

February 24, 2009

TO: Members of the MAG Specifications and Details Committee

FROM: Robert Herz, Maricopa County DOT, Chairman

SUBJECT: MEETING NOTIFICATION AND TRANSMITTAL OF AGENDA

Wednesday, March 4, 2009 at 1:30 p.m.
MAG Office, Second Floor, Cholla Room
302 North First Avenue, Phoenix

The meeting of the MAG Specifications and Details Committee will be held at the place and time indicated above. The agenda for the meeting is provided below. **Please park in the garage under the building. Bring your ticket to the meeting, parking will be validated. For those using transit, the Regional Public Transportation Authority will provide transit tickets for your trip. For those using bicycles, please lock your bicycle in the bike rack in the garage.** Please call me at (602) 506-4760 if you have questions about the upcoming meeting.

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AGENDA

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

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

February 4, 2009

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

AGENCY MEMBERS

Jim Badowich, Avondale	Gordon Haws, Mesa
* Steven Borst, 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
Jim Cerracchio for	* Rodney Ramos, Scottsdale
Tom Kaczmarowski, Glendale	* Loren Kelley, Surprise
Troy Tobiasson, Goodyear	Tom Wilhite, Tempe
Bob Herz, MCDOT	

ADVISORY MEMBERS

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

MAG ADMINISTRATIVE STAFF

Gordon Tyus

* Members not attending or represented by proxy.

GUESTS/VISITORS

Bill Lieware, Jima Environmental
Cristi Graca, Jima Environmental
Doug Berg, Contech Construction Products

1. Call to Order

Chairman, Bob Herz, called the meeting to order at 1:36 p.m.

2. Approval of Minutes

The members reviewed the January 7, 2009 meeting minutes. Jesse Gonzalez introduced a motion to accept the minutes as written. Jim Badowich 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. The committee discussed various aspects of the case including allowing an option to mill or sawcut pavement edges, the use of various controlled low strength material backfills in trenches, increasing the remnant removal piece from 24 to 48 inches, and revising wording in note 7 of proposed Detail 200-1 to better define longitudinal trenches. Committee members are requested to continue reviewing the case and provide comments as soon as possible so that this case can be resolved this year.

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. Bob Herz provided revised requirements for dome-to-dome spacing in radial installations from 1.6 inches to 0.65 inches to be in compliance with national standards. Committee members are requested to review the proposal and return with comments for the next meeting.

b. **Case 09-02 – Modifying Acceptable Vacuum Relief Valve Vendors, Section 630.6:** Jami Erickson presented a case to include A.R.I. as an additional approved vendor for vacuum relief valves since many agencies presently use their products. The committee discussed option in lieu of adding vendors to the list, including creation of a performance specification, identifying specific product provided by A.R.I. as acceptable, or modifying the standard to delete all direct vendor names and reference the agency's approved products list. Jami said she would revise the case based on these recommendations and return with modifications at next month's meeting.

c. **Case 09-03 – Addition of Geosynthetic Specifications to the MAG Standards:** Peter Kandarlis presented a case to create a new geosynthetic material Section 796, modify Section 322 to include interlayer fabric for asphalt concrete overlays, modify Sections 220 and 703 to incorporate Maricopa County Supplemental Specification Section 224 for filter fabric, and create a new geogrid application Section 306. Jim Carusone noted that Section 322 will probably be incorporated into Section 321 later this year, but that the proposed fabric interlayer addition could be included with that addition. Bob Herz suggested that the case be separated into multiple cases since there are substantial changes proposed. Committee members are requested to review the proposal and return with comments for the next meeting.

5. General Discussion:

Troy Tobiasson noted that he would be proposing a new case at the next meeting for modifications to Sections 615 and 745 relating to PVC pipe.

John Ashley provided an update of the case list developed last year by the supplements subcommittee to show progress in supplement reduction work. It was noted that last year's case work had resulted in a reduction in supplements. John requested each agency to review their supplements and provide feedback to better document these reductions.

Jeff Benedict and Jim Carusone inquired on the committee's interest in providing a new case for blending recycled asphalt pavement (RAP) into new pavement hot mixes. The group suggested that a case may be premature. It was recommended that industry representatives contact individual agencies to test the use for specific projects and develop a history of successful product application prior to proposing a new standard.

Jim Carusone asked the committee if there was interest in the use of recycled concrete as base course material. He noted that a number of test cases have shown improved base performance over time from unhydrated latent cement in the recycled product. After discussion the committee agreed that Jim should provide more technical information to the group along recommended guidelines for use. As with RAP, it was recommended that test cases be documented with individual agencies to develop a use history.

6. Adjournment:

The meeting was adjourned at 2:49 p.m.

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		
						Yes	No	Abstain
08-10	Detail 200 and Sections 336 and 601 – Trench backfill and pavement Replacement	SRP	Peter Kandaris	2/06/2008 4/02/2008		0	0	0
09-01	Modification to Section 340.2.1 Detectable Warnings	MCDOT	Bob Herz	01/07/2009		0	0	0
09-02	Revisions to Section 630.6 – Update list of Air Release and Vacuum Valves	Phoenix	Jamie Erickson	02/04/2009		0	0	0
09-03	Geosynthetic Specifications (Note: May be broken down into multiple cases.)	SRP	Peter Kandaris	02/04/2009		0	0	0
						0	0	0
						0	0	0
						0	0	0
						0	0	0
						0	0	0
						0	0	0
						0	0	0

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

TAPPING SLEEVES, VALVES AND VALVE BOXES ON WATER LINES

630.6 AIR RELEASE AND VACUUM VALVES:

Valve assemblies shall be furnished and installed where shown and as detailed on the drawings.

(A) Air release on water mains shall be controlled by the use of an air release valve assembly, or size and type as shown on the plans. Air release valves shall be of the flanged or screwed type as shown and shall be similar and equal to Apco, Crispin, A.R.I. or Simplex.

(B) Vacuum and Air Relief when called for on the plans shall be controlled by a vacuum relief valve on the air release valve noted above and the valves shall be of the same manufacture or may be a combination air and vacuum valve assembly similar and equal to Apco, Crispin, A.R.I. or Simplex.



P.O. Box 52025
Phoenix, AZ 85072-2025
(602) 236-5900

Case No. 09-03

DATE: February 4, 2009
TO: MAG Specifications and Details Committee Members
FROM: Peter Kandaris, SRP Representative *PK*
RE: **Geosynthetic Specifications to the MAG Standards**

Purpose: Provide material and application specifications for various geosynthetic fabrics, grids and membranes. Current MAG documents include no geosynthetic fabric specifications. But agencies are presently including these materials in public works projects. Maricopa County includes geosynthetic filter fabric requirements within their supplemental specifications for riprap construction (Section 224). City of Chandler references separation fabric in their Detail C-509. Other agencies either call out a specific vendor product on job-specific plans/specifications, or define the product properties within a project's special provisions. Specifically, research of public documents shows that during the past two years, the cities of Avondale, Mesa, Phoenix, Scottsdale and Peoria have awarded projects using various geosynthetic fabrics, grids and membranes.

Rational: New materials and design methods are expected to increase the use of geosynthetic fabrics and grids. These include separation fabrics needed with pervious concrete pavements and base stabilization grids to reduce aggregate base thickness or replace chemically stabilized subgrades. Having MAG standards will also increase competition between various vendors and their products and reduce the need for proprietary product acceptance. This case will also eliminate an agency supplemental specification (Maricopa County Supplemental Specification Section 224).

Proposed Changes:

1. Create a new materials specification (MAG 796) that specifies geosynthetics for pavements, base and subgrade reinforcement, erosion protection, filtration and separation. This section is primarily based on ADOT Standard Specification 1014 and includes fabric material requirements of Maricopa County Supplemental Specification Section 224.
2. Modify MAG 322 "Asphalt Concrete Overlay" to include pavement fabric installation specifications.
3. Modify MAG 220 "Riprap Construction" to incorporate the installation specification in Maricopa County Supplemental Specification Section 224.
4. Modify MAG 703 "Riprap" to incorporate the riprap material requirements of Maricopa County Supplemental Specification Section 224.
5. Create a new installation specification (MAG 306) for base and subgrade reinforcement geosynthetics, also called geogrids. This section is primarily based on ADOT Standard Specification 306 and manufacturer's recommended updates.

cc: D. Berg (Contech)

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 to be placed as an interlayer beneath a pavement overlay or between pavement layers 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: Fabric for use in subsurface drainage or as a permeable separator 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 fabric for use below all areas to receive aggregate or rip-rap rock slope protection 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: Geosynthetics (geogrids) used for improving the stability of weak soils or reinforcing aggregate bases shall be a network of integrally connected polymer tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil, aggregate, or other fill materials. 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.

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.

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

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 removed 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:

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

Before placing asphalt concrete overlay, severely raveted 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. Raveted 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.

If used, a pavement fabric interlayer shall be shown on the plans or specified in the special provisions.

322.4 PAVEMENT FABRIC INTERLAYER:

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

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 nor 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 with the heat banded side up onto the asphaltic binder 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, on-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:

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

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 PLAN 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 stones shall be placed in the toe trench, foundation courses, 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 lies at least a 3" joint bearing on the underlying stones. Bearing on smaller stones used to check voids will not be acceptable. Interstices between stones shall be checked with small stones and spalls. The finished surface shall be even and tight and shall not vary from the planned surface by more than 3/4 inches per foot of depth.

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

220.5 GROUDED 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 of aggregate. The portland cement shall be Type II as specified in Section 7.25 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 spalling and blooming. 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 grade. The first course shall be a double row of stretchers laid in nearly horizontal 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 delay in placing succeeding layers of the hanging of work by stream, 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 dry light 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

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. Allowable tolerance from the slope lines and grades shown for the finished riprap surfaces shall not exceed a distance equal to 0.67 x D₅₀ above or 0.33 x D₅₀ below the design surfaces. Special care shall be exercised in placing riprap within 3 feet of structures to avoid damage to such structures.

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 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 geosynthetic fabrics as described in Section 796 may be used in the cross-section to provide separation, filtration or drainage; however, no structural contribution shall be attributed to the geosynthetic materials other than the specified geogrid.

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 should 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.

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.

Paving platform found deficient shall be removed and replaced.