



**SPECIAL PROVISIONS
FOR
CONCRETE STEPS WITH HANDRAIL**

**Story County
BRFN-065-5(30)--39-85**

**Effective Date
December 17, 2013**

THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

120085.01 DESCRIPTION.

This specification details construction of concrete steps with an attached handrail.

120085.02 MATERIALS.

A. Steps.

1. **Concrete:** Class C concrete complying with Section 2301 of the Standard Specifications.
2. **Reinforcing Steel:** Comply with Section 2404 of the Standard Specifications.
3. **Expansion Joint:** Comply with Article 4136.03, A of the Standard Specifications.
4. **Forms:** Comply with Section 2403 of the Standard Specifications.

B. Handrail.

1. 1 1/4 to 2 inches in diameter; ensure post diameter matches handrail diameter.
2. **Steel:** Welded or seamless black steel pipe and posts complying with ASTM A 53, Grade A or B.
3. **Aluminum:** Aluminum-alloy extruded structural pipe complying with ASTM B 429, alloy 6061-T6 or 6063-T6, schedule 40 (if specified; for use with grouted connection only).
4. **Bends:** Provide manufactured pipe bends and connections for handrail. Do not field bend pipe.
5. Submit shop drawings for handrails.

C. Finish: Galvanize steel handrails.

1. Provide zinc coating complying with ASTM A 123.
2. Hot-dip galvanize components after fabrication.

D. Attachment.

1. Bolted Connection.

- a. **Anchor plate:** 1/4 inch thick, 5 inch by 8 inch galvanized steel anchor plate with a 46,000 psi yield strength.
- b. **Bolts:** Provide 3/8 inch galvanized anchor bolts or threaded rod with length as required to provide a 3 inch embedment. Comply with ASTM A 36.
- c. **Adhesive Anchoring Material.**
 - 1) Epoxy complying with ASTM C 881, Type IV. Provide appropriate epoxy class based upon concrete temperature at time of installation.
 - 2) Grout on approved products list in Materials I.M. 491.11, Appendix C.

2. Grouted Connection.

- a. **Polymer Grout:** Comply with Materials I.M. 491.11.
- b. **Non-shrink Grout:** Comply with Materials I.M. 491.13.

120085.03 CONSTRUCTION.

A. Installation of Steps.

1. **Prepare Subgrade:** In fill areas, construct and compact subgrade to 95% of maximum Standard Proctor Density.
2. **Forming:** Comply with Article 2403.03, B, 5 of the Standard Specifications.
3. **Concrete:** Comply with Article 2403.03 of the Standard Specifications. Deposit concrete for the full depth of the steps in one operation.
4. **Reinforcing Steel:** Comply with Section 2404 of the Standard Specifications. Provide a minimum 2 inches of cover on all reinforcing steel.

B. Installation of Rail.

1. General.

- a. Install rail continuously with no gaps or breaks along the length specified in the contract documents.
- b. Use welded connections between rail components. Grind connections to remove sharp or abrasive edges and to remove other irregularities.

2. **Handrail:** Install the top rail between 34 inches and 38 inches above the nose of the step tread. Maintain a consistent height above the step treads. Install the bottom rail midway between the nose of the step and the top rail.

3. **Posts:** Install posts at a maximum spacing of 8 feet. Attach handrail posts in one of the following ways.

a. Bolted Connection.

- 1) Weld anchor plate to the bottom of the handrail posts.
- 2) Layout location and drill four 7/16 inch holes for anchor bolts at each post attachment point. Drill holes with a carbide drill bit; do not core drill anchor bolt holes.
- 3) Apply adhesive anchoring material according to manufacturer's published recommendations and install threaded rod or anchor bolts.

b. Grouted Connection.

- 1) Form a 6 inch deep hole in the concrete curb 1 inch larger than the outside diameter of the post. Alternatively, hole may be core drilled in hardened concrete.
- 2) After the concrete hardens, set handrail posts into holes and temporarily secure.
- 3) Fill the void between the post and holes with non-shrink or polymer grout.

120085.04 METHOD OF MEASUREMENT.

A. Concrete Steps.

Measurement will be the area of concrete steps in square feet for each type of concrete step. The length will be the horizontal length between expansion joints, and the width will include side rails (for Type B steps).

B. Handrail.

Measurement will be in linear feet for each type of handrail, measured along the top of the handrail from end of rail to end of rail.

120085.05 BASIS OF PAYMENT.

A. Concrete Steps.

Payment will be at the unit price per square foot of concrete steps. This payment includes reinforcement, expansion joint material, and preparation of subgrade.

B. Handrail.

Payment will be at the unit price per linear foot for each type of handrail. This payment includes posts, mounting hardware or concrete grout, and finishing.