrs and rough edges to be removed.
- F. **Exposed connections** to be made with hairline joints, flush and smooth. Locate joints where least conspicuous.

**2.01 EMBEDDED WELD CONNECTIONS**

- A. **Steel angle:** Standard sizes, 3" x 2" x .25", 4" x 4" x .25"
- B. **Steel plate:** Standard sizes, 4 x 10" x .25, 12" x 12" x .25"
- C. **Headed weld studs:** .500" dia, x 0'- 4"
- D. **Attachment of studs to angle or plate:** Specialized arc welding equipment.
- E. **Embeds:** All embeds are 100% Tested and Certified by independent third party inspection.

**2.02 FASTENERS FOR STANDARD APPLICATIONS**

- A. Hilti Kwik Bolt TZ .625" dia. X 6" (Concrete anchors).
- B. Hilti Kwik Bolt KB3 .625" dia. X 6" (CMU anchors).
- C. .625" x 1.5" A325 Tension control bolts.
- D. .625" x 4.5" A307 MB for tube steel posts.

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**2.03 STEEL FRAMED STAIRS WITH STEEL TREADS**

- A. **Risers** are closed.
- B. **Treads:** Smooth steel plate or checker plate with a medium pattern.
  - i. **Thickness:** 14 ga. standard minimum thickness (.075") or as determined by structural design and/or calculations.
- C. **Anchorage to stringers:** Treads and Risers to be welded to stringers to eliminate buckling.
  - i. **Riser thickness:** 14 ga. Standard minimum thickness (.075") or as determined by structural design and/or calculations.
- D. **Riser nosing profile:** Sloped riser with rounded nosing of minimum radius.
- E. **Stringers:**
  - i. Steel plate, 1/4" minimum thickness or greater as determined by structural design and/or calculations.
  - ii. Channel, MC10 – 8.4# minimum sizing or greater as determined by structural design and/or calculations.

**2.04 STEEL FRAMED LANDINGS**

- A. **CHECKER PLATE:**
  - i. Structural framing supports: C6 x 8.2# channel w/ 14 ga. bent plate supporting members or greater as determined by structural design and/or calculations.
  - ii. Surfacing: 1/8" checker plate sheeting w/ medium pattern.
- B. **PAN-FILL CONCRETE:**
  - i. Structural framing supports: C6 x 8.2# channel w/ 1 1/2" BR decking and 10 ga. bent plate outside framing or greater as determined by structural design and/or calculations.
  - ii. Surfacing: Concrete fill by others.

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**2.05 STAIR RAILINGS**

**A. SERIES 100 ~ TWO LINE (2-line – Detail No. R140)**

- i. **Stair Rail:** (1) Line of 1 ½" Tube Steel (T.S) (1.5" O.D.) top cap with 1 ½ Tube Steel .12D Wall Posts.
- ii. **Midline:** Offset (1) Line of 1 ¼" SCH #40 Pipe (1.66 O.D.)
- iii. **Guards:** (1) Line of 1 ½" Tube Steel (T.S) with .25" x 4" kick plate.
- iv. **Posts:** Inline 1 ½" T.S. .120 Wall (side mount / top mount).
- v. **Infill:** (1) Line 1 ¼" SCH 40 Pipe (1.66 O.D)

**B. SERIES 200 ~ PIPE (6-line – Detail No. R210 / R240)**

- i. **Stair Rail:** 1.5" x .120 wall square tube steel top cap and posts.
- ii. **Guardrail:** 1.5" x .120 wall square tube steel top cap and posts.
- iii. **Hand Grab:** Continuous 1 ¼" pipe (1.66" O.D.), offset by 1 ½" with 3/16" x 1 ¼" bent brackets.
- iv. **Infill:** Offset 1 ¼" pipe (1.66" O.D.), w/ dome caps both ends.
- v. **Spacing:** Maximum of 3.875".
- vi. **Mounting of rails:** To side of plate stringer, side of channel stringer, top of channel stringer or embed by welding.

**C. SERIES 300 ~ TUBE (7-line – Detail No. R310 / R340)**

- i. **Stair Rail:** 1.5" x .120 wall square tube steel top cap and posts.
- ii. **Guardrail:** 1.5" x .120 wall square tube steel top cap and posts.
- iii. **Hand Grab:** Continuous 1 ¼" pipe (1.66" O.D.), offset by 1 ½" with 3/16" x 1 ¼" bent brackets.
- iv. **Infill:** Inline ¾" x 1 ½" rectangular tube steel.
- v. **Spacing:** Maximum of 3.875".
- vi. **Mounting of rails:** To side of plate stringer, side of channel stringer, top of channel stringer or embed by welding.

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**D. SERIES 400 ~ PICKET (3-line – Detail No. R410 / R440)**

- i. **Stair Rail:** 1.5" x .120 wall square tube steel top cap, bottom cap and posts.
- ii. **Guardrail:** 1.5" x .120 wall square tube steel top cap and posts.
- iii. **Hand Grab:** Continuous 1 ¼" pipe (1.66" O.D.), offset by 1 ½" with 3/16" x 1 ¼" bent brackets.
- iv. **Infill:** ½" square bar picket.
- v. **Spacing:** Maximum of 3.875".
- vi. **Mounting of rails:** To side of plate stringer, side of channel stringer, top of channel stringer or embed by welding.

**E. SERIES 400a ~ MODIFIED PICKET (4-line – Detail No. R440a)**

- i. **Stair Rail:** 1.5" x .120 wall square tube steel top cap and posts.
- ii. **Guardrail:** 1.5" x .120 wall square tube steel top cap and posts.
- iii. **Hand Grab:** Continuous 1 ¼" pipe (1.66" O.D.), offset by 1 ½" with 3/16" x 1 ¼" bent brackets.
- iv. **Infill:** Offset 1 ¼" pipe (1.66" O.D.), w/ ½" square bar pickets.
- v. **Spacing:** Maximum of 3.875".
- vi. **Mounting of rails:** To side of plate stringer, side of channel stringer, top of channel stringer or embed by welding.

**F. SERIES 500 ~ WIRE MESH (Inset Panels – Detail No. R510 / R540)**

- i. **Stair Rail:** 1.5" x .120 wall square tube steel top cap, bottom cap and posts.
- ii. **Guardrail:** 1.5" x .120 wall square tube steel top cap and posts.
- iii. **Hand Grab:** Continuous 1 ¼" pipe (1.66" O.D.), offset by 1 ½" with 3/16" x 1 ¼" bent brackets.
- iv. **Infill:** 2" Intercrip wire mesh inside 1" u-clip frame insert.
- v. **Spacing:** Maximum of 3.875" (Rail), 2" (Mesh).
- vi. **Mounting of rails:** To side of plate stringer, side of channel stringer, top of channel stringer or embed by welding.

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**G. SERIES 600 ~ CABLE (8-line – Detail No. R610 / R640)**

- i. **Stair Rail:**  $\frac{3}{4}$ " x  $1\frac{1}{2}$ " C.D. bar topcap w/  $\frac{3}{4}$ " x  $1\frac{1}{2}$ " C.D. bar posts.
- ii. **Guardrail:**  $\frac{3}{4}$ " x  $1\frac{1}{2}$ " C.D. bar topcap w/  $\frac{3}{4}$ " x  $1\frac{1}{2}$ " C.D. bar posts.
- iii. **Hand Grab:** Continuous  $1\frac{1}{4}$ " pipe (1.66" O.D.), offset by  $\frac{1}{2}$ " Round bar brackets.
- iv. **Infill:** 187" Stainless Steel cable with polished Stainless Steel hardware.
- v. **Spacing:** Maximum of 3.875".
- vi. **Mounting of rails:** To side of plate stringer, side of channel stringer, top of channel stringer or embed by welding.

**H. SERIES 700 ~ ROD (9-line – Detail No. R710 / R740)**

- i. **Stair Rail:** 1" x 2" C.D. bar topcap w/ 1" x 2" C.D. bar posts.
- ii. **Guardrail:** 1" x 2" C.D. bar topcap w/ 1" x 2" C.D. bar posts.
- iii. **Hand Grab:** Continuous  $1\frac{1}{4}$ " pipe (1.66" O.D.), offset by  $\frac{1}{2}$ " Round bar brackets.
- iv. **Infill:**  $\frac{1}{2}$ " Minimum C.D. round rod.
- v. **Spacing:** Maximum of 3.875".
- vi. **Mounting of rails:** To side of plate stringer, side of channel stringer, top of channel stringer or embed by welding.

**I. SERIES 800 ~ GLASS (Inset Panels – Detail No. R850)**

- i. **Stair Rail:** 1.5" x .120 wall tube steel top cap, bottom cap and posts.
- ii. **Guardrail:** 1.5" x .120 wall tube steel top cap and posts.
- iii. **Hand Grab:** Continuous  $1\frac{1}{2}$ " O.D. Stainless Steel Tubing, offset by  $1\frac{1}{2}$ " with Stainless Steel Brackets.
- iv. **Infill:**  $\frac{3}{8}$ " tempered glass panels with Stainless Steel hardware.
- v. **Spacing:** Maximum of 1.5".
- vi. **Mounting of rails:** To side of plate stringer, side of channel stringer, top of channel stringer or embed by welding.

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**2.06 WALL RAIL**

- A. Mandrel bent 1 ¼" pipe (1.66" O.D.), w/ minimum 12" level-offs returning to wall.
- B. Offset 1 ½" wall brackets evenly spaced w/ (3) mounting holes.

**2.07 GATES**

- A. **Fabricate gates** from 1 ¼" pipe (1.66" O.D.). Provide self closing hinges for fastening to walls. Overlapping stop provided with bumper to prevent opening in opposite direction of egress.

**3.00 SHOP FINISHES**

- A. Clean surfaces of rust, scale, grease and all foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding will occur.
- C. Remove all sharp edges and burrs.
- D. Finish Hand Rail To a NOMMA #2 Finish
- E. Preparation of steel: In accordance with SSPC-SP2, hand tool cleaning.
- F. **Prime painting:** Rodda Low HAP Shopcoat Primer
  - i. VOC Compliant Red Oxide #33954
- G. **Coverage:** (1) mil. Minimum DFT.

**3.01 EXECUTION**

- A. Verify that all field conditions are acceptable, and ready for work to begin.
- B. If any deviations or mistakes are discovered in framing or embed placement notify Pacific Stair Corp. in writing immediately. Work will not proceed until unsatisfactory conditions have been corrected.

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**3.02 STAIR INSTALLATION**

- A. Install all stair components plumb, level and accurately, free from distortion or defects.
- B. Provide all hardware, hangers, fasteners and struts required to connect stairs to parent structure.
- C. Provide temporary bracing to maintain alignment until installation has been completed and all connections are deemed permanent.
- D. All field welding to be done in accordance with AWS D1.1.
- E. Field welding and bolting to match shop work. Use concealed fasteners wherever possible.
- F. All joints to be butted tight flush, with hairline joints. Welds to be ground smooth and flush.
- G. Touch up paint after welding and grinding.

**3.03 RAIL INSTALLATION**

- A. Railing to be installed plumb, and straight.
- B. Welded Connections to be used for permanent connections. All splices to be ground smooth, free from grinder marks and irregularities.
- C. Railing to be welded to stair stringers per plans and specifications. Welds to be clean and have good conformance to acceptable standards.

**3.04 WALL RAIL INSTALLATION**

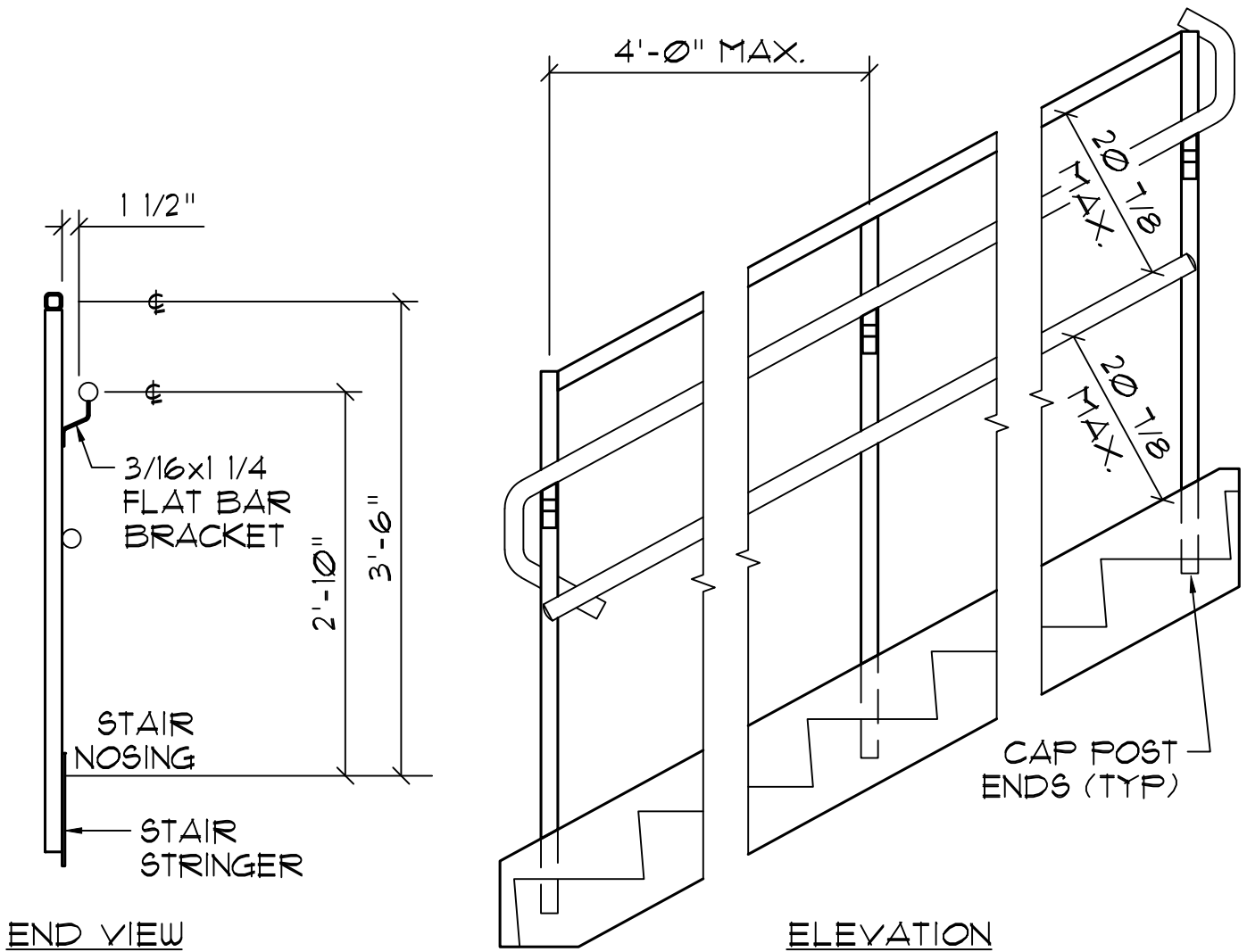
- A. Make certain that proper backing has been placed in wall for attachment of wall rails.
- B. Attach wall rails to walls with brackets that provide 1.5" clearance from face of finish wall to the inside face of railing.
- C. Use proper fasteners to secure railing to substrate. If fastening to gypsum board make certain that proper spacer is provided to prevent the gyp board from being damaged.

**3.05 ERECTION TOLERANCES**

- A. Maximum variation from plumb: .25" per story, non accumulative.
- B. Maximum offset from true alignment: .25"
- C. Maximum out of position: .25"

**END OF SECTION**

**NOTE:** POSTS AND TOP LINE MATERIAL IS 1 1/2" x 1 1/2" HSS  
 HANDRAIL & MID LINE MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE

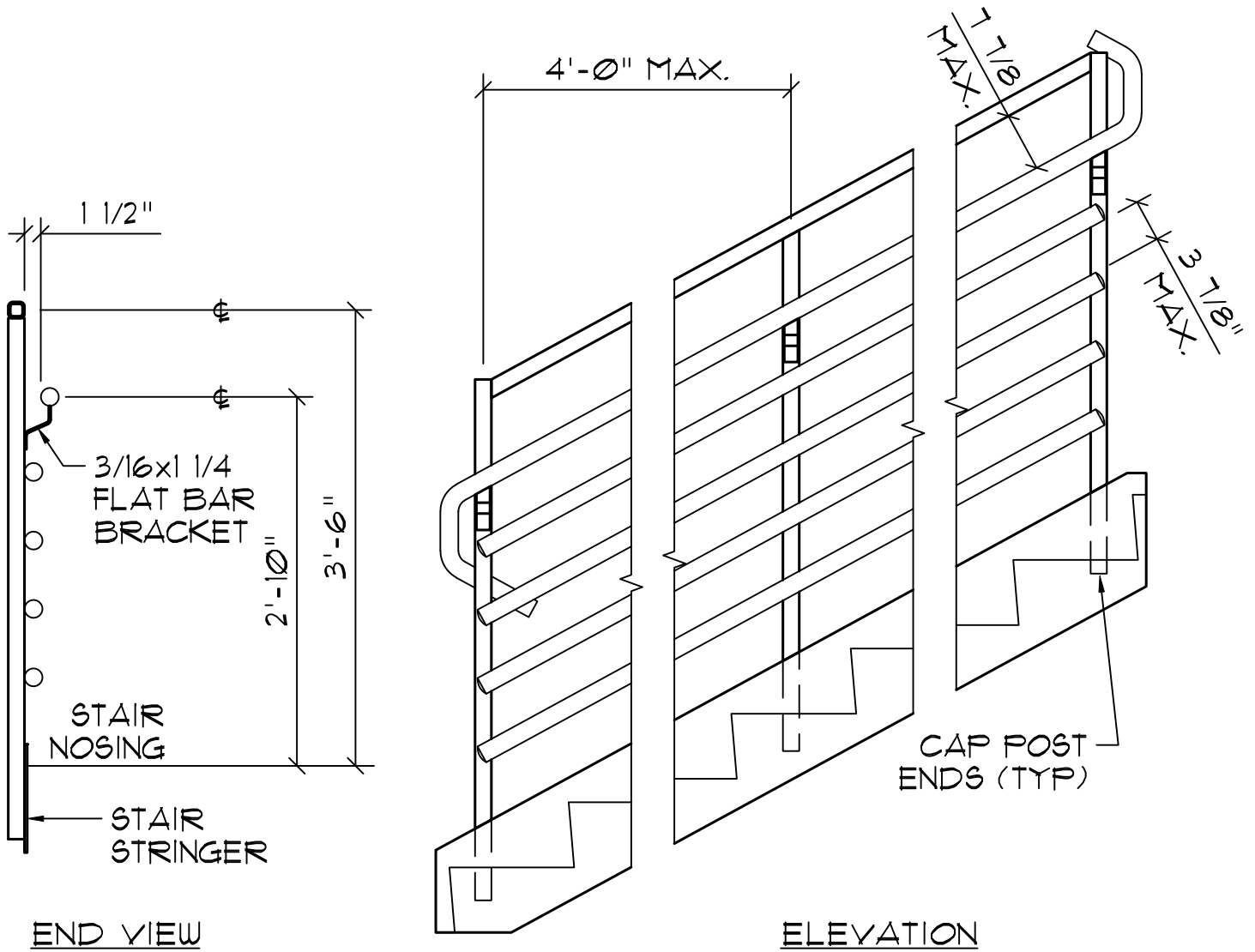


STAIR RAIL



TYPE:	2-LINE RAIL
SCALE:	NTS
DETAIL NO.	R140

**NOTE:** POSTS AND TOP LINE MATERIAL IS 1 1/2" x 1 1/2" HSS  
 HANDRAIL & MID LINE MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE



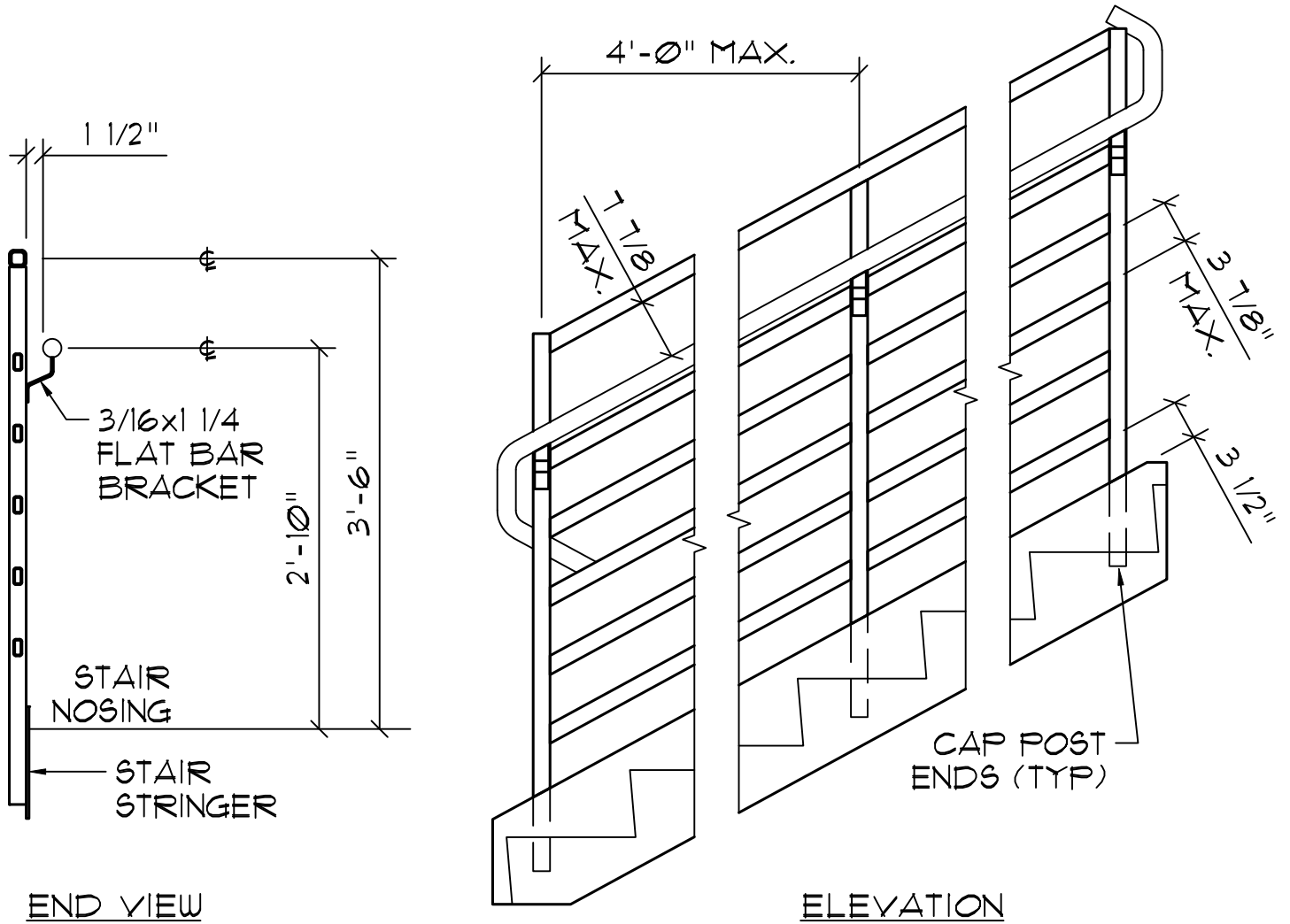
STAIR RAIL



**PACIFIC STAIR  
 CORPORATION®**

TYPE:	PIPE RAIL
SCALE:	NTS
DETAIL NO.	R240

NOTE: POSTS AND TOP LINE MATERIAL IS 1 1/2" x 1 1/2" HSS  
 HANDRAIL MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE  
 MID LINE MATERIAL IS 3/4" x 1 1/2" HSS



STAIR RAIL



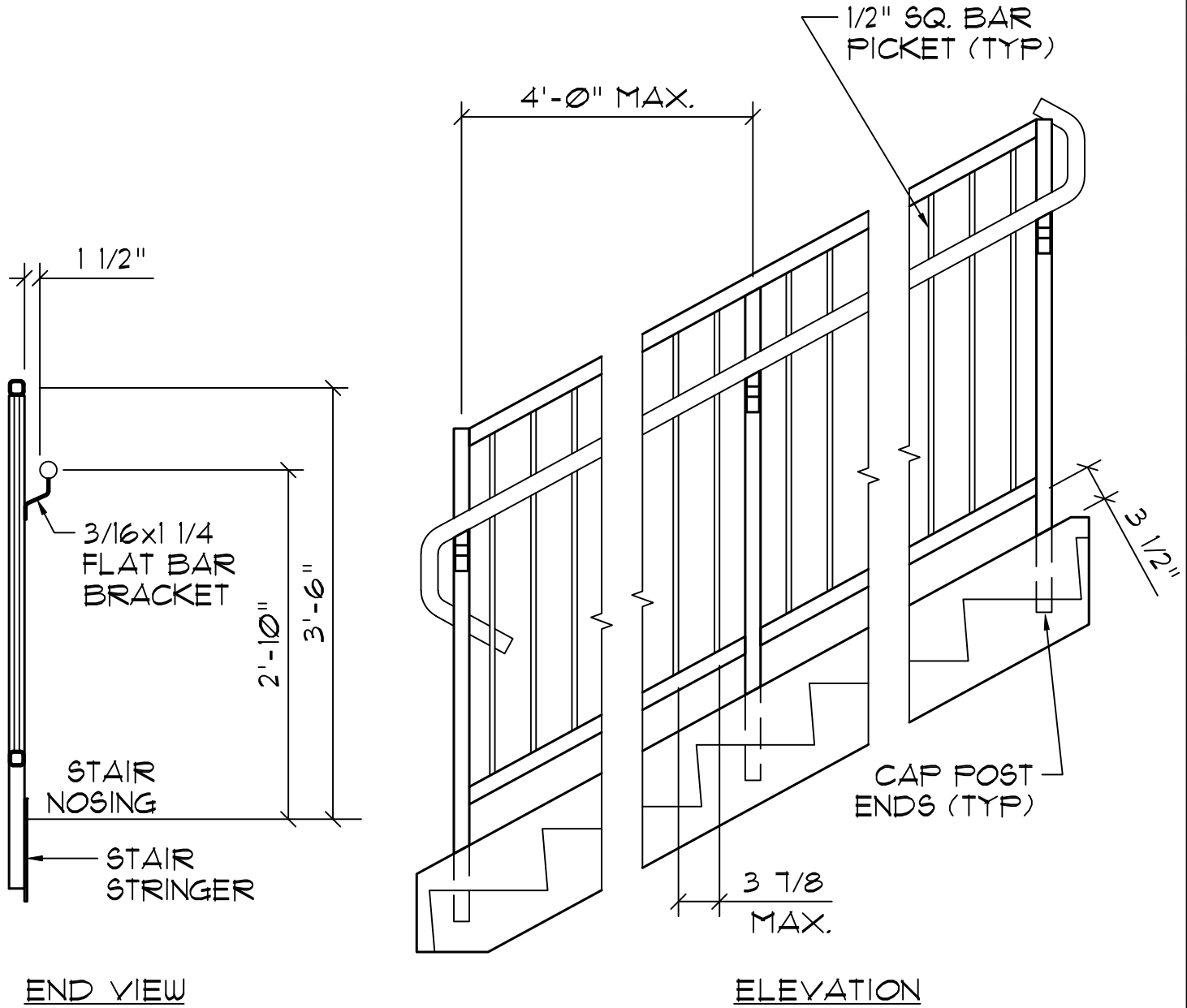
**PACIFIC STAIR**  
**CORPORATION®**

TYPE: TUBE STEEL RAIL

SCALE: NTS

DETAIL NO. R340

**NOTE:** FRAME MATERIAL IS 1 1/2" x 1 1/2" HSS  
 HANDRAIL MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE



STAIR RAIL



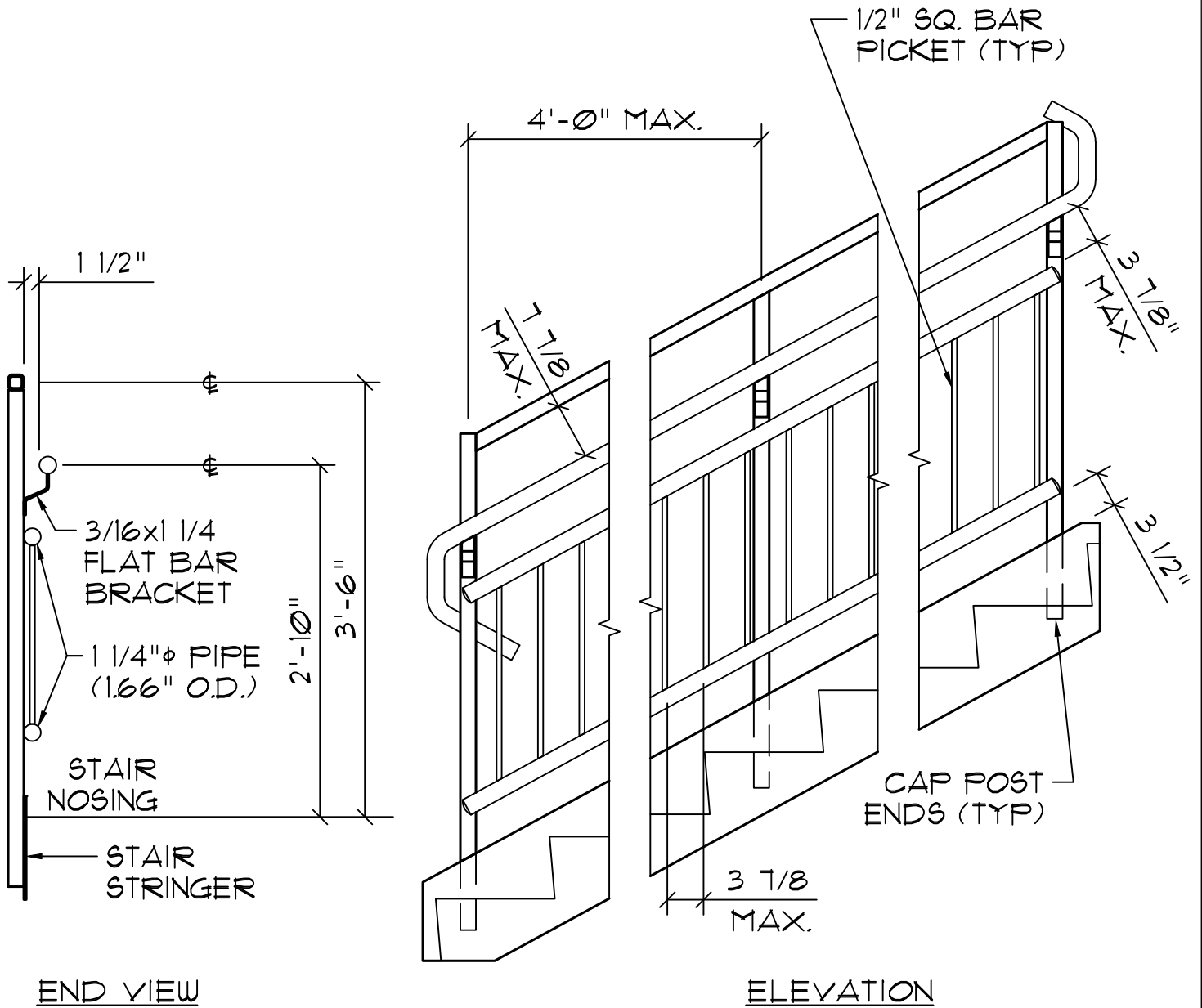
**PACIFIC STAIR CORPORATION®**

TYPE: PICKET RAIL

SCALE: NTS

DETAIL NO. R440

NOTE: POSTS AND TOP LINE MATERIAL IS 1 1/2" x 1 1/2" HSS  
 HANDRAIL MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE



STAIR RAIL



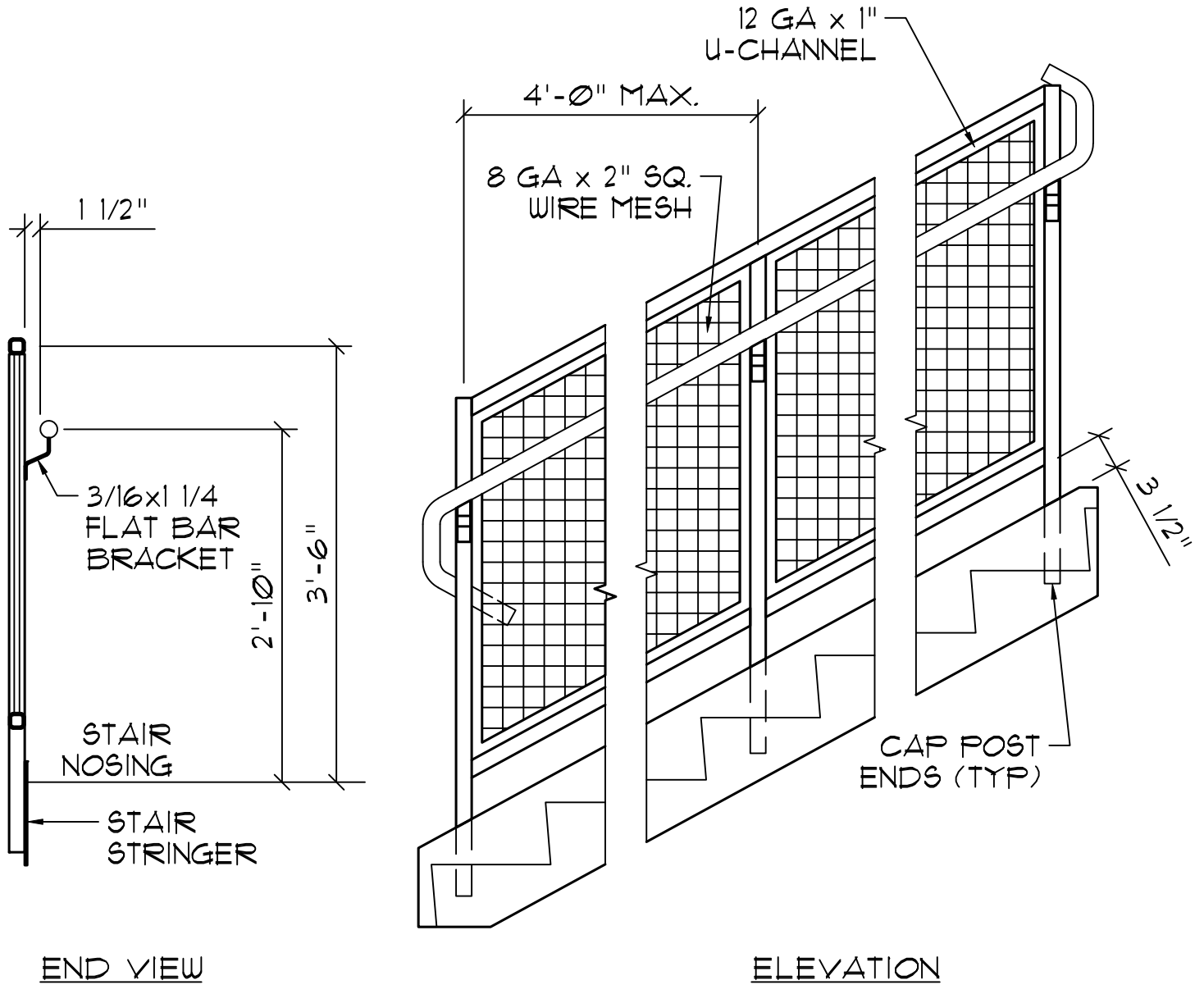
**PACIFIC STAIR**  
**CORPORATION®**

TYPE: ECONOMY PICKET

SCALE: NTS

DETAIL NO. R440a

**NOTE:** FRAME MATERIAL IS 1 1/2" x 1 1/2" HSS  
 HANDRAIL MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE



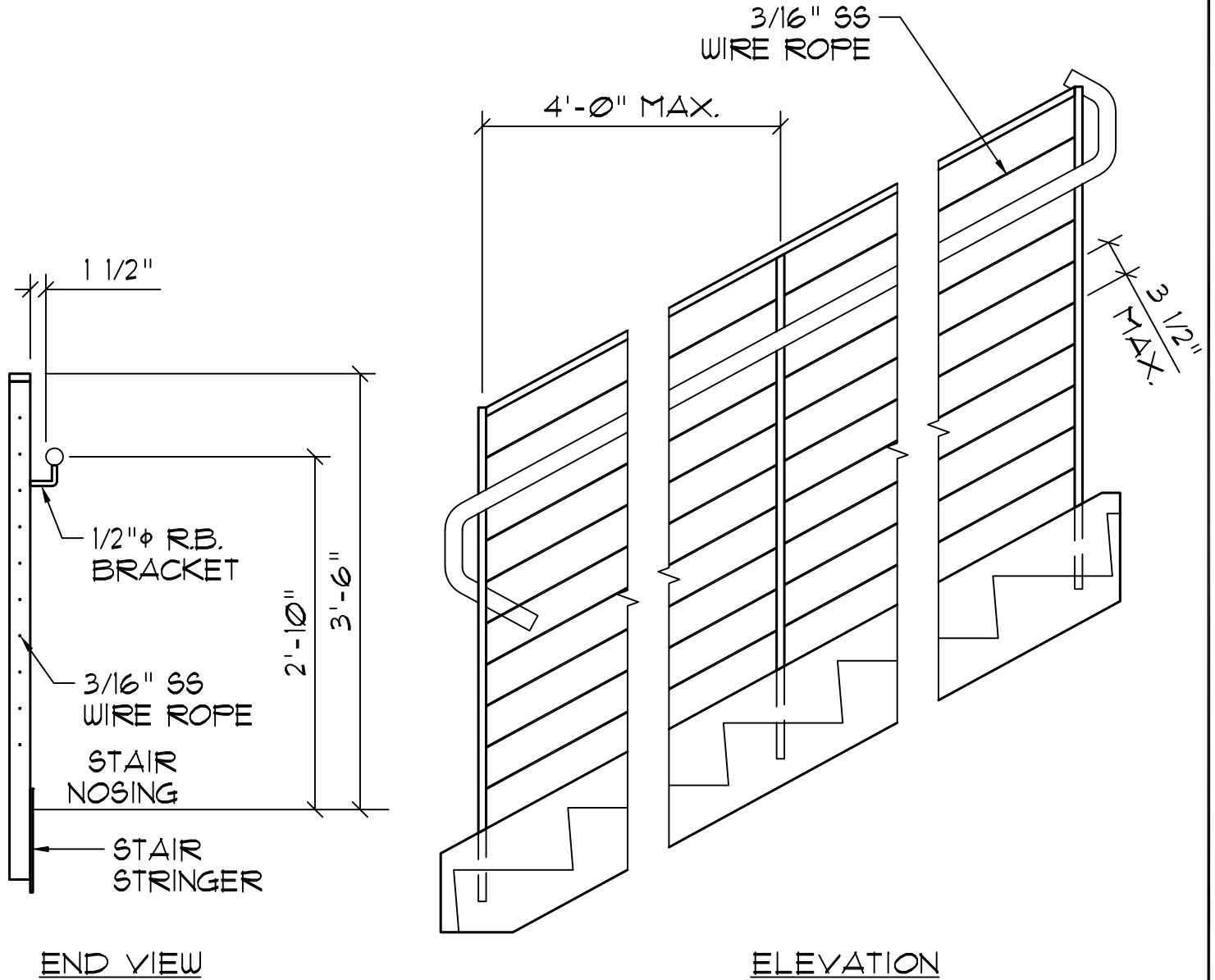
STAIR RAIL



**PACIFIC STAIR**  
**CORPORATION®**

TYPE:	MESH RAIL
SCALE:	NTS
DETAIL NO.	R540

NOTE: FRAME MATERIAL IS 3/4" x 2" FLAT BAR  
 HANDRAIL MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE



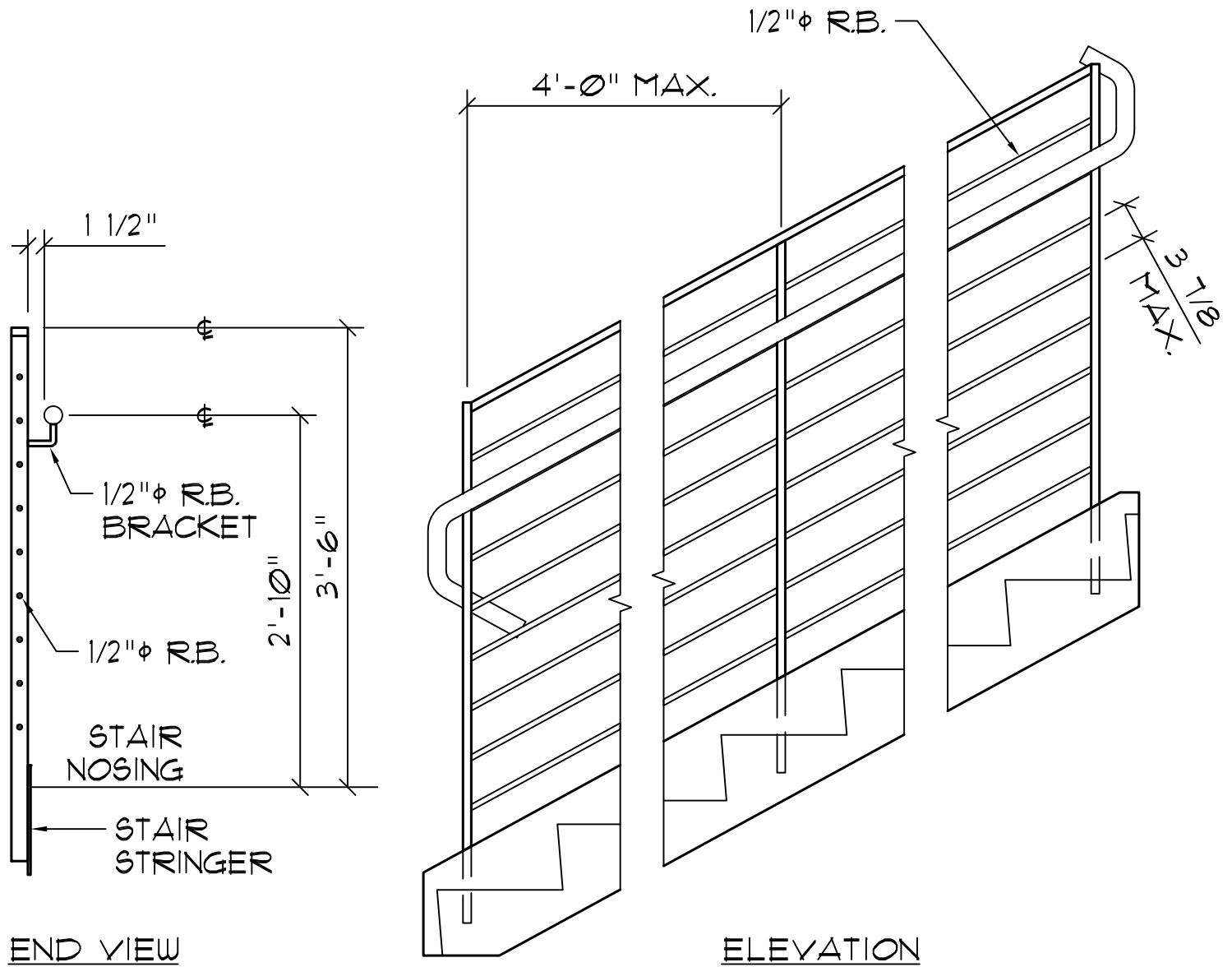
STAIR RAIL



**PACIFIC STAIR**  
**CORPORATION®**

TYPE:	CABLE RAIL
SCALE:	NTS
DETAIL NO.	R640

NOTE: FRAME MATERIAL IS 3/4" x 2" FLAT BAR  
 HANDRAIL MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE



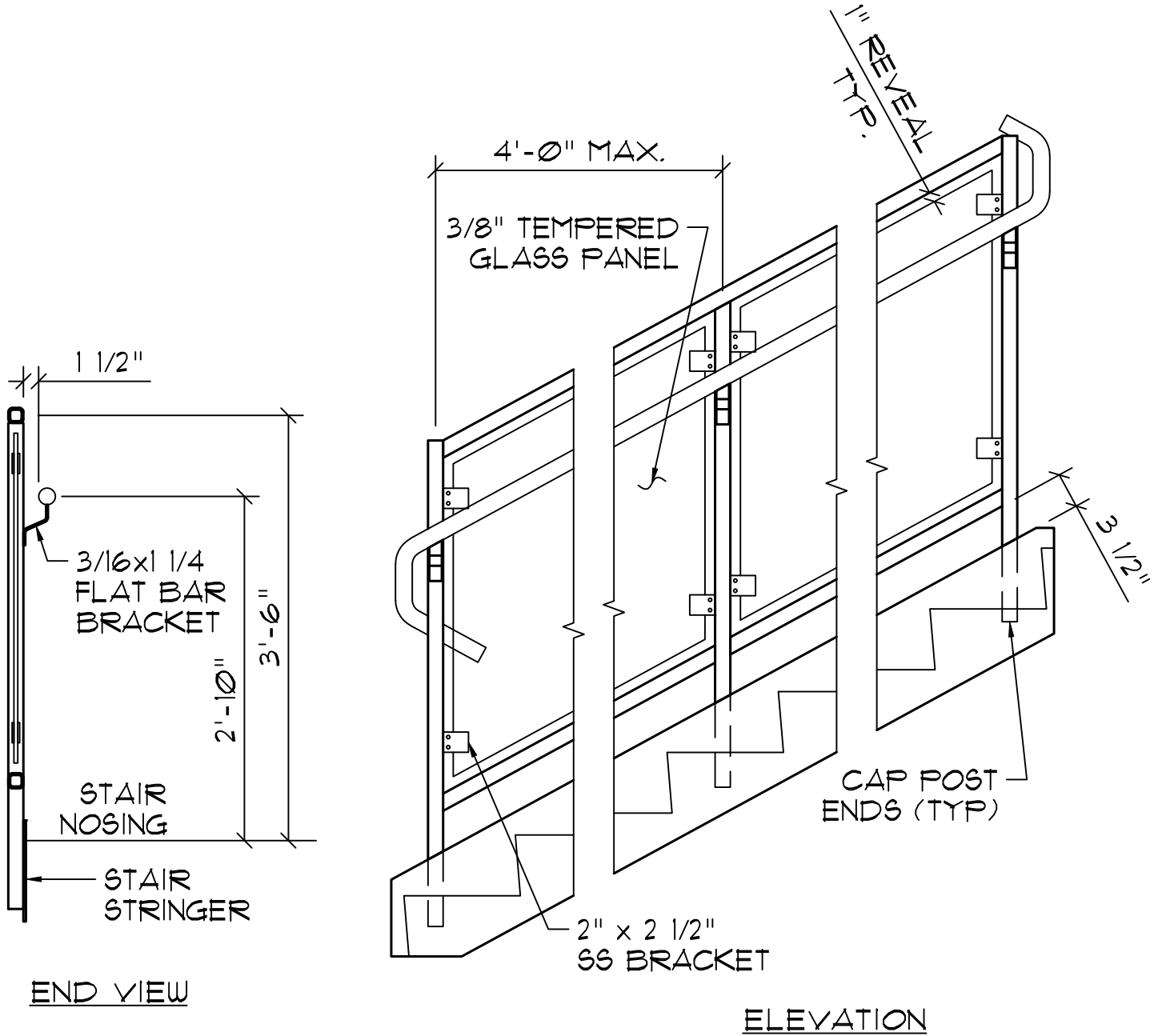
STAIR RAIL



**PACIFIC STAIR**  
**CORPORATION®**

TYPE:	ROD RAIL
SCALE:	NTS
DETAIL NO.	RT40

NOTE: FRAME MATERIAL IS 1 1/2" x 1 1/2" HSS  
 HANDRAIL MATERIAL IS 1 1/4"φ (1.66" O.D.) PIPE



STAIR RAIL



**PACIFIC STAIR**  
**CORPORATION®**

TYPE: GLASS RAIL

SCALE: NTS

DETAIL NO. R840