Date: May 29, 2015

To: MAG Specifications and Details Committee

From: Brian Gallimore, Chairman Materials Working Group

Subject: Revisions to Sections 321 **Case # 15-10**

PURPOSE: Incorporate revisions to Section 321, "*Rehabilitation Work*" into the MAG Specifications.

REVISIONS:

321.10.5.3 - Added this subsection to allow for some relief on asphalt density when provisions for reworking substandard bases (removals) or existing asphalts (overlays) to meet Section 310 or Section 321 for overlays are missing from bid documents or scope of work.

Currently, industry is being held to same standards on spot removals and edge mill/overlays as new construction over optimal base materials.

TABLE 321-6 ASPHALT PAVEMENT THICKNESS PAYMENT REDUCTION For Thickness Deficiency of More Than 0.25 inches and less than 0.50 inches	
Total Specified Asphalt Pavement Thickness exclusive of ARAC (if any)	**Reduction in Payment Applied to asphalt concrete Except ARAC layers (if any)**
Less than 1.5 inches	50%
1.50 inches to 1.99 inches	33%
2.00 inches to 2.49 inches	25%
2.50 inches to 2.99 inches	20%
3.00 inches and over	17%

321.10.5 Density:

321.10.5.1 Pavement 1-1/2 Inches or Less in Nominal Thickness:

Compaction shall consist of a "Rolling Method Procedure" using an established sequence of coverage with specified types of compactors. A pass shall be defined as one movement of a compactor in either direction. Coverage shall be the number of passes as are necessary to cover the entire width being paved.

The rolling sequence, the type of compactor to be used, and the number of coverages required shall be as shown in Table 321-7.

TABLE 321-7 ROLLING SEQUENCE FOR LIFT THICKNESS 1½" OR LESS				
Rolling Sequence	**Type of Compactor**		**No. of Coverages**	
	Option No. 1	**Option No. 2**	**Option No. 1**	**Option No. 2**
Initial	Static Steel	Vibrating Steel	1	1
Intermediate	Pneumatic Tired	Vibrating Steel	4	2- 4*
Finish	Static Steel	Static Steel	1-3	1-3
* Based on the roller pattern which exhibits the best performance.				

The Contractor shall select the option for compaction and, when pneumatic-tired compactors are used will designate the tire pressure. Steel wheel compactors shall not be used in the vibratory mode for courses of one inch or less in thickness nor when the temperature of the asphaltic concrete falls below 180 degree F. Initial and intermediate compaction shall be accomplished before the temperature of the asphaltic concrete falls below 200 degree F.

Compaction will be deemed to be acceptable on the condition that the asphaltic concrete is compacted using the type of compactors specified, ballasted and operated as specified, and with the number of coverages of the compactors as specified.

321.10.5.2 Pavement Greater than 1-1/2 Inches in Nominal Thickness:

Achieving the required compaction is the responsibility of the contractor. The number and types of rollers is the contractor's responsibility and shall be sufficient to meet these requirements.

Compaction effort is not solely dependent on the type and/or quantity of equipment on the job, but also includes the speed at which such equipment is utilized. It shall be the contractor's responsibility to prove to the agency that every effort has been made to achieve the greatest possible density on projects that do not have provisions for reworking the base materials to compaction standards set forth in Section 301 for pavements over native subgrade, Section 310 for pavements over aggregate base course (ABC), or Section 321 (overlays).

In-place air voids shall be determined in accordance with AASHTO T-269 utilizing cores taken from the finished pavement. The maximum theoretical density used in the determination of in-place air voids will be the average value from the acceptance samples determined for the Lot as outlined in 321.10.1.

The Engineer will designate one random test location for each sublot and the acceptance laboratory will obtain one core from that location. Regardless of sublot quantities or boundaries, a minimum of one core will be obtained per residential street and a minimum of one core per travel lane for collector and arterial streets. The outside one foot of each pass of the pavement course or any unconfined edge will be excluded from testing. The Engineer may exclude areas from the compaction lot that are not accessible by normal compaction equipment.

The Contractor will provide the traffic control to facilitate any coring operations necessary for compaction acceptance.

Cores will be taken per the Asphalt Concrete Coring Method. This method can be found in Section 321.14. Acceptance testing results will be furnished to the contractor within five working days of receipt of samples by the acceptance laboratory.

If the pavement density has in-place voids of 8.0% or less, the asphalt concrete will be paid for at the contract unit price. If the pavement density has in-place voids greater than 8.0%, the deficient area will be evaluated within the sublot by coring at maximum intervals of 100 feet from the deficient core(s). If both cores in a sublot are deficient, 3 to 4 additional cores may be necessary to re-evaluate acceptance. The in-place voids of all the original core(s), whether deficient or acceptable, will be averaged with the in-place voids of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the average of the in-place voids is greater than 8.0% then Table 321-8 shall apply to the sublot. Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.

TABLE 321-8

PAVEMENT DENSITY PENALTIES

Limits of In-place Air Voids for design lift thicknesses 1.5 inches and greater	When the contracting agency is the owner: Payment Reduction ($ per ton of asphalt concrete)	When the contracting agency is not the owner (i.e. permits): Corrective Action
Below 3.0%	Removal* or EA	Removal* or EA
3.0% to below 4.0%	$10.00	EA and Type II Surry Seal
4.0% to 8.0%	Full Payment	No Corrective Action
Greater than 8.0% to less than 9.0%	$6.00	EA
9.0% to 10.0%	$10.00	EA and Type II Surry Seal
Greater than 10.0%	Removal* or EA	Removal* or EA

NOTES: *The Contractor shall remove and replace the entire sublot that is deficient.
EA = Engineering Analysis per Section 321.10.6
Removal for In-place Air Voids greater than 11.0% is not eligible for Section 321.10.6.

321.10.5.3 Rehabilitation Work

In-place voids on rehabilitation work should take into consideration the underlying base materials and not be subject to penalties in Table 321-8, other than in place voids shall not exceed 10%. Rehabilitation work shall be considered any mill and overlays or remove and replace projects that **do not** have provisions for reworking the base materials to compaction standards set forth in Section 301 for pavements over native subgrade, Section 310 for pavements over aggregate base course (ABC), or Section 321 (overlays).

OR

321.10.5.3 Placement of Pavement on Surfaces with Questionable Support Characteristics: This section shall only apply when any mill and overlay or remove and replace projects **do not** have provisions for reworking the base materials to compaction standards set forth in Section 301 for pavements over native subgrade, Section 310 for pavements over aggregate base course (ABC), or Section 321 (overlays).When pavement is to be placed on a surface suspected by the Contractor of having conditions that may adversely impact compaction, the Contractor at their own expense and prior to paving may demonstrate to the agency that the existing surface has characteristics that may prevent obtaining the standard required density. Unreliable compaction conditions may result from: base materials that provide inadequate support; extremely fractured pavement that moves when subjected to various loading conditions; or milled areas where the pavement thickness was less than anticipated and breaking of the remaining underlying pavement occurs sporadically. When the agency agrees in writing that the surface conditions within a specified area may significantly impact compaction and directs that paving proceed without corrective measures, then the Contractor shall not be subject to air void penalties within the specified area unless the in place air voids exceed 10%.

321.10.6 Engineering Analysis (EA): Within 10 working days after receiving notice that a lot or sublot of asphalt concrete is deficient and is found to fall within the "Removal or EA" band per Table(s) 321-4, 321-5, and/or 321-8 the contractor may submit a written proposal (Engineering Analysis) to accept the material in place at the applicable penalties along with possible remediation(s) listed in the "Removal or EA" category. Engineering Analysis can also be proposed for non-removal categories of "Corrective actions" when the contracting agency is not the owner (i.e. permits).

The Engineering Analysis shall contain an analysis of the anticipated performance of the asphalt concrete if left in place. The Engineering Analysis shall also detail the effect of any proposed corrective action to the material(s) in place as it relates to the in-place material's performance. The Engineering Analysis shall be performed by a professional engineer experienced in asphalt concrete testing and mix designs.

If a lot or sublot is accepted for referee testing and the referee test results still show a deficiency, the contractor shall have ten working days to submit an engineering analysis beginning upon notification of referee test results. When an Engineering Analysis recommends that a specific lot or sublot should not be removed, the Engineering Analysis will recommend that the following penalties (Table 321-9) be paid when the contracting agency is the owner, for the specific criteria being reviewed by the EA.

TABLE 321-9

ENGINEERING ANALYSIS PENALTIES for REMOVAL* LOTS/SUBLOTS LEFT IN-PLACE

Acceptance Criteria	Acceptance Limits	Penalty When Contracting Agency is the Owner ($/Ton)
Asphalt Binder Content	Over 0.2% points from that Permitted	$9.00
Laboratory Air Voids (Measured at N_{des} or 75 blows as applicable)	Less than 1.5% or Greater Than 8.0%	$7.50
Limits of In-place Air Voids	Less than 3% or Greater than 10.0%	$15.00

Within 15 working days, the Engineer will determine whether or not to accept the contractor's proposed Engineering Analysis.

321.11 REFEREE:

If the Contractor has reason to question the validity of any of the acceptance test results, the Contractor may request that the Engineer consider referee test for final acceptance. Any request for referee testing must describe the contractor's reasons for questioning the validity of the original acceptance test results and must clearly describe which set of acceptance tests are in question. The engineer may either accept or reject the request for referee testing. When referee testing is accepted the