

All concrete produced for use in Department work shall be manufactured from aggregates which have been tested and accepted by Department personnel.

**703.02--Fine Aggregate for Hydraulic Cement Concrete.**

**703.02.1--General Requirements.** Fine aggregate for hydraulic cement concrete used in construction of culverts, headwalls, retaining walls, steps, or other minor structures shall consist of natural sand or manufactured limestone sand. Fine aggregate used in major construction, such as concrete pavements and bridges, shall be natural sand unless otherwise designated on the plans or in any special provisions. Natural sand, or manufactured limestone sand, shall be composed of clean, hard, durable, and uncoated particles free of deleterious substances and organic impurities. Fine aggregate from more than one source shall not be used alternately, or mixed, without the written consent of the Engineer. Fine aggregates will be added to the APL based on new source approval testing by the Department. Source approval of fine aggregate sources will be based on the following:

- (a) Soundness of aggregate shall meet the requirements set out in Subsection 703.02.2.3.
- (b) Expansion of mortar bars shall not exceed 0.10% in 16 days when tested in accordance with AASHTO T 303. Alternatively to AASHTO T 303, ASTM C 1260 expansion test results shall not exceed 0.10% at 16 days.

A source of sand may be rejected if experience proves that concrete made from the source does not have a satisfactory service record. Unless indicated otherwise, fine aggregate shall meet the requirements hereinafter specified.

**703.02.2--Detail Requirements.**

**703.02.2.1--Deleterious Substances.** The quantity of deleterious substances shall not exceed the following limits:

Deleterious Substance	General Use	Bridges and Super Structures
	Maximum Percent (%) by Mass	
Clay Lumps and friable particles	3.0	1.0
Coal and lignite	0.5	None
Material finer than No. 200 sieve	2.0	1.0
Other deleterious substances such as shale, alkali, mica, coated grains, lightweight particles, and soft and flaky particles	2.0	1.0
Total Maximum Accumulative	3.0	2.0

**703.02.2.2--Gradation Requirements.** Fine aggregate for concrete shall be well graded from coarse to fine and shall conform to the following:

Square Mesh Sieve	Percent Passing by Weight
1/2 inch	100
3/8 inch	97 - 100
No. 4	92 - 100
No. 8	75 - 100
No. 16	45 - 90
No. 30	25 - 70
No. 50	3 - 35
No. 100	0 - 10

The gradation of material from any one source shall be reasonably uniform and not subject to the extreme gradation shown above. The degree of uniformity will be determined by fineness modulus determination from representative samples submitted from the sources the Contractor proposes to use.

When the slip-form method for placement of concrete pavement is used, the fine aggregate gradation requirements will be modified if necessary.

**703.02.2.3--Soundness.** When subjected to five cycles of soundness tests using magnesium sulfate, AASHTO T 104, the weighted percentage of loss shall not be more than 15.

**703.02.2.4--Additional Requirements.** Fine aggregate shall also meet the organic impurities and mortar-making properties specified in AASHTO M 6.

**703.03--Coarse Aggregate for Hydraulic Cement Concrete.**

**703.03.1--General Requirements.** Coarse aggregate shall consist of gravel, crushed limestone, granite, and Department-approved stone sources unless otherwise designated or permitted on the plans or in any special provisions.

The coarse aggregate shall be hard, durable particles that are thoroughly clean, free from adherent coatings of injurious character, and reasonably free of soft or disintegrated pieces, frozen lumps, vegetable, or other deleterious matter. Coarse aggregate from more than one source shall not be used alternately, or mixed, without the written approval of the Engineer. Coarse aggregates will be added to the APL based on new source approval testing by the Department. Coarse aggregate source approval will be based on the following:

- (a) Soundness of aggregate shall meet the requirements set out in Subsection 703.03.2.3.
- (b) Resistance to abrasion shall meet the requirements set out in Subsection 703.03.2.2.
- (c) Expansion of mortar bars shall not exceed 0.5% in six months, 0.10% in 16 days, or 1.0% in one year when tested in accordance with AASHTO T 303. Alternatively to AASHTO T 303, ASTM C 277 expansion test results shall not exceed 0.05% at 3 months and 0.10% at 6 months. If either of these test results exceed the tolerances, ASTM C 295 should be performed to further evaluate the