



Iowa Department of Transportation

SPECIAL PROVISIONS FOR AESTHETIC TREATMENT OF CONCRETE BARRIER

Johnson County
IM-080-6(281)244--13-52

Effective Date
February 19, 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.

120014.01 DESCRIPTION.

The Work consists of furnishing all labor, material, and equipment for integrally colored concrete and textured concrete finishes utilized on concrete barriers for the project, as specified herein, shown on the plans, or as directed by the Engineer.

120014.02 MATERIALS.

A. Integrally Colored Concrete.

Concrete barriers shall utilize integrally colored concrete, form liner texturing and rustication to provide a uniform aesthetic appearance to the barriers.

1. Concrete Strength: Concrete strength shall be as specified in the plans or Standard Specifications.
2. Color: The final color of the barrier concrete shall be a light buff limestone color. The color shall match Federal Standard No. 595C, Color Number 33717 as closely as possible using pigments added to a gray Portland cement base mix.
3. Cement pigments shall comply with ASTM C979. Pigments shall be lightfast, wettable, weather resistant, alkali resistant and free of deleterious fillers and extenders. The pigments shall be composed of inorganic natural and/or synthetic iron oxides to obtain the specified color. The amount of incorporated cement pigment is not to exceed 7% by weight of Portland cement in the concrete mix.
4. The contractor shall verify with the pigment manufacturer the compatibility of cement pigment with concrete admixtures, form release compounds and cleaning and curing methods. The sources and composition of sands and aggregate shall remain consistent for all applications involving integrally colored concrete.

5. For integrally colored concrete, Class 3 durability coarse aggregate is required. Fly ash and calcium chloride shall not be used. Slag (GGBFS) may be used if it is in accordance with the manufacturer's recommendations.
6. Water to cement ratio shall be kept consistent with a maximum variation of +/- 0.02%.
7. Approved cement pigment suppliers include the following:
 - a. Scofield Systems (800) 800-9900
 - b. Davis Colors (800) 835-0849
 - c. Dynamic Color Solutions (800) 657-0737
 - d. Other suppliers of products meeting all requirements of these Special Provisions, submitted to and approved by the Iowa Department of Transportation Office of Materials.

B. Concrete Form Liners.

1. The form liner pattern used to create the barrier surface texture as shown in the plan details shall produce the effect of a realistic, random dry-stacked stone masonry surface having natural, uncut stones of varying size and shape. Stone pattern shall not repeat at less than 10 foot intervals. Maximum texture relief shall be 0.75 inch deep from the bottom of the simulated mortar joints to the outermost surfaces of the texture. Simulated mortar joint width shall be a maximum of 0.75 inch. Maximum differential of stone surfaces across joints shall be 0.20 inch. All stone edges shall be rounded.
2. Only one texture pattern shall be used on the project. Texture produced shall be similar to the following patterns:
 - a. Architectural Polymers (Pattern No. 910 "Median Barrier Drystack")
 - b. SlipStone, Inc. (Pattern No. 2392 "Woodbridge Stack Stone")
 - c. Fitzgerald Formliners (Pattern No. 17008 "Brayman Drystack")
 - d. Other patterns meeting all requirements of these Special Provisions, submitted to and approved by the Iowa Department of Transportation, Office of Design.
3. Form liner systems and rustication strips shall be made of high-strength urethane elastomer, plastic or flexible foam materials capable of withstanding anticipated concrete pour pressures without leakage or causing physical defects.
4. Form liners and rustication strips shall easily attach to forms and be removable without causing concrete surface damage. If recommended by the form liner manufacturer, use structural backers to prevent deformation of the liner during loading of forms. The liners shall be designed to form surfaces conforming to the design intent including shape, lines and dimensions specified in the plans and to avoid visible pattern repeats.
5. Release agents shall be compatible with form liner materials and shall be non-staining. Apply release agents in accordance with the form liner manufacturer's recommendations.
6. If used, ties shall be made of non-corrosive materials when the portion permanently embedded in the concrete is less than 1 1/2 inches from the finished surface.

120014.03 CONSTRUCTION.

A. Submittals.

1. Provide manufacturers literature for proposed concrete pigment and two colored concrete manufacturer's samples containing only gray Portland cement base mix.

2. Submit a 2 foot by 2 foot sample of the proposed form liner. Sample may either be actual form liner materials or foam castings from form liners proposed for use on the project. Clearly mark the manufacturer's name and pattern number on the sample.
3. Provide barrier layout drawing for proposed form liner showing repeat frequency of pattern and rustication details.

B. Barrier Mockup Panel.

1. The contractor shall construct a 10 foot long, full size barrier mockup in accordance with the Standard Specifications and these Special Provisions for review by the Engineer. Locate mockup near the project site as directed by the Engineer. The mockup shall utilize integrally colored concrete with the proposed mix proportions and pigment color that are intended to be used for final production. The mockup shall also utilize the proposed form liner on both faces, shall demonstrate typical forming operations, use and position of ties, if required, and shall demonstrate typical rustication details specified in the plans. If slip-forming methods are proposed to provide the texturing on the barriers, the mockup shall demonstrate all aspects of the slip forming method as part of the mockup installation. Following removal of mockup forms, patching methods for defects and form tie holes shall be demonstrated on the mockup. Patching of voids and tie holes may require adjustment of the mortar mix proportions so that the patches match adjacent concrete.
2. Mockup shall be produced at least one month before start of actual barrier production. Additional mockup(s) may be ordered by the Engineer until an acceptable result is achieved. Actual barrier production may not proceed until final approval of the mockup.
3. The mockup shall remain at the project site for comparison to actual barriers as they are produced. Upon completion of the project, the mockup shall become the property of the Contractor and shall be removed from the project site.
4. Complete records of the casting process, including mix design, water content, cement pigment and rate of incorporation, mixing sequence, form release compounds and patching, curing and cleaning methods used on the approved mockup shall be submitted to the Engineer.

C. Execution.

1. The Contractor shall take particular care in all aspects of casting the barriers in order to achieve a consistent color and quality in the finished barriers.
2. Match patterns of form liner joints to make formed concrete surfaces appear uniform and continuous without visible seams and form marks. When joints are unavoidable, make joints along main features of the pattern in accordance with the manufacturer's recommendations. Minimize the number of splices in rustication strips. Use adequate blocking, sealing or other means in order to maintain the appropriate depth and character of texture at cut edges of form liners and to prevent mortar leakage. Forms shall be watertight.
3. Concrete mixing, batching and transporting equipment shall be thoroughly cleaned and rinsed prior to mixing and delivering colored concrete to the concrete barrier forms. The contractor shall follow pigment manufacturer's specifications for measuring pigment and distribution throughout the concrete prior to placement.

4. During loading of forms with concrete, take extra care to adequately vibrate concrete in order to maintain all intended features of the form liner in the final surface texture. The completed surface shall be free of blemishes, surface voids and conspicuous form marks to the satisfaction of the Engineer. The Contractor shall correct, at his own costs, any surface defects.
5. Strip formwork in accordance with the form liner manufacturer's recommendations after the concrete has sufficient strength to avoid surface damage. Clean and repair form liner surfaces prior to re-use. Do not re-use form liners if damaged from previous use on the project.
6. After removal of forms, the colored concrete barriers are to be cleaned with potable water and a stiff wire brush only. Care shall be taken to avoid damage to the textured surface during cleaning operations.
7. Cure barriers using a method preventing moisture loss and at a uniform temperature above 40°F during the curing period. If forms remain in place during the first 12 hours, exposed concrete surfaces shall require wet burlap application. Continued wet curing methods may be required to reduce the incidence of shrinkage cracks and to enhance cement hydration for achieving required concrete strengths. Do not apply any sealers to completed barriers.

120014.04 METHOD OF MEASUREMENT.

Aesthetic treatments for concrete barriers shall not be measured for individual payment.

120014.05 BASIS OF PAYMENT.

All costs for providing integral color for concrete barriers, for constructing texture and rustication for concrete barriers, and for constructing the concrete barrier mockup panel(s) shall be considered incidental to the bid item Concrete Barrier, Aesthetic.