

**Special Provisions**  
**AESTHETIC TREATMENTS**  
**SUM-8-1.75, State Route 8 Bridge (PID 91710)**  
Akron, Ohio

**I. DESCRIPTION**

**A. General.** This work consists of designing, preparing working drawings, and producing full-size custom patterns; fabricating custom form liners from approved full-size custom patterns; casting sample panels; and constructing raised relief patterns on exposed surfaces of precast concrete sound barrier wall panels and concrete bridge structures using the custom form liners; as described herein, as shown on the Plans, and as directed by the Engineer. The custom form liners shall be provided in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions shown on the Plans. The requirements in this Special Provision and Ohio Department of Transportation (ODOT) Standard Drawing NBS-1-09 govern the construction of the highway-facing side of portions of noise walls indicated in the plans to have custom patterned finishes other than ashlar stone. The non-highway facing side and ashlar stone patterned panels of the highway-facing side shall be governed by Ohio Department of Transportation (ODOT) Standard Drawing NBS-1-09.

**B. Standard Specifications.** Unless otherwise described herein, the work shall be in accordance with American Concrete Institute ACI 303R-91, Guide to Cast-In-Place Architectural Concrete Practice, ODOT Standard Drawing NBS-1-09, and the Ohio Department of Transportation Construction and Material Specifications (CMS).

**C. Definitions.**

**Bas-relief:** a kind of sculpture in which forms are created to project slightly higher from a flat background, with or without undercuts.

**Contractor:** as defined in CMS 101.03.

**Work:** as defined in CMS 101.03.

**Engineer:** as defined in CMS 101.03.

**Form Liner Company:** the individual, firm, or corporation with whom the Contractor subcontracts to provide the custom form liners described herein.

**Dimple:** a small oval or circular indentation in the surface of urethane rubber surface

**Simulated Stone:** a concrete surface pattern resembles the appearance of a natural stone.

**3D CAD modeling:** a digital sculpting using computer software that offers tools to manipulate a digital object as if it were made of a real-life substance such as clay.

**Suitable Materials:** any material that is strong enough to sustain handling, shipping and able to create a mold or form liner from.

## II. MATERIALS

- A. **Form Liners.** Use urethane rubber.
- B. **Plywood Backing.** If required by Engineer or Contractor, use 0.75-inch ACX plywood.
- C. **Form Release Agent.** Use Polytek Pol-Ease 2650, Armcon CRA3, Cresset Crete-Lease 20-VOC, or approved equal.

## III. CONSTRUCTION REQUIREMENTS

### A. Working Drawings, and Full-Size Patterns.

- 1. Working Drawings.
  - a. Following model acceptance, the Form Liner Company shall submit to the Engineer for review and acceptance Shop Drawings containing plans, elevations, sections, and details required to construct the custom patterns, including panel dimensions, joint details, form tie locations, and edge, perimeter, and other special conditions as necessary to completely fabricate the form liners and construct the patterns.
  - b. Shop drawings should be of sufficient scale to show the detail of all custom patterns and the assembly and connection of all form liner components. The form liner shall be patterned such that long continuous horizontal or vertical lines do not occur on the finished exposed surfaces.
- 2. Full-Size Patterns.
  - a. Following shop drawing acceptance, the Form Liner Company shall design and fabricate full-size patterns for use in making the urethane rubber form liners.
  - b. The Engineer will inspect the full-size patterns at the Form Liner Company's facility prior to fabrication of the urethane rubber form liners, or approve the pattern by reviewing high resolution photographs provided by the Form Liner Company. The full-size patterns must be approved prior to commencing form liner fabrication. Poor workmanship, lack of consistency with approved shop drawings, or other deficiencies, at the Engineers sole discretion, shall be sufficient cause for rejection of the full-size patterns.
  - c. Refer to the plans for additional information.

### B. Form Liner Fabrication, Handling, and Storage.

- 1. Requirements and Tolerances.
  - a. The form liners shall be fabricated with shapes that allow removal of the forms without damage or visual impairment of the concrete and shall use 1/8-inch minimum radii and no sharp edges.
  - b. The dimensions of the form liners shall conform to plan dimensions within 1/4-inch per 10-foot of length in either direction.
  - c. The squareness of any rectangular form liner shall be within 1/4-

inch as determined by the difference between the two diagonals.

d. The Form Liner Company's name, Project number, and image identification shall be permanently recorded on the back or sides of the form liners.

2. Shipping, Handling and Storage.

a. Each form liner should be checked for tolerances and quality prior to leaving the Form Liner Company's facility.

b. Form liners shall be stored flat and level in a climate controlled indoors environment when possible, or outdoors in a cool, dry place.

c. Form liners shall be elevated off the ground and covered with polyethylene sheet or a tarp when not in use.

d. Form liners shall be protected from moisture, heat and sunlight. Form liners degrade when exposed to intense sunlight for extended periods of time. Degradation can affect the life of the liner, and in some cases, cause discoloration of the concrete surface.

e. If stacked, form liners shall be oriented front to back with compressible dunnage such as Styrofoam used to separate them with the spacers uniformly located and smaller pieces stacked on top of larger pieces.

f. Surface temperatures in excess of 190° F shall be avoided as this may cause permanent thermal distortion and diminish the physical properties of the form liner.

g. The surface of the form liners shall be kept clean and free of precipitation, oil, dust, and debris.

**C. Sample Panels and Full-Size Mock-Up.**

1. Sample Panels for noise walls shall be the requirements of ODOT Standard Drawing NBS-1-09.

2. The noise wall text relief pattern drawing prepared by the concrete formliner company must be submitted to ODOT District Environmental Staff and OES Central Office by the contractor or supplier for ODOT review and written approval before the panel is produced.

**D. Preparation, Casting, and Stripping.**

1. Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Repairs shall be inspected and approved by the Engineer before being reused. Form liners that cannot perform as intended or are no longer repairable shall be replaced after notifying the Engineer.

2. The form liners shall fit snugly and square within the Contractor's forms, resulting in minimal voids or misalignments and in accordance with the lines, elevations, reliefs, and locations shown on the Plans. The form liners shall be capable of withstanding the applied concrete pour pressures without leakage,

physical, or visual defect.

3. Once placed in form, the form liners should be visually checked to confirm registration between form liner sections. All seams between liners shall register horizontally and vertically, and all final surfaces shall be flush with one another. If the surface of a form liner is not flush with the adjacent one due to variations in the supporting form surface, the form liners shall immediately be adjusted to be flat and true. If there are slight variations or differences in height between the liner sections, small 1/32-inch shim(s) can be placed under the edge and/or along the seam of one liner to bring the surface flush with the adjacent liner prior to caulking. After the registration is adjusted as necessary, the registration will be approved by the Engineer.

4. Prior to casting, all joints between liners shall be filled with silicone caulking and scraped back to keep adjacent surfaces flush and level and to prevent cement paste from bleeding. Liner butt joints shall be carefully blended into the approved pattern to minimize visible seams in the concrete. When caulking seams through textured areas, the Contractor shall make every attempt to match the texture on either side of the joint by tooling the caulking to minimize visible joints in the concrete.

5. Form ties shall be designed to allow breakback and complete removal to a depth of 2-inch from the concrete face without spalling or damaging the concrete. The Contractor shall submit the type of form ties to the Engineer for approval.

6. To avoid cold joints, concrete placement should never be stopped part way up the form liner pattern.

7. Concrete should be vibrated to ensure a good consolidation and prevent honeycombing. When vibrating the concrete, the vibrator should not lie on or against the form liner surface.

#### **E. Surface Finish and Color.**

1. Once cast, tie recesses, minor honeycombing and bug holes in the surface of the concrete shall be repaired by pointing with concrete mortar that closely matches the color and consistency of the base pour.

2. Surface Cleaning and Finishing.

a. Pressure washing with water (minimum 3000 psi) is the preferred method of removing latent concrete from raised relief or recessed aesthetic treatments. Following surface cleaning, the final surface shall be free of blemishes, discolorations, voids, and form marks, to the satisfaction of the Engineer.

b. Sandblasting shall not be allowed for cleaning concrete surfaces within areas of aesthetic treatments, including bas-reliefs, recessed text, medallions, or standard form liner finishes, as it will compromise the contrast and clarity of the images.

c. Grout cleaning and rubbed surface finishing shall not be used within areas of aesthetic treatments, as these methods will compromise the contrast and clarity of the images.

3. Surface Color.

a. Noise Walls: An epoxy-urethane sealer shall be applied to all exposed areas of concrete as specified in the finish elevations shown in the plans. Sealer shall not be applied to the noise wall posts or post caps.

b. Bridge: The simulated stone stain shall closely match the sample color image as shown in sheet A4.6. Final stain colors are subject to approval by the Engineer. Use base stain similar to the recommended federal color ID No. 36586. Three additional recommended colors (one surface color and two highlight/shading colors) will be required to give the appearance of natural stone, and recommended stain colors are federal color ID No. 33446 for the surface color, federal color ID No. 34201 and 36473 for the highlight colors. The base color shall be applied to the entire surface (stones and grout pattern joints) and may be sprayed, with a minimum of two complete coats. Contractor shall take necessary precautions to protect adjacent property from damage during the spraying process. The surface color shall be randomly applied to approximately 65 percent of the overall surface of simulated stones (front face and edges). Each highlight/shading color shall be applied on top of the base color on the surface of the simulated stones (front face only). The surface and highlight/shading colors shall be applied to the front face of the simulated stones using a sponge, however, the surface color shall be applied to the edges of the simulated stones by brush. The surface and highlight/shading colors shall not be applied to the grout pattern joints.

**IV. MEASURE AND PAYMENT**

A. The development and preparation of working drawings including shop drawings, the development and furnishing of all form liners, installation of all sample panels and mock-ups, construction, concrete finish, relocation and disposal of all sample panels and mock-ups, the services of the manufacturer's representative, and all materials, labor, equipment, tools, and any incidentals necessary to complete the work will not be measured separately but will be incidental to the Contract unit price for the pertinent items as listed below.

B. Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit Symbol</b>
Concrete, Misc.: Form Liner	Lump Sum
Special - Form Liner	Square Feet
Concrete, Misc.: Bas-Relief Images and Text	Each