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Case 11-30

DATE: January 18, 2012

TO: MAG Specifications and Details Committee Members

FROM: Peter Kandaris, SRP Representative

RE: **Revisions to Section 702 – Base Materials**

Purpose: Update standard identified by Outside ROW WG

Revisions: The purpose of the changes is to simplify base material requirements with physical properties shown in a single table. Delete information that is redundant to Section 701 (re-defining general aggregate requirements) and remove language that is vague and cannot be enforced through objective tests.

Major changes are summarized below:

(a) Delete references to specific aggregate materials such as decomposed granite, slag, etc., as these should be covered by Section 701 requirements.

(b) Add functional descriptions for ABC and Select Material.

(c) Consolidate all material requirements into Table 702-1. This includes PI, fractured face and LA abrasion testing.

(d) Fractured face for ABC was changed from 50% to 30% to match ADOT requirements. Fractured Face was left at existing 50% - moved from 701.2.1

(e) Change from 1-1/4” sieve to 1” sieve in Table 702-1 as plants do not have the capability to separate at 1-1/4”. Modify the gradation requirement for the 1” sieve to meet the same gradation as before.

(f) Include a referee test for aggregates that exceed a PI of 5. A white paper was prepared by the Materials Working Group to give the rational for using an R-value of 70 if the PI is too high (to be provided to the committee at the next meeting).

SECTION 702 – REVISED 02-13-2012

BASE MATERIALS

702.1 GENERAL:

Base materials shall be as defined in Section 701, consisting of appropriately sized coarse and fine aggregates, other inert materials, and/or aggregates that have been treated for plasticity index mitigation, as approved by the Engineer.

When base material without further qualification is specified, the Contractor shall supply Aggregate Base Course as defined in Table 702-1. When a particular classification of base material is specified, the Contractor may substitute Aggregate Base Course for Select material when approved by the Engineer.

The Contractor shall provide the Engineer, in writing, material information and the source location at least 10 business days prior to use of the material unless the material is currently accepted for use, as determined by the Engineer.

702.1.1 Aggregate Base Course shall be used primarily in roadway applications or where otherwise specified by project plans or special provisions.

702.1.2 Select Material shall be primarily used, but not limited to applicable structure and pipe backfill installations, shoulders, turnouts, driveways, and tapers or where otherwise specified by project special provisions.

702.2 PHYSICAL PROPERTIES:

702.2.1 Base material shall meet the physical properties listed in Table 702-1.

Table 702-1

Sieve Analysis Test Methods AASHTO T-27, T-11			
Sieve Size	Accumulative Percentage Passing Sieve, by Weight		
	Select Material		Aggregate Base Course
	Type A	Type B	
3 in.	100	- -	- -
1-1/2 in.	- -	100	100
1 in.	- -	- -	90 – 100
No. 4	30 - 75	30 - 70	38 - 65
No. 8	20 - 60	20 - 60	25 – 60
No. 30	10 - 40	10 - 40	10 – 40
No. 200	0 - 12	0 - 12	3 – 12
Plasticity Index Test Methods AASHTO T-89 Method A, T-90, T146 Method A			
Maximum allowable value	5	5	5
Fractured Face, One Face Test Method ARIZ 212, Percent by Weight of the Material Retained on a #4 Sieve			
Minimum required value	50	50	50
Resistance to Degradation and Abrasion by the Los Angeles Abrasion Machine Test Method AASHTO T-96, Percent Loss by Weight			
Maximum allowable value at 100 revolutions	10	10	10
Maximum allowable value at 500 revolutions	40	40	40

702.2.2: When tested for acceptance, Base material that does not meet Table 702-1 properties for gradation or PI may be approved at the Engineer's discretion if the R-Value is at least 70 when determined by test method AASHTO T-190 (see Table 310-1).

End of Section

SECTION 310 – 01-08-2012

PLACEMENT AND CONSTRUCTION OF AGGREGATE BASE COURSE

310.1 DESCRIPTION:

Aggregate base course shall comply with Subsection 702 unless the use of a different type of material is specifically authorized in the special provisions.

310.2 PLACEMENT AND CONSTRUCTION:

The compacted lift thickness shall not exceed 6 inches, unless approved by the Engineer. Based on ~~–~~the type of material, type of equipment and compaction methods used, the Contractor may propose a greater lift thickness to the Engineer for approval.

After distributing, the aggregate base course material shall first be uniformly watered and then graded to a uniform layer that will net, after compacting, the required thickness. The grading operation shall be continued to such extent as may be necessary to minimize segregation. The quantity of water applied shall be that amount which will assure proper compaction resulting in the density required by Section 310.3.

After placement, the aggregate base course surface shall be true, even and uniform conforming to the grade and cross-section specified. In no case shall the aggregate base course vary by more than ½ inch above or below required grade.

310.3 COMPACTION

The contractor is responsible for providing appropriate equipment and techniques to achieve the compaction results required by this specification. The aggregate base course shall be compacted in lift thicknesses as allowed by Section 310.2.

The laboratory maximum dry density and optimum moisture content for the aggregate base course material shall be determined in accordance with AASHTO T-99. Field 'one-point' maximum dry density and optimum moisture procedures shall only be allowed upon approval of the Engineer.

The in-place density shall be determined in the field by nuclear density testing in accordance with AASHTO T-310 or sand cone density testing in accordance with AASHTO T-191. In the event nuclear density testing is selected, ~~a minimum of one sandcone correlation shall be performed for each 10 nuclear density tests~~and density results are in question, a sand cone correlation will be performed by the accepting agency at the contractor's request, not to exceed one sand cone for each ten nuclear density tests.

A rock correction, to compensate for rock content larger than the #4 or ¾ inch sieves (as required by the laboratory maximum dry density and optimum moisture procedure selected), shall be performed in accordance with AASHTO T-224. Care should be taken to account for the specific gravity of the oversize particles particularly if recycled materials are utilized for aggregate base course. The specific gravity shall be determined in accordance with AASHTO T-85, as applicable.

For roadway construction, a minimum of one field density test shall be performed per lift per 660 feet per lane. For other aggregate base course applications, a minimum of ~~1~~ one field density test shall be performed for each 800 square yards. ~~More or less frequent testing may be performed at the approval of the Engineer.~~

Unless otherwise noted in the project plans or project specifications, the moisture content of the aggregate base course at the time of compaction shall be the optimum moisture content +/- 3%.

The following percent compaction is required:

(A) Below asphalt concrete pavement	100%
(B) Below Portland cement concrete pavement, driveways, curb & gutter, ~~attached~~ sidewalks, and roadway ~~S~~shoulders~~, and other areas of the right-of-way subject to vehicular traffic~~.	95%
(C) All other areas not subject to vehicular traffic	85%

Areas which fail initial testing for density and/or moisture content shall be reworked until passing tests for density and/or moisture content are achieved. Lower moisture content percentages at the time of field density testing may be allowed if significant time has passed since the time of compaction and the required density has been achieved.

310.4 THICKNESS AND/OR PLASTICITY INDEX DEFICIENCY:

When in the opinion of the Engineer there is reason to believe that a deficiency in thickness, or an excess of plasticity exists, measurements or samples will be taken in the same pattern as that defined in Section 321. If the base has been covered or it is otherwise impractical to correct the deficiency, the corrective measures in Table 310-1 shall be taken by the Contractor at no additional cost to the Contracting Agency.

TABLE 310-1

THICKNESS AND PLASTICITY DEFICIENCY

Type	Deficiency	Corrective Measure
I	Less than ½ inch of the required thickness	No corrective measure required.
II	½ inch or more but less than 1inch of the required thickness	(1) The contractor may choose to add additional material and rework the grade to meet the specification requirements. (2) The contractor may choose to increase the thickness of asphalt concrete by the amount of the aggregate base course thickness deficiency at no additional cost to the Owner. Required grade shall be met.
III	Thickness deficiency by greater than 1 inch	(1) The contractor will remove the aggregate base course and regrade the subgrade to allow the required aggregate base course layer thickness to be constructed. (2) If grades allow, the contractor may propose that the thickness of asphalt concrete be increased by the amount of the aggregate base course deficiency at no additional cost to the Owner.
IV	A plasticity index of 6 to 7 inclusive or gradation deficiency	(1) An Engineering Analysis (EA) that includes R-value testing may be prepared by the contractor to evaluate the expected performance of the aggregate base course layer. The EA may provide mitigation options for the Engineer to consider. If the Engineer accepts the plasticity index as a result of the EA, the material will be accepted at full payment. If the Engineer rejects the EA, the contractor will perform

		either option 2 or 3 below. (2) The contractor may choose to reprocess or treat the existing material to bring it within specification limits or remove deficient material from affected area and replace with material complying with the specifications. (3) If grades allow, the contractor may increase the thickness of asphalt concrete by ½-inch at no additional cost to the Owner.
V	A plasticity index of over 7	(1) The contractor may choose to reprocess or treat the existing material to bring it within specification limits or remove deficient material from affected area and replace with material complying with the specifications.

310.4 PAYMENT:

Payment for aggregate base course will be made on the basis of the contract unit price per ton unless an alternate basis of payment is provided in the proposal.