



**SPECIAL PROVISIONS  
FOR  
AESTHETIC TREATMENT OF CONCRETE BARRIERS**

Woodbury County  
BRM-7057(650)--8N-97

Effective Date  
January 19, 2011

**THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

**093004.01 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.

**093004.02 MATERIALS.**

**A. Integrally Colored Concrete.**

Barriers on the bridge and concrete barrier tapered end sections on the roadway approaches shall utilize integrally colored concrete 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 utilizing 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 percent 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 percent.
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 submitted to and approved by the Iowa Department of Transportation Office of Materials.

**B. Concrete Form Liners.**

1. Form liners shall produce the dry stacked stone masonry texture specified in the plans. Obtain form liner materials matching the pattern numbers and manufacturers specified in the plans.
2. Form liner systems 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.
3. Form liners 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.
4. 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.
5. 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.

**093004.03 CONSTRUCTION.**

**A. Submittals.**

1. Provide manufacturers literature for proposed concrete pigment and two 6 inch by 6 inch by 1 1/2 inch colored concrete samples.
2. Submit a 1 foot by 1 foot sample of the proposed form liner. Samples may either be actual form liner materials or foam castings from form liners proposed for use on the project.
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 2 foot 10 inch high by 4 foot long, full size barrier mockup for review 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. All colored concrete for barriers along the north side of the project (bridge and roadway approach barriers) shall be produced and placed in a single day and under a single production lot. Colored concrete for the barriers along the south side of the project (bridge and roadway approach barriers) shall likewise be produced and placed in a single day and under a single production lot and shall duplicate all production methods used for the opposite side of the project.
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. 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 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 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. No sealers shall be applied to completed barriers.

**093004.04 METHOD OF MEASUREMENT.**

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

**093004.05 BASIS OF PAYMENT.**

All costs for furnishing and providing integrally colored concrete for barriers, furnishing and placing form liners, constructing mockup panel(s), and all labor, equipment and incidentals needed to complete the work shall be considered incidental to the bid items "Concrete Barrier Rail, Aesthetic" and "BA108 Concrete Barrier Tapered End Section."