Section 703. MORTAR AND CONCRETE PATCHING, REPAIR, AND RESURFACING MIXTURES

703.01. Description. This work consists of producing and furnishing mortar and concrete mixtures for patching, repair, and concrete overlays in accordance with section 701, except as modified by this section.

703.02. Materials. Provide materials in accordance with the following:

Cement, Type I, Type IA	901
Silica Fume	901
Coarse Aggregate 6AA, 6A, 26A	902
Fine Aggregate 2NS	902
Polypropylene Fibers	903
Latex Emulsion Admixture	903
Water Reducing and Water Reducing-Retarding Admixtures	903
Air Entraining Admixtures	903
Water	911

A. **General Requirements.** Unless otherwise required by the contract, provide air-entrained concrete or mortar.

Proportion mixtures as specified in Table 703-1 and Table 703-2. Aggregate weights specified in the tables are based on a dry bulk specific gravity of 2.65 for gravel and stone. Adjust the weights if the specific gravity of the materials used varies by more than 0.02 from the specified values.

The specified quantity of water is approximate. Use the least amount of water to provide the consistency required for the specific mixture.

Do not use slag aggregates.

B. **Mortar and Concrete Patching Mixtures, Types F-L, M, C-L, C-L-HE, C, and C-HE.** Provide mortar and concrete patching mixtures for patching bridge decks or substructure elements.

Select a mixture from Table 703-1 based on the depth of patched area and the length of curing time available before allowing traffic on patches. Provide either regular strength or high-early strength patching mixtures. Allow a cure time of at least five days for regular strength patching mixtures and at least 24 hours for high-early strength patching mixtures.

C. **Latex Modified Concrete (LMC) Overlay Mixture.** Provide 100 percent crushed 26A coarse aggregate conforming to section 902. Ensure LMC meets the strength requirements of Grade D concrete as specified in Table 701-1, in accordance with section 605 and the contract.

Table 703-1
Structures Patching Mixtures

Depth of Patch in	Aggregate Required	Mixture Type (g)	Mixture Proportions per cyd, dry weight					Air Content %
			Cement lb	Net Water (approx) lb	Latex Admixture lb (gal)	Fine Aggregate lb	Coarse Aggregate lb	
<1.5	2NS	F-L	752 (c)	(b)	235 (28.0)	2,450	N/A	6.0 ±2.0
1.5 – 4	2NS & 26A	M	799	358 (a)	N/A	1,260	1,260	7.5 ±1.5
≥1.5	2NS & 26A (d)	C-L	658 (c)	169 (b)	143 (17.0)	1,348 (e)	1,458 (e)	4.5 ±1.5
		C-L-HE	846 (c)	(b)	228 (27.0)	1,308 (e)	1,416 (e)	4.5 ±1.5
>4 (f)	2NS & 6AA	C	705	315 (a)	N/A	1,220	1,530	6.5 ±1.5
		C-HE	846	300 (a)	N/A	1,220	1,590	5.5 ±1.5

a. Control water to provide a stiff, workable mixture with 1 in to 2 in slump. During hot and windy weather, the Contractor may increase slump to 3 in to 4 in, as determined by the Engineer.
b. Add water, in addition to water in the latex admixture, to control slump to within 3 in to 5 in. Measure slump from 4 min to 5 min after discharge from the mixer. During this waiting period, deposit concrete on the deck and do not disturb. If placing mixtures on sections within super-elevated curves, the Contractor may need to use the lower allowable range of the slump requirement, as determined by the Engineer. Do not exceed water-cement ratio, by weight, of 0.30 including water contained in the latex emulsion.
c. Use only Type I cement in these mixtures.
d. Ensure the 26A absorption does not exceed 2.5%, in accordance with ASTM C 127.
e. The aggregate proportions are approximate; due to gradation changes, the Engineer may make adjustments. The Contractor may increase the fine aggregate quantity by no greater than 5% by weight of total aggregate if reducing coarse aggregate by an equivalent volume.
f. Substructure repairs.
g. F, M, and C indicate fine, medium, and coarse: L indicates latex modified; HE indicates high-early strength. Type F mixtures are mortars.

Table 703-2
Overlay Mixtures

Mixture Type	Aggregate	Slump in	Air Content %	Admixture Required	Mixture Proportions lb/yd³, dry weight					
					Cement (a)	Dry Densified Silica Fume (i)	Net Mix Water	Fine Agg	Coarse Agg	Latex Admixture
SFMC	2NS & 26A (b)	4 – 6	6.5±1.5	(c, d, e)	618	40	273 (f)	1,273	1,601	—
LMC	2NS & 26A (b)	(g)	4.5±1.5	—	658	—	(g)	1,490 (h)	1,300 (h)	206

a. Use only Type I portland cement.
b. Provide 26A aggregate, 100% crushed, with an absorption no greater than 2.5%, in accordance with ASTM C 127.
c. Water-reducing high-range admixture or water-reducing high-range and retarding admixture.
d. Virgin polypropylene collated fibers at 2 lb/yd³.
e. Air entraining admixture.
f. Provide a net water to cementitious material ratio of 0.41 (cementitious material includes cement and silica fume).
g. Add water. In addition to water in the latex admixture, to control slump to within 3 in to 5 in. Measure slump from 4 min to 5 min after discharge from the mixer. During this waiting period, deposit concrete on the deck and do not disturb. If placing mixtures on sections within superelevated curves, the Contractor may need to use the lower allowable range of the slump requirement, as determined by the Engineer. Do not exceed water-cement ratio, by weight, of 0.30 including water contained in the latex emulsion.
h. Aggregate proportions are approximate; due to gradation changes, the Contractor may increase proportions by no greater than 5% by weight of total aggregate if reducing coarse aggregate by an equivalent volume.
i. For SFMC mixtures, the Contractor may use a blended silica fume portland cement. However, if the silica fume content of the blended material is greater than 8% of the total cementitious material, submit to the Engineer, modified mix proportions with Type I portland cement added to the blended material to achieve the equivalent individual cementitious material mixture proportions.

D. **Silica Fume Modified Concrete (SFMC) Overlay Mixture.** Provide 100 percent crushed 26A coarse aggregate conforming to section 902. Ensure SFMC meets the strength requirements of Grade D concrete as specified in Table 701-1, in accordance with section 605 and the contract. Supply the silica fume admixture in dry-densified form. Remove dry-densified silica fume from packaging. Do not incorporate the packaging into the concrete mix.

703.03. Construction.

A. **Equipment.** Provide equipment for producing latex modified concrete by volumetric batching and continuous mixing in accordance with ASTM C 685. Provide certification to the Engineer, or demonstrate by field tests, that equipment is calibrated for yield and proportioning. Obtain the Engineer's approval for equipment before starting production.

Supply hand held vibrating equipment to consolidate the repair concrete.

B. **Mixing Concrete and Mortar.** Mix and transport silica fume modified concrete and mortar patching mixtures as specified in subsection 601.03. Do not deliver more than 7.0 cubic yards of silica fume modified concrete per load to the bridge site in ready mix trucks.

Proportion and mix latex modified mixtures in self-contained mobile continuous type mixers in accordance with ASTM C 685, except the Engineer will determine requirements for certification.

Ensure silica fume modified mixtures receive at least 100 revolutions at mixing speed after adding dry-densified silica fume. Add additional high-range water reducer (HRWR) to the mixture at the project to adjust the slump to the required range. After adding the HRWR, provide at least 60 revolutions at mixing speed. Do not add water at the project.

703.04. Measurement and Payment. The cost of mortar and concrete patching, repair, and resurfacing mixtures is included in the unit prices for other relevant pay items.