



**SPECIAL PROVISIONS
FOR
AESTHETIC TREATMENT OF MSE RETAINING WALL CONCRETE PANELS**

**Polk County
IM-080-3(264)124--13-77**

**Effective Date
July 16, 2024**

THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

230199.01 DESCRIPTION.

This work consists of furnishing all labor, material, and equipment for integrally colored concrete and textured concrete finishes utilized on precast concrete panels for Mechanically Stabilized Earth (MSE) retaining walls, as specified herein, shown on the plans, or as directed by the Engineer.

230199.02 MATERIALS.

A. Integrally Colored Concrete.

1. General: MSE retaining wall precast concrete panels shall utilize integrally colored concrete to provide a uniform aesthetic appearance. The contractor shall take particular care in all aspects of manufacturing the wall panels to achieve consistent color and quality in the finished panels. Integral color is not required for panels that will be entirely below the final grade line. Fully exposed and partially exposed units shall be integrally colored.
2. Concrete Strength: Concrete strength shall be as specified in the plans or Standard Specifications.
3. Color: The final color of the precast concrete panels shall be a light buff limestone color. The color shall match Federal Standard Color Number 23522 as closely as possible using gray Portland cement.
4. Cement pigments shall comply with ASTM C 979. 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 shall not exceed 7% by weight of Portland cement in the concrete mix.
5. 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.
6. 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 pigment manufacturer's recommendations.
 7. Water to cement ratio shall be kept consistent with a maximum variation of +/- 0.2%.
 8. 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 DOT, Construction and Materials Bureau.
 9. Integrally colored concrete is not required for coping, slip joint covers, or corner elements.

B. Concrete Form Liners.

1. Concrete form liner may only be used if the form liner characteristics precisely match the texture details in the plans. Form liners used shall be from one of the following manufactures:
 - a. Fitzgerald Formliners (submit pattern)
 - b. Architectural Polymers (submit pattern)
 - c. Scott System, Inc. (submit pattern)
 - d. Custom Rock International (submit pattern)
 - e. Spec Formliners (submit pattern)
 - f. Symons Form Liners (submit pattern)
 - g. Approved equal
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 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.
6. Texture is not required on panels that will be entirely below the final grade line. Fully exposed and partially exposed panels shall include texture.
7. Coping, slip joint covers, and corner elements shall be smooth form finish texture.

230199.03 CONSTRUCTION.

A. Submittals.

1. Provide manufacturer's literature and two colored concrete manufacturer's chip samples for the proposed concrete color pigment.
2. Submit manufacturer's cut sheets for form liners. No form liner samples are required to be submitted for the approved form liners listed in the plans and these Special Provisions. If an alternate manufacturer and pattern are proposed, a physical sample is required. Submit a 1 foot by 1 foot sample of each of the proposed form liners. Samples may either be actual form liner materials or foam castings from the form liners proposed for use on the project. Include labels listing manufacturer name, pattern number and/or title, and material type on the samples. Deliver samples to the Iowa DOT Bridges and Structures Bureau, Attn: Aesthetics Coordinator, 800 Lincoln Way, Ames IA 50010. Approval of proposed form liners must be received prior to building final MSE wall panel casting forms.
3. Provide a shop drawing for proposed precast concrete panel surface treatment showing form liner and texture details. See the drawings for further information.

B. Mockup Panel.

1. Construct two full-size mockups precast concrete MSE panels for review by the Engineer. For the purposes of the mockups, cast Panel Type A1 and Panel Type B1. The mockup shall utilize integrally colored concrete with the proposed mix proportions and pigment color that are intended for use in final production work. The mockup shall also utilize the proposed rustication strips or form liners, shall demonstrate typical forming operations, use and position of ties, if required, and shall demonstrate typical rustication details as specified in the plans. 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 or are slightly lighter than the surrounding concrete. White cement may be required to lighten the patching mix.
2. Construct mockups at least 10 days before start of production precast concrete wall panel work to allow for adequate curing and final color evaluation by the Engineer. Additional mockup(s) may be ordered by the Engineer until an acceptable result is achieved. Actual precast panel production may not proceed until final approval of the mockup following curing time deemed adequate by the Engineer for assessing the final concrete color.
3. The mockups shall remain at the precast panel production site for comparison to actual production panels as they are cast. Upon completion of the production panel casting operations, and if approved for use by the Engineer, the mockup panel may be incorporated into the project.
4. Submit 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 to the Engineer prior to the start of production panel casting work.

C. Execution.

1. Take particular care in all aspects of casting the precast concrete MSE wall panels to achieve a consistent color and quality in the finished panels.
2. Form each continuous textured surface on the panel using a single continuous form liner with no joints. The formed concrete surfaces shall appear uniform and continuous without visible seams and form marks. Use adequate blocking, sealing or other means 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. Thoroughly rinse concrete mixing, batching, and transporting equipment prior to mixing and delivering colored concrete to the forms. Follow pigment manufacturer's specifications for measuring pigment and distribution throughout the concrete prior to placement.
4. During loading of forms with concrete, take care to adequately vibrate concrete to maintain all intended features of the form liner and rustication in the formed surfaces. The completed surface shall be free of blemishes, surface voids and conspicuous form marks to the satisfaction of the Engineer. Correct any surface defects at no additional cost to the project. Panels of unacceptable visual quality may be rejected by the Engineer and shall not be used on the project.
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 damaged form liners or rustication strips on the project.
6. After removal of forms, clean the colored concrete surfaces with potable water and a stiff, non-staining wire brush only. Do not stain or damage the surfaces during cleaning operations. Patching of voids and tie holes may require adjustment of the mortar mix proportions so that the patches match or are slightly lighter than the surrounding concrete. White cement may be required to lighten the patching mix. Finish minor defects to match the surrounding surface texture.
7. Cure concrete using a method preventing moisture loss and at a uniform temperature above 40°F during the curing period. Store panels face down during initial cure and cover with wet burlap for the first 24 hours. Continued wet curing methods may be required to reduce the incidence of shrinkage cracks and to enhance cement hydration for achieving required concrete strengths in shorter time periods. No sealers shall be applied to completed panels.

230199.04 METHOD OF MEASUREMENT.

Aesthetic treatment of MSE retaining wall precast concrete panels shall not be measured for individual payment.

230199.05 BASIS OF PAYMENT.

All costs associated with integrally colored concrete for MSE retaining wall precast concrete panels, furnishing and placing form liners, constructing mockup panel(s), and all labor, equipment and incidentals needed to complete the described work shall be considered incidental to the bid item "Mechanically Stabilized Earth Retaining Wall".