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

703.01 Description. Concrete and mortar patching, repair, and resurfacing mixtures shall consist of air-entraining Portland cement or Portland cement, fine aggregate, water, coarse aggregate, and admixtures when specified or permitted. The materials shall be combined in proportions specified for the various types. Unless otherwise specified, air-entrained concrete or mortar will be required.

Except as otherwise provided, this work shall be performed according to section 701.

703.02 Materials. Materials shall meet the following requirements.

A. **General Requirements.** The mixture proportions will be as shown for the various types of patching mortars and concretes. The aggregate weights are based on a dry bulk specific gravity of 2.65 for gravel and stone and 2.30 for slag and may be adjusted by the Contractor if the specific gravity of the material used varies by more than 0.02 from the assumed values. Slag aggregates are not permitted for patching or overlay mixtures. The amount of water specified is approximate. The actual amount of water used shall be the least amount necessary to provide the consistency required for the specific mixture.

B. **Mortar and Concrete Patching Mixtures, Types F-L, M, C-L, C-L-HE, C, and C-HE.** These mixtures are used generally for patching of bridge decks or substructure elements. In the mixture type nomenclature the letters F, M, and C indicate fine, medium, and coarse, the letter L indicates latex modified, and the letters HE indicate high-early. Type F mixtures are mortars. The mixture used shall be based on the depth of patched area and the length of curing time available before the patches are opened to traffic, according to Table 703-1.

   The regular strength patching mixtures require a minimum cure time of 5 days and the high-early-strength patching mixtures require a minimum cure time of 24 hours. The use of regular strength or high-early-strength patching mixtures will be at the option of the Contractor.

C. **Latex Modified Concrete (LMC) Overlay Mixture.** This mixture is used for resurfacing existing bridge decks. The mixture shall be according to Table 703-2. In addition to the requirements of section 902 the 26A coarse aggregate will be 100 percent crushed.

D. **Silica Fume Modified Concrete (SFMC) Overlay Mixture.** This mixture is used for resurfacing existing bridge decks. The mixture shall be according to Table 703-2. The

Table 703-1 Structures Patching Mixtures

Depth of Patch, inch	Aggregate Required	Patching Mixture Type	Mixture Proportions per cubic yard, Dry Weight					Air Content Percent
			Cement lb	Net Water (approx.) lb	Latex Admixture lb (gal)	Fine Aggregate lb	Coarse Aggregate lb	
Under 1.5	2NS	F-L	752 (c)	(b)	235 (28.0)	2450	N/A	6.0 ± 2.0
1.5 to 4	2NS & 26A	M	799	358 (a)	N/A	1260	1260	7.5 ± 1.5
1.5 or more	2NS & 26A	C-L	658 (c)	169 (b)	143 (17.0)	1348(e)	1458 (e)	4.5 ± 1.5
	(d)	C-L-HE	846 (c)	(b)	228 (27.0)	1308(e)	1416(e)	4.5 ± 1.5
Over 4 (f)	2NS & 6AA	C	705	315(a)	N/A	1220	1530	6.5 ± 1.5
		C-HE	846	300(a)	N/A	1220	1590	5.5 ± 1.5

a. The water shall be controlled to provide a stiff, workable mixture of approximately 1 to 2 inches slump. During hot and windy weather, the slump may be increased to 3 to 4 inches as determined by the Engineer.
b. Water in addition to that in the latex admixture shall be added to control slump to within 3 to 5 inches The slump shall be measured 4 to 5 minutes after discharge from the mixer. During this waiting period, it shall be deposited on the deck and not be disturbed. When placing these mixtures on sections within superelevated curves, it may be necessary to work with the lower allowable range of the slump requirement to get satisfactory placement as determined by the Engineer. In no case shall the water-cement ratio, including water contained in the latex emulsion, exceed 0.30 by weight.
c. Only Type I cement shall be used in these mixtures.
d. The 26A absorption, as determined according to ASTM C 127, shall not exceed 2.5 percent.
e. The aggregate proportions are approximate and should produce good workability, but due to gradation changes, may be adjusted by the Engineer. The fine aggregate quantity may be increased by as much as 5 percent by weight of total aggregate if the coarse aggregate is reduced by an equivalent volume.
f. Substructure repairs.

Table 703-2 Overlay Mixtures

Mixture Type	Aggregate Required	Slump inch	Air Content %	Admixtures Required	Mixture Proportions (pounds per cubic yard, dry weight)					
					Cement (a)	Dry Densified Silica Fume	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)	1273	1601	N/A
LMC	2NS & 26A (b)	(g)	4.5 ± 1.5	N/A	658	N/A	(g)	1490 (h)	1300 (h)	206

a. Only Type I Portland cement shall be used in these mixtures.
b. The 26A absorption, determined according to ASTM C 127, shall not exceed 2.5 percent. and shall be 100 percent crushed.
c. Water-reducing, high range admixture, or water-reducing, high range, and retarding admixture.
d. Virgin polypropylene collated fibers at 2 pounds per cubic yard
e. Air entraining admixture
f. Net water/cementitious (w/c) ratio = 0.43 (cementitious material includes cement and silica fume).
g. Water in addition to that contained in the latex admixture shall be added to control slump to within 3 to 5 inches The slump shall be measured 4 to 5 minutes after discharge from the mixer. During this period, it shall be deposited on the deck and not disturbed. When placing modified compositions on sections within superelevated curves, it may be necessary to work with the lower allowable range of the slump requirement, as determined by the Engineer, to get satisfactory placement. In no case shall the water-cement ratio, including water contained in the latex emulsion, exceed 0.30 by weight.
h. The aggregate proportions are approximate and should produce good workability but due to gradation changes may be increased by as much as 5 percent by weight of total aggregate if the coarse aggregate is reduced by an equivalent volume.
i. For SFMC mixtures, a blended silica fume Portland cement is permitted. However, if the silica fume content of the blended material is greater than 8 % of the total cementitious material, The Contractor must 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.

silica fume admixture is to be supplied in a dry-densified form. In addition to the requirements of section 902 the 26A coarse aggregate will be 100 percent crushed.

703.03 Construction.

A. **Equipment.** Equipment for producing latex modified concrete by volumetric batching and continuous mixing shall conform to ASTM C 685. The Contractor will be required to demonstrate that the equipment is properly calibrated for yield and proportioning by certification or by field tests. Use of this equipment will be permitted provided that a satisfactory product is obtained, as determined by the Engineer.

The Contractor must supply hand held vibrating equipment capable of consolidating the repair concrete.

B. **Mixing Concrete and Mortar.** Silica fume cement, concrete and mortar patching mixtures may be mixed and transported by any of the methods described in subsection 701.03. Ready mix trucks transporting silica fume modified concrete to the bridge site shall not deliver more than 7.0 cubic yards per load.

Latex modified mixtures shall be proportioned and mixed in self contained mobile continuous type mixers meeting ASTM C685 except that requirements for certification shall be determined by the Engineer.

For silica fume modified mixtures, after the addition of dry-densified silica fume, the mixture shall receive a minimum of 100 revolutions at mixing speed. At the project site, additional high-range water reducer (HRWR) may be added to the mixture to adjust the slump to the specified range. After addition of the HRWR, a minimum of 60 revolutions at mixing speed is required. Water additions are not allowed at the project site.

703.04 Measurement and Payment. Not specified directly. Mortar and concrete patching, repair and resurfacing mixtures, associated materials, equipment and labor are included in other contract items (pay items).