

May 26, 2009

Members of the MAG Specifications and Details Committee

Robert Herz, Maricopa County DOT, Chairman

SUBJECT: MEETING NOTIFICATION AND TRANSMITTAL OF AGENDA

Wednesday, June 3, 2009 at 1:30 p.m.
MAG Office, Second Floor, Cholla Room
302 North First Avenue, Phoenix

A meeting of the MAG Specifications and Details Committee has been scheduled for the time and place noted above. Members of the MAG Specifications and Details Committee may attend the meeting either in person, by videoconference or by telephone conference call. If you have any questions regarding the meeting, please contact Committee Chair Robert Herz at 602-506-4760 or Gordon Tyus, MAG staff at 602-254-6300.

Please park in the garage under the building, bring your ticket, parking will be validated. For those using transit, Valley Metro/RPTA will provide transit tickets for your trip. For those using bicycles, please lock your bicycle in the bike rack in the garage.

In 1996, the Regional Council approved a simple majority quorum for all MAG advisory committees. If the MAG Specifications and Details Committee does not meet the quorum requirement, no action can be taken. Your attendance at the meeting is strongly encouraged.

Pursuant to Title II of the Americans with Disabilities Act (ADA), MAG does not discriminate on the basis of disability in admissions to or participation in its public meetings. Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting Gordon Tyus at the MAG office. Requests should be made as early as possible to allow time to arrange the accommodation.

It is requested (not required) that written comments on active cases be prepared in advance for distribution at the meeting.

AGENDA

<u>ITEM</u>	<u>COMMITTEE ACTION REQUESTED</u>
<u>Call to Order</u>	1. No action required.
<u>Approval of May 6, 2009 Meeting Minutes</u>	2. Corrections and approval of May 6, 2009 minutes.
<u>2008 & 2009 Cases</u>	3. Review submitted cases and submission of new cases.
<u>General Discussion</u>	4. Open general discussion.
<u>Adjournment</u>	5. No action required.

MEETING MINUTES FROM THE
MARICOPA ASSOCIATION OF GOVERNMENTS
STANDARD SPECIFICATIONS AND DETAILS COMMITTEE

May 6, 2009

Maricopa Association of Governments Office, Cholla Room
302 North First Avenue
Phoenix, Arizona

AGENCY MEMBERS

Jim Badowich, Avondale	Gordon Haws, Mesa
Scott Zipprich, Buckeye	Jesse Gonzalez, Peoria
Warren White, Chandler	Jeff Van Skike, Phoenix (St. Trans.)
* Dennis Teller, El Mirage	* Jami Erickson, Phoenix (Water)
* Edgar Medina, Gilbert	* Mark Palichuk, Queen Creek
Tom Kaczmarowski, Glendale	Rodney Ramos, Scottsdale
Troy Tobiasson, Goodyear	Nick Mascia, Surprise
Bob Herz, MCDOT	Tom Wilhite, Tempe

ADVISORY MEMBERS

John Ashley, ACA	Jeff Hearne, ARPA, for Adrian Green
Jeff Benedict, AGC	Paul R. Nebeker, Independent
Brian Gallimore, AGC	* William Ast, NUCA
Peter Kandararis, SRP, Vice Chairman	* Bill Davis, NUCA
* James Carusone, ARPA	

MAG ADMINISTRATIVE STAFF

Gordon Tyus

* Members not attending or represented by proxy.

GUESTS/VISITORS

Aaron Schlessinger, Contech Construction Products
Arturo Chavarria, Hansen Pipe and Precast
John Rapacz, Tekway
Chuck Christiansen, MCDOT

1. Call to Order

Chairman, Bob Herz, called the meeting to order at 1:35 p.m.

2. Approval of Minutes

The members reviewed the April 1, 2009 meeting minutes. Jesse Gonzalez introduced a motion to accept the minutes as written. Jeff Van Skike seconded the motion. A voice vote of all ayes and no nays was recorded.

3. 2008 Cases (old cases)

a. **Case 08-10 – Modification to Trench Backfill and Pavement Replacement, Detail 200, Section 336 and Section 601:** Revisions to reduce numerous agency trench backfill and pavement replacement supplemental details by combining the most common practices. Peter Kandaris has received a number of comments from agencies, but has not yet compiled responses. He will provide revisions to the case at the next meeting. Committee members are requested to continue reviewing the case and provide comments.

4. 2009 Cases (new cases)

a. **Case 09-01 – Modification to Detectable Warnings, Section 340.2.1:** Update detectable warning specifications to conform to current ADA requirements. Voting on the case is deferred until the next meeting since the latest MAG website version did not correctly show the latest revision. Members are requested to be prepared to vote on this case at the next meeting.

b. **Case 09-02 – Modifying Acceptable Vacuum Relief Valve Vendors, Section 630.6:** Include A.R.I. as an additional approved vendor for vacuum relief. The committee had no discussion on this item. Case revisions by Jami Erickson are anticipated for next month's meeting.

c. **Case 09-03 – New Geosynthetic Materials Specification, Section 796:** Create a geosynthetic material specification, Section 796. Peter Kandaris provided a revision to the case that included definitions of the various geosynthetic material applications and responses to review comments provided by Gordon Haws. Members discussed geosynthetic material environment protection language and requested that the introduction be revised to describe the intent of the new section. Revisions will be prepared for the next meeting. Committee members are requested to continue reviewing the case and provide comments.

d. **Case 09-04 –AC Overlay Interlayer Fabric Requirements, Section 322:** Modify Section 322 to include interlayer fabric for asphalt concrete. Peter Kandaris provided a revision to the case that included items requested by the committee during the April meeting and responses to review comments provided by Gordon Haws. He noted that Section 322, with the proposed revisions, could be included folded into Section 321. Members requested that Peter prepare a case (new case 09-10) for that purpose and include references to the milling specification (Section 317). Revisions and the new case will be prepared for the next meeting.

e. **Case 09-05 – Modify Riprap Construction to Include Filter Fabric, Sections 220 and 703:** Modify Sections 220 and 703 to incorporate Maricopa County Supplemental Specification Section 224 for filter fabric. Peter Kandaris provided a revision to the case that included a modified description for finished riprap elevation and changes to the grouted riprap section. Discussion included revised language to better describe the need for positive draining and minimizing ponding. Revisions will be prepared for the next meeting. Committee members are requested to continue reviewing the case and provide comments.

f. **Case 09-06 – New Geogrid Fabric Specification, Section 306:** Create a new geogrid application Section 306. Peter Kandaris provided a revision to the case that included items requested by the committee during the April meeting and responses to review comments provided by Gordon Haws. Committee members are requested to continue reviewing the case and provide comments.

g. **Case 09-07 – Revisions to Concrete Materials Specification, Section 725 and 701:** Revisions to Section 725 and portions of Section 701 to make specifications current with modern concrete manufacture, materials and quality control practices. Troy Tobiasson provided case revisions addressing changes requested during the April meeting, including clarification on where water may be added to mixes, a new subsection on hand-mixed concrete, a new section on volumetric batching methods, and revisions to acceptance of hardened concrete. The committee discussed the sections on testing and acceptance, the processes for engineering studies (and who pays for them), and methods for acceptance or pay reduction based on cores/cylinders. Members questioned the proposed change of maximum mix temperature from 90 to 95 degrees. Jeff Van Skike asked whether the increase is appropriate for local Maricopa County conditions. Jeff Hearne noted that the working group will meet on May 13th to incorporate changes resulting from the discussion and provide revisions for the next meeting. Committee members are requested to continue reviewing the case and provide comments.

h. **Case 09-08 – Modification to Valley Gutter, Detail 240:** Modifications to Detail 240 to increase valley gutter thickness to match adjoining commercial and industrial driveways concrete driveway thickness (as noted in Detail 250). Bob Herz provided a revised detail showing a 6-foot wide by 9-inch thick valley gutter section. Discussion included revisions to wording of the valley gutter area, deletion of the sidewalk grade break arrow, modification to new Note 3 defining joint locations, and reduction of the finished contraction joint depth from 2 inches to $\frac{3}{4}$ inch. Bob will include these comments and have revisions prepared for the next meeting. Committee members are requested to continue reviewing the case and provide comments.

i. **Case 09-09 – Modification to Dust Palliative, Section 792:** Modifications to Section 792 to update dust palliative product, compliance and environmental requirements. Peter Kandaris provided responses to review comments provided by Gordon Haws. Members requested that the section be revised to note that product qualification data be received at the time of shop drawing submittal, not with the bid documents. Revisions will be

prepared for the next meeting. Committee members are requested to continue reviewing the case and provide comments.

j. **Case 09-10 – Modification of Section 321 to include Section 322:** (see discussion in Case 09-04).

k. **Case 09-11 – Modification to Dust Palliative Application, Section 230:** Peter Kandaris provided modifications to Section 230 that included product verification processes, applicator compliance verification, update of distributor equipment requirements, field quality control measurements, remedies for deficient work and warranty of work. Committee members are requested to review the proposal and return with comments for the next meeting.

5. General Discussion:

Bob Herz stated that Chuck Christiansen of MCDOT has volunteered to help establish a CAD Symbols Working Group for the MAG Community. The purpose of the Group is to encourage uniformity for symbols and line styles presented in plans for construction of public works projects within the MAG Community. Members are requested to provide contact information for individuals interested in participating on a CAD Symbols Working Group prior to or at the June 3rd meeting.

6. Adjournment:

The meeting was adjourned at 3:45 p.m.

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Page 1 of 4
May 15, 2009

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2009 PROPOSED REVISIONS TO MAG SPECIFICATIONS AND DETAILS

(Updated information can be found on the website: <http://www.mag.maricopa.gov/detail.cms?item=9688>)

CASE	DESCRIPTION	PROPOSED BY	MEMBER	SUBMITTAL DATE Last Revision	VOTE DATE	VOTE	
08-10	Case 08-10 : Revisions to Detail 200 and Sections 336 and 601 – Trench Backfill and Pavement	SRP	Peter Kandariz	2/06/2008 1/07/2009		0 0 0	Yes No Abstain
09-01	Case 09-01 : Modification to Section 340.2.1 – Detectable Warnings	MCDOT	Bob Herz	01/07/2009 02/04/2009	Scheduled for: 06/03/2009	0 0 0	Yes No Abstain
09-02	Case 09-02 : Revisions to Section 630.6 – Update list of Air Release and Vacuum Valves	Phoenix	Jami Erickson	02/04/2009		0 0 0	Yes No Abstain
09-03	Case 09-03 : New Section 796 – Geosynthetic Specifications	SRP	Peter Kandariz	02/04/2009 05/06/2009		0 0 0	Yes No Abstain
09-04	Case 09-04 : Modification to Section 322 – Add Pavement Fabric Interlayer for AC Overlay	SRP	Peter Kandariz	02/04/2009 05/06/2009		0 0 0	Yes No Abstain
09-05	Case 09-05 : Revisions to Sections 220 and 703 – Riprap Construction	SRP	Peter Kandariz	02/04/2009 05/06/2009		0 0 0	Yes No Abstain
09-06	Case 09-06 : New Section 306 – Mechanically Stabilized Subgrade - Geogrids	SRP	Peter Kandariz	02/04/2009 05/06/2009		0 0 0	Yes No Abstain
09-07	Case 09-07 : Revisions to Sections 725 and 701 – Portland Cement Concrete	Goodyear	Troy Tobaisson	03/04/2009 04/08/2009		0 0 0	Yes No Abstain
09-08	Case 09-08 : Modification to Detail 240 – Valley Gutter	MCDOT	Bob Herz	03/04/2009 05/06/2009		0 0 0	Yes No Abstain
09-09	Case 09-09 : Revisions Section 792 – Dust Palliative	SRP	Peter Kandariz	03/04/2009 05/06/2009		0 0 0	Yes No Abstain

* Case was approved with verbal modifications at time of voting.

2009 PROPOSED REVISIONS TO MAG SPECIFICATIONS AND DETAILS

(Updated information can be found on the website: <http://www.mag.maricopa.gov/detail.cms?item=9688>)

CASE	DESCRIPTION	PROPOSED BY	MEMBER	SUBMITTAL DATE Last Revision	VOTE DATE	VOTE
09-10	Case 09-10 : Incorporate Section 322 - Asphalt Concrete Overlay into Section 321 and delete Section 322	SRP	Peter Kandarlis	05/06/2009		0 0 0 Yes No Abstain
09-11	Case 09-11 : Modify Section 230 - Dust Palliative Application	SRP	Peter Kandarlis	05/06/2009		0 0 0 Yes No Abstain

* Case was approved with verbal modifications at time of voting.



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: January 6, 2009 (Revised 2/4/2009)
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Modification to Section 340.2.1 Detectable Warnings Case 09- 01

PURPOSE: Update requirements to conform with current ADA requirements.

REVISION:

340.2.1 Detectable Warnings Detectable warnings shall consist of raised truncated domes aligned in a square grid pattern in conformity to the Americans with Disabilities Accessibility Guidelines. Truncated domes shall have the following nominal dimensions: base diameter of 1.0 inches (0.9 inches minimum), top diameter of 50 percent of the base diameter minimum to 65 percent of the base diameter maximum, and height of 0.2 inches. Dome center-to-center spacing of 2.35 inches, measured between the most adjacent domes on the square grid. Dome center-to-center spacing for radial installations shall be 1.6 inches minimum and 2.4 inches maximum with a base-to-base spacing of 0.65 inches minimum. Detectable warnings shall contrast visually with adjoining surfaces. Visual contrast shall be obtained by color, use safety yellow or other approved color. The color shall be an integral part of the material surface. The material is to be durable with a non-slip surface not subject to spalling, chipping, delamination, or separation. All detectable warnings shall be approved by the jurisdictional agency prior to installation.

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SECTION 796
GEOSYNTHETICS

796.1 GENERAL:

Geosynthetic fabrics, grids and membranes used for construction purposes, including woven and non-woven materials, shall be in conformance with this Section.

Identification, packaging, delivery, storage and handling of geosynthetic materials shall be in accordance with manufacturer's recommendations and ASTM D4873. Each roll shall be labeled or tagged to provide product identification sufficient to determine the product type, manufacturer, quantity, lot number, roll number date of manufacture, and shipping date.

Geosynthetic materials shall be packaged in a manner that will protect the materials from harmful environmental conditions as referred to in the manufacturer's specifications. Fabric rolls shall be stored and protected from the weather. If stored outdoors, the rolls shall be elevated and protected with a waterproof cover, and in no case shall geosynthetics be exposed to mud, dirt, dust and debris.

796.2 MATERIALS AND REQUIREMENTS;

Geosynthetic materials shall be inert to commonly encountered chemicals, resistant to rot and mildew, and shall have no tears or defects which adversely affect or alter its physical properties.

Materials required for complete and proper installation of geosynthetic materials that are not specifically described herein (such as pins, nails, washers, etc.) shall conform to the manufacturer's recommendations and be as selected and supplied by Contractor subject to final approval by the Engineer.

Requirements represent minimum average roll values in the weaker principal direction. Average of test results from any sampled roll in a lot shall meet or exceed the minimum values noted herein. Lot shall be sampled according to ASTM D 4354.

796.2.1 Pavement: Pavement fabric geosynthetics are non-woven polyester or polypropylene fabrics that are field saturated with an asphalt binder and placed as an interlayer beneath a pavement overlay or between pavement layers. When placed, the fabric becomes an integral part of the roadway section, forming a barrier to water infiltration and absorbing stresses to reduce reflective and fatigue cracking of the new pavement surface layer.

Pavement fabric shall be constructed of at least 95 percent (by weight) nonwoven synthetic fibers of polyester or polypropylene, thermally bonded on one side. The fabric material shall additionally conform to the physical properties shown in Table 796-1.

TABLE 796-1			
PAVEMENT GEOSYNTHETIC PROPERTIES			
Property	Class A	Class B	ASTM Test Method
Weight: oz/yd ²	4.1 min.	4.0 min	D3776
Grab tensile strength: lbs.	100 min.	90 min	D4632
Elongation at break: %	50 min.	50 min	D4632
Melting point: degree F	300 min.	300 min	D276
Asphalt retention: gal/yd ²	0.25 min. ⁽¹⁾	0.20 min	D6140

(1) May be reduced within street intersections, on steep grades or in other zones where vehicle braking is common, but not less than 0.20 gal/yd².

796.2.2 Filtration (Drainage) and Separation: Filtration and separation fabrics are nonwoven or woven polypropylene or polyester fabrics with specified strength characteristics used as permeable separators to restrain soil or other particles subjected to hydrodynamic forces while allowing the passage of fluids into or across a geotextile and to prevent inter-migration of adjacent soil layers of vastly different particle sizes and particle distributions.

Filtration and separation fabrics shall be nonwoven or woven fabric consisting only of long chain polymeric filaments such as polypropylene or polyester formed or woven into a stable network such that the filaments retain their relative position to each other. The fabric material shall additionally conform to the physical properties shown in Table 796-2.

TABLE 796-2			
FILTRATION & DRAINAGE GEOSYNTHETIC PROPERTIES			
Property	Class A ⁽¹⁾	Class B ⁽²⁾	ASTM Test Method
Grab tensile strength: lbs.	180 min	80 min.	D4632
Seam strength: lbs.	160 min	70 min.	D4632
Puncture strength: lbs.	80 min	25 min.	D4833
Trapezoidal tear: lbs	50 min	25 min.	D4533
Apparent opening size: US Standard sieve size	> 50	>50	D4751
Ultraviolet Stability: %	50 min.	50 min	D4355

- (1) Class A - Use where installation stresses are more severe than for Class B application (i.e. very coarse sharp angular aggregate, heave degree of compaction).
 (2) Class B – Use with smooth graded surface having no sharp angular projections and sharp angular aggregate.

796.2.3 Erosion Control: Erosion control fabrics are woven monofilament fabrics or nonwoven fabrics similar to filtration and separation fabrics, but are thicker and stronger (higher survivability) to absorb stress and resist abrasion. These fabrics are used below all areas to receive aggregate or rip-rap rock slope protection and act as filter/separators to provide sustained permeability while maintaining structural stability.

Erosion control fabrics shall be a woven monofilament fabric or a nonwoven fabric consisting only of long chain polymeric filaments such as polypropylene or polyester formed into a stable network that the filaments retain their relative position to each other. The fabric material shall additionally conform to the physical properties shown in Table 796-3.

TABLE 796-3			
EROSION CONTROL GEOSYNTHETIC PROPERTIES			
Property	Class A ⁽¹⁾	Class B ⁽²⁾	ASTM Test Method
Weight: oz/yd ²	8.0 min	6.0 min	D3776
Grab tensile strength: lbs.	270 min	200 min.	D4632
Elongation at break: %	45min, 115 max	15 min., 115 max.	D4632
Puncture strength: lbs.	110 min	75 min.	D4833
Burst strength: psi	430 min	320 min.	D3786
Trapezoidal tear: lbs	75 min	50 min.	D4533
Apparent opening size: US Standard sieve size	30 – 140	30 - 140	D4751
Ultraviolet Stability: %	70 min.	70 min	D4355

- (1) Class A - Use where installation stresses are more severe than for Class B applications.
 (2) Class B – Use with structures or under conditions where the fabric is protected by sand cushion or by "zero drop height" placement of stone (stone placement depth < 3 ft; stone wt < 250 lbs).

796.2.4 Soil or Base Reinforcement: Geogrid geosynthetic materials are used for improving the stability of weak soils or reinforcing aggregate bases. Geogrids are defined as biaxial or triaxial polymeric grids

formed by a regular network of integrally connected polymer tensile elements with apertures of sufficient size to permit significant mechanical interlock with the surrounding soil, aggregate, or other fill materials to function primarily as reinforcement.

The geogrid structure shall be dimensionally stable and able to retain its geometry under manufacture, transport and installation. Geogrids shall be comprised of 100 percent punched and drawn or extruded virgin resin polypropylene or high-density polyethylene, with a maximum of 5 percent in-plant regrind material. Geogrids shall additionally conform to the physical properties shown in Table 796-4.

TABLE 796-4			
REINFORCEMENT GEOGRID PROPERTIES			
Property	Requirement		Test Method
	Type 1	Type 2	
Aperture size: in	1 min.	1-3/8 min.	ID callipered
Rib Thickness: mil	30 min.	50 min.	ASTM D1777
Rib Shape	Rectangular or Square	Rectangular or Square	Observation
Junction Thickness: mil	60 min.	60 min.	ASTM D1777
Ultimate Tensile Strength: lb/ft	850	1300	ASTM D4945
Flexural Rigidity: Mg-cm	250,000	750,000	ASTM D1388
Min Tensile Strength @ 2% Strain: lb/ft MD	280	410	ASTM D6637
Min Tensile Strength @ 2% Strain: lb/ft CMD	450	620	ASTM D6637
Min Tensile Strength @ 5% Strain: lb/ft MD	580	810	ASTM D6637
Min Tensile Strength @ 5% Strain: lb/ft CMD	920	1340	ASTM D6637
Junction Strength: %	80 min.		ASTM 638
Ultraviolet Stability: %	70 min		D4355

(1) (MD) Machine Direction (2) (CMD) Cross-Machine (transverse) Direction

796.3 TEST & CERTIFICATION REQUIREMENTS:

Certificates of compliance shall be submitted to the engineer upon delivery of material for use of a specified project. Samples of materials shall be submitted for testing. No samples shall be taken within five feet from either end of roll. Dimension and determination of the amount of samples needed shall be determined by the Engineer. Each geosynthetic material lot or shipment must be approved by the Engineer before the materials may be incorporated in the work.

Testing methods and results shown in the certificate of compliance shall conform to the listed specifications for the proposed geosynthetic use. Supporting documentation including, but not limited to, product information sheets, installation procedures and recommendations, recommended use, and project references shall also be submitted by the supplier or manufacturer as part of product evaluation and pre-approval.

SECTION 322

ASPHALT CONCRETE OVERLAY

322.1 DESCRIPTION:

Asphalt concrete overlay consists of the placing and compaction of plant mix asphalt concrete over existing asphalt concrete paving. The thickness of the overlay shall be as shown on the plans or as specified in the special provisions. Preliminary preparation of existing surfaces will be required except when accomplished by the Contracting Agency, and it is so stipulated in the special provisions. With the exception of those which have been preheated and remixed only, existing surfaces shall receive a tack coat.

322.2 MATERIALS:

The tack coat, asphalt concrete mix and transportation of the mix shall be as specified in Sections 710 and 321, except for the maximum size of aggregate and percentage of binder which shall be as specified in the following paragraph.

322.3 ASPHALT CONCRETE:

The aggregate gradation and percentage of asphalt binder shall be in accordance with Section 710 using a 1/2 inch Marshall-Low Traffic mix for overlay more than one and one-half inch in thickness and a 3/8 inch Marshall Low Traffic mix for overlay one and one-half inch or less in thickness, unless otherwise shown or specified in the special provisions.

322.4 PREPARATION OF SURFACES:
322.5

Except when they have been preheated and remixed, surfaces shall be prepared as follows:

Before placing asphalt concrete overlay, severely raveled areas or cracked areas that are depressed more than 3/4 inch from the adjoining pavement shall be cut out and patched at least 48 hours prior to the resurfacing operation. Over-asphalted areas or rough high spots shall be removed by burning or blading. Large shrinkage cracks shall be filled with asphalt sealing compound acceptable to the Engineer. The entire surface shall be cleaned with a power broom. Raveled areas that do not require removing shall be cleaned by hand brooming. The above are incidental, and the cost thereof shall be included in the bid items.

After surfaces have been prepared to the satisfaction of the Engineer, they shall receive a tack coat as specified in Section 321. Traffic will not be permitted over surfaces which have received a tack coat. When the overlay is to extend onto the concrete gutter, the gutter shall be thoroughly cleaned of loose dust and cement particles and shall be tack coated.

322.5 CONSTRUCTION METHODS:
322.6

Placing and rolling on the asphalt concrete and the smoothness of the surface shall be as specified in Section 321.

322.6 MANHOLES:
322.7

Manholes shall be built up and the frames set flush with the finished surface of the new paving, and tops of valve boxes, clean-outs and other existing structures shall be adjusted to finish grade. In the event the base course and original paving have been removed or disturbed in order to build up the manhole, they shall be replaced with approved materials which shall be thoroughly compacted. The asphalt concrete around the manhole frame shall be completed and made flush with the adjacent overlay.

322.7 PAYMENT:
322.8

Payment for tack coat and asphalt concrete will be as specified in Section 321 except as noted above.

322.4 PAVEMENT FABRIC INTERLAYER:

Pavement fabric interlayer shall be used below an asphalt concrete overlay only when specified on the plans or in the specifications and shall not result in a reduction in the design asphalt concrete overlay section thickness.

Pavement fabric interlayer shall be in accordance with Class B in Table 796-1 unless otherwise specified on the plans or in the specifications.

Asphalt binder coat used to bond the fabric to the pavement shall be an asphalt cement conforming to the requirements of Section 711. Unless otherwise specified, the grade to be used shall be PG 70-10. The application of asphalt binder and distributing equipment shall conform to the requirements of Section 330. The asphalt binder coat shall be uniformly spray applied to the prepared pavement surface at the rate of 0.20 gallons per square yard for Class B fabric or at the rate of 0.25 gallons per square yard for Class A fabric. Some underlying surfaces may require a higher or lower application rate. A test strip may be necessary to determine the proper application rate. The width of liquid asphalt cement application shall be the fabric width, plus six inches.

Neither the asphalt binder coat or fabric interlayer shall be placed when weather conditions, in the opinion of the Engineer, are not suitable. Placement of the asphalt binder and fabric interlayer shall be placed either when (a) the ambient air temperature is above 50 degrees F and rising, or (b) the pavement is dry and pavement temperature is 40 degrees F and rising.

Equipment for placing the fabric shall be mechanized and capable of handling full rolls of fabric. The equipment shall be able to lay the fabric smoothly in order to maximize pavement contact and remove air bubbles. Stiff bristle brooms shall be used to smooth the fabric, scissors or blades to cut the fabric are also required. The equipment used to place the fabric shall be in good working order and is subject to approval by the Contracting Agency.

Pavement fabric interlayer shall not be placed if the in-place binder is hotter than 325 degrees F or has cooled to 180 degrees F or below (as determined by non-contact thermometer).

Pavement fabric interlayer shall be placed onto the asphaltic binder with the heat bonded side up with a minimum amount of wrinkling or folding. Large wrinkles (1-inch and larger) shall be slit and lapped in the direction of paving. Burning or torching of wrinkles is not allowed. Fabric joints shall overlap three to six inches to insure full closure of the joint. Transverse joints shall be lapped in the direction of paving to prevent edge pickup by the paver. A second application of hand-placed asphalt binder may be required at laps and repairs as determined by the Engineer to ensure proper binding of the narrow double fabric layer. No joints shall be lapped with more than two layers of fabric.

All areas where fabric has been placed shall be paved with asphaltic concrete during the same workshift. Placement of the asphaltic concrete shall closely follow fabric lay down. The temperature of the asphaltic concrete when delivered shall not exceed 325 degrees F. In the event that asphalt binder coat bleeds through the fabric causing construction problems before the overlay is placed, the affected areas shall be sanded with a sand blotter in compliance with Section 333. Excess sand shall be removed before beginning the paving operation. In the event of a rainfall on the fabric prior to the placement of the asphaltic concrete, the fabric must be allowed to dry completely before the asphalt concrete is placed.

Turning of the paving machine or of other vehicles on the fabric shall be gradual and kept to a minimum to avoid damage to the fabric. Should equipment tires stick to the fabric during pavement operations, small quantities of paving asphalt concrete shall be broadcast on the fabric to prevent pick-up. Decrease of binder rate in order to minimize pick-up on tires is not allowed.

SECTION 220

RIPRAP CONSTRUCTION

220.1 DESCRIPTION:

The construction of riprap shall consist of furnishing and placing stone, with or without grout, ~~or sacked concrete riprap~~. The depth and type of riprap shall be as shown on the plans or specified in the special provisions.

220.2 MATERIALS:

Materials furnished for riprap shall conform to the requirements of Section 703.

220.3 PREPARATION OF GROUND SURFACES:

The bed for the riprap shall be shaped and trimmed to provide even surfaces. A footing trench shall be excavated along the toe of the slope as shown on the plans.

220.4 PLAIN RIPRAP:

~~When the required riprap is less than 20 inches in depth, stone shall be placed by hand. Stone shall be placed to provide a minimum of voids. The larger stone shall be placed in the toe trench, foundation course, and on the outer surface of the riprap. Stones shall be placed with their longitudinal axis normal to the face of the embankment and so arranged that each stone above the foundation course has at least a 3 point bearing on the underlying stones. Bearing on smaller stones used to chink voids will not be acceptable. Interstices between stones shall be chinked with small stones and spalls. The finished surface shall be even and tight and shall not vary from the planned surface by more than 3 inches per foot of depth.~~

~~When the required riprap is 20 inches or more in depth, the stone may be placed by dumping and spread in layers by bulldozers or other suitable equipment.~~

220.5 GROUTED RIPRAP:

~~Riprap shall be placed as specified and grouted with portland cement mortar. The grout shall consist of 1 part cement and 3 parts by volume or aggregate. The portland cement shall be Type II as specified in Section 725 and the aggregate shall be 2 parts sand and 1 part gravel passing a 3/8 inch square mesh screen. The quality of the sand and gravel shall be as specified in Section 701.~~

~~The amount of water shall be such as to permit gravity flow into the interstices with limited spading and brooming. The consistency of the grout shall be as approved by the Engineer.~~

~~Except when hand mixing is permitted by the Engineer, grout shall be mixed in an approved machine mixer for not less than 1 1/2 minutes. Should hand mixing be permitted, the cement and aggregate shall be thoroughly mixed in a clean, tight mortar box until the mixture is of uniform color after which clean water shall be added in such quantity as to provide a grout of the specified consistency.~~

~~220.6 SACKED CONCRETE RIPRAP:~~

~~Slopes on which the sacked concrete riprap is to be placed shall be finished within 0.2 foot of the designated grades. The first course shall be a double row of stretchers laid in a neatly trimmed trench. The second course shall be a single row of headers. The third and remaining courses shall be stretchers or headers as shown on the plans or specified in the special provisions and shall be placed so that joints between courses are staggered. Dirt and debris shall be removed from the tops of sacks before the next course is laid thereon. Headers shall be placed with the folds upward. Not more than 4 vertical courses shall be placed in any tier until the initial set has taken place in the first course of any such tier.~~

~~When, in the opinion of the Engineer, there will not be proper bearing or bond due to delays in placing succeeding layers of the hampering of work by storm, mud or for any cause, a small trench shall be excavated back of the row of sacks already in place and this trench filled with fresh concrete before more sacks are placed. Payment for excavating the trenches shall be considered as included in the payment for the concrete in the trench.~~

~~Sacked concrete riprap shall be cured by sprinkling with a fine spray of water every 2 hours during daylight for not less than 3 days.~~

and underlain with erosion control geosynthetic fabric.

Erosion control geosynthetic fabric shall conform to the requirements of Section 796, Class B in accordance with Table 796-3.

Waste or sacked concrete shall not be permitted for use as riprap

The Contractor, at no additional cost, shall provide mechanical equipment, a sorting site, and labor needed to assist in checking riprap gradation.

Bedding material shall consist of processed natural material conforming to the requirements of Section 702.3, with a material gradation conforming to Select Materials Type A or B, or Aggregate Base as specified in Table 702-1.

220.3 PLACEMENT OF EROSION CONTROL GEOTEXTILE FABRIC:

Fabric shall be placed in a manner and at the locations shown on the project plans. The surface to receive fabric shall be free of obstructions, depressions, and debris. Any defects or soft yielding places which occur in the subgrade for any cause whatsoever shall be corrected and compacted to require density and stability before fabric is placed. These repairs shall be made at the expense of the contractor. The fabric shall be loosely laid (not in a stretched condition), aligned and placed with no wrinkles that lap.

The fabric strips shall be placed to provide a minimum 24-inch of overlap for each joint. On horizontal joints, the uphill strip shall overlap the downhill strip. On vertical joints, the upstream joint shall overlap the downstream joint.

Bedding material shall be placed uniformly on the fabric to the depth specified on the plans and shall be free of mounds, dips, and windrows. Bedding material shall not be compacted.

Use the following description per MCDOT supplemental specification:

Riprap shall be carefully placed on the bedding material and erosion control geosynthetic fabric in such a manner as to not damage the fabric. If the Engineer determines that the placement of stone has damaged or displaced the fabric to the extent that it cannot function as intended, the Contractor, at his expense, shall remove the placed riprap stone and properly correct the damage to, and/or the displacement of, the fabric. Such correction may include the removal and subsequent replacement of the bedding material and fabric, and re-grading the affected area, each as determined by the Engineer.

Riprap shall be placed in a manner which will produce a reasonably well-graded mass without segregation and with a minimum amount of voids, with the larger stone evenly distributed through the riprap mass. The individual placement of larger riprap stones may be required to obtain a uniform distribution of stone size. The riprap placement shall be supplemented by such hand methods as are required to obtain a uniform finished surface. Final surface elevations shall be no higher than the finished grades indicated on the plans. Individual stones shall project above the finished grades as shown on the plans no higher a distance equal to $0.67 \times D_{50}$. The riprap layer shall depress below the finished grades as shown on the plans no lower than a distance equal to $0.33 \times D_{50}$. Special care shall be exercised in placing riprap within 3 feet of structures to avoid damage to such structures.

Place rip-rap as specified in Section 220.5 then grout in place with portland cement mortar. Place grout to the depth as shown on the plan but in no case less than 70 percent of the depth of rip-rap. Pour and consolidate grout into place with suitable spades, trowels or other approved means so as to provide a dense stone and mortar layer with all voids and interstices filled. After grout has been placed, the rocks shall be thoroughly brushed so that their top surfaces are exposed. If required, use water pressure to clean stone faces after the mortar has achieved sufficient strength. The outer rocks shall project 1/3 to 1/4 their diameter above the grouted surface

Delete. An archaic specification (dates back to the 1950's) that may violate present-day environmental regulations. More typically used today for emergency actions. Can become a long-term maintenance item.

SECTION 220

220.7 MEASUREMENT:

The quantities of riprap construction shall be those of the completed bid item, in place, within the limits of dimensions shown on the plans.

~~The Engineer will compute the quantities of riprap by a method which, in his opinion, is best suited to obtain an accurate determination.~~

Measurement will be in cubic yards rounded to the nearest cubic yard. Measurement shall extend from the erosion control geosynthetic fabric to the top of the riprap. Quantities will be computed by the average end area method.

No separate measurement will be made for erosion control geosynthetic fabric or bedding material.

220.8 PAYMENT:

Payment for riprap will be made for the number of cubic yards of riprap ~~in place~~, on the basis of unit prices stipulated in the proposal and shall include ~~preparation of ground surfaces and trenching~~, unless an alternate basis for payment is stipulated in the proposal.

construction

complete in-place riprap construction as measured in 220.7

excavation, ground surface preparation, erosion control geosynthetic fabric, bedding material, riprap rock, grout (if used for the project) and backfilling.

End of Section

The price shall be full compensation for furnishing all material, labor and equipment for riprap construction.



SECTION 703

RIPRAP

703.1 STONE:

Stone for plain and grouted riprap shall be sound and durable, free from seams and coatings, and of such characteristics that it will not disintegrate when subjected to the action of water. Loss by abrasion shall not exceed the limits specified in Section 701.4. ← meet the requirements of Section 701.4.

Stone shall be of shapes which will form a stable protection structure of the required depth. Rounded boulders or cobbles shall not be used on slopes steeper than 2 to 1 unless grouted. Angular shapes may be used on any slope. Flat or needle shapes will not be acceptable unless the thickness of the piece is more than 1/3 the length. If specified, rounded may flatter

← If specified on the plans or in the specifications, riprap stone shall be color-matched with the adjacent landscape aggregate. |

~~Waste concrete may be used, if the pieces are sound free from coatings, and meet the size requirements specified for a stone.~~ Delete. Provides no method to determine if durability requirements can be met.

703.2 SIZE OF STONE:

Riprap stone shall be as large as can be conveniently placed in a layer of the required depth. The stones, excepting small stones and spalls used to chink interstices shall weigh not less than 10 pounds and at least 50 percent of the stone shall weigh not less than 100 pounds.

← Delete. The application is not provided within Section 220 and contradicts grouted riprap per the same section.

~~703.3 CONCRETE:~~

~~The portland cement, aggregates and mixing shall be as specified in Section 725 and as herein specified. The aggregate may be pitrun material, at least 80 percent of which shall pass a 1 1/2 inch square mesh screen. Separating aggregates by primary sizes will not be required. Los Angeles rattler tests and soundness tests will not be required.~~

~~The mixed concrete shall contain 376 pounds of portland cement per cubic yard.~~

~~The amount of water shall be such as to produce a mixture with a slump of 3 to 5 inches, when tested in accordance with ASTM-C-143.~~

~~703.4 SACKS:~~

← Delete. An archaic specification (dates back to the 1950's) that may violate present-day environmental regulations. More typically used today for emergency actions. Can become a long-term maintenance item.

~~Sacks shall be made of burlap not lighter than 10 ounce and shall be approximately 19 1/2 inches by 36 inches measured inside the seams when the sack is laid flat. Sound reclaimed sacks may be used. The capacity of each sack shall be 1.25 cubic feet. Each sack shall contain 1 cubic foot of concrete loosely placed so as to leave room for folding the open end, the fold just enough to retain the concrete at the time the filled sacks are placed. Immediately after filling, the sacks shall be placed and lightly trampled to cause them to conform with the ground surface and with adjacent sacks in place.~~

End of Section

SECTION 306

MECHANICALLY STABILIZED SUBGRADE - GEOGRID

306.1 DESCRIPTION:

The work under this section shall consist of furnishing and placing a geogrid material within or below the aggregate base as shown on the project plans to mechanically stabilize the subgrade. Work shall provide a stabilized paving platform section on which paving materials can be placed. Geogrid type, fill thickness, pavement cross-section and associated details, shall be as shown on the contract drawings.

This specification shall be used for a construction platform and not as a means of mitigating swell (retaining moisture in subgrades) unless retaining moisture in the section can be assured by other means.

306.2 MATERIALS:

The geogrid material shall be supplied in accordance with and conform to the material requirements of Section 796 and Table 796-4.

Other than the specified geogrid, no structural contribution shall be attributed to other geosynthetic fabrics that may be specified as part of the pavement or subgrade cross-section to provide separation, filtration or drainage.

306.3 PREPARATION:

The surface upon which the geogrid is to be placed shall be brought to a compacted condition, true to line and grade as directed by the Engineer or as shown on the plans. During this process any unsuitable soil or material shall be removed and replaced with acceptable material. The compacted surface shall be at the proper elevation as specified, shown on the plans, or as directed by the Engineer, for the placement of the geogrid. At completion of this phase, the material and surface shall be approved by the Engineer before proceeding with the next step.

The geogrid shall not be placed when weather or surface conditions, in the opinion of the Engineer, are not suitable for placement. This will normally be at times of wet and snowy conditions, heavy rainfall, extreme cold or frost conditions, or extreme heat.

306.4 EQUIPMENT:

Mechanical or manual laydown equipment shall be capable of laying the geogrid properly and smoothly, according to the manufacturer's recommendations.

306.5 GEOGRID PLACEMENT:

The geogrid shall be installed in accordance with the installation guidelines provided by the manufacturer or as directed by the engineer.

The geogrid may be temporarily secured in place with ties, staples, pins, sand bags or backfill as required by fill properties, fill placement procedures or weather conditions or as directed by the Engineer. A 12-inch minimum secured overlap is required at all joints (both transverse and longitudinal). At transverse joints, the preceding roll shall overlap the following roll in the direction that the aggregate base will be placed. The geogrid shall be rolled out along the alignment in the direction of advancing construction. All wrinkles and folds shall be removed.

The geogrid shall be tensioned by hand and anchored to the ground at the edges, including overlaps, and in the center of the roll at 30-foot intervals along the roll length, at the corners if applicable, or as directed by the Engineer. Securing locations may be reduced or eliminated by the Engineer if it can be shown that by careful installation the geogrid is adequately tensioned by hand and anchored by the placed aggregate in a progressive installation process as recommended by the manufacturer's representative.

Care shall be taken to ensure that geogrid sections do not separate at overlaps during construction. Placement of geogrid around corners will require cutting of the geogrid product and diagonal overlapping of the same to make sure that excessive buckling of geogrid material does not occur.

306.6 PLACING AND COMPACTING AGGREGATE FILL:

The aggregate shall be back dumped and spread in a uniform lift maintaining the design aggregate thickness at all times. The aggregate material shall be bladed onto the geogrid in such a manner that the aggregate rolls onto the grid ahead, by gradually raising the dozer blade while moving ahead.

When underlying substrate is trafficable with minimal rutting, rubber-tired equipment may pass over the geogrid reinforcement at slow speeds (less than 10 mph) when integrally-formed geogrids are used. This shall not be allowed with coated geogrids. Sudden stops and turning by trucks shall be avoided while on the grid. A minimum loose fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles shall be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.

Any ruts which might develop during spreading or compacting the aggregate shall be filled with additional aggregate rather than bladed from surrounding areas. Placing additional aggregate into the rutted areas insures that the design aggregate thickness is maintained.

Aggregate base shall be compacted as specified in Section 310. Aggregate base material shall not be mixed or processed on the geogrid. The aggregate base material shall be premixed at the stockpile area or another location in a manner approved by the Engineer. Aggregate base materials will be sampled for acceptance after premixing and prior to placement on the geogrid material. Contamination and segregation of aggregate base materials prior to or during placement shall be minimized.

306.7 REPAIR:

Any roll of geogrid damaged before, during and after installation shall be replaced by the contractor at no additional cost to the owner.

Proper replacement shall consist of replacing the affected area overlapping geogrid at least 3 feet beyond all sides of the affected area.

[Paving platform found deficient shall be removed and replaced.](#)

306.8 PAYMENT:

Geogrid reinforcement will be measured by the square yard in-place. Measurement will be to the nearest square yard. No allowance will be made for material in laps.

The accepted quantity of geogrid reinforcement, measured as provided above, will be paid for at the contract unit price per square yard, which price shall be full compensation for furnishing all labor, material, and equipment, and performing all operations in connection with placing the geogrid as shown on the project plans. No payment will be made for geogrid reinforcement rejected due to either contamination or damage due to either the fault or negligence of the contractor.

PORTLAND CEMENT CONCRETE**725.1 GENERAL:**

Portland cement concrete shall be composed of cementitious materials, fine and coarse aggregates, water, and, if *specified* or allowed, certain chemical admixtures and additives.

TABLE 725-1		
CONCRETE CLASSES - MINIMUM REQUIREMENTS		
Class of Concrete	Minimum Cementitious Materials Content (lbs. per cubic yard)	Minimum Compressive Strength (1) at 28 Days (psi)
AA	600	4000
A	520	3000
B	470	2500
C	420	2000

(1) In accordance with section 725.10.

Class AA concrete shall be used as specified.

Class A concrete shall be used for concrete structures, either reinforced or non-reinforced, and for concrete pavements.

Class B concrete may be used for curbs, gutters and sidewalks.

Class C concrete may be used for thrust blocks, encasements, fill or over excavation, etc.

725.2 CEMENTITIOUS MATERIALS:

Cementitious materials to be used or furnished under this specification shall be:

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Portland cement, meeting the requirements of ASTM C-150

Type II, low alkali, when no other specific type is specified

Type III, low alkali, for high early strength, when applicable *or specified*

Type V, low alkali, when specified in the special provisions for use in concrete which will be exposed to contact with soils or waters containing water soluble sulfates (as SO₄) in concentration greater than 0.20% by weight of soil or 1500 PPM in solutions

Portland Pozzolan Cement ASTM C-595

Type IP (MS), when no other specific type is specified

Supplementary cementitious (pozzolanic) materials shall not be used as an additional cementitious materials replacement in concrete in combination with Portland Pozzolan Cement.

Cementitious materials shall be sampled and tested as prescribed in the applicable ASTM specifications. The Contractor shall obtain and deliver to the Engineer a certification of compliance signed by the material manufacturer, identifying the cementitious material and stating that the cementitious material delivered to the batching site complies with the appropriate specifications. When requested by the Engineer, the Contractor shall furnish 3 copies of the cementitious materials certification. The cost of furnishing tested cementitious materials shall be considered as included in the contract bid price and no additional allowance will be made therefore.

When suitable facilities, as recommended by the Concrete Plant Manufacturer's Bureau, and approved by the Engineer, are available for handling and weighing bulk cementitious materials, such facilities shall be used. Otherwise the cementitious material shall be delivered in original unopened sacks that bear the name or brand of the manufacturer. The type of cementitious material, and the weight contained in each sack shall be plainly marked thereon.

Cementitious materials shall be stored in such manner as to permit ready access for the purpose of inspection and identification, and so as to be suitably protected against damage by contamination or moisture. Should any lot of bulk cementitious material be delivered to the site show evidence of contamination, the Engineer may require that such lot be removed from the site.

725.2.1 Supplementary Cementitious (Pozzolanic) Materials (SCM): Supplementary cementitious (pozzolanic) materials to be used in concrete or furnished under this specification shall conform to the appropriate ASTM requirements as follows:

Fly ash or natural pozzolan	ASTM C-618 and C-311
Silica Fume	ASTM C-1240

Up to 25 percent by weight of the Table 725-1 minimum cementitious materials requirements may be an approved fly ash or natural pozzolan. Additional pozzolanic

material in excess of the minimum Table 725-1 requirements may be incorporated into a concrete mix design to achieve enhanced performance, upon approval of the Engineer or Agency.

The Contractor shall obtain and deliver to the Engineer a certification of compliance signed by the pozzolan supplier identifying the pozzolanic material and stating the pozzolan delivered to the batching site complies with the appropriate specifications. The cost of furnishing tested pozzolan shall be considered as included in the contract bid price and no additional allowance will be made therefore.

Pozzolanic materials shall be handled and stored in the same manner as other cementitious materials. When facilities for handling a bulk pozzolan are not available, the pozzolan shall be delivered in original unopened sacks bearing the name and brand of the supplier, the type and source of the pozzolan, and the weight contained in each sack plainly marked thereon.

725.3 AGGREGATES:

Coarse aggregates, consisting of crushed rock or gravel or a combination thereof, and fine aggregate shall conform to the requirements prescribed in Section 701.3.3. Prior to the delivery of the aggregates, the Contractor will be required to furnish samples for testing, and shall notify the Engineer as to when and where they will be available. Thereafter, additional required samples shall be furnished at the expense of the Contractor, but the cost of testing and making the grading analysis will be borne by the Contracting Agency. Samples shall be taken by the Engineer or in the presence of the Engineer.

725.4 Remove and renumber subsequent sections

725.5 WATER:

The water used for mixing concrete shall be potable or shall meet the requirements of ASTM C-1602, when tested by a qualified independent testing laboratory.

725.6 ADMIXTURES AND ADDITIVES:

Admixtures or additives of any type, except as otherwise specified, shall not be used unless incorporated into the approved mix design or authorized by the Engineer or appropriate Agency representative.

Water Reducing admixtures incorporated into the approved concrete mix design shall meet the requirements of ASTM C-494 for the appropriate type.

Air entraining admixtures incorporated into the approved concrete mix design shall meet the requirements of ASTM C-260.

Pigments incorporated into the approved concrete mix design for integrally colored concrete shall meet the requirements of ASTM C-979.

Fibers incorporated into the approved concrete mix shall meet the requirements of ASTM C-1116.

Any admixtures used shall be included in the bid price for that item.

725.7 MIX DESIGN PROPORTIONING:

A concrete mix design carrying the producer's designated mix number for each type of concrete being furnished under these specifications shall be submitted to the Agency or Engineer at least once each year for approval. Each design shall utilize the proper proportioning of ingredients to produce a concrete mix that is homogeneous and sufficiently workable to provide a consistent and durable concrete product that meets the specified compressive strength and other properties as required by the application. In the event there is a modification to the mix design proportions:

- A) Modifications that will not require a new mix design submittal/approval:
 - 1 Modifications which do not result in batch target weights for the fine aggregate or combined coarse aggregates changing by more than 5 percent from the original approved mix design.
 - 2 Modifications to the percentage of coarse aggregate fractions that do not change the total coarse aggregate volume.
 - 3 Modifications to dosages of chemical or air-entraining admixtures, within the manufacturer's recommendations.
 - 4 The incorporation or elimination of chemical admixtures which are listed on the mix design to effect a change in the time-of-set (retarders or accelerators).
- B) Modifications that will require a new mix design submittal/approval and may require performance verification:
 - 1 Modification to the class of concrete per Table 725-1.
 - 2 Modification to the type/class of cement, fly ash, natural pozzolan, or silica fume.
 - 3 Modification to the percentage of fly ash, natural pozzolan, or silica fume.
 - 4 Modification to a coarse aggregate size designation.
 - 5 Modification of the type of chemical admixture, or the incorporation or

elimination, of an air-entraining admixture.

6. Modification of coarse or fine aggregate source

725.8 MIXING:

All proportioning/batching/mixing equipment shall comply with the standards of the Concrete Plant Manufacturer's Bureau and the certification requirements of the Arizona Rock Products Association or National Ready Mixed Concrete Association. The proportioning shall consist of combining the specified sizes of aggregates with cement, supplementary cementitious materials, admixtures/additives, and water as herein provided. No method which may cause the segregation or degradation of materials shall be used.

Weighing and metering devices used for the purpose of proportioning materials shall fulfill requirements as to accuracy and tolerance prescribed by the Weights and Measures Division of the State of Arizona and shall be sealed and certified in accordance with the procedures established by this agency. This certification shall not be over 12 months old and shall be renewed whenever required by the Engineer. When portable plants are set up at a new or temporary location, the scales and scale assembly shall be inspected and certificate issued regardless of the date when the scales were last tested. The Engineer may require the Contractor to run a quick scale check at any time with certified weights furnished by the Contractor and order the scale recertified if necessary.

Any admixture shall be measured accurately by mechanical means into each batch by equipment or in a method approved by the Engineer.

The equipment for measuring and supplying the water in the mixer shall be so constructed and arranged that the amount of water to be added to the mixture can be measured, in gallons or by weight, positively. The amount of water shall be varied in accordance with the percentage of free moisture in the material and the requirements of the workability of the aggregate.

Machine mixing will be required in all cases other than those in which it would obviously prove to be impractical; in which latter event hand mixing will be permitted, only to the extent necessary. Regardless of the method employed, mixing shall be commenced as soon as possible after the cement is placed in contact with the aggregates. All concrete mixers shall be of such design and construction, and so operated, as to provide a thoroughly and properly mixed concrete in which the ingredients are uniformly distributed.

725.8.1 Paving and Stationary Mixers: Paving and stationary mixers shall comply with the standards of the Concrete Plant Manufacturer's Bureau and the certification requirements of the Arizona Rock Products Association.

Mixers shall be maintained in proper and serviceable working condition, and any part or

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portion thereof that is out of order, or becomes worn to such extent as to detrimentally affect the quality of mixing, shall be promptly repaired or replaced.

The proper proportions of aggregate, cement, Pozzolan and water for each batch of concrete shall be placed in the mixer, and shall be mixed for a period of not less than 50 seconds after all such materials are in the drum.

The rotating speed at which the mixer shall be operated shall conform to that recommended by the manufacturer.

The total volume of materials mixed in any one batch shall neither exceed the water level capacity of the mixer nor the manufacturer's catalog rated capacity of the mixer.

725.8.2 Transit Mixers: Transit mixers shall meet the requirements of the Truck Mixer Manufacturer's Bureau and the certification requirements of the Arizona Rock Products Association. Ready mix concrete and shall comply with ASTM C-94 except as herein specified.

Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates, installed by the manufacturer, on which is plainly marked the capacity of the drum in terms of the volume of mixed concrete and the speed of rotation for the agitating and mixing speeds of the mixing drum or blades.

Each mixer shall have an identification number painted on the truck in such a location that it can be easily read from the batching platform.

The total volume of materials introduced into the mixer for mixing purposes shall not exceed the manufacturer's guaranteed mixing capacity. If the concrete so mixed does not meet the uniformity requirements of this section, the amount of materials charged into the mixer shall be reduced.

The rotation speed at which the mixer shall be operated shall conform to that recommended by the manufacturer.

Each batch of concrete placed in the mixer shall be mixed for not less than 70 nor more than 100 revolutions of the drum or blades, at the speed designated by the manufacturer of the equipment as mixing speed. Additional mixing shall be at the agitating speed designated by the manufacturer of the equipment. The revolving of the drum shall be continuous until the concrete is completely emptied from the drum. Before any portion of the materials for any batch of concrete is placed therein, the drum of the mixer shall be completely emptied of the previously mixed batch.

At the time of delivery to the job site, the Agency or Engineer shall be provided with a legible delivery ticket which shall contain the following information:

Date and Truck Number.

Name of the Supplier.

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Name of the Contractor.

Specific designation of job (name and location).

Number of cubic yards in the batch.

Time the transit mixer is loaded.

Amount of water added at the job site at request of receiver, and his signature or initials.

Suppliers' mix design code number.

Type and amount of admixture or additive that is not already included in the approved mix design, if any.

Serial number of the ticket.

Additional water may be added on the jobsite in accordance with ASTM C-94 Tolerances in Slump section to adjust slump providing the slump after such water addition does not exceed the maximum allowed by these specifications in section 725.11 and that water so added is mixed into the batch for a minimum of 30 additional revolutions at mixing speed. Loss of cement mortar during discharge which in the opinion of the Engineer would be of sufficient amount to affect the homogeneity of the concrete will be cause for rejection of the load. The Contractor shall be responsible for all concrete to which water is added at the job site.

725.8.3 Hand Mixed Concrete: Hand mixed concrete shall be prepared in a watertight container of suitable volume in batches not to exceed 1/3 cubic yard each. Proportioning of batches shall be in accordance with the applicable required mix design in Table 725-1 and section 725.7. All mixing shall be done prior to placement in the forms and in accordance with the following procedure:

- A) Mixing shall be done in a mechanical batch mixer of approved type.
- B) The mixer shall be rotated at a speed recommended by the manufacturer.
- C) Mixing shall continue for at least 1-1/2 minutes after all materials are in the mixer, unless a shorter time is shown to be satisfactory by the mixing uniformity tests of ASTM C-94.
- D) Materials handling, batching, and mixing shall conform to the applicable provisions of ASTM C-94.
- E) Suitable records shall be kept to indentify the number of batches, proportions of materials used, and time and date of mixing and placement along with the approximate location in the structure.

In lieu of mixing individual ingredients for concrete placement, a prepackaged commercial product may be used, upon approval of the Engineer/Agency representative. Any mixing of a prepackaged product must be in accordance with the manufacturer's recommended procedure.

725.8.4 Dry batched Unmixed Concrete: Should the Contractor elect to use dry batched unmixed concrete, an accurate batch weight shall be provided to record the quantities of cementitious materials, aggregate and water batched into the containers. The date of batching, the container number and the batching certificate number shall be recorded at the time of batching. Copies of the batch weight records shall be submitted to the Agency or Engineer upon request.

All dry batched unmixed concrete delivered to the job site shall be stored in containers so constructed that the cement cannot come in contact with the water and aggregate within the container. Any admixture added to powder form shall be added to the cement; if added in liquid form, it shall be added to the water.

The contents of the container shall be discharged into a mixer at the job site. Following discharge of the first container into the mixer, the mixer shall be operated at mixing speeds during the discharge of the remaining containers. After the contents of the last container have been discharged into the mixer, the concrete shall be mixed as specified in this specification for transit mixers, and drum or turbine type mixers.

Any spillage of cement, aggregate, water or admixture during the filling, transporting, or the discharging of the container, shall be cause for rejection of the container or the contents of the mixer if any portion of the rejected container is discharged into the mixer.

725.8.5 Volumetric Batching and Continuous Mixing Concrete and Equipment

Volumetric-batching and continuous-mixing concrete and equipment may be utilized upon approval of the Engineer/Agency for job site concreting applications. Material handling, procedures, and operations shall be in accordance with ACI 304.6R, Guide for the use of Volumetric-Measuring and Continuous-Mixing Concrete Equipment and all concrete produced and all test performed shall be in accordance with ASTM C-685, Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing. All equipment shall meet the requirements of the Volumetric Mixer Standards of the Volumetric Mixer Manufacturers Bureau and shall have a suitable copyrighted rating plate furnished by the Bureau and attached to the volumetric mixing equipment.

725.9 Remove and renumber subsequent sections

725.10 TESTS AND TEST METHODS:

725.10.1 Concrete shall be sampled in accordance with ASTM C-172 for determination of temperature, slump, unit weight and yield (when required) and air content (when required) as well as for fabrication of test cylinders for compressive strength determination at 28 days. Samples shall be of sufficient size to perform all the required tests and fabricate the necessary test cylinders but in no case less than 1 cubic foot. Concrete shall be sampled during discharge of the middle portion of the batch. At the

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discretion of the Agency and/or Engineer or his representative, a sample may be obtained at the beginning of the discharge if the properties of the concrete do not appear to be within the specification limits for slump or temperature.

All testing shall be done by a certified technician meeting the requirements of the ACI Concrete Field Testing Technician, Grade I or equivalent.

Temperature of the concrete mixture will be determined in accordance with ASTM C-1064.

Slump of the concrete mixture will be determined in accordance with ASTM C143.

Air content of the concrete mixture (when required) will be determined in accordance with ASTM C-231 or C-173, whichever is applicable.

Unit weight and yield of the concrete mixture (when required) will be determined in accordance with ASTM C-138.

All compressive strength test specimens will be made, cured, handled, protected, and transported in accordance with the requirements of ASTM C-31. The contractor shall provide and maintain for the sole use of the testing laboratory/technician adequate facilities for safe storage and proper curing of concrete test cylinders on the project site including sufficient access on weekends and holidays to allow the timely pick-up of cylinders specimens. Any and all deviations from the standard procedure of any test method shall be promptly identified and corrected. Any deviations shall be clearly noted by the testing laboratory on all written reports. Testing results obtained from non-standard testing procedures may be considered invalid and discarded by the Agency and/or Engineer.

725.10.2 In accordance with ACI 318 Chapter 5 Section 5.6.2.4, a cylinder strength test shall be the average of the strengths of at least two 6 inch by 12 inch cylinders or at least **(three or two)** 4 inch by 8 inch cylinders made from the same sample of concrete and tested at 28 days. An adequate number of cylinder specimens will be made for each 50 cubic yards or not less than each half-day's placement of each class of concrete. All specimens will be tested in a laboratory approved by the Agency and/or Engineer in accordance with ASTM C-39 for concrete acceptance. Should an individual cylinder show evidence of improper sampling, molding, curing, or testing, the results shall be discarded and the compressive strength shall be the result of the average of the remaining cylinder(s). Additional cylinder specimens may be made and tested at other ages to obtain additional compressive strength information and may not be considered as acceptance tests.

725.10.3 If the 28-day strength test does not meet the compressive strength requirements, the contractor **or Engineer/Agency** may choose to contest the compressive strength results of any test for purposes of acceptability or payment. This may involve an engineering study to determine the acceptability of the concrete in question, **such as testing of additional cylinders at later ages, (for example - hold**

cylinders at 56 days or more), or core testing to determine in-place concrete strengths. This additional testing or engineering study will be at the expense of the contractor, *unless otherwise agreed upon by the Contractor and the Engineer/Agency*. If core testing is performed, at least three representative cores shall be obtained, conditioned and tested in accordance with ASTM C-42 from each concrete member or area of concrete to be tested at locations designated by the Agency and/or Engineer. Cores damaged subsequent to or during removal shall be rejected and additional core samples taken. Cores must be obtained and delivered to a laboratory acceptable to the Agency and/or Engineer in time to allow complete strength testing within 48 days of original concrete placement. The contractor may elect to have a representative present during sampling and testing. A core strength test shall be the average of the results of the three cores. Should an individual core show evidence of improper sampling, curing, or testing, the results shall be discarded and the compressive strength shall be the result of the average of the remaining core(s). Results of the core strength testing will replace the results of the cylinder strength test for that sample.

725.11 ACCEPTANCE:

A) Plastic Concrete Properties

- 1) The slump of the concrete shall meet the requirements of ASTM C-94 Tolerances in Slump section. When the approved mix design or project specification requirements for slump are a “maximum” or “not to exceed”, the following tolerances will apply:

Specified slump:	If 3” or less	If more than 3”
Plus tolerance	0 inch	0 inch
Minus tolerance	1 1/2 inch	2 1/2 inch

When the approved mix design or project specification requirements for slump are not written as a “maximum” or “not to exceed”, the following tolerances will apply:

For design slump of:	Tolerance
2 inch and less	+/- 1/2 inch
More than 2 through 4 inch	+/- 1 inch
More than 4 inch	+/- 1 1/2 inch

- 2) *Limit the maximum allowable temperature of the concrete mixture immediately before placement to 90 degrees F unless otherwise specified or unless a higher allowable temperature is accepted by the Engineer/Agency, per ACI 305, Specification for Hot Weather Concreting. This acceptance can be based upon past field experience or preconstruction testing using a concrete mixture similar to one known to have been successfully used at a higher concrete temperature.*

Per ACI 306, Specification for Cold Weather Concreting, when the atmospheric temperature at the time of placing concrete is above 30°F the temperature of the concrete, as placed, shall not be less than 60°F. When the atmospheric

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temperature at the time of placing concrete is between 0°F and 30°F the temperature of the concrete, as placed, shall not be less than 65°F.

- 3) Air entrained concrete shall meet the requirements of ASTM - Air-Entrained Concrete section. The air content of air-entrained concrete when sampled from the transportation unit at the point of discharge shall be within the approved mix design tolerance or +/- 1.5 % of the specified value. When a representative sample taken prior to discharge shows an air content below the specific level by more than the allowable tolerance, additional air entraining admixture may be used to achieve the desired air content level, followed by a minimum of 30 revolutions at mixing speed.
- 4) Per ASTM C-94 Mixing and Delivery section, discharge of the concrete shall be completed within 1 1/2 hour after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates. The Engineer/Agency or their representative may allow the continuation of concrete placement after the 1 1/2 hour time limit has been reached if the concrete is of such slump or workability that it can be placed without the addition of water to the batch.

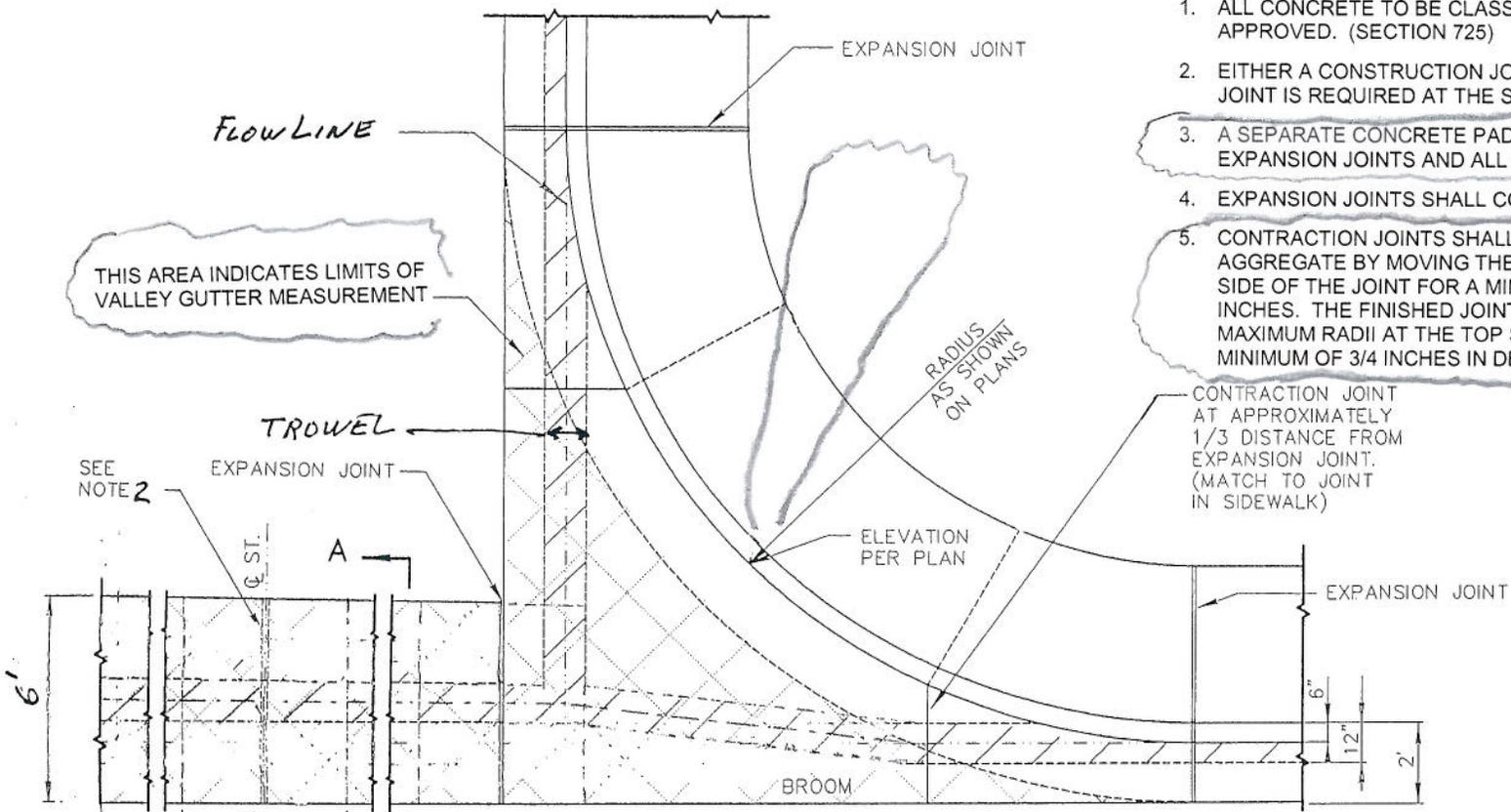
Concrete failing to meet the tolerances for plastic concrete properties in 1-4 above shall be reviewed by the Engineer/Agency or their representative and may be subject to rejection.

B) Hardened Concrete Properties – Compressive Strength

- 1) *Concrete represented by a cylinder strength test obtained in accordance with section 725.10.2 shall be acceptable if the 28-day strength meets or exceeds the specified design strength. Concrete failing to meet the compressive strength requirement shall be reviewed by the Engineer/Agency and may be subject to rejection and replacement or an adjustment as indicated in 725.11 B) 3). When concrete is accepted on the basis of cylinder strength tests of less than 100% of the required minimum 28-day compressive strength, an adjustment in the concrete unit price may be made for the quantity of concrete represented by such strength tests in accordance with table 725-2.*
- 2) *Core strength tests obtained in accordance with section 725.10.3 shall be considered acceptable if their average is equal to or greater than 85 percent of the specified strength and no single core is less than 75 percent of the specified strength. Concrete failing to meet the acceptability requirement as evidenced by drilled core specimens shall be reviewed by the Engineer/Agency and may be subject to rejection and replacement.*

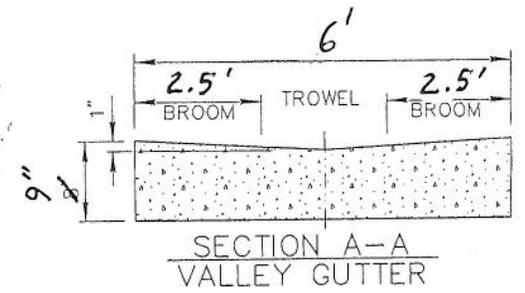
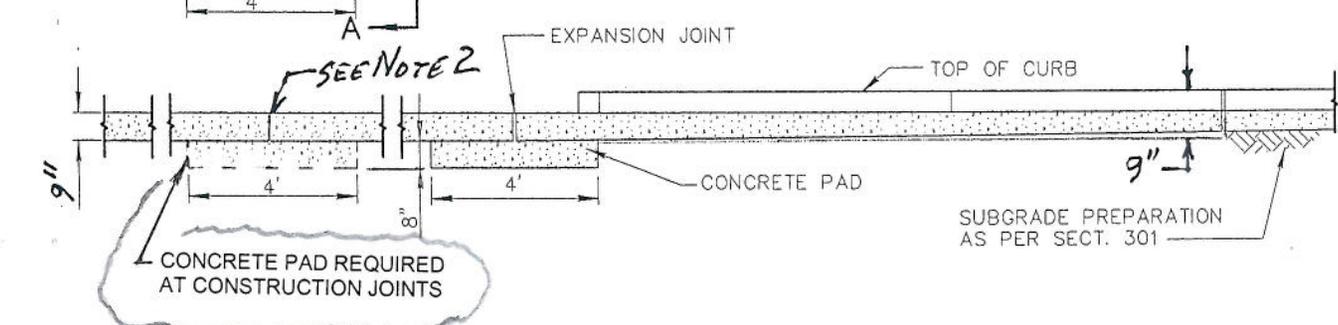
TABLE 725-2	
Adjustment in Concrete Unit Price Based on Cylinder Testing	
Percent of Specified Minimum 28-day Compressive Strength Attained (Nearest 1%)	Percent of Concrete Unit Price Allowed
<i>100 % or greater</i>	<i>100</i>
<i>95-99</i>	<i>95</i>
<i>90-94</i>	<i>90</i>
<i>85-89</i>	<i>85</i>

DRAFT



NOTES:

1. ALL CONCRETE TO BE CLASS 'A' UNLESS OTHERWISE APPROVED. (SECTION 725)
2. EITHER A CONSTRUCTION JOINT OR CONTRACTION JOINT IS REQUIRED AT THE STREET CENTERLINE.
3. A SEPARATE CONCRETE PAD IS REQUIRED AT ALL EXPANSION JOINTS AND ALL CONSTRUCTION JOINTS.
4. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
5. CONTRACTION JOINTS SHALL SEPARATE LARGE AGGREGATE BY MOVING THE AGGREGATE TO EITHER SIDE OF THE JOINT FOR A MINIMUM DEPTH OF 2½ INCHES. THE FINISHED JOINT SHALL HAVE 1/4 INCH MAXIMUM RADII AT THE TOP SURFACE AND BE A MINIMUM OF 3/4 INCHES IN DEPTH.



DETAIL NO.
240



STANDARD DETAIL
ENGLISH

VALLEY GUTTER

REVISED
01-01-2010

DETAIL NO.
240

CASE 09-08
Revised 5/12/2009



P.O. Box 52025
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DATE: March 4, 2009

TO: MAG Specifications and Details Committee Members

FROM: Peter Kandaris, SRP Representative

RE: **Request for Modifying MAG 792 "Dust Palliative"**

Purpose: Provide revisions to MAG 792 to (a) update products information based on changes in the market, (b) include submittal of compliance requirements for product data, and (c) provide more defined environmental requirements.

Rational: The existing specifications (last revised in 2000) do not give methods to objectively qualify vendors or their products. Changes are proposed so that quantitative data can be obtained and reviewed instead of just relying on vendor sales information.

Since the last time these specifications were revised there have been a number of changes in dust control materials. Additionally, other area agencies have revised their specifications to include their experiences and updated practices. It is recommended that the dust palliative specifications be updated to include the most recent improvements in product and vendor verification.

SECTION 792

DUST PALLIATIVE

792.1 GENERAL:

Dust palliatives shall consist of various chemical dust suppressants which work by binding together lighter soil particles.

All materials must meet the environmental requirements of Section 792.3 and must be approved by the Engineer prior to their use.

792.2 TYPE OF MATERIALS AND APPLICATION RATES:

Emulsions shall be miscible with water in all proportions as noted in Table 792-1. The dilution ratio will vary based upon the local soil and weather conditions. The ratios shall be proposed by the Contractor and agreed upon by the Engineer.

The rate of application noted in Table 792-1 shall be for the treatment, method and use specified by the Contracting Agency, or as directed by the Engineer. To compensate for local conditions, the Contractor may adjust the application rate within the ranges specified.

Products specifically formulated as tackifiers which prevent wind-blown erosion shall not be acceptable as dust palliatives for vehicular traffic, but may be used for their intended purposes.

TABLE 792-1				
DUST PALLIATIVE DILUTION RATIOS AND APPLICATION RATES				
Product Type	Use/Treatment ⁽¹⁾	Dilution Ratio ⁽²⁾		Application Rate ⁽³⁾ (gal/sy) [l/m ²]
		Range	Typical	
Acrylic Copolymer and Polymer	Topical - Road or parking Lot	20:1 to 4:1	9:1	0.20 to 0.10
	Topical - Road Shoulder	20:1 to 4:1	15:1	0.16 to 0.09
	Surface Course (per inch of depth)	20:1 to 4:1	9:1	0.10 to 0.06
Petroleum Resin Emulsified	Topical - Road or parking Lot	4:1	4:1	0.15 to 0.10
	Topical - Road Shoulder	10:1 to 7:1	8:1	0.15 to 0.07
	Surface Course (per inch of depth)	4:1	4:1	0.11 to 0.07
Lignin-Based Type (Lignosulfonate)	Topical - Road or parking Lot	1:1	1:1	0.10 to 0.05
	Topical - Road Shoulder	7:1 to 4:1	4:1	0.05 to 0.03
	Surface Course (per inch of depth)	1:1	1:1	0.30 to 0.10
Organic Resin	Topical - All	10:1 to 2:1	5:1	0.25 to 0.15
	Surface Course (per inch of depth)	2:1 to 1:1	1:1	0.15 to 0.10
Other	As approved by the Engineer			

Based on input from product vendors, the values for polymers needed to be adjusted. Also, the market is now broadened to both polymers and copolymers. Changes are intended to keep up with changes in products.

0.20 to 0.15
0.16 to 0.12
0.08 to 0.06

Paragraph included to insure testing and product compliance are performed, with the responsibility on the contractor.

Contractor shall submit with the bid proof of conformance in the form of test reports to verify that the dust palliative product proposed for use meets the minimum material requirements specified in this section. Testing must be specific to the proposed product and not generic to similar type palliative products. Testing shall be performed by independent AASHTO accredited laboratories, and signed and sealed by Professional Engineers registered in the State of Arizona. The Contractor is responsible for any costs associated with the testing of soil and palliative product prior to the application of as specified herein.

- (1) Topical application rates shown are to obtain 1/2 to 1 inch penetration. Higher rates should be used if greater penetration is anticipated.
- (2) The dilution ratio (water:product) is variable and shall be appropriate for the local soil and weather conditions, as proposed by the Contractor and agreed upon by the Engineer.
- (3) Application rate of undiluted concentrate.

(A) Acrylic Copolymer Types: _____ and Polymer

The material shall be a white or clear emulsion that can penetrate, saturate and bond together treated soils to create a hard, dust-free and water resistant surface. The material shall have the following properties in its undiluted state:

SECTION 792

Specification Designation	ASTM Test Method	Requirements
Composition	–	Acrylics, acrylates & acetates
pH	E 70	4.0 - 9.5
Residue (active solids content), %	D 244	40 min.
Flash Point, °F	D 92	None
Absolute Viscosity (Brookfield), cP, 77 °F.	–	1500 max.
Specific Gravity, 60/60 °F.	D 1298	1.00 - 1.15

(B) Petroleum Resin Emulsified Types:

The materials shall be a light yellow petroleum resinous emulsion suitable for use as an agglomerate for soil particles. The material shall have the following properties in its undiluted emulsified state:

Specification Designation	ASTM Test Method	Requirements
Kinematic Viscosity, SFS at 77 °F.	D 244	15 min.
pH	E 70	4.0 - 7.0
Residue, % wt. (1)	D 244	64±4
Sieve Test, % wt. Retained (2)	D 244	0.1 max.
Particle Charge Test	D 244	Positive
Flash Point of base product, CO, °F.	D 92	400 °F. min.
Specific Gravity of base product, 60/60°F.	D 1298	1.00 to 1.04

(A) ASTM test modified by heating 50 g of sample to 300 °F. until foaming ceases, then cooling immediately and calculation results.

(B) Replace 2% sodium oleate solution with distilled water in test.

The emulsion shall be stable, i.e., should not break when stored in clean closed containers at temperatures between 35°F. and 200 °F. for a minimum of 3 months. The sequestering agents shall make the preparation stable against hard water, thus permitting dilution of the emulsion with almost all types of water. The emulsion shall be non-corrosive to metal containers. The materials shall penetrate into the soil and not form a skin at the surface or a crusted surface.

(C) Lignin-Based Types:

Lignin-based dust palliative shall be an aqueous lignosulfonates (a residual co-product of wood pulping by the sulfite process in the manufacturer of cellulose products) that dispersed readily in water to yield a stable, brown-colored solution. The material shall have the following properties in its undiluted state:

Specification Designation	ASTM Test Method	Requirements
Absolute Viscosity (Brookfield), cP, 77°F.	–	< 1,000
Residue (total solids content), %	D 244	48 min.
Lignin sulfonate content (% of solids)	D 244	60 min.
pH	E 70	5.0 - 7.0
Specific Gravity (liquid), 77/60°F.	D 1298	1.00 min.

Language from COP Aviation specification for acrylic products to quantify the binding characteristics of the product.

Acrylic Copolymer/Polymer Performance Tests: Product shall be blended at the specified stabilizer content application rate with soil that is either representative of the site soils to be treated or be a local A-7 (as determined by the Engineer) and tested in accordance with ASTM D1883. Results of treated soil must show a minimum 25% increase in CBR (California Bearing Ratio) value over the untreated soil for the acrylic copolymer/polymer product to be accepted for either topical dust suppression or soil stabilization.

Test Method: Testing shall be in accordance with ASTM D1883, as modified herein. Test reporting shall include all the information required by ASTM D1883, Section 10.0 for both treated and untreated CBR samples. In addition, the penetration vs. stress plog for each test shall be included (ASTM D1883, Fig. 2). CBR specimens, after molding, shall be left in their mold, on their sides and cured in the laboratory air for 7 days prior to being immersed in water for 96 hours and then tested for CBR. At least three CBR test specimens shall be compacted at the optimum moisture content, both treated and untreated (ASTM D698, method C), with the result reported as the average value. The surcharge weight shall be 10 pounds.

SECTION 792

(D) Organic Resinous Types:

The material shall be a tan emulsion designed specifically for dust control of unpaved roads, traffic surfaces, and road shoulders that utilizes non-petroleum based organic esters and resins combined with other additives to penetrate, bond and coat treated soils. The material shall have the following properties in its undiluted state:

Specification Designation	Test Method	ASTM	Requirements
Absolute Viscosity (Brookfield), cP, 77°F	-		50 - 200
PH	E 70		3.0 - 9.0
Residue (active solids content), %	D 244		45 min
Flash Point	D 92		None
Specific Gravity, 60/60°F	D 1298		1.00 min.

Paragraph included to insure testing and product compliance are performed, with the responsibility on the contractor.

(E) Other Types:

Other types of dust palliative may be approved for use by the Engineer. Test methods, requirements, dilution ratios and application rates shall be as specified by the manufacturer.

Contractor shall submit proof in the form of test reports and certificates to verify that the dust palliative product is in environmental compliance. Verification and certification shall be submitted to the Buyer at time of bid. The Contractor is responsible for any costs associated with the testing of soil and palliative product prior to the application of as specified herein.

792.3 ENVIRONMENTAL CRITERIA:

Products shall not contain or emit chlorinated fluorocarbons (CFS's Freon's) and shall not contain or emit volatile organic compounds (VOC's) that exceed Federal, State or Local air quality limitations.

Included to provide more defined method to insure environmental compliance (language adapted from COP Aviation specification).

Products and their degradation products shall not be composed of elements, compounds, mixtures or produce runoffs with the characteristics identified under Arizona Revised Statutes 36-2822 of the Arizona Hazardous Waste Management Act, emit or off-gas during placement, use or degradation of any hazardous air pollutant listed under Section 112 of the Federal Clean Air Act [42 U.S.C. § 7412], be a hazardous chemical substance or mixture pursuant to Section 7 of the Federal Toxic Substances Control Act [15 U.S.C. § 2606], be designated by rule an extremely hazardous chemical substance pursuant to the Arizona Environmental Quality Act, produce runoffs that contain concentrations exceeding the parameters designated in Section 2.18 Table 5 of the National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit for Industrial Activities (see Note A), be prohibited for use by the Arizona Department of Environmental Quality, the Environmental Protection Agency, or any applicable law, rule or regulation.

Product runoff and their degradation product runoffs shall not contain concentrations that exceed the parameters designated in Section 2.18 'Table 5' of the National Pollution Discharge Elimination System (NPDES) Multi-Sector General Permit for Industrial Activities (see Note A). Adequate proof can be shown by providing one of the following:

- A. Complete aquatic toxicity test for lethal concentration at 50% (LC50).
- B. Provide complete and accurate listing of all individual chemical constituents (including proprietary chemical information) and percentage of each in a given volume of pure chemical product.
- C. Surface water runoff test. This test involves running distilled water over a treated soil area, collecting the test water, and submitting to a certified lab for analysis.

Products or their components and degradation products shall be tested and certified by the manufacturer not to be substances or composed of substances known to be, or reasonably anticipated to be carcinogenic or toxic by the U.S. Department of Health and Human Services.

Products must have hazardous Materials Identification System (HMIS) ratings equal to or less than the following for each category: H=1; F=1; R=1; PPE=X.

Contractor shall obtain from the dust palliative product manufacturer independent verification and certification of performance and environmental claims by a recognized agency of the United States or Canadian Precertification or Environmental Technology Verification programs for chemical dust suppressants.

Note A: Parameter benchmark values shall be provided by the Engineer and based on the Contracting Agency's requirements.

End of Section



*P.O. Box 52025
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(602) 236-5900*

DATE: May 6, 2009

TO: MAG Specifications and Details Committee Members

FROM: Peter Kandaris, SRP Representative

RE: **Request for Modifying MAG 230 “Dust Palliative Application”**

Purpose: Provide revisions to MAG 230 to include a product verification process, applicator compliance verification, update of distributor equipment requirements, field quality control measurements, remedies for deficient work, and warranty of work.

Rational: The existing specification (last revised in 2000) does not provide methods to measure and verify that the quantity and quality of dust control products delivered and applied at the site are in conformance with the bid materials. Also, the existing specification does not provide remedies for deficient work or warranty of the work. Changes are proposed to provide better field tools to manage the work and insure compliance.

Since the last time these specifications were revised there have been a number of changes in dust control materials. Additionally, other area agencies have revised their specifications to include their experiences and updated practices. It is recommended that the dust palliative specifications be updated to include the most recent improvements in application and vendor verification.

SECTION 230

DUST PALLIATIVE APPLICATION

230.1 DESCRIPTION:

This section shall govern the application of dust control palliatives (agents) on unpaved roads, traffic surfaces, vacant lots, construction sites and road shoulders. Dust palliatives may also be used to protect erosion of slopes, embankments, sediment control and re-vegetated areas.

Dust palliatives may be applied as topical treatments to penetrate an undisturbed surface, or may be applied to larger areas using mixing methods that blend the product with surface material and then compact the mixture to provide a stabilized, dust resistant, surface course.

230.2 MATERIALS:

Materials to be used as dust palliatives shall conform to the requirements of Section 792. The specific dust palliative to be used shall be as shown on the plans or as directed by the Engineer.

Water used for diluting dust palliatives and for pre-wetting of treated subgrade shall be either potable or from a source compatible with dust palliative ingredients.

230.2.1 Product Verification :

The Contractor, in the presence of the Engineer or his designee, shall obtain samples of the bulk, undiluted liquid dust palliative/stabilizer product as it is delivered to the job site. Samples shall be taken from each bulk tanker that delivers the liquid dust palliative/stabilizer for product verification testing purposes. If the bulk undiluted liquid dust palliative/stabilizer is delivered in containers, a sample must be taken from each container delivered to the job site. The Engineer will select the exact locations and times of sampling. The obtained liquid dust palliative/stabilizer samples will be split in three equal portions (minimum 2 ounce each), whereby the Contractor may retain one sealed portion for verification testing, and the Engineer will retain two sealed portions. One portion of the Agency's samples will be provided to an AASHTO accredited test lab chosen by the Contractor. The other sample will be held for backup until the testing is completed. Sample containers will be labeled and sealed under the supervision of the Engineer.

The accredited lab will test the product in accordance with ASTM D2834 to confirm that the liquid dust palliative/stabilizer meets the Agency.

If the test reports indicate that the minimum acceptable active solids content value as specified in Section 792.2 is not met, the quality of the liquid dust palliative/stabilizer product shall be deemed deficient by the Engineer. The delivery and application of a deficient product shall be stopped, and the Agency will make no additional orders or award future bids to a supplier of a deficient product.

The Contractor may perform additional verification testing on the split samples. In case of dispute where the verification tests produce different results by the Contractor than the Engineer, the Engineer will hire a different independent AASHTO accredited testing laboratory to perform a third round of testing. Such testing and the results of the testing shall be considered final by both the Engineer and Contractor for verification.

230.3 COMPLIANCE:

At least two weeks prior to the start of work, the Contractor shall provide the Engineer the following Applicator qualifications: (a) Information showing that the Applicator shall has at least three years of experience within the last five years serving as either a primary contractor or subcontractor in delivering and applying dust palliative/stabilizer product services, (b) A minimum 3 local references (including company/organization name, contact person and telephone number) to demonstrates that the Applicator is familiar with local environmental and permitting requirements associated with soil stabilization and dust palliative, and (c) Copy of the Applicator's of State of Arizona Registrar of Contractors License.

At least two weeks prior to the start of work, the Contractor shall provide the Engineer the proposed application methods and equipment for the project. The information provided shall include: (a) curing time for each application method required for the project, (b) application and dilution rates proposed for the project, and (c) equipment to be used during all phases of application that are in conformance with Section 230.4.

Prior to the commencement of any work, the Contractor shall provide copies of all required environmental/dust control permits, any required notices of intent, and the current Material Safety Data Sheet (MSDS) for the dust palliative/stabilizer product. The MSDS must include all chemical compounds present in concentrations greater than 0.1% for dust palliative/stabilizer product.

~~230.3~~ EQUIPMENT:

~~230.4~~

The Contractor shall provide all equipment necessary to complete the work. The equipment may include but not be limited to motorized graders, distribution trucks, mixing and pulverizing equipment, pneumatic-tired rollers, sprinkler systems, etc. All equipment used for this work is subject to approval by the Engineer. Equipment that does not perform satisfactorily shall be removed from the job.

which fails to provide an acceptable application of properly diluted dust palliative/stabilizer product or

and replaced with acceptable equipment meeting the requirement of this specification.

~~Distributor trucks shall be pressure type with a computer-controlled applicator. Spray bars and extensions on distribution trucks shall be of the full circulating type. The spray bar shall be adjustable to permit varying height above the surface to be treated.~~

Repeated in 230.6. Move to 230.6 to combine similar concepts in the same place.

~~230.4~~ PREPARATION OF SURFACE:

~~230.5~~

All surface preparation shall be in conformance with Maricopa County Rule 310 and 310.01 as applicable.

Distributor trucks shall be in accordance with ADOT Section 404-3.02. Distributor trucks shall be designed, equipped, maintained and operated so that dust palliative/stabilizer product may be applied uniformly on variable widths of surface up to 16 feet at readily determined and controlled rates from 0.03 to 1.0 gallons per square yard, with uniform pressure, and with an allowable transverse variation from any specified rate not to exceed 10% or 0.02 gallon per square yard, whichever is less. The maintenance and calibration of this vehicle shall be checked periodically. The record of maintenance and calibration shall be submitted to the Engineer for review upon request.

⁵ 230.4.1 Topical Preparation: Prior to the application of the dust palliative, the surface shall be graded to provide drainage.

~~Unless otherwise stated in the manufacturer's technical data, all areas to receive the dust palliative shall be uniformly moistened. Moisture must be maintained on the surface until the time of the application. Dust palliatives shall not be applied when the surface is excessively wet or saturated.~~

Distributor trucks proposed for use shall have been tested within 6 months from the date of spreading to determine the rate of the transverse spread. If requested, the contractor shall furnish the Engineer with evidence that the transverse spread of the distributor truck, when the trucks were approved for use, was as uniform as practicable and under no condition was there a variance on any of the test pads greater than the allowable transverse variation; however, the Engineer may require that each distributor truck be tested to determine the rate of the transverse spread. The rate of the transverse spread shall be determined in accordance with the requirements of Arizona Test Method 411.

⁵ 230.4.2 Surface Course Preparation: Areas to receive dust palliative shall be graded and scarified to at least the minimum depth and width shown on the plans. The material shall be damp at time of scarification to reduce dust and aid in pulverization. Soil clods shall be pulverized until all material, exclusive of gravel or stone, will pass a ~~1 1/2~~ ² inch sieve.

From vendors: Pre-moistening for topical application may result in poor product performance and cause dilution. Vendors suggest deleting this requirement.

All debris, weeds, organic material, stone larger than 4 inches, etc. shall be removed from the site. Surface gravel or stones shall be removed or thoroughly mixed with the surrounding soils to obtain a homogeneous mixture.

The soil shall be scarified/loosened by tilling, disking, ripping, or by other soil preparation methods, which achieves uniform results to the minimum depth shown on the plans

If pre-wetting is required, ample amount of water shall be added and mixed with the in-place material to obtain a moisture content near optimum. This moisture content shall be established prior to and maintained until the application of the dust palliative. The methods to establish and maintain the moisture shall be done in accordance with manufacturer's recommendations. The moisture must be uniformly distributed throughout the surface course and over the underlying undisturbed soil. Dust palliatives shall not be applied when the soil is excessively wet or saturated. Moisture content shall be determined in accordance with either ASTM ~~D-2922~~, D ~~3017~~ or D 4944.

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SECTION 230

230.6

~~230.5~~ APPLICATION:

~~6~~
230.5.1 General: The dust palliative shall be applied by a pressure type distributor truck. Spray bars and extensions shall be of the full circulating type. Valves which control the flow from nozzles shall be of a positive active design so as to provide a uniform, unbroken spread of dust palliative on the surface.

Corners or surface that cannot be accessed by the distributor truck shall be hand sprayed by means of hoses or bars pressurized by a gear pump or air tanks.

~~The distributor shall be equipped with certified meter or weight tickets and calibration charts relating to the specific gravity of the concentrate and/or dilution to provide for accurate, rapid determination and control of the amount of dust palliative being applied. The spreading equipment shall be designed so that uniform application of a dust palliative can be applied in controlled amounts ranging from 0.05 to 2.00 gallons per square yard.~~

The dust palliative shall be applied at the ~~dilution ratio and application rate~~ specified in accordance with Section 792, unless otherwise directed by the Engineer. Products may be applied in multiple passes at reduced application rates to meet the total application rate specified and/or assure uniform coverage.

~~6~~
230.5.2 Topical Application: Topical applications shall be rolled only when recommended by the manufacturer. Complete penetration of palliative will be required prior to the surface rolling. Complete penetration occurs when the compaction equipment will not track or pick up the dust palliative and/or the top layer of the surface material.

~~6~~
230.5.3 Surface Course Application: Mixing shall be done in-place using mixing equipment or by motorized grader (blade mixing). The blending methods utilized shall result in a uniformly treated mixture of soil and dust palliative at or near optimum moisture content (minus any post-compaction dust palliative top coat application quantity). The dilution ratio may be adjusted to bring the mixture to the desired moisture content. The amount of area treated each day shall be limited to that which the Contractor can thoroughly mix and compact within that work day.

Complete penetration of palliative will be required prior to compaction. Complete penetration occurs when the compaction equipment will not track or pick up the blended material.

The blended material shall be shaped to the required grade line and cross section shown on the plans and be compacted at least 95% of maximum density in accordance with ASTM D 698, unless otherwise directed by the Engineer. The final surface shall be rolled to a smooth and even grade. Immediately after the compaction, a top coat of dust palliative shall be applied.

230.7
~~230.6~~ CURING:

No equipment or traffic will be permitted on the treated surface for 24 hours unless otherwise approved by the Engineer.

230.8
230.7 WEATHER CONDITIONS:

~~Dust palliatives shall be applied only when the ambient temperature is above 40 °F and there is no possibility of rainfall during or within 24 hours after placement. Application during high wind should be avoided.~~

Moved from 230.4:

vehicle equipped with a power unit for the pump, full circulation spray bars adjustable laterally and vertically, and computer controls. The distribution vehicle shall be calibrated to ensure a controlled application method.

Paragraph reworded to update to current equipment and practices:

Distributor equipment shall be equipped with a tachometer and pressure gauge. To provide for accurate, rapid determination and control of the amount of dust palliative being applied, distributor equipment shall include one or more of the following: accurate volume measuring devices, a calibrated tank, and/or a certified meter or weight tickets and calibration charts relating to the specific gravity of the concentrate and/or dilution.

Last sentence moved to 230.4

The Contractor shall dilute the dust palliative product as needed, with the dilution ratio adjusted within the ranges specified in Section 792, to bring the mixture to the desired moisture content.

The stabilization product shall be applied, incorporated and thoroughly blended into the soil until the homogeneous mixture is obtained to the full depth of treatment

Sufficient grading shall be done to provide reasonable drainage within the limits of existing drainage patterns.

Once cured, the dust palliative final coat shall form a skin at the surface or a crusted surface.

Changes per vendor recommendations:

Dust palliative/stabilizer product shall be applied only when the ambient temperature is above 50°F. Application should be avoided during high wind or when there is the chance of rain within the next 8 hours. The Contractor shall be responsible to retreat at no additional cost if the application is degraded by weather within the first 24-hours of placement.

230.9 QUALITY CONTROL

The Contractor must provide manufacture-trained personnel for on-site technical assistance during initial delivery and application. This technical assistance is to assure that the dust palliative/stabilizer product is applied to proper dilution ratios and application rates on various soil, and subgrade types for optimum results.

At the start of each work day, the bulk tanker will be measured to verify the gallons of liquid dust palliative/stabilizer product brought to the job site. At the end of the day, the bulk tanker will be measured to verify the gallons of liquid dust palliative/stabilizer product remaining at the job site. The distributor truck shall be inspected to insure it is empty at the end of the day. The total gallons of liquid dust palliative/stabilizer product used for the day will be established by the start and end of day measurements of the bulk tanker.

A daily "Gallon Use Report" will be filled out by the distributor truck driver. The report will also identify the size of area treated for the day. It will be verified and signed by the Engineer or his designee. This report will be used to verify application rate and total product used. If the report indicates that the minimum application rate was not achieved, the work shall be deemed deficient by the Engineer.

230.10 DEFICIENCIES AND WARRANTY

If applied product active solids content is found deficient per Section 230.2.1, the Engineer may allow the Contractor to apply to any surfaces already treated by the deficient product additional topical coats of a different approved liquid dust palliative/stabilizer product to remedy the deficiency. Otherwise, the Contractor shall be required to repeat all work as directed by the Engineer with a different approved liquid dust palliative/stabilizer product. The Contractor shall bear the cost of all remediation work for deficient product.

If the application rate as determined by the methods described in Section 230.9 is found to be deficient, the Contractor shall apply additional product within 24-hours of the original application to bring the total application rate to at least the minimum specified amount. If liquid dust palliative/stabilizer product was used as a soil stabilizer per Section 230.6.3, at the discretion of the Engineer, the Contractor shall re-scarify the stabilized section to its full depth and re-apply product at the original application rate, discounting the stabilizing value of any product previously applied. The Contractor shall bear the cost of all remediation work for deficient application rate.

Application of the dust palliative/stabilizer product placed in accordance with this Section shall provide a stabilized surface, as defined herein and in accordance with the application methods described in Subsection 230.6, for a minimum of 12 months from substantial completion (warranty period). For purpose of this work, a "skin" on the surface will be a formation of any palliative on the surface of the soil that can be dislodged from the soil by winds. Any formation of the palliative on the soil surface must adhere to the underlying soil to a depth of 1/8th inch when applied topically.

Contractor shall provide and install the product free of charge if the finished project fails to meet the performance requirement and specification/criteria outlined under this technical specification. The Contractor shall provide additional applications when within five working days of notification from the Engineer of performance failure. Payment will only be made upon satisfactory performance determined by the Engineer.

230.11

~~230.8~~ MEASUREMENT:

Dust palliative surface course application shall be measured by the square yard [meter], in place, treated, compacted, to the proper depth and accepted.

Dust palliative materials will be measured by the ton of undiluted material. Any conversion from volumetric quantities shall be done with Contractor-supplied calibration charts relating to the specific gravity of the concentrate and/or dilution.

230.12

~~230.9~~ PAYMENT:

Payment will be made for the applicable items at the Contract unit prices bid in the proposal, and shall constitute full compensation for the item completed, as herein described and specified.

End of Section



MARICOPA COUNTY
Department of Transportation

MEMORANDUM

Date: May 12, 2009
To: MAG Specifications and Details Committee
From: Robert Herz, MCDOT Representative
Subject: Miscellaneous Bloopers Case 09-__

PURPOSE: Correct typographical errors.

REVISION: Change the table reference shown in the last paragraph of section 321.10.4 prior to Table 321-6 from Table 321-2 to Table 321-6 as indicated below.

If the pavement thickness deficiency is greater than 0.25 inches and the contracting agency is the owner, Table 321-6 will apply.

Deleted: 321-2

Table with 2 columns: Specified Mat Thickness, Reduction in Payment or Corrective Action. Rows include thickness ranges from less than 1.5 inches to 3.00 inches and over with corresponding reduction percentages.

321.10.5 Density: 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.