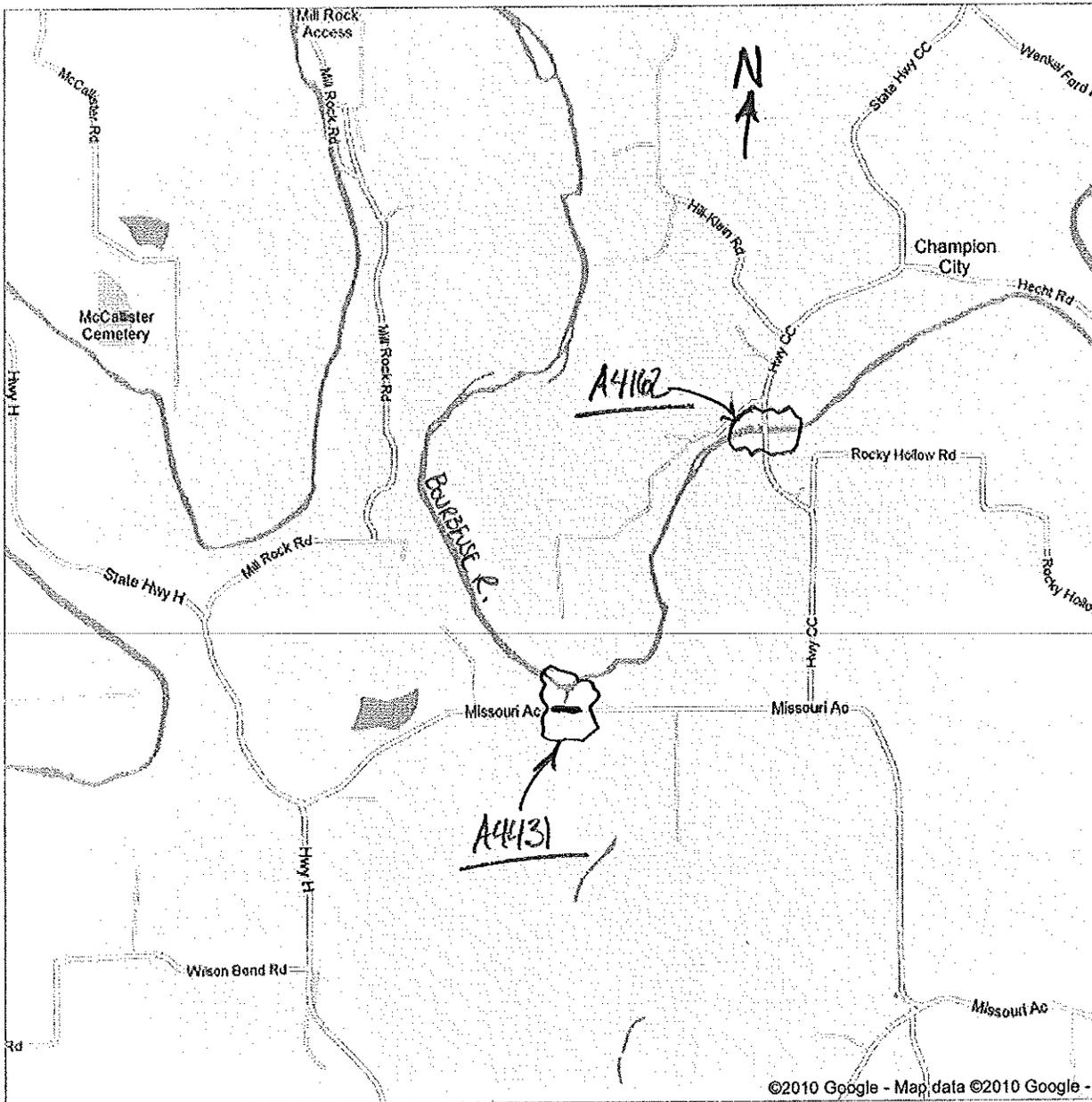
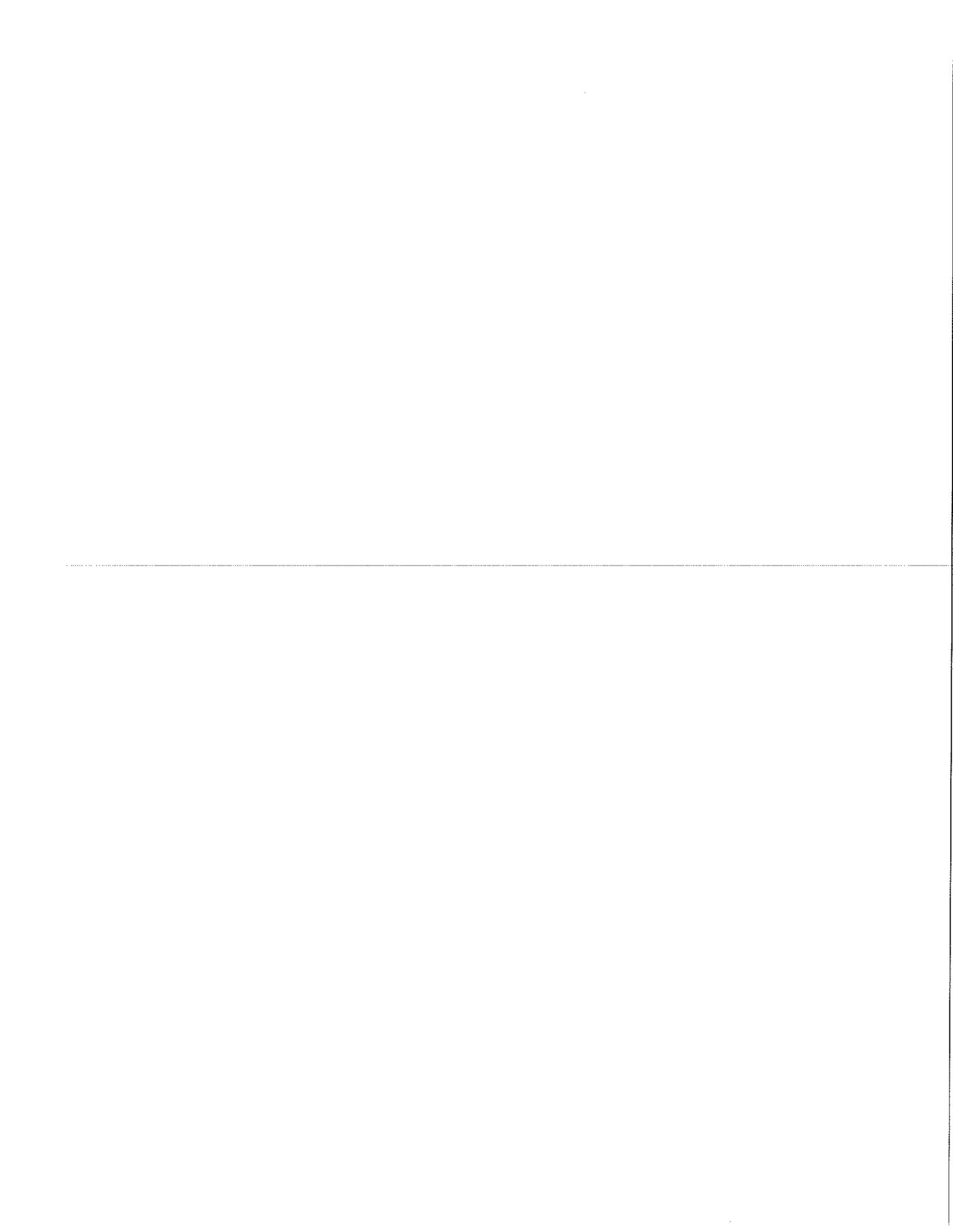


Google maps

Notes Bridges A4162 & A4431
Franklin County
South of Gerald, MO



⇒ APPROXIMATELY 2 MILES BETWEEN BRIDGES



SECTION 413.30 ULTRATHIN BONDED ASPHALT WEARING SURFACE

413.30.1 Description. This work shall consist of producing and placing an ultrathin bonded asphalt wearing surface.

413.30.2 Material. All material shall be in accordance with Division 1000, Material Details, and specifically as follows, except as modified herein:

Item	Section
Coarse Aggregate	1002.2
Fine Aggregate	1002.3
Mineral Filler	1002.4

413.30.2.1 Coarse Aggregate. Coarse aggregate may consist of crushed gravel, limestone, dolomite, porphyry, steel slag, flint chat, or blends of two or more of these aggregates will be acceptable. When coarse aggregate for these mixes are from more than one source or of more than one type of material, the coarse aggregate shall be proportioned and blended to provide a uniform mixture. Coarse aggregate shall be material predominantly retained above the No. 4 (4.75 mm) sieve and shall be in accordance with the following requirements:

Coarse Aggregate Modified Requirements			
Test	Method	Min	Max
Los Angeles Abrasion Value, % Loss ^a	AASHTO T 96		35
Soundness, % Loss, Sodium Sulfate ^a	AASHTO T 104		12
Flat & Elongated Ratio, % @ 3:1 ^b	ASTM D 4791		25
% Crushed, single face ^b	ASTM D 5821	95	
% Crushed, two faces ^b	ASTM D 5821	85	
Micro-Deval, % loss ^a	AASHTO TP 58		18

^aTests shall be determined on each individual ledge basis.

^bTested on the coarse portion of the blended aggregate

413.30.2.2 Fine Aggregate. Fine aggregate shall be material predominantly passing the No. 4 (4.75 mm) sieve and shall be in accordance with the following requirements:

Fine Aggregate Modified Requirements			
Tests	Method	Min	Max
Sand Equivalent ^a	AASHTO T 176	45	
Methylene Blue ^a	AASHTO TP 57		10
Uncompacted Void Content ^a	AASHTO T 304	40	

^aTested on the fine portion of the blended aggregate

413.30.2.3 Asphalt Binder. The asphalt binder shall be in accordance with Sec 1015, including all subsections pertaining to PG70-22.

413.30.2.4 Polymer Modified Emulsion Membrane. The emulsion shall be polymer modified and shall be in accordance with Sec. 1015.

413.30.3 Job Mix Formula. At least 30 days prior to placing any mixture on the project, the contractor shall submit a mix design to Construction and Materials for approval. Representative samples from each ingredient for the mix shall be submitted with the mix design.

413.30.3.1 Proficiency Sample Program. Laboratories that participate in and achieve a score of three or greater in the AASHTO proficiency sample program for T 11, T 27, T 84, T 85, T 166, T 176, T 209, T 304 (ASTM C 1252), T 308 and T 312 will have the mixture verification process waived. The mix design shall be submitted to Construction and Materials for approval at least seven days prior to mixture production.

413.30.3.2 Required Information. The mix design shall include raw data from the design process and contain the following information:

- (a) Source, grade and specific gravity of asphalt binder.
- (b) Source, type (formation, etc.), ledge number if applicable, and gradation of the aggregate.
- (c) Bulk and apparent specific gravities and absorption of each aggregate fraction in accordance with AASHTO T 85 for coarse aggregate and AASHTO T 84 for fine aggregate including all raw data.
- (d) Specific gravity of hydrated lime, mineral filler or baghouse fines, if used, in accordance with AASHTO T 100.
- (e) Percentage of each aggregate component.

- (f) Combined gradation of the job mix.
- (g) Percent asphalt binder, by weight (mass), based on the total mixture.
- (h) Theoretical maximum specific gravity (G_{mm}^{25}) as determined by AASHTO T 209, in accordance with Sec 403.19.3.1, after the sample has been short term aged in accordance with AASHTO R 30.
- (i) The tensile strength ratio as determined by AASHTO T 283 including all raw data.
- (j) Mixing temperature and gyratory molding temperature.
- (k) Bulk specific gravity (G_{sb}) of the combined aggregate.
- (l) Percent chert contained in each aggregate fraction.
- (m) Percent deleterious contained in each aggregate fraction.
- (n) Blended aggregate properties for clay content, angularity, and thin and elongated particles.
- (o) Draindown for mixture.
- (p) Film thickness for mixture

413.30.4 Composition of Mixture.

413.30.4.1 Asphalt Amount. The amount of asphalt binder in the mixture shall meet the following limits for the type of mixture specified in the contract.

Mix Design Criteria			
	Type A	Type B	Type C
Asphalt Content, %	5.0 – 5.8	4.8 – 5.6	4.6 – 5.6

413.30.4.2 Gradation. Prior to mixing with asphalt binder, the combined aggregate gradation, including filler if needed, shall meet the following gradation for the type of mixture specified in the contract.

Mix Design Criteria			
Composition by Weight (Mass) Percentages			
Stieves	Type A % Passing	Type B % Passing	Type C % Passing
3/4 in. (19.0 mm)			100
1/2 in. (12.5 mm)		100	75 – 100
3/8 in. (9.5 mm)	100	75 – 100	50 – 80
No. 4 (4.75 mm)	40 – 55	25 – 38	25 – 38
No. 8 (2.36 mm)	22 – 32	19 – 27	19 – 27
No. 16 (1.18 mm)	15 – 25	15 – 23	15 – 23
No. 30 (600 μ m)	18 max.	10 – 18	10 – 18
No. 50 (300 μ m)	13 max.	8 – 13	8 – 13
No. 100 (150 μ m)	10 max.	6 – 10	6 – 10
No. 200 (75 μ m)	4.0 – 6.0	4.0 – 6.0	4.0 – 6.0

413.30.4.3 Film Thickness. The film thickness shall be a minimum 9.0 microns when calculated using the effective asphalt content in conjunction with the surface area for the aggregate in the Job Mix Formula. The surface area factors can be found in Table 6.1 of the Asphalt Institute MS-2, *Mix Design Methods for Asphalt Concrete and Other Hot Mix Types*, Sixth Edition.

413.30.4.4 Non-Carbonate Aggregate Requirement. Mixtures containing limestone coarse aggregate shall contain a minimum amount of non-carbonate aggregate as shown in the table below, or the aggregate blend shall have an acid-insoluble residue (A.I.R.), MoDOT Test Method TM 76, meeting the plus No. 4 (4.75 mm) sieve criteria of crushed non-carbonate material. Non-carbonate aggregate shall have an A.I.R. of at least 85 percent insoluble residue.

Coarse Aggregate (+ No. 4)	Minimum Non-Carbonate by Volume
Limestone	30% Plus No. 4
Dolomite	No Requirement

413.30.4.5 Drain Down. Drain down from the loose mixture shall not exceed 0.10 percent when tested in accordance with AASHTO T 305.

413.30.4.6 Moisture Susceptibility. The mixture shall have a tensile strength ratio (TSR) of 80 percent or greater when compacted to 95mm (3.7 inches) with 7 +/- 0.5 percent air voids and tested in accordance with AASHTO T 283.**413.30.4.7 Reclaimed Material.** The mixture shall not contain reclaimed material.

413.30.5 Construction Requirements.

413.30.5.1 Weather Limitations. A damp pavement surface may be acceptable for placement if free of standing water and favorable weather conditions are expected to follow. Mix shall not be placed if the air temperature or the temperature of the surface on which the mixture is to be placed is below 50 F (10 C), the surface is wet or frozen, or weather conditions prevent the proper handling or finishing of the mixture. Temperatures shall be obtained in accordance with MoDOT Test Method TM 20.

413.30.5.2 Paver. The paver shall be capable of spraying the polymer modified asphalt emulsion membrane, applying the hot mix asphalt overlay and leveling the surface of the mat in one pass. Wheels or other parts of the paving machine shall not come in contact with the polymer modified emulsion membrane before the hot mix asphalt concrete wearing course is applied. The screed shall have the ability to crown the pavement at the center and shall have vertically adjusted extensions to accommodate the desired pavement profile.

413.30.5.3 Surface Preparation. Immediately prior to placing the ultrathin bonded asphalt wearing surface, the roadway surface shall be thoroughly cleaned of all vegetation, loose material, dirt, mud and other objectionable material. All non-working surface cracks with an opening size exceeding 1/4 inch (6 mm) and any size working crack shall be sealed prior to placement of the ultrathin bonded asphalt wearing surface. Immediately prior to spraying the polymer modified emulsion membrane, the surface shall be free of fresh bituminous mix. The ultrathin bonded asphalt wearing surface shall not be placed until the sealant has cured. Curing time of sealant shall be in accordance with the manufacturer's recommendations.

413.30.5.4 Application of Membrane. The polymer modified emulsion membrane application shall be applied in accordance with the manufacturer's recommendations. The sprayer shall accurately and continuously monitor the rate of spray and shall provide a uniform application across the entire width to be overlaid.

413.30.5.4.1 Adjusting Membrane Rate. The engineer may make adjustments to the spray rate based on the existing pavement surface conditions and the recommendations of the polymer modified emulsion membrane manufacturer.

413.30.5.4.2 Application Rate of Membrane. Limits of the target application rate of the asphalt emulsion shall be 0.20 ± 0.07 gallon per square yard (0.9 ± 0.3 L/m²).

413.30.5.5 Application of Mixture. The hot mix asphalt concrete shall be applied at a temperature of 290 to 330 F (143 - 166 C) and shall be spread over the polymer modified emulsion membrane immediately after application of the polymer modified emulsion. The hot asphalt concrete wearing course shall be placed over the full width of the polymer modified emulsion membrane with a heated vibratory-tamping bar screed.

413.30.5.5.1 Handwork. For handwork, the hot mix asphalt shall be applied within five minutes after the application of the polymer modified emulsion.

413.30.5.5.2 Application Rate of Mixture. The target application rate of the ultrathin bonded asphalt wearing course shall be as shown on the plans. The application rate shall be adjusted to minimize fracturing of the top size aggregate by the screed. The engineer will determine the acceptable extent of fracturing at the edges for tapering purposes.

413.30.5.6 Rolling. Rolling of the wearing course shall consist of no more than three passes immediately following placement of the ultrathin bonded asphalt wearing course with a steel, double-drum, asphalt roller with a minimum weight of 10 tons (9 Mg). All rolling shall be completed before the material temperature has fallen below 195 F (91 C). Rollers shall be equipped with a functioning water system and scrapers to prevent adhesion of the fresh mix onto the roller drums. An acceptable release agent approved by the engineer may be added to the water system to prevent adhesion of the fresh mix to the roller drum and wheels. Rolling shall be done in the static mode. Excessive rolling to the extent of aggregate degradation will not be permitted. The engineer will determine the acceptable extent of fracturing at the edge of the pavement from the rolling operation. New pavement shall not be opened to traffic nor shall any roller sit idle on the pavement until the rolling operation is complete and the material has been cooled below 140 F (70 C).

413.30.5.7 Bituminous Mixing Plants. Bituminous mixing plants and preparation of materials and mixtures shall be in accordance with Sec 404.

413.30.5.8 Hauling Equipment. Trucks used for hauling bituminous mixtures shall be in accordance with Sec 404.

413.30.5.9 Wearing Course. The finished wearing course shall have a minimum thickness of 1/2 inch (13 mm) for Type A, 5/8 inch (16 mm) for Type B, and 3/4 inch (19 mm) for Type C.

413.30.5.10 Pavement Marking. Pavement marking shall be replaced in accordance with Sec 620.

413.30.5.11 Acceptance. Acceptance will be based on test results indicating that the ultrathin bonded asphalt wearing surface meets the specification requirements, the contractor following the approved QC Plan, and favorable comparison of the contractor's QC test and the engineer's QA test.

413.30.6 Quality Control.

413.30.6.1 Quality Control Operations. Quality control shall be conducted in accordance with Sec 403.17, except as follows.

413.30.6.1.1 Aggregate Gradation. Sieve analysis shall be performed for every 600 tons (600 Mg) of mixture produced. Test shall be performed in accordance with AASHTO T 27 from randomly sampled material taken from the composite cold feed belt or the hot bins.

413.30.6.1.2 Asphalt Content. The asphalt binder content shall be determined for each 600 tons (600 Mg) of mixture produced. Test shall be performed in accordance with AASHTO T 287 or AASHTO T 308. Samples for determination of the asphalt binder content shall be retrieved from the hot elevator at the asphalt plant or from the transport truck at the plant by random sampling.

413.30.6.1.3 Deleterious Content. Deleterious content shall be determined for every 600 tons (600 Mg) of mixture produced. Test shall be performed in accordance with MoDOT Test Method TM 71 from randomly sampled material taken from the composite cold feed belt.

413.30.6.2 Gradation and Asphalt Binder Tolerances. The total aggregate gradation and asphalt content shall be within the range specified in Sec 413.30. 4.2 and the maximum variations from the approved job mix formula shall be within the following tolerances:

Gradation and Asphalt Binder Tolerances			
Sieves	Percent Passing		
	Type A	Type B	Type C
3/4 in. (19.0 mm)	-	-	-
1/2 in. (12.5 mm)	-	-	± 5.0
3/8 in. (9.5 mm)	-	± 5.0	-
No. 4 (4.75 mm)	± 5.0	± 4.0	± 4.0
No. 8 (2.36 mm)	± 4.0	± 4.0	± 4.0
No. 16 (1.18 mm)	± 4.0	-	-
No. 200 (75 µm)	± 1.0	± 1.0	± 1.0
Asphalt Content, %	± 0.3	± 0.3	± 0.3

413.30.6.3 Deleterious Content Tolerance. The deleterious content of the material retained on the No. 4 sieve shall not exceed the limits specified in Sec 1002.2.

413.30.6.4. Verifying Membrane Rate. The application rate of the polymer emulsion membrane shall be verified by dividing the volume of polymer modified emulsion membrane used by the area of paving for that day.

413.30.6.5 Mix Adjustments. The contractor may make field adjustments to the job mix formula as noted herein. The adjusted job mix formula shall be in accordance with the mix design requirements of Sec 413.30.4. The engineer shall be notified prior to making any change in the cold feed settings, the hot bin settings or the binder content. No additional fractions of material or new material will be permitted for field adjustments.

413.30. 6.6 Defective Areas. The contractor shall remove and replace defective areas at the contractor's expense with material meeting specification requirements as directed by the engineer.

413.30.7 Quality Assurance. Quality assurance will be conducted in accordance with Sec 403 except as follows.

413.30.7.1 Sampling Frequency. Corrective action shall be taken by the contractor if any QA tests are outside the QC tolerances shown in Sec 413.30.6.2. The engineer will, at a minimum, independently sample and test at the following frequency:

Sample	Frequency
Aggregate Gradation	1 per day
Asphalt Binder Content	1 per day
Deleterious Content	1 per day

413.30.7.2 Testing Retain Samples. The engineer will test, at a minimum, one retained QC gradation sample and one retained QC asphalt binder content sample per calendar week. The engineer's test results, including all raw data, will be made available to the contractor by the next working day.

413.30.7.2.1 Aggregate Comparison. A favorable aggregate comparison will be achieved when test results are within the specified tolerances shown in Sec 403.18.2.

413.30.7.2.2 Asphalt Content Comparison. A favorable asphalt content will be achieved when test results are within 0.3 percent.

413.30.8 Method of Measurement. Final measurement of the completed surface will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. Where required, measurement of ultrathin bonded asphalt wearing surface, complete in place, will be made to the nearest square yard (m^2). The revision or correction will be computed and added to or deducted from the contract quantity.

413.30.9 Basis of Payment. The accepted quantity of ultrathin bonded asphalt wearing surface will be paid for at the contract unit price.

SECTION 413.40 BITUMINOUS FOG SEALING

413.40.1 Description. This work shall consist of furnishing diluted asphalt emulsion and preparing and sealing surfaces by means of a bituminous distributor.

413.40.2 Material. Asphalt emulsion grades SS-1, SS-1H, CSS-1, or CSS-1H shall be in accordance with Sec 1015 and shall be used unless otherwise directed by the engineer.

413.40.3 Equipment. The distributor shall be designed, equipped, maintained and operated such that liquid asphalt at even heat may be applied uniformly on variable widths of surface up to 15 feet (4.5 m) at readily determined and controlled rates from 0.02 to 1.00 gallon per square yard (0.1 to $4.6 L/m^2$), with uniform pressure, and with an allowable variation from any specified rate not to exceed 0.02 gallon per square yard ($0.1 L/m^2$). The distributor equipment shall include a tachometer, pressure gauges, a calibrated tank and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and with full circulation spray bars adjustable both laterally and vertically. The calibration of all distributors shall be approved by the engineer prior to use, and the contractor shall furnish all equipment, material and assistance necessary if calibration will be required.

413.40.4 Construction Requirements.

413.40.4.1 Asphalt emulsion shall be applied only during weather conditions under which satisfactory application and curing can be obtained. Asphalt emulsion shall not be placed on a damp or wet surface except as approved by the engineer. The surface shall be free of objectionable material prior to sealing.



SECTION 622

PAVEMENT AND BRIDGE SURFACE REMOVAL AND TEXTURING

622.1 Description. This work shall consist of removing or texturing the surface of existing pavement and bridge decks as shown on the plans. The term "pavement" as used in Sec 622 will be considered reference to the paved portion of the highway within the limits of construction, including bridge decks.

622.2 Construction Requirements.

622.2.1 The pavement surface shall be removed or textured to the depth, width, grade and cross slope shown on the plans or as directed by the engineer.

622.2.2 Unless specified otherwise in the contract, the contractor shall accept full ownership of all material generated by removal or texturing operations and shall indemnify the Commission of responsibility for and pay all costs relating to generation, handling, storage, treatment, transportation, disposal, or any future use of the material.

622.2.3 Depth transitions at the beginning and end of a project, side roads, bridge ends or other locations shown on the plans shall be milled by using equipment and a process approved by the engineer. The equipment will not be required to have an automatic grade leveling and slope control device or a means of removing and discharging millings from the pavement, unless specified otherwise. Any necessary pavement marking in the transition areas shall be as directed by the engineer and at the contractor's expense.

622.2.4 The contractor shall provide signing informing motorists of coldmilled areas open to traffic, at the contractors expense. The contractor may use static signs, changeable message signs, or a combination thereof to provide this warning. Signing shall be deployed in advance of an exit from the mainline prior to the milled area to allow motorists an opportunity to take an alternate route. Signing shall also be placed on any ramps leading into the milled area. If an alternate route cannot be provided, deployment of the signs shall be located in advance of the milled area to allow motorists to safely negotiate the section of milled pavement. Sign locations shall be approved by the engineer prior to installation. Signing shall be in accordance with Sec 616. Sign layout for static signs shall be as shown in the standard plans. Changeable message signs shall be programmed as directed by the engineer.

SECTION 622.10 COLD MILLING EXISTING PAVEMENT FOR REMOVAL OF SURFACE

622.10.1 Description. This work shall consist of coldmilling the existing pavement surface to the depth, profile and cross slope shown on the plans and removing and disposing of the milled material.

622.10.2 Equipment.

622.10.2.1 The equipment for milling and removing the pavement surface shall be capable of removing a thickness of bituminous or concrete material to the specified depth and providing a uniform profile and cross slope.

622.10.2.2 The equipment shall be capable of accurately and automatically establishing profile grades within 1/8 inch (3 mm) of each edge of the machine. The milling equipment shall be regulated by an automatically controlled grade leveling and slope control device. The device shall provide control for producing a uniform surface to the established grade and a cross slope in accordance with the typical section. The device shall also be equipped with the necessary controls to permit the operator to adjust or vary the slope as directed by the engineer.

622.10.2.3 The equipment shall have provisions for controlling dust and other particulate matter created by the cutting action. The equipment shall also have an effective means of removing cuttings from the pavement and discharging them into a hauling unit, all in one operation, as the pavement is milled.

622.10.3 Construction Requirements.

622.10.3.1 In the event the milled surface begins to ravel under traffic or other problems resulting from the milling occur, restrictions on the amount of time that a milled area may be left open will be determined by the engineer.

622.10.3.2 The milling operations, except in depth transition areas, shall be regulated by an automatically controlled grade leveling and slope control device.

622.10.3.3 The roadway pavement surface shall be removed and planed around and over manholes, utility valves and drainage appurtenances within the limits of the work as directed by the engineer. Any damage to manholes, utility valves or drainage appurtenances by the removal and planing operation shall be repaired by the contractor at the contractor's expense. After removal of existing material around manholes, utility valves and other appurtenances, the contractor shall place a temporary wedge around the appurtenance. The temporary wedge shall consist of bituminous or another approved material at a slope that will allow safe transition over the appurtenance by through traffic and of a thickness and design that the material remains intact while under traffic. Bituminous wedges shall be removed prior to resurfacing.

622.10.3.4 The milled surface of each layer shall be substantially free from waves or irregularities. The final milled surface shall not vary from a 10-foot (3 m) straightedge, applied parallel to the centerline, by more than 1/4 inch (6 mm). Spalled areas presenting a hazard shall be repaired using an approved bituminous pavement. The texture of the final milled surface shall be a grid surface with discontinuous longitudinal striations.

622.10.3.5 Existing shoulder material shall be removed as necessary to ensure no ponding of water on the driving surface occurs after the milling operation.

622.10.3.6 Care shall be exercised not to damage existing concrete pavement. The concrete pavement surface may be scarified as shown on the plans or approved by the engineer.

622.10.3.7 Loose material not picked up by the milling machine shall be removed from the roadway or bridge deck surface immediately behind the milling operation, except in areas with earth or stabilized aggregate shoulders. Loose material may be swept to the shoulders as approved by the engineer.

622.10.3.8 The contractor shall provide pavement marking as shown on the plans through the limits of the milled surfaces in accordance with Sec 620.

622.10.4 Method of Measurement. Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract

quantity. Where required, measurement for removal of the existing pavement surface will be computed to the nearest square yard (m²). The correction will be added to or deducted from the contract quantity.

622.10.5 Basis of Payment. The accepted quantity of removal of existing surface will be paid for at the contract unit price for each of the pay items included in the contract. No direct payment will be made for removal of shoulder material by milling or other methods as required to provide drainage in accordance with Sec 622.10.3.5, unless shoulders are to be removed as part of the contract. No direct payment will be made for loading, hauling, stockpiling or disposing of milled material, repairing spalled areas, placing and removing temporary wedges, providing temporary pavement marking or performing other items incidental to completion of this work.

SECTION 622.20 COLD MILLING PAVEMENT FOR A DRIVING SURFACE

622.20.1 Description. This work shall consist of fine-tooth coldmilling to improve the profile, cross slope or texture of an existing pavement surface as shown on the plans or as directed by the engineer. The finished profile shall provide a smooth riding surface, free from gouges, and shall have a uniform textured appearance.

622.20.1.1 Locations may be field adjusted in length by the engineer, not to exceed 1/4 mile (0.5 km) for any one location and provided the total area for all locations is not changed, without change in payment. All specified locations shall be milled.

622.20.1.2 Contractors shall make their own conclusions concerning the quantity of material to be removed. The actual depths of milling will vary due to rut depths, drainage and profile requirements.

622.20.2 Equipment. Equipment for profiling, texturing and removing the pavement surface shall be in accordance with Sec 622.10, except as modified herein.

622.20.2.1 The minimum drum cutting width shall be 12 feet (3.6 m), unless specified otherwise in the contract.

622.20.2.2 The carbide cutting teeth shall be uniform in diameter, with a uniform length of ± 0.02 inch (± 0.5 mm). In addition, the tooth holder blocks shall be uniform and shall not vary the cutting radius of the mandrel by more than ± 0.02 inch (± 0.5 mm).

622.20.2.3 Removing millings from the pavement and discharging the millings into a hauling unit may be individual operations.

622.20.3 Construction Requirements.

622.20.3.1 Removal of material for rut removal shall be to the approximate depth of the bottom of the wheel rut in the lane being milled. The bottom of the rut shall be textured, but only minimal material removed. Milling shall be done in an approximate lane width, but may start to the right of the centerline in the approximate left wheelpath, extending into the shoulder to allow drainage, leaving the existing centerline marking in place.

622.20.3.2 Removal of material for surface texturing shall be done for the full lane width, to the depth needed in order to texture all of the described areas.

622.20.3.3 After the proper combination of mandrel speed and forward speed have been established to produce the required texture, the daily operation shall be uniform and

continuous for other than repair or emergency operations. The milling machine shall not be halted to load or unload trucks, or to take on water.

622.20.3.4 The entire surface shall be textured, substantially free from waves or irregularities, and shall not vary from a 10-foot (3 m) straightedge, applied parallel to the centerline, by more than 1/8 inch (3 mm). There may be occasional exceptions where the bottom of a wheelpath may not be textured in order to maintain an acceptable profile. Spalled areas shall be repaired using an approved bituminous patching material.

622.20.3.5 The texture produced for the finished pavement shall be a uniform surface with longitudinal striations. There shall be a maximum lateral distance of 0.2 inch (5 mm) between adjacent longitudinal striation mark lines. The longitudinal distance from the center of a strike mark to the center of the next successive strike mark in line shall not exceed 5 inches (125 mm). The longitudinal successive strike marks shall approximate a continuous grooved line. The difference between the high and low of the surface texture shall be approximately 1/16 inch (2 mm).

622.20.3.6 The pavement surface shall be removed and milled around and over appurtenances, such as manholes, utility valves and drainage features, within the limits of the work as directed by the engineer. Any damage to appurtenances by the milling and removal operation shall be repaired by the contractor at the contractor's expense. The final milled pavement surface shall be smoothly transitioned at all appurtenances located in the pavement to maintain an acceptable profile.

622.20.3.7 Material adjacent to the lane being milled shall be removed as necessary to provide a smooth transition and to ensure no ponding of water on the driving surface after the milling operation. There will be no pay for additional milling width beyond lane width as required for drainage. Removal in the traffic lanes shall be with the same equipment, providing the same texture. Removal of shoulder material may be with other milling equipment meeting the engineer's approval.

622.20.3.8 Loose material not picked up by the milling machine shall be removed from the roadway immediately behind the milling operation. In areas with earth or aggregate shoulders, the loose material may be swept to the shoulders when approved by the engineer. If required by the engineer, the finished surface shall be wetted just prior to returning to traffic to reduce traffic visibility problems due to dust.

622.20.3.9 Obliterated edgelines next to a shoulder will not be required to be replaced by the contractor, unless specified in the contract. Any other pavement marking removed by the contractor's operations shall be replaced with temporary pavement marking in accordance with Sec 620, except when permanent pavement marking is specified in the contract. Prior to installation of permanent pavement marking, all joints and cracks shall be cleaned and sealed with hot-poured, elastic type concrete joint sealer in accordance with Sec 1057.

622.20.4 Method of Measurement. The roadway lane width will be assumed for computing milling quantities. Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in contract quantity. Where required, measurement for coldmilling of the existing pavement surface will be computed to the nearest square yard (m²). The corrections will be added to or deducted from the contract quantity.

622.20.5 Basis of Payment. The accepted quantity of coldmilling of existing pavement surface will be paid for at the contract unit price for each of the pay items included in the contract. No direct payment will be made for loading, hauling, stockpiling or disposing of milled material, repairing spalled areas, temporary pavement marking or other items incidental to completion of the work.

SECTION 622.30 DIAMOND GRINDING OF EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

622.30.1 Description. This work shall consist of grinding concrete pavement to provide good riding characteristics, a surface texture and proper drainage. The finished surface shall be as shown on the plans or as directed by the engineer.

622.30.2 Equipment. The equipment shall be of a size that will grind a strip at least 3 feet (1 m) wide using diamond blades, and shall not cause spalls at cracks, joints or other locations.

622.30.3 Construction Requirements.

622.30.3.1 The construction operation shall be scheduled and proceed in a manner that produces a uniform finished surface. Auxiliary or ramp lane grinding shall transition from the edge of the mainline as required to provide drainage and an acceptable riding surface. Grinding of bridge decks will not be permitted unless specified in the contract.

622.30.3.2 Pavement undersealing or pavement repair, if required, shall be completed prior to any grinding.

622.30.3.3 Grinding shall be accomplished in a manner that eliminates joint or crack faults and provides lateral drainage by maintaining a constant cross slope between grinding extremities in each lane. A maximum tolerance of 1/16 inch (2 mm) will be allowed for adjacent sides of joints and cracks, except that under no circumstances shall the grinding depth exceed 3/4 inch (20 mm) from the top of the original surface. When grinding across faulted joints, a minimum of a 20-foot (6 m) transition onto the approach side slab shall be used.

622.30.3.4 The cross slope of the pavement shall be as shown on the plans and shall have no depressions or misalignment of slope greater than 1/4 inch in 12 feet (2 mm/m) when measured with a 12-foot (3.6 m) straightedge placed perpendicular to the centerline. Areas of deviation shall be reground. Straightedge requirements will not apply across longitudinal joints or outside the ground area.

622.30.3.5 As soon as practical after grinding, the surface will be straightedged longitudinally and all variations exceeding 1/8 inch in 10 feet (1 mm/m) will be plainly marked. Areas of deviation shall be reground.

622.30.3.6 Substantially all of the pavement surface shall be textured. Extra depth grinding to eliminate minor depressions in order to provide texturing on 100 percent of the pavement surface will not be required. No unground surface area between passes will be permitted.

622.30.3.7 The grinding process shall produce a final pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. The line-type texture shall contain parallel longitudinal corrugations that present a narrow ridge corduroy-type appearance. The peaks of the ridges shall be approximately 1/32 inch (0.8 mm) higher than the bottoms of the grooves. The grooves shall be evenly spaced. There shall be approximately 50-55 grooves per foot (164-180 grooves/m), measured perpendicular to the centerline.

622.30.3.8 The contractor shall remove and dispose of all residue from the grinding in a manner and at a location to satisfy environmental regulations. The contractor shall have the engineer's approval for the method of spreading and disposal of the residue prior to beginning any grinding operations.

622.30.3.8.1 Solid residue shall be removed from the pavement surface before any residue is blown by traffic action or wind.

622.30.3.8.2 Residue shall not be permitted to encroach on open lanes.

622.30.3.8.3 The residue shall not enter into gutters or closed drainage systems. Suitable means to restrict the infiltration of the residue into a closed drainage system shall be provided.

622.30.3.8.4 The contractor may disperse residue onto unpaved shoulders, adjacent roadside embankments, or median ditch areas of divided highways where the residue runoff can percolate into the soil, unless specified otherwise in the contract. The spread rate shall not generate surface runoff. If surface runoff occurs at a grinding location, the contractor shall haul the residue to an approved location at the contractor's expense.

622.30.3.8.5 Discharge of any residue runoff shall not flow into adjacent rivers, streams, lakes, ponds or other open bodies of water.

622.30.3.8.6 Residue shall not be spread within 100 feet (30 m) of any streams, lakes or other open bodies of water, or within 15 feet (5 m) of a water filled ditch.

622.30.3.8.7 The contractor shall use appropriate equipment and methods so the discharging of the residue does not cause erosion of soil or damage to established vegetation along the roadway. The contractor shall repair and reseed any areas where the discharge of grinding residue causes damage to roadway slopes or vegetated areas at the contractor's expense.

622.30.3.8.8 If the solids concentration of discharged residue at any particular area is determined to be excessive by the engineer, the contractor shall provide equipment and material to flush the areas with water as directed by the engineer, at the contractor's expense.

622.30.3.8.9 Obliterated edgelines next to a shoulder will not be required to be replaced by the contractor unless specified in the contract. Any centerline or lane line markings removed by the contractor's operations shall be replaced with temporary pavement marking material in accordance with Sec 620, unless permanent pavement marking material is specified in the contract. Prior to installation of permanent pavement marking material, all joints and cracks shall be cleaned and sealed if specified in the contract.

622.30.4 Smoothness Requirements.

622.30.4.1 An initial profile index of representative portions of the pavement will be available through the project contact person upon written request. After the contract is awarded, the initial profile index will be available from the engineer. This information represents a summary of conditions found to exist at the time the survey was made. The availability of this information will not constitute a guarantee that a profile other than that indicated will not be encountered at the time of grinding. This information is provided only to give the contractor an idea of the condition of the pavement in regard to smoothness when bidding on this work. The contractor assumes the risk of error if the information is used for any purpose other than the intended purpose. The Commission makes no representation as to the accuracy of the initial profile index, since the accuracy of the profile index is limited by the number of profiles taken. Any assumption the contractor makes from this data will be at the contractor's risk, none are intended by the Commission.

622.30.4.2 Prior to performing any grinding work, the contractor shall provide a control profilograph trace in accordance with Sec 502. This control trace will be used to identify the required smoothness for the project. Each segment of the finished ground surface shall have a final profile index of 35 percent of the control profilograph trace or 30 inches per mile

(45 mm/km), whichever is greater, and shall not include any bumps exceeding 0.5 inch in 25 feet (13 mm in 8 m). Depressed pavement areas due to subsidence or other localized causes and areas where the maximum cut at mid panel or a fault restricts further grinding, will be excluded from testing with the profilograph when approved by the engineer.

622.30.4.3 Profilograph testing shall end 15 feet (5 m) prior to excluded areas and shall resume 15 feet (5 m) following excluded areas.

622.30.4.4 The ground surface shall be tested and evaluated in accordance with Sec 502, with the following modifications:

(a) The test shall be run and the profilogram shall be evaluated using the same procedure as for the control trace.

(b) Each segment for which continuous grinding is designated will be evaluated individually, and shall meet the smoothness and bump requirements in accordance with Sec 622.30.4, regardless of the segment's length. The engineer may require removal of unbroken fins at the contractor's expense.

(c) In excluded areas, smoothness requirements will be modified or may be waived by the engineer.

(d) The engineer may test for smoothness and bumps near the center line and at other spot locations where compliance is questionable. Additional grinding may be required. The provisions under Sec 502.8.6 will not apply.

(e) The original and final profilograph traces shall not be used to determine grinding depth.

622.30.5 Method of Measurement. Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. Where required, measurement will be made to the nearest square yard (m^2). Measurement will be based upon the full pavement lane width. No deduction will be made for gaps within the pavement lane to avoid striping, raised pavement markers, manholes or other structures.

622.30.6 Basis of Payment. The accepted quantity of ground pavement surface will be paid for at the contract unit price for diamond grinding concrete pavement. Payment will be considered full compensation for all labor, equipment, material and incidentals to complete this work, including hauling and disposal of grinding residue.

SECTION 622.40 DIAMOND GRINDING OF NEW PORTLAND CEMENT CONCRETE PAVEMENT

622.40.1 Description. This work shall consist of grinding new Portland cement concrete pavement to provide good riding characteristics and surface texture. The finished surface shall be as shown on the plans.

622.40.2 Equipment. The grinding equipment shall be in accordance with Sec 622.30.2.

622.40.3 Construction Requirements.

622.40.3.1 Paving. When diamond grinding is used as the final texturing for new Portland cement concrete pavement, concrete paving shall be in accordance with Sec 502, except as follows. All joints shall be protected to prevent grinding residue from entering. Joints to be

diamond ground shall be cleaned and sealed in accordance with Sec 502 after diamond grinding is completed.

622.40.3.2 Smoothness Requirements.

622.40.3.2.1 No diamond grinding shall be done until the pavement has attained a strength sufficient to be opened to all types of traffic, and no sooner than twenty one days after being placed. All diamond grinding shall be completed on any section prior to opening that section to other than construction traffic, unless approved by the engineer.

622.40.3.2.2 The final pavement surface from the grinding process shall be in accordance with Sec 622.30.3.7. All grooves and adjacent passes shall be parallel to each other and the roadway, with no variation. Adjacent passes shall completely lap with no unground surface between, however, they shall not overlap more than 1 1/2 inches (35 mm). Adjacent passes shall be within 1/8 inch (10 mm) of the same height as measured with a 3-foot (914 mm) straightedge. No less than 98 percent of the specified surface shall be textured by grinding. There shall be no ridge between lanes. Any remaining ridges on the outside edge next to the shoulder greater than 1/8 inch (10 mm) high shall be feathered out to the satisfaction of the engineer in a separate operation.

622.40.3.2.3 Any deficiencies in the final surface due to improper contractor operations or equipment shall be corrected by the contractor, at the contractor's expense.

622.40.3.2.4 The contractor shall remove and dispose of all residue from grinding operations in accordance with Sec 622.30.3.8.

622.40.4 Basis of Payment. No direct payment for diamond grinding new concrete pavement will be made. Diamond grinding new concrete pavement will be considered as part of the work paid for under the contract unit price for Portland concrete pavement in accordance with Sec 502.



SECTION 616

TEMPORARY TRAFFIC CONTROL

616.1 Description. This work shall consist of furnishing, installing, operating, maintaining, cleaning, relocating and removing temporary traffic control devices and equipment, and the removal and relocation or covering and uncovering of existing signs and other traffic control devices in accordance with the contract documents or as directed by the engineer. For purposes of this specification, the work zone will be defined as the area between the first and last temporary traffic control device as shown on the plans for the work being performed.

616.2 Material. All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Section
Temporary Traffic Control Devices	1063

616.3 Safety Requirements.

616.3.1 All workers within highway right of way who are exposed to traffic or construction equipment shall wear high-visibility safety apparel meeting Class 2 or Class 3 requirements of ANSI/ISEA 107-2004 publication entitled, "American National Standard for High-Visibility Safety Apparel and Headwear".

616.3.2 All traffic control devices shall be in accordance with the MUTCD and any applicable safety and design codes.

616.3.3 The contractor shall furnish a manufacturer's certification of crashworthiness, per NCHRP 350 Evaluation Criteria, for FHWA Category 1 traffic control devices and appurtenances. The contractor shall furnish the FHWA acceptance letter for FHWA Category 2 and Category 3 traffic control devices and appurtenances. The FHWA acceptance letter shall indicate that the device and appurtenance complies with the crash test requirements of NCHRP 350, Test Level 3 (TL-3). Regardless whether the device meets NCHRP 350 criteria, the engineer reserves the right of final approval. Installation of a device prior to the engineer's approval will be at the contractor's risk.

616.3.4 The contractor shall:

- (a) Designate a trained person at the project level who has the primary responsibility, with sufficient authority, for implementing the traffic management plan and other safety and mobility aspects of the project. The name of that person, proof they successfully completed MoDOT's Advanced Work Zone course, ATSSA's Traffic Control Supervisor course or an approved equivalent training course, and a 24-hour contact number for that person shall be provided to the engineer at the pre-construction meeting. Re-certification will be required as dictated by the organization providing the training.
- (b) Ensure all contractor personnel are trained in traffic control to a level commensurate with their responsibilities.

- (c) Advise the engineer, as required, at least two working days before any work requiring a lane closure begins and 14 calendar days prior to the imposition of height, width and weight restrictions.
- (d) Perform quality control of work zones to promote consistency and ensure compliance with contract documents, policies and guidelines.

616.4 Construction Requirements.

616.4.1 Performance and operational aspects of the devices shall be in accordance with the latest editions of the MUTCD and the Missouri *Quality Standards for Temporary Traffic Control Devices*.

616.4.1.1 All traffic control devices shall be removed as soon as practical when the devices are no longer needed. When work is suspended for short periods of time, traffic control devices that are no longer appropriate shall be turned away from traffic, removed or covered. All temporary traffic control devices shall be removed after the completion of construction and shall remain the property of the contractor unless specified otherwise. All permanent traffic control devices that are in conflict with temporary traffic control devices shall be covered or removed as shown on the plans or as directed by the engineer. Upon completion of the work, all permanent traffic control devices to remain in place shall be restored to original condition.

616.4.1.2 All sign covers shall meet the requirements of the MoDOT *Quality Standards for Temporary Traffic Control Devices*.

616.4.1.3 All permanent traffic control devices relocated on a temporary basis shall be moved in the timeframe designated by the engineer, and shall remain visible to the traveling public during all stages of construction. The contractor shall place temporarily relocated permanent traffic control devices in the final location when construction is complete. Damaged devices shall be replaced by the contractor at the contractor's expense.

616.4.2 The contract will indicate the minimum requirements for traffic control. With the engineer's approval, the contractor may add to the traffic control plan any temporary traffic control devices or services the contractor considers necessary to adequately protect the public and the work. Device quantities may be adjusted accordingly.

616.4.2.1 Signs and sign quantities for blasting areas will not be included in the contract traffic control plan. The contractor will be responsible for furnishing, installing, maintaining and removing blasting zone signs in accordance with the MUTCD, at the contractor's expense. Placement of blasting zone signs will be subject to approval from the engineer.

616.4.2.2 All changes to the traffic control plan resulting from contractor staging revisions, including proposed total road closures for the contractor's convenience, shall be submitted in writing to the engineer for review and acceptance prior to implementation. Device quantities may be adjusted accordingly.

616.4.2.3 If the engineer determines the need for additional traffic control devices not included in the traffic control plan, the contractor will be notified in writing to provide the additional devices. Reimbursement for authorized changes to the traffic control plan will be made in accordance with Sec 104.3, unless covered by contract unit prices.

616.4.2.4 The contractor shall monitor traffic flow through the project and verify that all traffic control devices are in place and functioning properly during both daytime and nighttime conditions, as applicable. If the contractor determines that a deficiency in any traffic control device exists, the contractor shall take corrective action. No additional payment will be made for the corrective action.

616.4.2.5 As soon as possible after observing a traffic control deficiency, the engineer will report the deficiency to the contractor, either verbally or in writing. After receiving notification, if the contractor does not make corrections within an agreed upon timeline, order records or suspension of the work may occur. Regardless of the severity of the deficiency, corrections shall be made as soon as possible to maintain a quality work zone.

616.4.2.5.1 The severity of a deficiency will be categorized as follows:

- (a) Category 1 – Presents an immediate danger to the traveling public or workers and needs to be addressed immediately.
- (b) Category 2 – The situation doesn't pose an immediate threat to either the public or the workers, but can impact the proper functioning of the work zone.
- (c) Category 3 – The situation doesn't impact the functioning of the work zone but is more of a maintenance or aesthetic issue.

616.4.2.5.2 When the engineer determines that the contractor has not made a good faith effort in correcting a deficiency as agreed upon in Sec 616.4.2.5, an order record will be issued and the contractor will be notified of the following timelines to correct the deficiency.

- (a) A Category 1 deficiency shall be corrected within one hour.
- (b) A Category 2 deficiency shall be corrected within 24 hours.
- (c) A Category 3 deficiency shall be corrected within 96 hours.

616.4.2.5.3 When the engineer determines the contractor has not made a good faith effort in complying with an order record issued in accordance with Sec 616.4.2.5.2, the following action may be taken:

- (a) A second order record will be issued.

(b) The engineer may find the contractor in violation of the contract in accordance with Sec 105.

616.4.2.5.4 For reoccurring deficiencies of similar nature within the contractor's control, the engineer may issue order records in accordance with Sec 616.4.2.5.3, bypassing Sec 616.4.2.5.2 requirements.

616.4.2.6 The contractor shall provide written notice to the engineer of any pedestrian or vehicular accident when physical evidence or other information suggests an accident has occurred in the work zone. The contractor shall obtain and provide to the engineer copies of law enforcement accident reports for any accidents in the work zone.

616.4.3 Each flagger, automated flagger assistance devices (AFAD) operator, portable flagger device (PDF) operator and pilot vehicle operator shall maintain a valid flagger certification card that certifies the individual has been trained in the principles of flagging in accordance with the MUTCD. Certifications will not be required in emergency situations that arise due to actions beyond the contractor's control when flagging is necessary to maintain safe traffic control on a temporary basis. All flagging, AFAD, PFD and pilot vehicle operations shall be in accordance with the MUTCD. Flaggers and pilot vehicles shall be provided as shown on the plans or as approved or directed by the engineer. When not specified in the plans, the contractor may use a Type B (Red/Yellow Lens) AFAD PFD or pilot vehicle to supplement the flagging operation upon approval from the engineer. When two-way traffic is maintained over a single lane, each flagger, AFAD operator, if used in tandem, and pilot vehicle operator involved in the traffic flagging operation shall be equipped with a portable, two-way, communication system approved by the engineer. When the AFED or PFD are not in use they shall be removed from the roadside.

616.4.4 Crossovers for hauling material will be permitted only at locations indicated in the traffic control plan or as authorized by the engineer. Modifications to specified locations shall be in accordance with applicable portions of Sec 104. Crossovers shall be signed in accordance with the traffic control plan. When the project has been completed, temporary crossovers shall be removed and the area restored to original condition. Existing crossovers shall be restored to original condition, including surface material.

616.5 Lighting Requirements.

616.5.1 All construction-related vehicles and equipment, except for haul trucks within paving operations, shall be equipped with a USDOT-approved warning light. Lights shall be amber in output, mounted such that the lights are visible to traffic from 360 degrees and activated while in the work zone.

616.5.2 Work zone lighting shall be provided between dusk and dawn as specified in Secs 616.5.2.1 and 616.5.2.2. Lighting systems shall be positioned such that the lighting systems do not cause glare or hot spots, i.e. concentrated areas of high lighting intensity when compared to the average, for motorists, spillover to adjacent properties or become safety concerns. When work zone lighting is required, a lighting plan shall be submitted to the engineer for review 14 days prior to the start of operations. The lighting plan shall show the areas to be illuminated, the type and layout of the lighting systems and calculations of average maintained footcandles (lux).

616.5.2.1 Work area lighting shall be provided in areas where construction equipment and labor are active. Lighting shall provide a minimum maintained intensity of 5 footcandles (54 lux).

616.5.2.2 Overhead lighting shall be provided for flaggers and other specified locations shown on the plans. Lighting in these areas shall provide a minimum maintained intensity of 0.6 footcandles (6.5 lux).

616.6 Flashing Arrow Panel. The contractor shall deploy, operate and maintain flashing arrow panels as specified on the plans for the duration of the project, in accordance with the manufacturer's recommendations, at the contractor's expense. A minimum vertical clearance of 7 feet (2.1 m) shall be maintained from the edge of pavement to the bottom of the flashing arrow panel.

616.6.1 When not in use, trailer-mounted flashing arrow panels shall be stored in accordance with Sec 107.5.

616.6.2 Control programs shall be as follows:

(a) Caution: Flash the two highest and two lowest lamps on panel simultaneously.

(b) Left or Right Arrow: Flash five lamps in the arrowhead and five lamps in the horizontal shank simultaneously.

(c) Double Arrow: Flash five lamps in both the left and right arrowheads and three lamps in the horizontal shank simultaneously.

616.7 Changeable Message Signs. The contractor shall place the changeable message sign (CMS) at the location shown on the plans or as directed by the engineer. The CMS shall not be located in the median.

616.7.1 The contractor shall deploy, operate and maintain the CMS as specified in the traffic control plan and in accordance with the manufacturer's recommendations for the duration of the project at the contractor's expense. The contractor shall program the CMS as directed by the engineer.

616.7.2 When the CMS is not in use, the message board shall be turned away from traffic. When not required for longer than a 24-hour period, the CMS shall be stored in accordance with Sec 107.5.

616.8 Work Zone Traffic Signals. Work Zone Traffic Signals (WZTS) provide one-lane, two-way temporary traffic control through the use of a temporary traffic signal or a portable traffic signal programmed for two-phase operation. WZTS shall be in accordance with the provisions of this section. Unless otherwise shown on the plans, the contractor may choose either method to fulfill the WZTS requirement.

616.8.1 The contractor shall notify the engineer at least 48 hours prior to the work zone traffic signal installation. After installation, the contractor shall receive approval from the engineer prior to activating the WZTS system. The contractor shall provide a service technician to be available for day, night and weekend trouble calls as required under test period requirements in Sec 902. The contractor shall furnish the telephone number or other contact information where the technician can be reached.

616.8.1.1 The contractor shall operate and maintain the WZTS, at the contractor's expense, as specified in the traffic control plan until two-way traffic is restored.

616.8.1.2 When the WZTS is not in use, the signal heads shall be covered to the satisfaction of the engineer.

616.8.1.3 Adequate traffic control, including flaggers, shall be provided at the contractor's expense during the startup and shutdown of the WZTS installation. If the WZTS installation becomes inoperable due to alterations, malfunctions or periods of shutdown for required maintenance when one-way traffic control is required, the contractor shall provide adequate traffic control, including flaggers, at the contractor's expense.

616.8.1.4 All signal timing and programming shall be provided by the contractor and furnished to the engineer for approval prior to use. The contractor shall ensure proper signal timing is provided for the duration of the project. The contractor shall provide the locations of the vehicle detection zones.

616.8.1.5 The WZTS and lighting system shall be removed after two-way traffic has resumed or as directed by the engineer. All equipment shall remain the property of the contractor.

616.8.1.6 Measurement of WZTS system, including lighting and traffic signals at both ends of a one-lane, two-way section, will be made per each.

616.8.2 Temporary Traffic Signals. Temporary traffic signals and lighting shall be in accordance with Sec 902.3.

616.8.3 Portable Traffic Signals. Portable traffic signals shall be in accordance with Sec 1063. The contractor shall place the portable traffic signal (PTS) units a minimum of 6 feet (2 m) beyond the edge of shoulder at the location shown on the plans or as directed by the engineer. Each unit shall be level to the satisfaction of the engineer. Each PTS shall be delineated with a minimum of five non-metallic drum-like channelizers. The PTS shall not be located in the median.

616.8.3.1 When not required for a longer than a 24-hour period, the PTS shall be stored in accordance with Sec 107.5.

616.8.3.2 The contractor shall deploy, operate and maintain the PTS in accordance with the manufacturer's recommendations. The contractor shall provide two copies of the operating manual to the engineer.

616.8.3.3 Overhead lighting with an average maintained intensity of 0.6 footcandles (6.5 lux) shall be provided and maintained at each PTS location as authorized by the engineer.

616.9 Portable Flagger Device. Portable flagger devices (PFD) shall be installed on each side of roadway per direction and in accordance with Sec 1063.9.

616.10 Method of Measurement. Measurement for relocation of post-mounted signs will be made to the nearest square foot (m^2) of sign area.

616.11 Basis of Payment. Temporary traffic control devices specified in the traffic control plan or authorized by the engineer will be paid for at the contract unit price for each of the pay items included in the contract. No direct payment will be made for the following:

(a) Incidental items necessary to complete the work, unless specifically provided as a pay item in the contract.

(b) Installing, operating, maintaining, cleaning, repairing, removing or replacing traffic control devices.

(c) Covering and uncovering existing signs and other traffic control devices.

(d) Relocating temporary traffic control devices, including permanent traffic control devices temporarily relocated, unless specifically included as a pay item in the contract.

(e) Worker apparel.

(f) Flaggers, AFADs, PFDs, pilot vehicles, and appurtenances at flagging stations.

(g) Furnishing, installing, operating, maintaining and removing construction-related vehicle and equipment lighting.

(h) Construction and removal of temporary equipment crossovers, including restoring pre-existing crossovers.

