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September 28, 2017

Construction Information Memorandum No. 9 - 2017

TO: Region Engineers

ATTN: Area Operations, Construction, Materials, and County Transportation Engineers

FROM: Winston J. Powe, PE
State Construction Engineer

RE: Concrete Mixture Requirements for Bridges

The purpose of this CIM is to inform construction and materials personnel of two issues that were recently addressed on a particular project regarding concrete mixtures used for bridge construction.

1) Manufactured limestone sand may not be used in concrete mixtures designated for bridge decks, but may be used in all other components of a bridge not exposed to traffic (such as barrier rail), with the approval of the Engineer. See Article 802.06 (copy attached) for language pertinent to this issue.

2) In general, a contractor should use a concrete mixture from one plant throughout a structure; however, with the approval of the State M&T Engineer, differing mixes from differing plants may be allowed in a structure, i.e., one mixture in the deck and another mixture in the rails. See Section 6.7 of ALDOT-170 for language pertinent to this issue (copy attached). Contractors are required to follow this ALDOT Procedure by Item 501.02(c)1 (copy attached).

Please insure that all personnel managing your construction projects are familiar with these issues.

WJP/JLB/jlb
Attachments
pc: Mr. George Conner, PE
FHWA
AAPA
ACIA
Mr. Scott George, PE
ALBCA
ARBA
CIM File

sieve with 95 percent of the material retained on the No. 8 {2.36 mm} sieve having at least one freshly fractured face.

Natural fine aggregate is defined as any fine aggregate that is not manufactured fine aggregate. Natural fine aggregate shall be reasonably clean, non-plastic, and uniformly graded sand which shall pass the 3/8 inch {9.5 mm} sieve and not have more than 10 percent passing the No. 200 {75 µm} sieve when tested in accordance with AASHTO T 11 and T 27.

Mineral filler meeting the requirements of Section 805, agricultural limestone, or carbonate stone screenings may be used when additional fines are needed.

802.05 Blank.

802.06 Manufactured Sand for Portland Cement Concrete.

Manufactured sand shall meet all of the requirements for ALDOT #100 concrete sand, Article 802.02, except the requirement of Subitem 802.02(b)1a may be increased to five percent if the material is "Dust of Fracture."

Manufactured sand may be produced from crushing gravel, granite, sandstone, or quartzite which may be used either as a blend with natural sand or as one hundred percent of the total fine aggregate. Gravel used to produce manufactured sand for use in concrete pavement or bridge superstructure concrete (except prestress concrete) shall have a bulk specific gravity greater than 2.550 (AASHTO T 85).

Manufactured sand produced from crushing limestone shall not be used in bridge decks or concrete pavement. However, manufactured limestone sand may be used in prestressed or precast concrete, or cast in place concrete, which will not be exposed to vehicular traffic, if approved by the Engineer.

802.07 Fine Aggregate for White Concrete.

Fine aggregate for white concrete shall be a natural white, washed sand and/or an artificial sand made from white quartz, crushed white limestone, white marble, or white granite and shall contain no discoloring material, clay loam, or other foreign matter. It shall be secured from sources previously tested and approved by the Department for whiteness and light reflecting qualities or by visual comparison shall be, in the opinion of the Engineer, at least as white as the approved standard sample on file in the Engineer's office. Other requirements for this fine aggregate shall conform to Article 802.02, with the gradation requirements in accordance with ALDOT Size No. 106.

802.08 Blank.

802.09 Gradation.

Fine aggregate shall be well graded between the limits specified and the size or sizes designated shall conform to the limits shown in the Fine Aggregate Gradation Table.

TABLE OF ALDOT FINE AGGREGATE SIZES

Aggregate Size Number	DESCRIPTION	PERCENT PASSING BY WEIGHT {MASS}, SIEVE SIZE [1]						
		3/8 inch {9.5 mm}	No. 4 {4.75 mm}	No. 8 {2.36 mm}	No. 16 {1.18 mm}	No. 50 {300 µm}	No. 100 {150µm}	No. 200 {75µm}
100	Concrete Sand	100	95-100	80-100	50-90	5-30	0-10	
101	Mortar Sand			100		15-40	0-10	
104	Plant Mix Sand	100						0-12
105	Manufactured Sand	100	95-100		50-80	20-50	10-25	5-12
106	White Concrete Fine Aggregate	100	95-100	75-100	50-90	10-35	5-15	0-5

NOTES: 1. Figures are percentages by weight {mass} of material finer than each sieve.
2. The F.M. for Size No. 100 when used in Portland cement concrete pavement shall be 2.30 minimum, 3.00 maximum.
3. See Articles No. 802.02 to 802.07 for descriptions.

and supporting data submitted to the Department. Unsigned submittals shall be returned to the originator.

6. **Approved Concrete Mixture Design Distribution**

6.1. Upon approval, the Bureau of Materials and Tests will provide the concrete producer with a BMT-75 form containing the approved concrete mixture design(s) from which the concrete producer shall choose to use in supplying concrete to Department projects.

6.2. Unless otherwise specified, the BMT-75 shall be valid for a period of four years. However, it can only be used if the concrete producer maintains its National Ready Mix Concrete Association (NRMCA) certification status. No changes or modifications are allowed to be made to an approved BMT-75 form.

6.3. Prior to using an approved concrete mixture design on a specific project, the Contractor shall submit each proposed BMT-75 to the respective Division Materials Engineer, along with the project number and a detailed description of the structure(s) where the concrete mixture will be used. This request shall be submitted a minimum of seven (7) calendar days prior to use of the concrete mixture design.

6.4. Prior to granting approval to use an approved mixture design on a specific project, the Division Materials Engineer will review the information on BMT-75 and verify that the concrete mixture design(s) submitted meets the requirements for the project contract. The Division Materials Engineer will also verify that the concrete producer has a current NRMCA certification.

6.5. The Division Materials Engineer, upon approval, will notify the Contractor. If the concrete mixture design submitted does not meet the requirements for the specific project, the Division Materials Engineer will notify the Contractor of the reason(s) for non-approval.

6.6. Upon approval, the Division Materials Engineer will submit copies of the BMT-75, with the specific project number, structure name, and compliance with NRMCA noted, to the Materials and Tests Engineer, Contractor and Concrete Producer.

6.7. The Division Materials Engineer may approve the use of a back-up plant on any project, provided the back-up plant has an approved concrete mix design and the materials used by each plant are the same. Back-up plants will only be allowed when technical difficulties hinder the primary plant from providing concrete to the job site within the Department specifications. When the use of a back-up plant is allowed, the Project Manager will maintain records of exact placement locations for further reference. **Two different concrete plants cannot supply concrete to the same structure, on a given project, unless requested by the contractor in writing and approved in writing by the Materials and Tests Engineer prior to placement.**

6.8. Copies of approved BMT-75 forms shall be kept in the project file at the concrete producer's plant at all times.

ALABAMA DEPARTMENT OF TRANSPORTATION

DATE: July 6, 2016 Special Provision No. 12-0676(3)

EFFECTIVE DATE: September 1, 2016

SUBJECT: Structural Portland Cement Concrete.

Alabama Standard Specifications, 2012 Edition, shall be amended by replacing SECTION 501 and by modifying SECTION 510, and SECTION 815 as follows:

SECTION 501
STRUCTURAL PORTLAND CEMENT CONCRETE

501.01 Description.

The work under this Section shall cover the furnishing of portland cement concrete to be used in constructing concrete structures. Structures shall include but are not limited to bridges of all types, box culverts, headwalls, retaining walls, and other miscellaneous structures.

501.02 Materials.

(a) General.

Handling, storage, and control of materials shall comply with appropriate portions of Section 106. All materials shall conform to the requirements set forth in Division 800, Materials. Specific reference is made to applicable portions of the following Sections:

Section 801 - Coarse Aggregate
Section 802 - Fine Aggregates
Section 806 - Mineral Admixtures
Section 807 - Water
Section 808 - Air Entraining Admixtures for Concrete
Section 809 - Chemical Admixtures for Concrete
Section 815 - Cement
Section 830 - Concrete Curing Material
Section 832 - Concrete Joint Fillers, Sealers and Waterstop Material
Section 835 - Steel Reinforcement

(b) Special Requirements.

Aggregates from different sources, which are to be used for concrete Class A and Class C as specified in Item 501.02(c)2, may be stockpiled together provided material from each source meets the requirements of Section 801 and the specific gravity of the aggregates from each source does not vary more than plus or minus 0.05.

In the event the coarse aggregate shows a tendency to segregate in the stockpile, the Engineer may order the coarse aggregate be furnished and batched in two fractions from two separate stockpiles.

The Contractor may be required to adjust the size of coarse aggregate for the concrete used around steel reinforcement of heavily reinforced members.

(c) Proportioning Materials.

1. Mixture Design.

The Contractor's concrete producer shall establish the proportion of materials for each class of concrete following the guidelines described in ALDOT-170, "Method of Controlling Concrete Operations for Structural Portland Cement Concrete". It shall be the responsibility of the concrete producer to request approval of concrete mixture design(s) for use in Department's projects. The Contractor shall submit the proposed concrete mixture no later