Community Design Solutions

DOMESTIC WATER DISTRIBUTION SYSTEM

SPECIFICATIONS

Prepared by
CDS
9384 Valley View Drive NW
Suite 100
Albuquerque, New Mexico 87114

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CDS Project Number W0393.22002

Community Design Solutions

CERTIFICATION

I, Cassy McClintock, do hereby certify that this report was duly prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the state of New Mexico.

Cassy McClintock

Cassy McClintock, P.E.
NMPE No. 29490

6/20/2025

Date

CASSY L. MCCLINTOCK
NEW MEXICO
29490
PROFESSIONAL ENGINEER

Community Design Solutions

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SECTION 112

PAVING ASPHALT BINDER

112.1 GENERAL: Paving asphalt binder for asphalt concrete (AC), bituminous treated base course construction (BTB), and plant mixed seal coat (PMSC), shall conform to the requirements of this specification. The CONTRACTOR shall be solely responsible for the binder supplied under this specification, its proportions and manufacture. The binder shall be supplied from a single source/supplier and be of a single formulation for the duration of either the authorized period of a job mix formula including the binder, or the project, as directed by the ENGINEER. The CONTRACTOR shall submit his qualifications in writing, and at least three references to whom he has supplied the same or similar binder, as directed by the ENGINEER.

112.2 REFERENCES

112.2.1 American Society For Testing and Materials, ASTM

- D 5 Standard Test Method for Penetration of Bituminous Materials
- D 8 Standard Definitions of Terms Relating to Materials for Roads and Pavements
- D 92 Standard Test Method for Flash and Fire Points of Bituminous Materials
- D 113 Standard Test Method for Ductility of Bituminous Materials
- D 946 Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
- D 1754 Standard Test Method for Effect of Heat and Air on Asphaltic Materials (Thin Film Oven Test, TFOT)
- D 2042 Standard Test Method for Solubility of Bituminous Materials in Organic Solvents
- D 2171 Standard Test Method for Viscosity of Asphalt by Vacuum Capillary Viscometer
- D 2170 Standard Test Method for Kinematic Viscosity of Asphalts
- D 2872 Standard Test Method for Effect of Heat and Air on Asphaltic Materials (Rolling Thin Film Oven Test, RTFPT)
- D 3381 Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
- D 4402 Standard Test Method for Viscosity Determinations of Unfilled Asphalt Using the Brookfield Thermosel Apparatus

112.2.2 American Association of State Highway and Transportation Officials, AASHTO

- MP1 Standard Specification for Performance Graded Asphalt Binder
- MP2 Specification for Superpave™ Volumetric Mix Design
- TP1 Test Method for Determining Flexural Creep Stiffness of Asphalt Binder Using Bending Beam Rheometer (BBR)
- TP3 Test Method for Determining Fracture Properties of Asphalt Binders in Direct Tension (DT)
- TP5 Test Method for Determining Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)
- T40 Practice for Sampling Bituminous Materials
- PP1 Accelerated Aging of Asphalt Binder Using Pressure Aging Vessel (PAV)
- PP5 Laboratory Evaluation of Modified Asphalt Systems
- PP6 Grading or Verifying the Performance Grade of an Asphalt Binder
- PP-28 Superpave™ Volumetric Design for HMA

112.2.4 This Publication:

- SECTION 116 ASPHALT CONCRETE CONSTRUCTION
- SECTION 307 PLANT MIXED BITUMINOUS TREATED BASE COURSE CONSTRUCTION
- SECTION 329 PLANT MIXED SEAL COAT
- SECTION 336 ASPHALT CONCRETE PAVEMENT

112.3 MATERIAL

112.3.1 An asphalt binder shall be either an asphalt cement, a blend of asphalt cement(s), or a blend of asphalt cement(s) and admixture(s), to be determined by the CONTRACTOR, complying with the requirements specified in either TABLE 112.A 60-70 PENETRATION GRADE BINDER SPECIFICATION, or TABLE 112.B AC-20 VISCOSITY GRADE BINDER SPECIFICATION, or TABLE 112.C PERFORMANCE GRADE (PG) BINDER SPECIFICATIONS.

112.3.2 The CONTRACTOR shall submit certified test results in writing, with the job mix formula submittal, that a binder complies with the specification. The certification shall include, but not be limited to:

(a) name of the supplier
(b) source(s) of base asphalt cement(s)
(c) type and source(s) of admixture(s)
(d) proportions of materials
(e) laboratory test results of the binder
(f) certification statement that the binder complies with the requirements of this specification.

A certification shall be submitted (1) for a binder used in the design of a job mix formula as a part of the submittal, and, (2) during the life of an authorized job mix formula as scheduled herein.

112.4 SAMPLING AND TESTING

112.4.1.1 Quality assurance sampling and testing of asphalt binders shall be performed by the CONTRACTOR, at no cost to the OWNER, to verify compliance with the specification. A sample shall be taken at random during paving operations from a load(s) of material shipped as directed by the ENGINEER. The sample shall be tested by the CONTRACTOR to verify compliance with the specification requirements specified in either TABLE 112.A 60-70 PENETRATION GRADE BINDER SPECIFICATION, or TABLE 112.B AC-20 VISCOSITY GRADE BINDER SPECIFICATION, or TABLE 112.C PERFORMANCE GRADE (PG) BINDER SPECIFICATIONS. Test results shall be reported in writing to the ENGINEER by the CONTRACTOR. Non-complying sample test results shall be reported in to the ENGINEER within 24 hours of completion of the test(s). Complying sample test results shall be reported in writing to the ENGINEER, no later than ten working days after the date of sampling.

112.4.1.2 The binder sample used in the design of a job mix formula(s) shall be tested, and certified to comply with this specification. Written test results of the design sample binder tabulated with specifications with the certification of compliance shall be reported as specified herein and included in a job mix formula submittal.

112.4.2 A test report shall include, but not be limited to, (1) report date, (2) date of sampling, (3) bill of lading number of load sampled, (4) destination of load, (5) report of test results, (6) standard test identifications, (7) specification requirements, (8) statement of compliance, and certification signature. Failure to comply with quality assurance testing may result in rejection of either the binder, and/or the job mix formula, and/or the associated job mix placed on a project, as directed by the ENGINEER.

112.4.3.1 If non-complying material is identified, the paving program may be suspended for 24 hours, as directed by the ENGINEER, during which time the CONTRACTOR and the ENGINEER will meet to determine the impact of the non-compliance, and specify the necessary remedial action to be taken by the CONTRACTOR. Remedial action shall be either acceptance, or acceptance at a pay adjustment, or removal and replacement at no cost to the OWNER. The paving program may continue upon written authorization by the ENGINEER. The suspension of asphalt concrete construction period due to the identification of non complying binder shall be at no cost to the OWNER.

112.4.3.2 Production binder identified to be in non-compliance shall not be shipped to a project. Asphalt concrete batched and placed with non-complying binder shall be removed and replaced with complying material by the CONTRACTOR at no cost to the OWNER, as directed by the ENGINEER.

112.4.4.1 GRADE CORRELATION: TABLE 112.D defines binder correlation(s). A binder grade to the right of a respective binder grade in the same row may be substituted.

112.4.4.2 A job mix formula using either penetration or viscosity grade binders shall be designed using the Marshall procedure and specifications.

112.4.4.3 A job mix formula using a performance grade, PG, binder shall be designed using the gyratory (SUPERPAVE) procedure and specification.

112.4.4.4 Binder substitution in an authorized job mix formula shall not be allowed.

112.5 TEMPERATURES

112.5.1 The CONTRACTOR shall specify the temperature ranges for mixing and compaction of a job mix formula for a binder, minimum and maximum, ^{o}F. Temperature ranges for mixing and compaction shall be specified in a job mix formula submittal.

112.5.2 The CONTRACTOR shall specify the "release to traffic" temperature, ^{o}F. Release to traffic temperature shall be the maximum temperature at which the viscosity of a binder is greater than 200,000 cps as determined by ASTM D4402. Release to traffic temperature shall be specified in a job mix formula submittal.

112.6 MEASUREMENT AND PAYMENT

112.6.1 Asphalt binder is an ingredient of asphalt concrete (AC), bituminous treated base course construction (BTB), and plant mixed seal coat (PMSC). Binder shall be paid either as incidental to the above materials, or as specified in the CONTRACT, as directed by the ENGINEER.

TABLE 112.A - 60-70 PENETRATION GRADE BINDER SPECIFICATION (ASTM D 946) [1]

		CHARACTERISTIC	min	max	ASTM Procedure
I.		Original Binder			
	1	Penetration @ 25 ^{O}C, 100 g, 5 s, mm	60	70	D 5
	2	Flash Point (Cleveland open cup), ^{O}C	230		D 92
	3	Ductility @ 25 ^{O}C, 5 cm/min, cm	100		D 113
	4	Solubility in trichloroethylene , %	99.0		D 2042
II.		Asphalt after Thin Film Oven Test, TFOT			
	1	Retained penetration @ 25 ^{O}C, 100 g, 5 s, mm	52		D 5
	2	Ductility @ 25 ^{O}C, 5 cm/min, cm	50		D 113

[1] PG64-22 binders shall be used if 60-70 Penetration Grade and AC-20 Viscosity Grade binders are unavailable.

112.B AC-20 VISCOSITY GRADE BINDER (ASTM D 3381, TABLE 2) [1]

CHARACTERISTIC	min	max	Procedure
I. Original Binder			
1 Viscosity @ 60 ^{o}C, poises	1600	2400	ASTM D2171
2 Viscosity @ 135 ^{o}C, cSt	300	-	ASTM D2170
3 Penetration @ 25 ^{o}C, 100 g, 5 s	60	-	ASTM D5
4 Flash Point, , ^{o}C (Cleveland open cup)	230	-	ASTM D92
5 Solubility in trichloroethylene, %	99.0	-	ASTM D2042
II. Tests on Residue From Thin-Film Oven Test			ASTM D1754
1 Viscosity after TFOT @ 60 ^{o}C, poises	-	10,000	ASTM D2171
2 Ductility after TFOT @ 25 ^{o}C, 5 cm/min, cm	50	-	ASTM D113

[1] PG64-22 binders shall be used if 60-70 Penetration Grade and AC-20 Viscosity Grade binders are unavailable.

TABLE 112.C PERFORMANCE GRADE (PG) BINDER SPECIFICATIONS

	Performance Grade Binder Characteristic	PG70-22	PG76-28	Standard Procedure
A.	Original Binder			
1	Dynamic Shear, 1.0 kPa min, G*/sin d @10 $^{rad}/_{sec}$	70	76	AASHTO TP 5
2	Flash Point, min	230	230	ASTM D48
3	Viscosity, 3 Pa. s (3000 cP) max, @temp	135	135	ASTM D4402 [1]
B.	Rolling Thin Film Oven Test Residue, RTFOT (T 240), 1 minute			
1	Mass loss, 1% max	yes	yes	
2	Dynamic Shear, 2.20 kPa, min,G*/sin d @ 10 $^{rad}/_{sec}$	70	76	AASHTO TP 5
C.	Pressure Aging Vessel Residue, PAV (PP1), after RTFOT			
1	PAV Temperature	110	110	
2	Dynamic Shear: G*/sin d , max, 5,000 kPa, @10 $^{rad}/_{sec}$	28	28	AASHTO TP 5
3	Physical Hardening (report) [2]			
a.	Creep Stiffness: S, 300 Mpa , max, m-value, 0.300 minimum, @ 60 s	-12	-18	AASHTO TP 1 [3]
b.	Direct Tension: Failure strain, 1.0 % min @ 1.0 mm/min	-12	-18	AASHTO TP 3 [4]

Notes:

[1] This requirement may be waved if the binder supplier warrants that the supplied binder can be adequately pumped and mixed at temperatures that meet all safety standards.

[2] Physical Hardening - TP1 is performed on a set of asphalt beams according to Section 13.1 of TP 1, except the conditioning is extended to 24 hrs $\pm$10 minutes at 10 ^{O}C above the minimum performance temperature. The 24 hour stiffness, S, and the m-value are reported for information purposes only.

[3] The physical hardening index “h” accounts for the physical hardening of the binder. It shall be determined and reported in the submittal for the proposed binder and each sample tested for compliance with TABLE 112.PG76-28.A. ”h” is calculated as follows:

$$h= (S_{24} / S_{1})^{m1 / m24}.$$

“1" and “24" indicate 1 and 24 hours of conditioning of the tank asphalt. Conditioning and testing is conducted at the designated test temperature. Values should be calculated and reported. “S” is the creep stiffness after 60 sec loading time and “m” is the slope of the log creep stiffness versus the log time curve after 60 sec loading time.

[4] If the creep stiffness “S< 300 MPa, the direct tension test is not required. If 300 < S < 600 MPa, the direct tension failure strain requirement can be used in lieu of the creep stiffness requirement. The m-value requirement must be satisfied in both cases.

TABLE 112.D - ASPHALT BINDER CORRELATION(S)

Pen. Grade [1]	Visc. Grade[1]	Performance Grade [2]	
60-70	-	PG70-22	-
-	AC-20	PG70-22	-
-	-	PG70-22	PG76-28
-	-	-	PG76-28

[1] Marshall analysis/design

[2] Gyratory analysis/design

SECTION 170

ELECTRONIC MARKER DISKS

170.1 GENERAL: Electronic location markers shall consist of disks having a passive device capable of reflecting a specifically designated impulse frequency, unique to the utility being installed. Disks shall be color-coded in accordance with the American Public Works Association's Utility Location and Coordinating Council Standards. Electronic Marker Disks (EMD's) shall be as manufactured by Automation Products Company, or approved equal.

170.2 REFERENCES

170.3 INSTALLATION: Marker disks shall be installed flat and horizontal approx. 6 inches over the point to be located, and a minimum of 6 inches from any metal object. However, depth of burial shall not be less than 2-1/2 feet nor more than 6 feet. Disks shall be hand backfilled to 1 foot above the disk to prevent movement or damage.

170.4 PLACEMENT: Electronic Marker Disks shall be installed at the following locations:

170.4.1 SANITARY SEWER:

170.4.1.1 At manholes on unpaved streets and easements, one foot upstream of the manhole over the centerline of the main line.

170.4.1.2 At temporary dead ends of lines.

170.4.1.3 At the property line for all service lines, and service stubs from vacuum pits.

170.4.1.4 At the centerline of the gravity main line over all risers.

170.4.1.5 At all plugged tees.

170.4.1.6 At upper bend on vacuum sewer lifts.

170.4.1.7 At wye for branch line connect to vacuum sewer main.

170.4.1.8 On Sanitary Sewer Force Mains:

170.4.1.8.1 At valves, one foot north or west of the valve over the main line.

170.4.1.8.2 At bends, 22-1/2 degrees and larger.

170.4.1.8.3 At capped or plugged ends.

170.4.1.8.4 At tees over the main line.

170.4.1.8.5 For single services, over the main line at the service tap.

170.4.2 WATER LINES:

170.4.2.1 At valves, one foot north or west of the valve over the main line.

170.4.2.2 At flanged outlets on concrete cylinder pipes.

170.4.2.3 On all water line installations.

170.4.2.3.1 At bends, 22-1/2 degrees and larger.

170.4.2.3.2 At capped or plugged ends.

170.4.2.3.3 At tees over the main line.

170.4.2.3.4 For single services, over the main line at the service tap, if service is not 90^{o} to the main.

170.4.2.3.5 For double services, over the main line half-way between the service taps, if service is not 90^{o} to the main.

170.4.3 The CONTRACTOR shall certify in writing that the Electronic Marker Disk is in place, prior to paving over any of the above locations. Electronic Marker Disks that are found to be missing shall be installed at the CONTRACTOR'S expense. Existing disks that are encountered during construction, but are no longer required according to the above criteria, shall be returned to the OWNER.

170.5 MEASUREMENT AND PAYMENT: No separate measurement or payment will be made for Electronic Marker Disks.

SECTION 201

CLEARING AND GRUBBING

201.1 GENERAL

This work shall consist of removing natural and man-made objectionable material from the right-of-way, construction areas, road approaches, material and borrow sites, areas through which ditches and channels are to be excavated, and such other areas as may be shown on the plans. Clearing and grubbing shall be performed in advance of grading operations except that in cuts over 3 feet in depth, grubbing may be done simultaneously with excavation, provided stumps, roots, embedded wood, foundations and slabs are removed as specified. Clearing and grubbing shall be in accordance with the requirements herein specified, such as erosion control requirements. Demolition of structures, other than foundations or slabs, shall be as shown on the plans.

201.2 REFERENCES

201.3 PRESERVATION OF PROPERTY

Existing improvements, adjacent property, utility and other facilities, and trees and plants not to be removed shall be protected from injury or damage resulting from the CONTRACTOR's operations. Only trees and plants designated or marked for removal by the ENGINEER shall be removed.

201.4 CONSTRUCTION METHODS

201.4.1 The natural ground surface shall be cleared of vegetable growth, such as trees, tree stumps, logs, roots or downed trees, brush, grass, weeds, and surface boulders, as well as fences, walls, rubbish, foundations and slabs.

201.4.2 Unless otherwise shown on the plans, the entire area of the project within the limit lines specified below shall be cleared and grubbed. No payment will be made to the CONTRACTOR for clearing and grubbing outside these limits, unless such work is authorized by the ENGINEER.

201.5 LIMIT LINES: Except when limit lines for clearing and grubbing are shown on the plans or are staked by the ENGINEER, clearing and grubbing shall extend only within reasonable limits of the work area.

201.6 REMOVAL OF TREES AND TREE BRANCHES

201.6.1 Trees shall be removed in such a manner as not to injure standing trees, plants, and improvements which are to remain. Tree branches extending over a roadway and which clear finish grade by 12 feet or less shall be cut off close to the boles in a workmanlike manner.

201.6.2 Trees requiring trimming to facilitate normal construction operations shall be trimmed by a tree surgeon.

201.7 REMOVAL AND DISPOSAL OF DEBRIS

Debris to be removed shall be disposed of outside the right-of-way at a location satisfactory to the ENGINEER, except when burning of combustible debris is permitted. The area to be graded and adjacent areas shall be left with a neat and finished appearance. No accumulation of flammable material shall remain on or adjacent to the property line. In case burning precedes construction operations, the piles may be placed in the center of the area; otherwise, the piles shall be placed in the most convenient location at the side of the area and beyond slope lines where they may be burned without damage to surrounding forest cover or adjacent property. Burning shall be done in conformance with local regulations and at such times and in such manner as to prevent the fire from spreading to areas adjoining the construction site. In areas where burning is prohibited by local regulations, all removed material shall be disposed in an approved solid waste disposal site.

201.8 REMOVAL AND DISPOSAL OF SALVAGEABLE ITEMS

Items and materials of salvage value as shown on the plans or as determined by the ENGINEER, unless incorporated in the new work, shall remain the property of the OWNER and shall be delivered to approved storage areas as directed by the ENGINEER. Such items and materials shall be carefully removed and delivered in such a manner as to permit re-use.

201.9 MEASUREMENT AND PAYMENT

201.9.1 CLEARING AND GRUBBING:

201.9.1.1 When the proposal includes an item for clearing and grubbing, the quantity for measurement shall be as indicated in the Bid Proposal.

201.9.1.2 The unit price per acre paid for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in clearing and grubbing as shown on the plans, as provided in these specifications and as directed by the ENGINEER, including the removal and disposal of resulting material.

201.9.1.3 When the Bid Proposal does not include a pay item for clearing and grubbing as above specified and unless otherwise specified in the Supplementary Specifications, full compensation for any necessary clearing and grubbing required to perform construction operations specified shall be considered as included in the price paid for other items of work and no additional compensation will be allowed therefore.

201.9.2 REMOVAL AND DISPOSAL OF TREES: If the Bid Proposal includes separate estimates of quantities for the removal of trees, the trees shall be classified by size as follows:

201.9.2.1 Trees less than 12 inches in circumference at 3 feet above the original ground surface shall be considered as included in the price for clearing and grubbing or excavation, and no additional compensation will be allowed therefor.

201.9.2.2 Trees between 12 and 30 inches in circumference shall be measured as a unit price for each tree in the item provided in the Bid Proposal for trees of this dimension.

201.9.2.3 Trees more than 30 inches in circumference shall be measured as a unit price for each tree in the item provided in the Bid Proposal for trees of this dimension.

SECTION 343

REMOVAL AND DISPOSAL OF EXISTING PAVEMENTS,
CURB AND GUTTER, SIDEWALK, DRIVEPADS,
AND SLOPE PAVEMENT

343.1 GENERAL

343.1.1 The work covered by this section consists of furnishing all labor, equipment, materials, and incidentals necessary for the removal and disposal of existing pavement, curb and gutter, sidewalk, and drivepads as specified herein. Pavement removal and replacement in connection with trenching operations is covered in Section 801 of these specifications.

343.1.2 Removal of existing pavement, curb and gutter, sidewalk, and drivepads shall only be performed at the locations within the limits shown on the drawings or as directed by the ENGINEER.

343.2 REFERENCES

343.2.1 This Publication:
SECTION 801

343.3 REMOVAL METHODS

343.3.1 CURB AND GUTTER: Existing Portland cement concrete curb and gutter, median curbs, curbs, alley curbs, laydown curbs, or valley gutters shall be removed by such means as required to prevent damage to any adjacent structures designated to remain in place. Existing asphalt curb shall be removed by means that prevent damage to the pavement on which the curb is situated. When any curb cannot be removed without damaging the adjacent pavement, the pavement may be cut to allow a minimum of 1 foot clearance parallel to the edge of the curb adjacent to the pavement.

343.3.2 SIDEWALK, DRIVEPADS, AND SLOPE PAVEMENT: Existing Portland cement concrete sidewalk and drivepads shall be removed by means and methods such that no adjacent structures to remain in place are damaged.

343.3.3 PAVEMENT:

343.3.3.1 Prior to any cutting of pavement, the perimeter of the proposed cut shall be suitably outlined and shall consist of smooth, regular lines approved by the ENGINEER.

343.3.3.2 The pavement shall be cut along the marked perimeter of the area to be removed with such equipment as to produce a cut carried in a vertical plane through the pavement along a smooth horizontal line. For bituminous pavement removal, a power saw or steel-type cutter mounted on a motor grader or an air hammer equipped with a suitable cutting spade or other approved equipment which will score a smooth continuous line in the pavement to correct depth shall be used. Saw cutting only may be required by the ENGINEER if other methods of cutting leave an irregular or unsightly cut line.

343.3.3.3 The depth of cut made in asphalt pavement shall be sufficient to permit removal without damaging adjacent pavement. For Portland cement concrete pavement, a concrete saw which will score a continuous line in the pavement to a minimum depth of from 1 1/2 to 1 inches shall be used. Any unnecessary irregular breakage caused by the CONTRACTOR through inexperience or careless workmanship or otherwise shall be replaced by the CONTRACTOR at no additional expense. Any irregular breakage regardless of the cause shall be trimmed back as directed by the ENGINEER.

343.3.3.4 After the perimeter cut is made, any convenient and effective equipment may be used to break up and remove the pavement within, provided the following conditions are met:

343.3.3.4.1 The surrounding pavement and pavement perimeter shall not be damaged.

343.3.3.4.2 Any existing structures at the perimeter and/or within the vicinity of pavement removal shall not be damaged, whether they be surface or subsurface, as indicated on the drawings.

343.3.3.4.3 The normal functions of any utilities which may exist at the perimeter and/or within the area of pavement removal shall not be damaged, whether they be surface or subsurface, as indicated on the drawings.

343.4 DISPOSAL

The CONTRACTOR shall be responsible for disposing of all removed pavement, curb and gutter, sidewalk, drivepads, and slope pavement in accordance with local regulations and as directed by the ENGINEER.

343.5 MEASUREMENT AND PAYMENT

343.5.1 Measurement shall be made as follows:

343.5.1.1 Removal and Disposal of Existing Pavement--Measurement shall be made to the nearest square yard on the top surface of the pavement removed as directed by the ENGINEER. Pavement shall be defined as Portland cement concrete surfacing or asphaltic concrete surfacing together with the respective underlying base course of whatever character. Oil mats or dust pallative treated surfaces will be considered ordinary excavation for which no separate payment will be made for removal.

343.5.1.2 Removal and Disposal of Existing Curb and Gutter or Asphalt Curbs--Measurement shall be made to the nearest linear foot along with the face of the curb at the gutter line, at the pavement surface for curbs, at the flow line of valley gutters, or along the centerline of alley curbs as applicable.

343.5.1.3 Removal and Disposal of Existing Sidewalk, Drivepads, and Slope Pavement--Measurement shall be made to the nearest square yard on the top surface of the sidewalk or drivepad or slope pavement removed.

343.5.2 Payment will be made at the contract unit price per unit for the applicable item of removal, which payment shall be full compensation for performing all removal and disposal of the item and for furnishing all labor, equipment, and incidentals necessary to complete the work in the manner specified.

343.6 ALTERNATE METHOD OF MEASUREMENT AND PAYMENT

If a removal item does not appear as a bid item in the Bid Proposal, then no direct payment will be made for removal and disposal of existing pavement, curbs, gutters, sidewalks, and drivepads. All costs for such work shall be included in the lump sum price for site preparation.

SECTION 440

REFLECTORIZED PAINTED PAVEMENT MARKINGS

440.1 GENERAL: This work shall consist of furnishing and installing permanent and temporary reflectorized painted pavement markings in substantial compliance with the specifications and details shown on the plans, at the locations shown on the plans, or as established by the ENGINEER.

440.2 REFERENCES.

440.2.1 Manual on Uniform Traffic Control Devices (MUTCD), Latest Edition

440.3 MATERIALS.

440.3.1 TRAFFIC PAINT: Traffic paint shall conform to the requirements of the NMDOT for White and Yellow Traffic Line Paints Used on Construction Projects (Combination Alkyd and Hypalon - Fast Dry Type).

440.3.2 GLASS BEADS: Glass reflectorizing beads shall conform to the requirements specified in Section 441 for Glass Beads.

440.3.3 TEMPORARY MARKING TAPE

440.3.3.1 Temporary adhesive marking tape shall consist of weather and traffic resistant yellow or white reflective marking material and shall conform to the following requirements:

440.3.3.1.1 DESCRIPTION: The adhesive pavement striping material shall consist of white or yellow reflective marking material on a conformable non-metallic backing coated with a pressure sensitive adhesive and designed for marking of bituminous or portland cement concrete surfaces.

440.3.3.1.2 COLOR: The color of the visible surface shall be either white or yellow in accordance with the MUTCD and shall closely match the color of the paint specified in this Section 440.

440.3.3.1.3 REFLECTANCE: The white and yellow markings shall have the following initial minimum reflectance values at 0.2 degree and 0.5 degree observation angles and 86 degrees entrance angle as measured in accordance with the testing procedure of Federal Test Method Standard 370 unless a higher value is specified on the plans.

TEMPORARY MARKING TAPE			
Minimum Retroreflectivity (Millicandelas Per Footcandle Per Square Foot)			
OA	EA	White	Yellow
0.2	86	1770	1310
0.5	86	1270	820

Where: OA = Observation Angle in Degrees
EA = Entrance Angle in Degrees

440.3.3.1.4 ADHESION: The material shall have a precoated pressure sensitive adhesive which does not require a liner for protection from contamination, pre-adhesion, or blocking within the roll. Said material shall show no appreciable loss of adhesion after application.

440.3.3.1.5 CONFORMABILITY: The material shall be flexible and formable, shall show no cracking, flaking, or loss of reflective elements and, following application, shall remain conformed to the texture of the pavement surface.

440.3.3.6.1 PHYSICAL PROPERTIES.

440.3.3.1.6.1 DIMENSIONS: The thickness of the adhesive marking tape for normal use, shall not be less than 10 mils and shall be provided in 4-inch or 6-inch width (plus or minus 1/16 inch) unless otherwise specified.

440.3.3.1.6.2 WEAR RESISTANCE: Wear resistance samples of the adhesive pavement striping material applied to standard specimen plates and tested in accordance with Federal Test Methods No. 141, Method 6192, using a CS-17 wheel and 1000 gram load shall not exhibit a significant change in color after 5000 cycles.

440.3.3.1.7 REMOVABILITY

440.3.3.1.7.1 Temporary adhesive pavement striping material shall be readily removable from the pavement by following the manufacturer's recommendations, unless otherwise specified.

440.3.3.1.7.2 Removal shall not require sandblasting, solvent or grinding methods and shall not result in objectionable staining of the pavement surface.

440.3.3.1.8 DURABILITY: The material shall be weather resistant and show no appreciable fading, lifting, or shrinkage.

440.3.3.1.9 GENERAL

440.3.3.1.9.1 The materials as supplied shall be of good appearance and free from cracks, and the edge shall be true, straight, and unbroken.

440.3.3.1.9.2 The adhesive pavement striping material shall be packaged in accordance with accepted commercial standards, shall be stored at temperatures not to exceed 100 degrees Fahrenheit under normal conditions, and shall be suitable for use for a period of at least one (1) year after purchase.

440.3.4 ACCEPTANCE: Acceptance of traffic paint and temporary marking tape will be based upon receipt of certificates of compliance and documentation that the batch of paint and/or marking tape to be used has been tested by an independent laboratory and conforms with specifications.

440.4 CONSTRUCTION REQUIREMENTS.

440.4.1 GENERAL

440.4.1.1 The traffic paint, and beads shall be placed on the pavement by a spray type, self-propelled pavement marking machine, except that temporary striping during construction may be placed with other equipment designed for application of paint, or beads.

440.4.1.1.1 The machine shall be capable of applying a clear-cut 4-inch line or lines.

440.4.1.1.2 The machine shall be equipped with a mechanical device capable of placing a broken reflectorized centerline with a 10-foot painted segment and a 30-foot gap.

440.4.1.1.3.1 The machine shall be equipped with an air-operated glass bead drop-in dispenser controlled by the spray gun mechanism.

440.4.1.1.3.2 The dispenser shall be capable of placing the glass spheres into the paint line as the paint is applied to the pavement in such a manner as to provide satisfactory marking and delineation.

440.4.1.1.4.1 The volume of paint and glass beads in place shall be measured by the quantity per mile method. The CONTRACTOR shall provide certification of the volume of the paint and bead tanks. The CONTRACTOR shall strap the tanks prior to beginning striping operation and again after a mile has been striped. As an alternative, the CONTRACTOR may externally mark the tanks indicating a volume equivalent to the tolerances shown in this Section 440 or have a calibrated rod marked with the equivalent volumes. The volumes shall be measured after a mile has been striped. At the option of the ENGINEER, if the striping machine is equipped with air atomized spray units, (not airless), and paint and bead gauges, the volume may be determined by utilizing said gauges.

440.4.1.1.4.2 The CONTRACTOR shall be required to restripe the roadway if 50% of the paint or beads is not placed on the roadway or if the ENGINEER determines that the striping is not adhering to the pavement or the glass beads are not adhering to the paint.

440.4.1.1.5 When paint has settled excessively, the CONTRACTOR shall redisperse the settled pigments at the bottom of the paint drums, with a mixing device, prior to pumping or loading paint into the striping unit so excess pigments are not left on the bottom of the paint drum. Thinner shall not be allowed to be pumped into the paint tanks. If the CONTRACTOR uses thinner to clean his equipment, the CONTRACTOR shall be responsible for disposing of all debris including, but not limited to, thinner at disposal sites approved by government agencies regulating the disposal of such materials.

440.4.2 PLACEMENT OF BEADS AND TRAFFIC PAINT.

440.4.2.1 Reflectorized painted markings for temporary use on final surfacing is prohibited. Pavement markings shall be applied during daylight hours when the pavement surface is dry and the weather is not foggy, rainy, excessively windy, or otherwise adverse to the application of markings. The surface shall be free from excess asphalt or other deleterious substances before traffic paint or beads are applied. The CONTRACTOR shall remove dirt, debris, grease, motor oils, rocks, or chips from the pavement surface before applying markings.

440.4.2.2 The CONTRACTOR shall provide the necessary personnel and equipment to divert traffic from the installation area where the work is in progress and during drying time. The CONTRACTOR shall submit a traffic control plan to the ENGINEER for approval prior to the commencement of work. All damage to the pavement marking due to the CONTRACTOR's negligence or failure to maintain traffic control shall be repaired at the CONTRACTOR's expense.

440.4.2.3 Permanent reflectorized painted markings shall consist of two applications of markings. For painted markings on new pavement the second application of markings shall be placed no sooner than twenty-one days after placement of the first application of markings as directed by the ENGINEER.

440.4.2.4 If paint is not adhering to the pavement or if the glass beads are not adhering to the paint, or if the second application of pavement markings are not placed over the first application of markings in accordance with this Section 440, the CONTRACTOR will be required to remove the striping, and to restripe the roadway.

440.4.3 TOLERANCE FOR PLACING PAINT AND BEADS

440.4.3.1 The finished line shall be smooth, aesthetically acceptable and free from undue waviness.

440.4.3.2 Painted lines shall be 4, 8, or 12 inches wide as shown on the plans with a tolerance of plus or minus 1/8 inch and shall be placed at a minimum rate of 19.75 gallons of paint per mile for a solid 4-inch line and 4.94 gallons per mile for a broken 4-inch line, based on a 10-foot stripe and a 30-foot gap (40-foot cycle). Other widths of striping shall be applied at the minimum rate that is the equivalent multiple of the above.

440.4.3.3 The length of painted segment and gap shall not vary more than six (6) inches in a 40-foot cycle.

440.4.3.4 The following transverse gap dimension between centerline stripes for two (2) and three (3) stripe combinations reflect a three (3) paint gun set up on the striping unit. The broken line shall be placed on the centerline of the roadway with the respective left and right no passing zones placed so a two (2) inch gap exists between the broken and no passing zone stripe. There shall be an eight (8) inch gap between the double yellow markings for no passing zones.

440.4.3.5 Glass reflectorizing beads shall be applied on the wet paint at a minimum rate of six (6) pounds to each gallon of paint. This translates into a minimum weight of beads of 29.6 lbs. per mile of broken line and 118.5 lbs. per mile of solid line.

440.4.4 PLACING TEMPORARY ADHESIVE MARKING TAPE.

440.4.4.1 Adhesive tape marking materials shall be applied as follows:

440.4.4.1.1 The CONTRACTOR shall provide the necessary personnel and equipment to warn and divert traffic during installation and removal from the area where the work is in progress as approved by the ENGINEER. The surface to which the tape is applied shall be dry and free of oils, grease, dust, dirt and other deleterious substances and shall be primed with a primer material which is recommended by the manufacturer of the tape.

440.4.4.1.2 The tape shall be rolled or tamped down immediately after application until it adheres properly and conforms to the surface of the pavement in accordance with the manufactures recommendation.

440.4.4.1.3 Where striping is continuous, there will be no more than 3 splices per 120 feet of length.

440.4.5 REMOVAL OF TEMPORARY PAVEMENT MARKINGS

440.4.5.1 TEMPORARY ADHESIVE MARKING TAPE: All temporary pavement markings placed on the final pavement surface shall be removed by the CONTRACTOR when such temporary pavement markings are no longer required for traffic control as determined by the ENGINEER. Where temporary pavement markings, which are to be removed, consist of adhesive marking tape, the removal shall be complete with no segments or pieces of tape remaining on the pavement. The use of non-reflective black adhesive marking tape to obliterate temporary pavement markings will not be permitted. Overpainting is not an acceptable method.

440.4.5.2 REFLECTORIZED PAINTED MARKINGS: Reflectorized painted markings for temporary use on final surfacing is prohibited. Reflectorized painted markings when used for temporary pavement markings shall be removed where required by traffic control plan in accordance with the provisions of Section 443 - Pavement Marking Removal.

440.4.6 COMPLIANCE WITH MUTCD: All reflectorized painted markings and temporary adhesive marking tape shall conform to the Manual on Uniform Traffic Control Devices (MUTCD).

440.5 MEASUREMENT AND PAYMENT.

440.5.1 Reflectorized painted markings will be measured by the linear foot of 4-inch width, complete in place.

440.5.2 Temporary adhesive marking tape will be measured by the linear foot of 4-inch width, complete in place.

440.5.3 Removal of adhesive marking tape will not be measured.

440.5.4 Removal of reflectorized painted markings will be measured by the linear foot of 4-inch width, complete in place, in accordance with the provisions of

Section 443 - Pavement Marking Removal.

440.5.5 The accepted quantities of reflectorized painted markings and temporary adhesive marking tape will be paid for at the contract unit price per unit of measurement for each of the pay items as shown on the bid proposal. The removal of reflectorized painted markings will be paid in accordance with the provisions of Section 443 - Pavement Marking Removal.

SECTION 801

INSTALLATION OF WATER TRANSMISSION, COLLECTOR AND DISTRIBUTION LINES

801.1 GENERAL

The water facilities and materials, specified herein, are associated with water transmission, collector and distribution lines.

801.2 REFERENCES

801.2.1 American Water Works Association (Latest Edition) (AWWA):

C110 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids
C203 Coal-Tar Protective Coatings and Linings for Steel Water Pipelines -Enamel and Tape-Hot-Applied
C206 Field Welding of Steel Water Pipe
C207 Steel Pipe Flanges for Waterworks Service-Sizes 4 in. through 144 in.
C502 Dry Barrel Fire Hydrants
C504 Rubber-Seated Butterfly Valves
C509 Resilient-Seated Gate Valves for Water and Sewerage Systems
C600 Installation of Ductile-Iron Water Mains and Their Appurtenances
C651 Disinfecting Water Mains
C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution
C905 Polyvinyl Chloride (PVC) Water Transmission Pipe Nominal Diameter 14 in. through 36 in.
C909 Molecular Oriented Polyvinyl Chloride (PVCO), Pressure Pipe 4" - 12" for water distribution.
M9 Concrete Pressure Pipe
M23 PVC Pipe-Design and Installation

801.2.2 This Publication:

SECTION 121 PLASTIC PIPE
SECTION 127 STEEL WATER PIPE
SECTION 128 CONCRETE CYLINDER PIPE
SECTION 129 DUCTILE IRON PIPE
SECTION 130 GRAY IRON AND DUCTILE IRON FITTINGS
SECTION 340 PORTLAND CEMENT CONCRETE CURBS, GUTTERS, WALKS,DRIVEWAYS, ALLEY INTERSECTIONS, SLOPE PAVING, AND MEDIAN PAVING
SECTION 343 REMOVAL AND DISPOSAL OF EXISTING PAVEMENT, CURBS, GUTTERS, SIDEWALKS & DRIVEPADS
SECTION 701 TRENCHING, EXCAVATION AND BACKFILL
SECTION 1502 SUBMITTALS

801.3 MATERIALS:

801.3.1 GENERAL:

801.3.1.1 The CONTRACTOR shall submit certification from the manufacturer of the pipe as specified in Section 1502 as to the pipe material and that the pipe meets or exceeds the required testing. Only pipe manufactured in the United States of America will be acceptable.

801.3.1.2 Main line pipe and fittings shall be as specified in the Reference Section in this publication as listed above or as specified in the Supplemental Technical Specifications and/or as authorized by the ENGINEER.

801.3.2 PIPE:

801.3.2.2 Limitations of pipe materials versus pipe sizes will be as follows, unless otherwise specified on the plans or Supplemental Technical Specifications:

Pipe Type	Sizes
Ductile Iron	3" thru 64"
Concrete Cylinder(AWWA C303)	16" and larger
Plastic (PVC)	4" thru 20"
Welded Steel Pipe (AWWA 200)	16” and larger

801.3.2.3 The type of pipe used shall be approved by the ENGINEER. Steel pipe will be used only where specified on the drawings. All pipe shall be of domestic manufacture and origin. Unless otherwise approved by the ENGINEER, all pipe installed shall be identical from valve to valve.

801.3.3 GATE VALVES:

801.3.3.1 Gate valves shall only be used for pipe sizes of 12 inches and smaller, unless otherwise noted on the plans or in the Supplemental Technical Specifications.

801.3.3.2 Resilient seat gate valve shall be used and shall conform to AWWA C 509. The gate valve shall be a non-rising stem type with inside screw and "O" ring seals. The valve shall have a standard hub which opens counter-clockwise. Type valve ends shall be mechanical joints, unless otherwise specified on the plans. "O" ring retainer shall be secured with nuts and bolts.

801.3.3.3 The resilient seat shall be mechanically retained or bonded on the valve gate (wedge disc).

801.3.3.4 All brass or bronze parts used on gate valves shall comply with AWWA C 509.

801.3.3.5 The outside of the valve body shall be painted with coal tar enamel or corrosion-resistant coating. The inside shall be protected with corrosion resistant coating, approved for potable water.

801 .3.3.6 The valve stem shall comply with AWWA C 509. The material for the valve stem shall be brass or bronze, and shall have a minimum yield strength of 20,000 psi and minimum tensile strength of 60,000 psi.

801.3.3.7 Gate valves shall have a 2 inch square operating hub nut. Gate valves in vaults with valve covers at ground level shall have a handwheel with the 2" nut welded to the center.

801.3.3.8 Maximum input torque to open and/or close the valve shall be 200 foot pounds for a 4-inch valve and 300 foot pounds for 6-inch under a working pressure of 200 psi.

801.3.3.9 No Project will be accepted by the OWNER until all valves are operational and accessible.

801.3.3.10 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed “Water Valve Data Card”, as shown on Pages 801-5 and 801-6. The ENGINEER shall forward the card to OWNER.

801.3.4 RUBBER SEATED BUTTERFLY VALVES:

801.3.4.1 Butterfly valves will be used for sizes of 14 inches and larger, and shall comply to AWWA C 504.

801.3.4.2 Only short body, Class 150B valves are acceptable. Wafer type valves are not acceptable. Valve ends may be either mechanical joint or flanged.

801.3.4.3 The rubber seat shall be field replaceable on valve sizes 24 inches and larger. The rubber seat may be mechanically retained or bonded on the disc or valve body.

801.3.4.4 Butterfly valves shall have a 3 inch square operating hub nut. Butterfly valves in vaults with valve covers at ground level shall have a handwheel with the 3" nut welded to the center.

801.3.4.5 The valve shaft and disc shall be installed horizontally. The valve disc shall pivot and rotate on the horizontal axis.

801.3.4.6 The maximum input torque to open and/or close the valve shall not exceed 150 foot pounds under a minimum working pressure of 150 psi, and the butterfly operator shall be compatible with this pressure. Maximum operating torques shall be in accordance with AWWA C 504, Table 1, Class 150B. The manufacturer of the valve shall be responsible for the operator.

801.3.4.7 No project will be accepted by the OWNER until all valves are operational and accessible.

801.3.4.8 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed “Water Valve Data Card,” as shown on pages 801-5 and 801-6. The ENGINEER shall forward the card to the OWNER.

801.3.5 VALVE BOXES: Valve boxes shall consist of Polyvinyl Chloride (PVC) C-900, or High Density Polyethylene Pipe, (HDPE), with corrugated exterior and smooth interior pipe cut to accommodate the required depth. No joints shall be allowed. Pipe diameter shall be 10 inches for valves in paved areas to accommodate the cover and lid specified here-in. The pipe shall be centered and placed true to vertical around the axis of the operating nut. Valve covers and lids for re-use water shall be different than those used for potable water, and shall be as shown on re-use project construction plans.

801.3.6 COMBINATION AIR AND VACUUM VALVES: Air and vacuum valves shall be the type and size shown on the plans.

801.3.7 FIRE HYDRANTS:

801.3.7.1 Fire hydrants and their extensions shall be in accordance with AWWA C 502, traffic type. Fire hydrants shall have one 5 1/4 inch diameter valve opening; 6 inch mechanical joint inlet connection; two 2 ½ inch hose nozzle connections; and one 4 ½ inch steamer nozzle with National Standard Fire Hose Coupling Screw Threads. Fire hydrants shall have a bronze or cast iron, pentagon, operating nut, be designed for 150 psi. working pressure service, and have a normal bury of 4 to 4 ½ feet unless field conditions require a deeper bury, in which case extensions will be used so as to bring the bottom of the break-off flange 2 to 8 inches above the top of finish grade.

801.3.7.2 The pipe fittings and fire hydrants starting at the street main and ending at the fire hydrant itself shall be lying in a line perpendicular to the street's centerline or radially on a curvilinear installation. Fire hydrants shall have no more than ½ inch variation from a vertical line between the breakaway flange and the top of the fire hydrant.

801.3.7.4 Hydrants shall be dry barrel, post-type with compression main valve closing with pressure. They shall have a field lubrication capability. Hydrants shall have a bronze seat ring threaded into a bronze drain ring or bronze or cast iron bushing.

801.3.7.5 Exterior of hydrant, below the ground line, shall be coated with asphalt varnish, and the exterior painted from the top to a point one foot below the ground level flange, consisting of one coat rust inhibitive primer and one coat "chrome yellow" enamel. The bonnet shall then be painted with a reflectorized paint using a color as close to “chrome-yellow” as possible.

801.3.7.6 The bottom plate of the main valve shall be epoxy coated. The shoe of the fire hydrant shall have a 6-inch mechanical joint connection and the inside shall be epoxy coated to prevent corrosion. The nozzle shall be threaded in place and retained by stainless steel locks. Hydrant body shall be threaded to receive the threaded nozzle. Nozzle shall be secured by a stainless steel locking device.

801.3.7.7 Fire hydrant shall contain two drain outlets. The drain outlets shall be constructed of bronze. Hydrant shall be provided with a pentagon operating nut to open counter clockwise and shall have an anti-friction washer between the hold-down nut and the operating nut.

801.3.7.8 To prevent loss of brass operating nuts due to theft or vandalism, the following shall be included in or on the fire hydrant:

801.3.7.8.1 Attach OWNER approved anti-theft device to the hydrant; or

801.3.7.8.2 The bonnet must be removed in order to remove the operating nut; or

801.3.7.8.3 Use a cast iron operating nut.

801.3.7.9 Fire hydrants shall be installed at locations as shown on construction plans and in accordance with Standard Detail Drawings.

801.3.7.10 Fire hydrants shall be properly restrained in accordance with Section 130. If mechanical restraint is used, each joint on the hydrant leg shall also be restrained.

801.3.8 PRESSURE REDUCING VALVE (PRV): Pressure reducing valve shall be a globe pattern, flanged end, pressure Class 125. Submittals for approval shall be made to the ENGINEER and approval must be received before installation. The following items are required in the PRV:

801.3.8.1 Materials:

801.3.8.1.1 Main valve-cast iron with brass trim.

801.3.8.2 Pilot Control System:

801.3.8.2.1 Adjustment from 15 psi to 75 psi.

801.3.8.2.2 Shut-off cock on all pilot control system lines.

801.3.8.2.3 Inlet flow strainer.

801.3.8.2.4 Closing speed control.

801.3.8.2.5 Opening speed control.

801.3.8.2.6 Flow stabilizer.

801.3.8.2.7 Tubing shall be copper.

801.3.8.3 Installation shall be as per the construction plans. ENGINEER shall determine final settings on PRV.

801.3.8.4 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a "Water Valve Data Card”. The ENGINEER will forward the card to the OWNER.

801.3.9 TAPPING SLEEVES: (For other than Concrete Cylinder Pipe) For either taps greater than 2/3 line size, or size on size taps 12 inches or less, only approved, long body, fully gasketed tapping sleeves shall be allowed. During installation of the tapping sleeve, the pipe shall be fully supported to support the weight of the tapping sleeve and tapping machine.

801.3.9.1 Tapping sleeves of heavy welded steel bodies shall meet the following requirements:

801.3.9.1.1 Epoxy coated.

801.3.9.1.2 Bolts and nuts to be stainless steel.

801.3.9.1.3 Gaskets to be Buna-N rubber.

801.3.9.1.4 Flange to be flat face steel and comply with AWWA C-207.

801.3.9.1.5 Class D-ANSI 150 lbs. drilling.

801.3.9.1.6 Designed to sustain an operating pressure of 150 psi.

801.3.9.1.7 May be used on all water mains, 4" and larger.

801.3.9.2 Tapping sleeves of cast iron bodies shall meet the following requirements:

801.3.9.2.1 Mechanical joint type with a working pressure of 200 psi .

801.3.9.2.2 Outlet flange to be Class 125, ANSI B16.1.

801.3.9.2.3 Sleeves to include side and end gaskets of Buna-N rubber.

801.3.9.2.4 Eight high strength steel bolts and nuts to secure the halves of the sleeve to the pipe.

801.3.9.2.5 May be used on all water mains, 4" and larger.

801.3.9.3 Tapping sleeves of short sleeve cast iron shall meet the following requirements:

801.3.9.3.1 Working pressure of 150 psi.

801.3.9.3.2 Outlet flange to be Class 125, ANSI B16.1.

801.3.9.3.3 Outlet half to have an enclosed gasket in a groove for a pressure seal.

801.3.9.3.4 Four high strength steel bolts to secure halves of tapping sleeve to the pipe.

801.3.9.3.5 May be used on all water mains, 4" and
larger.

801.4 WATER VALVE DATA CARD: Water Valve Data Card, as shown on pages 801-5 and 801-6 shall be prepared for all types of valves (Gate Valves, Butterfly Valves, Pressure Reducing Valves, Air Release Valves, etc.) according to the following instructions.

801.4.1 A Water Valve Data Card will be prepared for each valve installed.

801.4.2 The Valve Number will be assigned by the OWNER at a later date.

801.4.3 Valve Size is the nominal diameter of the valve, i.e., 6-inch, 14-inch or 48-inch. In the case of compound valves give size of main valve and bypass valve, i.e., 24-inch and 4-inch, or 36-inch and 6-inch.

801.4.4 Valve Type is the general description of the valve, such as: Resilient-Seal Gate Valve, Butterfly Valve, Globe Valve, Check Valve, etc.

801.4.5 Make and Model refers to the manufacturer, make and model number to identify the valve for replacement parts. This information should be available from the shop drawings.

801.4.6 Number of Turns and Direction to Open is the number of revolutions of the operating nut to make the valve travel from fully closed to fully open, and the direction is either clockwise or counterclockwise, i.e., 54 turns counterclockwise. All standard valves shall open counterclockwise. Operation, turn count, and direction to open will be verified by the ENGINEER prior to installation.

801.4.7 Under Project Name is the assigned work order number.

801.4.8 Date Warranty Expires is the expiration date, under the contract, for requiring warranty repairs.

801.4.9 Street Location: Give both Block number and street name. For valves in intersections give both streets, i.e., 5200 San Mateo Blvd. NE and 3000 Candelaria NE.

801.4.10 The section on coordinate location shall be completed with information furnished by the ENGINEER.

801.4.11 All applicable items on the "Water Valve Data
Card" should be filled in. However, accuracy is more unknown and cannot be determined, leave the space blank.

801.4.12 Depth to "Operator" is vertical distance from the top of actual valve operating nut to top of valve box cover.

801.5 FIRE HYDRANT DATA CARD
Fire Hydrant Data Card, as shown on page 801-8 shall be prepared for all installations of fire hydrants, according to the following instructions.

CARD NO. 801.4
WATER VALVE DATA CARD
(Front Side)

MAP NO.	VALVE NO.	SIZE / TURNS	TYPE ☐ -B.F.V. ☐ -B.V. ☐ -R.S.G.V.	MAKE	MODEL	PROJECT	EMD ☐ -YES ☐ -NO

CHECKED													
DATE													
CREW													

"CHECKED" CODE:

O. - OK　L - LOST　E - EXTENSION NEEDED　C - NEEDS CLEANING

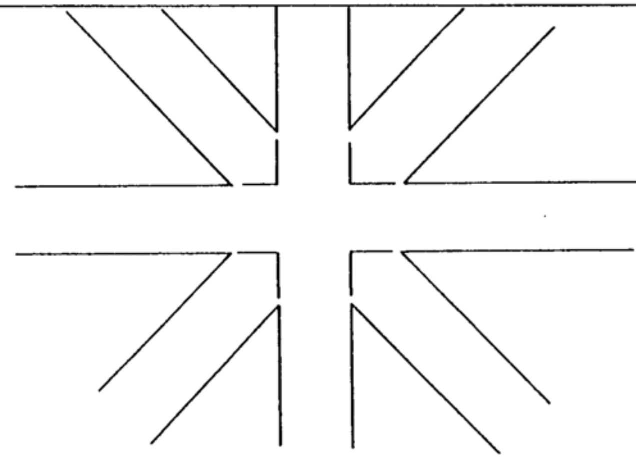
B - BROKEN　M - LID MISSING　R - RAISE TO GRADE

WARRANTY EXPIRES ______　DEPTH TO OPER. ______　LOCATION ______

CONTRACTOR ______　EXTENSION LENGTH ______　SKETCH EXACT LOCATION BELOW

NOTES: 1. Available at Water Systems Division.
2. Size 4 inches x 8 inches.

CARD NO. 801.4
WATER VALVE DATA CARD
(Reverse Side)



INDICATE NORTH
BY ARROW

REFERENCE SYMBOLS

- ⋈ - SUBJECT VALVE
- ⊗ - OTHER VALVE (S)
- ○ - PRESSURE REDUCING VALVE
- ○ - AIR RELIEF VALVE
- FIRE HYDRANT
- LINE VALVE IS FOR
- OTHER WATER LINES

COORDINATES OF LID

X - ____________________
Y - ____________________
Z - ____________________

801.5.1 Fire hydrant number will be assigned by the OWNER at a later date.

801.5.2 Fire hydrant type refers to the manufacturer's make and model.

801.5.3 Location. Indicate both block number and street name. At intersections indicate both street names.

801.5.4 Date installed. Indicate actual date the hydrant was installed.

801.5.5 Depth. Indicate the actual depth in feet of the lower barrel of the fire hydrant. This depth is measured from the shoe to the break-away flanges of the hydrant.

801.5.6 On the reverse side of the card indicate the location of fire hydrant on the sketch.

801.6 WATER LINE CONNECTIONS

801.6.1 GENERAL : All new water line tie-ins to the existing water system shall be directly inspected and approved by the ENGINEER. This includes non-pressurized or pressurized connections that will result in extension of the existing system.

801.7 LOCATIONS OF WATER MAINS AND SEWER LINES

801.7.1 Unless otherwise authorized by the ENGINEER, parallel water and sewer lines shall be installed at least 10 feet apart horizontally, and the water line shall be at a higher elevation than the sewer. Separate trenches will be required in all cases (this shall be effective even though one line has been installed prior to the other), and the water line shall be at least 18 inches above the sewer; when water and sewer lines cross each other, the water line shall be at least 18 inches above the sewer; otherwise the sewer shall be of pressure class pipe extending between manholes, or concrete encased for 10 feet on each side of the water line as shown in the Standard Detail Drawings. The crossings shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.

801.7.2 Water mains shall not be constructed under walkways, sidewalks, curbs and gutters, drivepads, or similar concrete structures by tunneling underneath them. Trenchless technologies may be allowed with prior approval by the OWNER. The CONTRACTOR will cut these structures by using a concrete saw or, at his option, he may remove and replace the section of the concrete structure to the nearest full expansion joint or edge.

801.8 TRENCHING AND BACKFILLING

801.8.1 All trenching and backfilling shall be in full accordance with Section 701. The minimum cover over distribution lines shall be 3 feet, and 4 feet of cover over transmission and collector lines.

801.9 GENERAL INSTALLATION ITEMS

801.9.1 Trenching, bedding, and backfilling shall comply with the requirements set forth in Section 701.

801.9.2 Pipe and accessories shall be new and unused and shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating. No other pipe or material of any kind shall be placed inside of a pipe or fitting after the coating has been applied.

801.9.3 The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during operations by plugging or other approved methods. When work is not in progress, open ends of pipes and fittings shall be securely closed so that no other substances will enter the pipes or fittings. Any section of the pipe found to be defective before or after laying shall be replaced with sound pipe without additional expense to the OWNER.

801.9.4 All nuts and bolts utilized in underground pipe connections shall be stainless steel, high strength cast iron or high grade, high strength steel. The full length of each section of pipe shall rest solidly upon the bed, with recesses excavated to accommodate bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipes shall not be laid in water or when trench or weather conditions are unsuitable for the work except by as authorized by the ENGINEER. All unconnected ends of pipes shall have a valve, plug, or cap installed on it.

801.9.5 Pipe shall be laid to line and/or grade shown on the plans or as staked in the field. Changes in horizontal or vertical alignment of the pipe at a joint shall not exceed the manufacturer’s recommended deflection for the type and size pipe being laid. When the change required is more than the recommended deflection, a fitting or several short joints of pipe shall be used. PVC pipe may not be deflected at the joints.

CARD NO. 801.5

FIRE HYDRANT DATA CARD

FIRE HYDRANT NUMBER

INSP.	
REP.	
CREW	
DATE	

TYPE

LOCATION

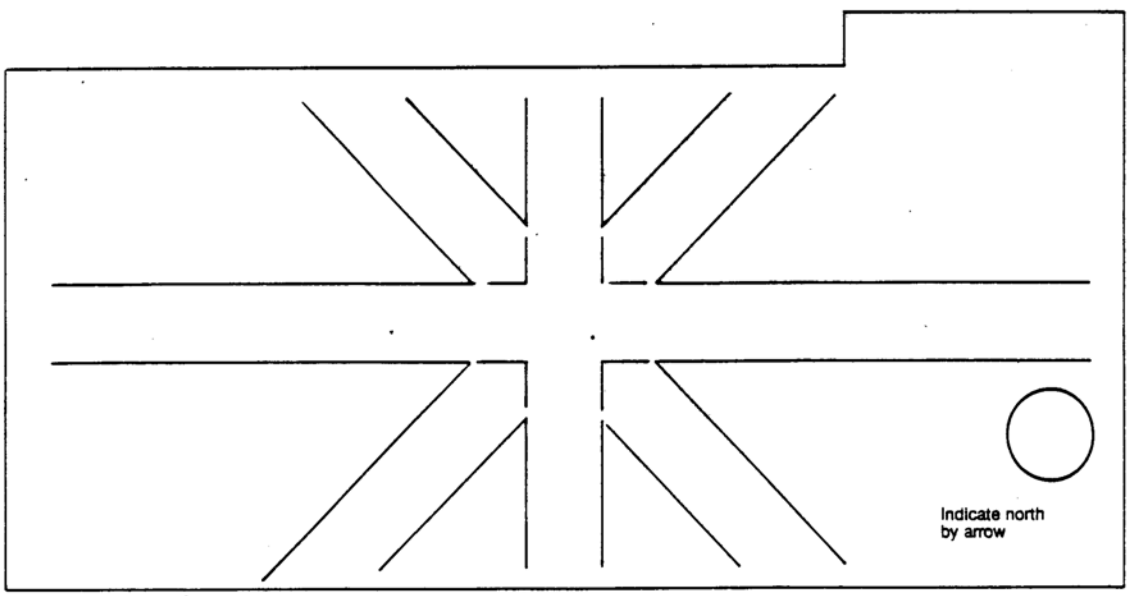
DATE INSTALLED

VALVES TO CLOSE FOR REPAIRS

DEPTH

REMARKS

FRONT SIDE



REVERSE SIDE

801.9.6 When new pipe is to be connected to an existing pipe or when crossing an existing pipe line, the CONTRACTOR shall excavate the existing lines well in advance of the laying of the new pipe line to enable the ENGINEER to verify their elevation and placement and to make any changes in grade and/or alignment of the new pipe line that may be required.

801.9.7 On all push-on-joints (bell and spigot, fluid-tite, and ring-tite) the rubber gasket shall be removed, cleaned, the groove cleaned, the gasket replaced, and the bell or plain end cleaned before jointing. The gasket and the bell or plain end of the pipe to be jointed shall both be lubricated with a suitable soft vegetable soap compound to facilitate jointing. Care shall be taken to insure that neither the bell or collar, or the pipe being jointed is damaged as it is being pushed home.

801.9.8 Flanged and mechanical joints shall be made with machine bolts and nuts of the proper size only. All components of these types of joints shall be cleaned before jointing. Only one (1) gasket will be permitted in a flange joint. In a mechanical joint the plain end pipe shall be fully seated before the gasket and gland is slipped up to the bell. Nuts on both types of joints shall be tightened by alternating nuts 180 degrees apart. The CONTRACTOR shall be responsible for assuring that proper torque is achieved and shall have a torque wrench available for verification by the ENGINEER.

801.9.9 When laying PVC pipe, a metalized detectable warning tape shall be installed a minimum of 1 foot above the top of pipe and 3 to 6 feet below the final surface. The tape shall be detectable with a standard metal pipe locator. The color of tape shall be safety precaution blue and will be inscribed at 10-foot intervals with the words, “CAUTION BURIED WATER LINE BELOW.” Tape shall be 2 inches wide. The tape shall be constructed of material that is impervious to alkalis, acids, chemical reagents, and solvents found in the soils.

801.9.10 When laying pipe, Electronic Marker Disks (EMDs) shall be installed in accordance with Section 170.

801.10 SPECIFIC PIPE LAYING REQUIREMENTS

801.10.1 Ductile iron pipe shall be installed in accordance with AWWA C 600 and as herein specified.

801.10.2 Steel pipe shall be installed in accordance with AWWA C 206 for welded joint and as herein specified. All field welded joints shall have one coat of coal-tar enamel of 3/32 inch thickness.

801.10.3 Plastic pressure pipe shall be installed in accordance with AWWA M 23 and C 900 and/or manufacturer’s printed recommendations, whichever is applicable. Where a conflict arises with this Specification, this Specification shall control. Trenching, embedment and backfill shall be specified in Section 701. A reference mark (a distinct circumferential line) is placed on the pipes spigot by the manufacturer to indicate the correct depth of the spigot penetration into the pipes gasket joint. If the pipe is seated too deep or too shallow, the pipe may buckle or separate due to thermal expansion/contraction, therefore particular attention must be exercised when jointing pipe. The reference mark must be showing and not farther than ½" from the leading edge of the bell. The CONTRACTOR shall verify that the manufacturer’s reference mark is correct per manufacturer’s literature.

801.10.4 All welded steel and concrete cylinder pipe shall have two small bond wires of low resistance, or other approved method, welded across the joint to make the joint electrically continuous. Where rigid joints are specified they shall be provided as specified herein. The outside joint recess shall be completely filled with a rich low shrinkage cement grout. The concrete surface in contact with the joint mortar shall be moistened with water just prior to pouring the joint recess. The mortar shall be poured into the joint recess against a waterproof paper or cloth diaper laid around and lapping the outside field joint. The diaper shall completely and snugly enclose the joint recess, being held in place by metal box strapping or wire. The mortar shall be poured into an opening slightly to one side on the top of the pipe and rodded by a flexible wire rod into place until it appears on the opposite side completely. After the joint recess has been filled with mortar, adjoining pipe sections shall not be disturbed. After the joint has been made, the concrete lining surfaces of the joint shall be moistened and the interior recess tightly jointed and troweled flush and smooth with the inside pipe surface. Grout for painting the interior joints shall be of a stiff consistency and shall have low shrinkage characteristics. In sizes of pipe smaller than 24", the mortar shall be buttered all around the shoulder inside the bell before the spigot is entered. A backing-up tool, such as an inflated rubber ball wrapped with burlap, shall be pulled through the joint to compact the mortar, completely fill the inside annular space and wipe off the excess mortar. Each joint will be inspected by the ENGINEER for proper and complete closure prior to final acceptance. Flanges shall be protected by “cocoon” type protection coating of coal-tar and felt in accordance with AWWA C 203. When moving individual pipe sections, the pipe shall be lifted using two web or belt type slings which support the pipe between the third and outside quarter points.

801.10.5 All fittings and valves shall be installed as per the type of joint as stated herein and/or as shown on the plans.

801.10.6 All couplings, clamps, sleeves, etc shall be installed as per the manufacturer's printed recommendations and as approved by the ENGINEER. The CONTRACTOR shall properly restrain all appurtenances as necessary.

801.10.7 All waterlines installed as part of a re-use system or other non-potable use shall be purple in color or shall be encased in purple PVC wrap.

801.11 CUTTING: The cutting of any type of pipe shall be done as per the manufacturer's printed recommendations, as approved by the ENGINEER. Care shall be taken in cutting any pipe that has an internal and/or external lining or coating.

801.12 BLOCKING AND RESTRAINED JOINTS

801.12.1 All restrained joints shall be by mechanical means unless directed or approved otherwise by the ENGINEER.

801.12.2 All tees, bends shall be restrained by mechanical means. Valves in runs need not be restrained, except that butterfly valves shall be flanged. Where rigid joints are called for on concrete cylinder pipe, the joints shall be flanged or field welded bell and spigot joints in accordance with the manufacturer's recommendation.

801.12.3 All caps and plugs on dead end lines will be mechanically restrained when feasible. Blocking may also be required when adequate restrain length is not available.

801.12.4 Where restrained joints on ductile iron pipe, or PVC pipe are called for on the plan, the mechanical restraining system employed shall conform to the recommendations of the pipe manufacturer. The restrained joint will be subject to the hydrostatic test specified herein.

801.13 RESTRAINING JOINTS FOR WELDED STEEL AND CONCRETE CYLINDER PIPE

801.13.1 Restrained joints in welded steel and concrete cylinder pipe for thrust restraint shall be produced by continuous welding the pipe joints and as shown on the plans.

801.13.2 Unless otherwise stated in the supplemental specifications the working pressure (operating plus transient) shall be 150 psi. The value for weight of overburden and the coefficient of friction shall be stated in the supplemental specifications.

801.14 TAPS INTO EXISTING CONCRETE CYLINDER PIPE

801.14.1 OBJECTIVE: The intent of this Subsection is to establish procedural and design criteria for making taps into existing concrete cylinder pipe for water distribution line extensions, and will be applicable to 4-inch and larger size water taps.

801.14.2 NEW WATER LINES: No non-factory taps will be allowed on newly-installed concrete cylinder pipes.

801.14.3 EXISTING WATER LINES:

801.14.3.1 Taps to existing concrete cylinder pipe must be approved in writing by the OWNER. The requester shall provide the following information:

801.14.3.1.1 Justification for the tap,

801.14.3.1.2 Project name and number, if applicable,

801.14.3.1.3 Date tap required,

801.14.3.1.4 Name of the CONTRACTOR who will be making the tap.

801.14.3.2 The CONTRACTOR shall coordinate the work with the OWNER before commencing work. The OWNER shall inspect and approve the entire installation of the tap.

801.14.4 INSTALLATION OF FIELD TAP:

801.14.4.1 Installation of field taps on concrete cylinder pipe shall be no smaller than 4 in. and no larger than 2/3 diameter of pipe to be tapped. No "weld neck" or weld on outlets will be used.

801.14.4.2 For field taps larger than 2/3 of pipe diameter, a tee will be inserted into the line.

801.14.4.3 For field taps greater than 4 in. and less than 2/3 diameter of pipe to be tapped an approved tapping saddle will be used. Tapping saddles shall be approved by the ENGINEER

801.15 SALVAGED MATERIALS
All salvaged materials (pipe, fittings, valves and other water line appurtenances) shall be stockpiled on-site in a neat manner by the CONTRACTOR. The ENGINEER and a representative of OWNER will inspect the stockpiled materials for salvage fitness and direct the following disposition:

801.15.1 If the material is considered salvageable, the CONTRACTOR will be directed to deliver the material to the OWNER. The CONTRACTOR will be responsible for the loading, transportation and off-loading of the salvageable materials. When the materials are delivered, the CONTRACTOR shall obtain a signed receipt from the OWNER. Before final acceptance of the project, all signed receipts will be submitted to the ENGINEER for accounting purposes.

801.15.2 Materials that do not have salvageable value will be disposed of by the CONTRACTOR at no additional cost to the OWNER.

801.16 HYDROSTATIC TESTS:

801.16.1 The CONTRACTOR shall be required to perform hydrostatic tests in all water mains, laterals, dead ends, and service lines in accordance with AWWA C 600. The test shall be conducted in the presence of the ENGINEER or his authorized representative. The testing of the lines shall be done without being connected to existing lines unless approved by the ENGINEER. The CONTRACTOR shall provide all temporary plugs required. If connections to the existing lines are allowed by the ENGINEER, it is with the understanding that the CONTRACTOR assumes any and all responsibility in case of damage or failure of the existing system. Water used for disinfecting may be used for hydrostatic testing. Leakage through connections to the existing system, leaks in the existing lines, or leaking existing valves under the test pressure will invalidate the test. The lines shall be tested at 150 pounds, or 1.5 times the normal working pressure of the line, whichever is greater, for not less than two hours. All taps, gauges and necessary equipment shall be provided by the CONTRACTOR as approved by the ENGINEER, however, the ENGINEER may utilize gauges provided by himself if he so elects. Each section of the new line, between valves shall be tested to demonstrate that each valve will hold the test pressure. No installed pipe will be accepted if the leakage is greater than that determined by hydrostatic test sheet calculations in which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested; D is the nominal diameter of the pipe in inches; and P is the test pressure in pounds per square inch gauge. During the test the test pressure should not lose more than 10 psig without being pumped back up to test pressure. The totals of the gallons of water required to hold the test pressure during the two hours and the amount of water required to return the line to the test pressure at the end of the test period is the total leakage. If the total leakage is less than the allowable, the line can be accepted. All visible leaks will be repaired regardless of the amount of leakage.

801.16.2 CONTRACTOR shall submit a testing plan to the ENGINEER for approval. In cases where a new main is being connected to an existing main without the installation of a new valve, the end of the new main shall be temporarily caped and blocked and a hydro-static test performed. Hydro-static tests should not be made such that an existing valve or existing main is included in the test section. Test Sheet on page 801-12 is the standard form which must be completed at the time of the test, signed by the ENGINEER and delivered to the OWNER prior to acceptance of the Project

801.17 DISINFECTING, FLUSHING, AND BACTERIA TESTING OF WATER LINES: New water lines shall be installed in such a manner as to not require cleaning by flushing. This shall require capping of stockpiled line, capping of lines at night and any other time work is not in progress, visual inspection of interior of lines, and cleaning as necessary, prior to placing in the trench. Every effort shall be made to prevent the entry of dirt and debris into pipelines under construction.

801.17.1 Mains shall be disinfected in accordance with AWWA C 651 or as required below with chlorine liquid solution, which is added by an approved method at one end of the lines as water is drawn through the lines and service connections. The chlorine solution shall remain in the line for at least 24 hours. The lines shall then be flushed until the chlorine residual is equal to the normal residual in the existing system or at 0.5 parts per million for unchlorinated water. Dry chlorine will not be used for disinfection of water lines. The flushed water will be disposed of by the CONTRACTOR appropriately.

801.17.2. Prior to the line being placed into service, bacteria samples shall be taken by the OWNER. Should results of the bacteriological analysis be unsatisfactory, the disinfection procedure shall be repeated.

801.17.3 The CONTRACTOR will be granted two free volumes of water for testing, disinfecting and flushing the new installation. All water used for testing, disinfecting and flushing shall be metered. If additional water is needed for these purposes, the water will be paid for by the CONTRACTOR at the current water rates. An approved backflow preventor system shall be used when withdrawing water from any waterlines and hydrants. Direct connection to the water system shall not be used for providing water for disinfecting, testing or flushing.

801.17.4 OWNER or the ENGINEER will collect the water sample to test the water in the existing lines at

TEST SHEET 801.16.2

Test No.:__________ HYDROSTATIC TEST

PROJECT NAME:____
DATE:________________________

PROJECT NUMBER:________________
CONTRACTOR:____

LOCATION:____
__

____
_____

PIPE MATERIAL: _________ DIP __________ PVC ________ CCP _______Fabricated Steel

Test: Length (S) = _________ ft.
Size (D) = _________ inches
Pressure (P) = ___________ psi - gauge (average test pressure during the hydrostatic test)
Leakage Allowed (L_{ALL}) - __________ gal / hr (L_{ALL} = SD P / 133,200 per AWWA C600-99)

Basis: Only resilient seated gate valves and/or rubber seated butterfly valves are used. No metal seated valves are allowed.

Total Leakage Allowed for 2 hour Test Period: L_{ALL} * 2 hours = ___________ gallons

Actual Amount of Water ADDED to maintain 150 psi ± 5 psi for 2 hours = ____________ gallons

If actual amount of water added is LESS THAN total leakage allowed, test PASSED
If actual amount of water added is GREATER THAN total leakage allowed, test FAILED

_______ Test Passed _________ Test Failed

______________________________ ___________ ___________________________ __________
Contractor Date Inspector Date

______________________________ ___________
Project Manager Date

COMMENTS:

____

____

____

____

Note: See Section 801.16 for the Specification for test procedure. A0224B/D2376B

the point of delivery for assurance of clean and potable water. The water in the existing lines will be used for testing and flushing.

801.18 INTERFERENCE WITH SERVICE AND SCHEDULE OR WORK

801.18.1 The CONTRACTOR shall obtain the permission of the ENGINEER before making any connections with existing mains. The required operation of existing valves will be performed by the OWNER as per Section 18.

801.18.2 Work shall be started after authorization of the ENGINEER and shall be completed in a prompt efficient manner in coordination and cooperation with other utilities concerned.801.18.3 The CONTRACTOR will be required to arrange his construction program with a view of maintaining continuous service to water users, from existing facilities, to the fullest extent possible. He shall, at all times, withhold construction work, where any conflict in the service requirements occur.

801.19 NOTIFICATION OF COMPLETION

The CONTRACTOR shall notify the ENGINEER, in writing, when the CONTRACTOR has completed construction of a water line. This notification should be submitted immediately upon completion; the water line will not be placed in service by the OWNER before the sewer service and the street are in place and until the OWNER has received and accepted all adequate documentation submittals. OWNER shall consider, on a case by case basis, exceptions for fire protection purposes.

801.20 VALVE CAN REHABILITATION

801.20.1 The rehabilitation of existing valve cans as shown on the plans or as authorized by the ENGINEER shall include the following:

801.20.1.1 Removing the existing valve can and ring and cover and installing the new type can and cover.

801.20.1.2 Install a new concrete collar in paved and unpaved areas. Size and direction of the line should be noted on the collar.

801.20.1.3 The existing ring and cover shall be considered salvaged materials.

801.20.1.4 Removal and replacement of the pavement.

801.20.1.5 Excavation, backfill, and compaction.

801.20.1.6 All materials, labor, and equipment necessary to do the work.

801.20.2 The work under this item shall be constructed per the Standard Detail Drawings.

801.21 DOCUMENTATION SUBMITTALS

801.21.1 At the time of the final inspection the following documentation will be submitted to the ENGINEER and OWNER:

801.21.1.1 Hydrostatic test data of the new water line system.

801.21.1.2 Microbiological test reports which were taken at representative locations along the system.

801.21.1.3 Fire hydrant and valve cards. All valves at that time shall be in the open position, unless otherwise authorized by the ENGINEER and OWNER.

801.21.1.4 A marked-up set of construction drawings reflecting as-built conditions. This does not supplant the requirements for record or as-built drawings.

801.22 MEASUREMENT AND PAYMENT

801.22.1 PIPE: Payment for all sizes and types of pipe shall be made on the basis of measurement per linear foot, including the length of fittings, valves, etc. The contract unit price of pipe shall include all jointing and coupling materials necessary for its installation and connections to other sections of pipe, except for fittings, valves or other appurtenances. The cost of hydrostatic testing, flushing and disinfecting of new water lines shall be included in the contract unit price for the item in place. Pipe locator tape for pipe shall be included in the contract unit price of the pipe.

801.22.2 DEPTH OF TRENCH:

801.22.2.1 The contract unit price for pipe and appurtenances in all cases shall include the trenching, installation, and compacted backfilling for trench cuts as specified in Section 701.

801.22.2.2 Payment for additional depth, below the specified limits shall be made on the contract unit price per vertical foot per linear foot, and shall include trenching, installation of pipe and appurtenances, and compacted backfilling in the deeper trench.

801.22.3 REMOVAL AND RELAY, RETURN, OR DISPOSAL OF PIPE:

801.22.3.1 The contract unit price for removal and relaying pipe shall include all labor and new gasket material necessary to remove and reinstall pipe in another location.

801.22.3.2 The payment for removing and the delivery 2-1/4 inch to 14 inch pipe to the Water Utility Division in the City Yard as salvage materials shall be made on the unit price per linear foot. Only cast iron or ductile iron pipe that is undamaged will be considered for salvage.

801.22.3.3 Where there is no salvage value of the pipe, the pipe shall be removed and disposed of by the CONTRACTOR. The payment for removal shall be made on a unit price per linear foot; there will be no additional cost to the OWNER for disposal.

801.22.3.4 The payments for removal and relaying, removal and return, or removal and disposal shall include trenching and compacted backfilling.

801.22.4 CAST IRON AND DUCTILE IRON FITTINGS:

801.22.4.1 All cast iron and ductile iron fittings shall be measured and paid for at the contract unit price per pound based on weights of an all mechanical joint ends fitting for the type and size of fitting used as specified in AWWA C 110, regardless of the type of ends on the fitting installed. The contract unit price per pound of fittings shall include all gaskets, glands, bolts and nuts required, no separate payment will be made for these items.

801.22.4.2 When the CONTRACTOR installs a OWNER-furnished fitting and replaces that fitting in the OWNER's inventory, the CONTRACTOR shall be paid the full contract unit price of that fitting as outlined above. If the CONTRACTOR does not replace the fitting in the OWNER's inventory the payment to the CONTRACTOR will be at the contract unit price of the fitting less the cost of the fitting itself.

801.22.4.3 Fitting insertion: The insertion of a fitting into an existing pipe line shall be measured and paid for at the contract unit price per pound based on weights of an all mechanical joint end fitting and if required an all mechanical joint connecting piece (coupling) of the type fitting and size used, as specified in AWWA C 110, regardless of the type of ends on the fitting and coupling installed. This payment shall include all compensation for the excavation, cutting and removal of the existing pipe, installation of the fitting and coupling, if required, the recutting of the existing pipe or new pipe installed between the fitting and coupling, and backfill and compaction complete in place. In addition to the payment for the fitting insertion, the CONTRACTOR shall be paid for one each non-pressurized (wet) connection and if pavement, curb and gutter, sidewalk, drivepad, etc., are removed, these items will be paid for as part of the appropriate item.

801.22.5 REMOVAL AND RELAY, RETURN OR DISPOSAL OF PIPE APPURTENANCES:

801.22.5.1 The contract unit price for removal and relaying the appurtenances shall include all labor and new gasket material necessary to remove and reinstall the item in another location.

801.22.5.2 The payment for removing and returning 2 1/4 inch to 36 inch appurtenance to the OWNER as salvaged material shall be made on the contact unit price per each or unit price per pound. Only undamaged material will be considered for salvage.

801.22.5.3 Where there is no salvage value of the appurtenance, the item shall be removed and disposed of by the CONTRACTOR. The payment for removal shall be made on the contract unit price per each or contract unit price per pound; there will be no additional cost to the OWNER for disposal.

801.22.5.4 The payment for removal and relaying, removal and return, or removal and disposal shall include trenching and compacted backfilling.

801.22.5.5 Only cast iron or ductile iron appurtenances will be removed and relaid or removed and returned for salvage.

801.22.5.6 Fire hydrant relocation payment shall be the contract unit price per each for removal and reinstallation and shall include excavation, blocking, aggregate and compacted backfilling, as shown in the Standard Detail Drawings.

801.22.6 CONCRETE CYLINDER OR WELDED STEEL PIPE FITTINGS:

Concrete cylinder or welded steel pipe fittings, such as flanged outlets, bends, reducers, etc., shall be considered as incidental to the contract unit price for installation of the pipe, as shown on the construction plans.

801.22.7 COUPLINGS: The measurement for steel or cast iron couplings shall include payment for all gaskets, bolts, and incidental materials as may be needed for its complete installation. Payment shall be made on the contract unit price per each size of coupling required.

801.22.8 STEEL FITTINGS: Steel fittings shall only be used when authorized by the ENGINEER and when needed to connect to an existing steel water line. Measurement and payment for steel fittings, when authorized, shall be made at the contract unit per pound based on weights of an all mechanical joint ends fitting of the type fitting and size used, as specified in AWWA C 110. This payment shall include all fabrication and welding required on the fitting.

801.22.9 VALVE AND VALVE CANS:

801.22.9.1 Valves shall be measured and paid for at the contract unit price per each size of valve. The contract unit price for valves 24-inch and larger shall include the bypass valve, fittings and piping, complete in place.

801.22.9.2 Valve boxes shall be measured and paid for at the contract unit price per each per type of valve boxes, which payment shall include the concrete pad with stem extension when required, complete in place.

801.22.10 FIRE HYDRANTS: Fire hydrants shall be measured and paid for at the contract unit price per each per depth of bury, which payment shall include excavation, gravel drain pocket, mechanical restraining system or blocking, backfilling, and compaction complete in place.

801.22.11 VALVE BOX ADJUSTMENTS:

801.22.11.1 Valve box adjustment using the adjustment collar and insert shall be measured and paid for per each complete in place including the concrete pad.

801.22.11.2 When the adjustment height required on a valve box exceeds the height of the adjustment collar or the valve box has been previously adjusted, the valve box will have to be rehabilitated. Measurement and payment shall be made as specified under Valve Box Rehabilitation.

801.22.12 WATER LINE CONNECTIONS:

801.22.12.1 Nonpressurized Connections: Nonpressurized connections shall be measured and paid for at the contract unit price per each for any size or type of pipe, complete in place, which shall include any extra excavation required, shut-off coordination, the removal of any caps or plugs or the cutting of the existing pipe any number of times required to make the connection, drainage plan (if required), pumping or handling of the water, backfilling and compaction. Fittings shall be measured and paid for per pound as specified herein, including all types of couplings.

801.22.12.2 Pressurized Connection: Pressurized connections shall be measured and paid for at the contract unit price per each per location shown on the plans, complete in place, which shall include excavation, the cleaning or removal of existing pipe coatings and coverings, air testing, the tapping, any grouting required, backfilling and compaction. The installation of the tapping sleeve and gate valve is to be paid under separate item or as indicated on the plans.

801.22.12.3 Connection to Steel Water Lines: All connections to existing steel water lines shall be made by using a transition coupling. The measurement and payment for this type of connection shall be made per pound of fitting for a Mechanical-Joint Connecting Piece of the size used based on the weights specified in AWWA C 110.

801.22.13 THRUST RESTRAINTS:

801.22.13.1 CONCRETE BLOCKING: When concrete blocking is used as a substitute for a mechanically restrained joint as authorized by the ENGINEER, the blocking shall be measured and paid for at the contract unit price per cubic yard placed to the neat lines shown on the plans or per the Standard Detail Drawings.

801.22.13.2 RESTRAINING JOINTS FOR WELDED STEEL OR CONCRETE CYLINDER PIPE: Measurement and payment for this item shall be at the contract unit price per linear inch of circumferential weld, complete in place, including protective coating of the weld.

801.22.13.3 MECHANICALLY RESTRAINED JOINTS: Mechanically restrained joint assemblies shall be measured and paid for at the contract unit price per each assembly per size of the pipe per each type (pipe to pipe, pipe to mechanical joint, pipe to fitting, etc.) complete in place.

801.22.13.4 VALVE ANCHORAGE: No separate measurement nor payment shall be made for valve anchorage as per Standard Detail Drawing. The cost of this work shall be included with the cost of the valve.

801.22.14 PRESSURE REDUCING VALVE (PRV): Measurement and payment for furnishing and installing a PRV shall be made at the contract unit price per each per size, complete in place as shown on the plans or in the Standard Detail Drawings. The payment shall include all labor, equipment and material required for the excavation, the PRV, all by-pass piping, fittings and valves both inside and outside the structure, the structure, backfilling and compaction.

801.22.15 AIR RELEASE VALVE (ARV): Measurement and payment for furnishing and installing an ARV shall be made at the contract unit price per each per size of ARV, complete in place as shown on the plans or in the Standard Detail Drawings. The payment shall include all labor, equipment and materials required for the excavation, ARV, piping, fittings, gate valve, can or structure, backfilling, and compaction.

801.22.16 VALVE BOX REHABILITATION: Valve box rehabilitation shall be measured and paid for at the contract unit price per each, complete in place which shall include the removal of the existing valve box, excavation, the new valve box installed, backfilling, compaction and the installation of the concrete collar.

801.22.17 CONCRETE STRUCTURES: The removal and replacement of concrete structures such as sidewalks, drive pads, and curb and gutters etc., required for the installation of water lines shall be measured and paid for as specified in Section 340 and 343.

801.22.18 BEDDING MATERIAL: No separate measurement nor payment shall be made for bedding material required when shown on the plans or when required due to the type of pipe supplied by the CONTRACTOR. The cost of the bedding material shall be included in the unit price of the pipe. If bedding material is not required by the conditions above but is required due to the conditions encountered during construction then the bedding material shall be measured and paid for as specified in Section 701.

801.22.19 SURPLUS MATERIALS: No separate measure nor payment will be made for the removal and disposal of surplus material generated by the pipe, bedding material or the use of lean fill.

SECTION 802

INSTALLATION OF WATER SERVICE LINES

802.1 GENERAL: This section pertains to the water service line which extends from the distribution line to the water meter.

802.2 REFERENCES

802.2.1 American Society for Testing and Materials (Latest Editions) (ASTM)

A-48 Specification for Gray Iron Castings
B-62 Specification for Composition Bronze or Ounce Metal Castings
B-88 Specification for Seamless Copper Water Tube
D-2000 Classification System for Rubber Products in Automotive Applications

802.2.2 American Water Works Association (Latest Editions) (AWWA)

C-800 Underground Service Line Valves and Fittings

802.3 MATERIALS

802.3.1 SERVICE LINE FITTINGS: All service line fittings shall be in full compliance with the latest revision of AWWA Standard C 800, except as modified herein. Service line fittings will be of brass which has a composition of 85 percent copper, 5 percent tin, 5 percent lead, and 5 percent zinc. Fittings will be of the type required for the type of service line being installed. All stops shall be of the round, full opening type with no restriction in the opening less than the nominal size. Fittings incorporating a threaded plastic gripper and “O” ring seal may be utilized in lieu of the flared configuration. All service pipe and fittings shall be designed to sustain and operating pressure of 150 psi.

802.3.2 COPPER SERVICE PIPE: The 3/4" to 2" copper service pipe shall conform to ASTM B 88 and shall be Type K, unless otherwise specified. Copper tubing shall be bent with approved tube benders without any kinks or sharp bends. Cutting of tubing will be performed with cutters designed for that purpose.

802.3.3 TAPPING SADDLES:

802.3.3.1 Service saddle bodies shall be of cast iron, ductile iron or bronze; straps, nuts, bolts, and washers shall be of stainless steel or bronze; gaskets shall be vulcanized elastomeric rubber or synthetic rubber compound.

802.3.3.2 The saddles shall be tapped for the type of thread being used on the corporation stop.

802.3.3.3 Tapping saddles for PVC C900 pipe shall have bronze straps and shall be installed as per the manufacturer’s printed recommendations.

802.3.4 METERS: Meters are furnished and installed by OWNER for new service line installations. For replacement and relocation work the meters will be furnished by the OWNER and installed by the CONTRACTOR.

802.3.5 METER

802.3.5.1 METER BOXES FOR 3/4"-1" Meters:

802.3.5.1.1 Meter boxes with two meters shall be centered on adjacent property lines.

802.3.5.1.2 The meter box is to be part of an underground enclosure for water meters and will have a cast iron cover plate or lid.

802.3.5.1.3 Meter box will be cast in one piece to form a hollow rectangle and new material or recycled materials shall be used in its manufacture.

802.3.5.1.4 The box material shall have the following minimum mechanical properties at variable ambient temperatures of -20°F to 120°F: compressive strength = 10,000 psi, tensile strength = 1,500 psi and flexural strength = 7,500 psi.

802.3.5.1.5 During testing of the materials at the above ambient temperatures no visual cracking, crazing, checking, blistering, surface pitting or deformation will be noted.

802.3.5.1.6 The finished meter box shall have the following physical properties:

802.3.5.1.6.1 Maximum wall deflection shall not exceed 1/8" at any one point when subjected to earth pressures or forces created during backfilling.

802.3.5.1.6.2 Material used for making the box shall be non-biodegradable when buried and/or exposed to water. Life expectancy of the box shall be at least 20 years.

802.3.5.1.6.3 Overall weight of the box component shall not exceed 80 pounds.

802.3.5.1.6.4 Inside dimensions of the box shall be: width = 16 ½ inches, length = 22 ½ inches, and depth = 24 inches. See Standard Detail Drawings for further dimensions and configurations. This meter box is for one and two meter installations.

802.3.5.1.6.5 Inside and outside surfaces of walls shall be reasonable smooth and free of burrs.

802.3.5.1.6.6 All materials used for box construction shall be approved for use in domestic water supply system.

802.3.5.2 METER COVER AND LID:

802.3.5.2.1 Lightweight and heavyweight meter box covers and lids shall be of Gray Iron casting materials. The light weight type is for use in sidewalk and unpaved areas not subject to traffic loads. The heavyweight type is for use in driveways and along streets having mountable curbs. The size, dimensions and details of the castings are as shown in the Standard Detail Drawings.

802.3.5.2.2 The casting shall conform to ASTM A 48, Class 30. The castings shall be true to pattern in form and dimensions and be free from pouring faults, sponginess, cracks, blowholes or other defects. Castings shall be filleted boldly at angles and arises shall be sharp and true. Edges shall be rounded or chamfered. The castings shall be thoroughly cleaned and the parting lines, grates, and risers ground flush. The lid shall seat firmly in the cover without rocking. The lid top surface shall be flush with the top surface of the cover. The lid shall be easily removed from the cover.

802.3.5.2.3 The cover and lid shall have, integrated in the casting top, a corrugated design to provide a nonslip surface. The lid shall have, integrated in the top of the casting, the words "WATER METER." The cover and lid shall be asphalt painted with coal tar paint. The paint thickness shall not exceed 30 mils.

802.3.5.3 METER BOX FOR 1 ½" AND 2" METERS:

802.3.5.3.1 The meter box is to be part of an underground enclosure for water meters.

802.3.5.3.2 The material used for manufacturing the box, cover and lid shall be new or recycled materials and shall have the following minimum mechanical properties at ambient temperatures from -20°F to 120°F: compressive strength = 11,000 psi, tensile strength = 1,700 psi and flexural strength = 7,500 psi.

802.3.5.3.3 During testing of the materials at the above ambient temperatures no visual cracking, crazing, checking, blistering, surface pitting or deformation will be noted.

802.3.5.3.4 The finished meter box shall have the following physical properties:

802.3.5.3.4.1 Box, cover and lid shall be rated for a load capacity of 1,000 lbs over a 4" x 4" area.

802.3.5.3.4.2 The overall weight of the box, cover and lid and extension shall not exceed 80 lbs.

802.3.5.3.4.3 Maximum wall deflection shall not exceed 1/8" at any one point when subjected to earth pressures or forces created during backfilling.

802.3.5.3.4.4 The material used for making the box shall be non-biodegradable when buried underground and exposed to water.

802.3.5.3.4.5 The minimum dimensions of the box, cover and lid shall conform to the Standard Detail Drawings.

802.3.5.3.4.6 The walls inside and outside of the box shall be reasonably smooth and free of burrs.

802.3.5.3.4.7 Cover of the meter box must have a non-skid surface and have "WATER METER" inscribed on the top. The cover shall be secured to the box by bolts.

802.3.5.3.4.8 All materials used for constructing the box, cover and lid shall be approved for use in domestic water supply systems.

802.3.5.4 LOCATIONS OF METER BOXES: Meter Boxes shall be located within the right-of-way as shown on Standard Detail Drawings.

802.3.6 CORPORATION STOP: Corporation stop shall be AWWA thread inlet by compression-type outlet or Pack Joint to fit 3/4", 1", 1 ½" and 2" copper tubing. The socket-housing or the rotating ball shall be PTFE coated to avoid metal to metal contact, ensure adequate seal and provide smooth turning operation. Outlet shall have a nominal size Standard AWWA C-800 copper service thread to fit existing OWNER drilling and tapping machine equipment. All casting shall be ASTM B-62 and outlet seals shall be Buna-N

802.3.7 TAILPIECE: The service will be placed in the meter box with a copper tubing tailpiece for 3/4" to 2", protruding from the standard concrete pad into the owner's property with a Pack Joint capped fitting to which the plumber can connect.

802.3.8 COPPERSETTERS: Coppersetters shall have pipe connections for Type K Copper Tubing. The coppersetter shall be an assembly of brass and copper tubing with a bottom bar, shall have a bronze ball valve on the inlet side of the meter, and shall be furnished with coupling gaskets. Coppersetters shall have temporary threaded plugs in the meter connections and shall be furnished free of excess grease. A stabilizer bar of 12 inches by ½ inch galvanized pipe shall be inserted in the yoke assembly as shown on the Standard Detail Drawings. A coppersetter with dual check valve shall be installed as per the Cross Connection Control section.

802.3.9 CROSS CONNECTION CONTROL: Approved dual check valves shall be installed on all services as indicated on the plans. For water customers having private wells located that connect to the municipal water system shall: agree to completely sever the private well from the premises existing plumbing system and install an approved dual check valve at the water meter. The owner of the premises shall also sign a covenant that runs with the land that the private well shall not be re-connected to the premises previous plumbing.

802.4 SERVICE LINE INSTALLATIONS

802.4.1 NEW 3/4" TO 2" SERVICE LINES:

802.4.1.1 New Service lines are complete new services in accordance with Standard detail Drawings and shall include the following:

802.4.1.1.1 Furnish and install tapping saddle, corporation stop, tubing, coppersetter, meter box, cover and lid and tailpiece, complete in place, including excavation and backfill and flushing.

802.4.1.2 Meters will not be installed as part of this work. However, construction of the meter box and placement of the yoke shall be such that at a later date the meter may be installed properly and easily.

802.4.1.3 The CONTRACTOR shall be responsible for proper vertical and horizontal location of the box over the meter yoke.

802.4.2 REPLACEMENT 3/4"-2" SERVICE LINES:

802.4.2.1 Replacement service lines are essentially new services installed in conjunction with the replacement of the water main. Unless otherwise specified in the Contract Documents, all existing services shall be replaced with new material between the water main and the meter yoke.

802.4.2.2 Replacement service line work does not include any relocation or rehabilitation of the meter. The work shall consist of the following:

802.4.2.2.1 Furnish and install tapping saddle, corporation stop, coppersetter and tubing, complete in place, including flushing.

802.4.2.2.2 Re-connection to the meter.

802.4.2.2.3 All necessary excavation and backfill and concrete removal and replacement.

802.4.3 3/4" thru 2" METER RELOCATION:

802.4.3.1 A meter relocation is the relocation of an existing meter to a position closer to or further away from the centerline of the street. The meter relocation item is to be used when the service line is not replaced.

802.4.3.2 A new meter box and cover shall be furnished and installed.

802.4.3.3 A coppersetter shall be used in the reinstallation of the meter, for services sized 3/4" thru 2", and shall be of a height to properly position the meter, vertically, within the box, as shown in the Standard Detail Drawings.

802.4.3.4 When moving the meter toward the property line, new tubing shall be installed, from the inlet connection point of the meter to be relocated, to the coppersetter, and a tailpiece shall be installed on the outlet side of the coppersetter to the property line. When the existing meter is moved toward the street, the gap in the service line shall be filled with new tubing, including connectors.

802.4.3.5 When determined by the OWNER, the existing meter shall be replaced by the CONTRACTOR with a meter furnished by the OWNER. 1" meters will be substituted for 1-1/4" meters.

802.4.3.6 The work and materials shall include the coppersetter, connector pieces, excavation, tubing, backfill, removal of old meter and meter box, installation of new meter, meter box, and concrete pad, necessary disconnections, and connections of the house and meter box service lines, complete restoration of the affected site (including landscaping) and adjustment of the meter to the level shown in the Standard Detail Drawings.

802.6 3/4" thru 2" METER REHABILITATION AND REPLACEMENT

802.6.1 3/4" THRU 2" METER REHABILITATION:

802.6.1.1 Meter rehabilitation is applicable where the meter box deficiency exists. Deficiencies include obsolete, broken above or below grade, improperly sized, or existing location does not allow access to the meter, curb stop or connector pieces (does not meet new installation standards). When any of these conditions exists, the meter box and meter installation shall be rehabilitated, as authorized by the ENGINEER.

802.6.1.2 The work and materials shall include:

802.6.1.2.1 Furnish and install a new coppersetter, meter box, cover and lid and concrete pad.

802.6.1.2.2 Furnish and install any reconnection pieces necessary for a complete service restoration.

802.6.1.2.3 Flushing out of the service line.

802.6.1.2.4 Site restoration (including any necessary landscaping) and cleanup.

802.6.2 3/4" thru 2" METER REPLACEMENT: Meters to be replaced under “Service Line Replacement” and “Meter Relocation” work shall be performed in accordance with the following procedure:

802.6.2.1 All existing meters involved with “Service Line Replacement” and “Meter Relocation” work shall be replaced by the CONTRACTOR with a meter provided by the OWNER as determined by the OWNER.

802.6.2.2 The replacement meter shall be requested, in writing by the CONTRACTOR from the OWNER with documentation of address and size meter for each meter to be replaced, project name and number, and CONTRACTOR’s name.

802.6.2.3 The request shall be received at least seven days prior to issuance of meters.
802.6.2.4 The CONTRACTOR will be issued a directive with each meter issued. The CONTRACTOR shall return the directive along with the replaced meter, within five days of replacement of the meter to the OWNER.

802.6.2.5 The work order must be turned in with the specific meter for which the meter replacement was issued. The replaced meter shall have a tag affixed to the meter, by the CONTRACTOR, showing the CONTRACTOR’s name, and project name and address from which the meter was removed.

802.6.2.6 The CONTRACTOR shall handle all meters so as not to damage them and shall be responsible for the meters from the time of receipt to turn in. Stolen or lost meters shall be replaced at the CONTRACTOR’s expense.

802.7 METER PIT FOR SERVICES 3" AND LARGER: Meter pit construction details and the installation of the pipe, valves and meter details will be shown on the construction plans.
802.8 MEASUREMENT AND PAYMENT

802.8.1 METERED SERVICE LINE INSTALLATIONS: For 3/4 inch thru 2 inches, new service lines, service line replacements and transfers, meter relocations, and meter replacements, and meter rehabilitation shall be measured and paid for as a completed unit of installation in accordance with the applicable items contained in the Bid Proposal, which payment shall include all materials, labor and equipment required to install, flush and place into service the applicable item.

802.8.2 SERVICE LINE TUBING: Unless otherwise authorized in the Contract Documents or by the ENGINEER, service line tubing shall be considered incidental to the applicable pay item established in the Bid Proposal.

802.8.3 PAVEMENT REMOVAL AND REPLACEMENT: Unless otherwise authorized in the Contract Documents or by the ENGINEER, pavement removal and replacement shall be considered incidental to the applicable pay item established in the Bid Proposal.

SECTION 1200

TEMPORARY TRAFFIC CONTROL

1200.1 GENERAL

This section pertains to barricading and temporary traffic control:

1200.2 CONTENTS

SECTION 1200

BARRICADING AND TEMPORARY TRAFFIC CONTROL

1200.1 GENERAL: The work under this section includes, but is not limited to, traffic control standards needed to ensure safety to motorists, the public, construction workers, and special event participants when City roadways are temporarily disrupted due to construction efforts or special events.

1200.2 REFERENCES

1200.2.1 Manual on Uniform Traffic Control Devices, (MUTCD), Part VI, FHWA.

1200.2.3 The American Traffic Safety Services Association (ATSSA), Quality Standards for Work Zone Traffic Control Devices.

1200.2.3 This Publication, Latest Edition

SECTION 400 TRAFFIC CONTROL

1200.3 BARRICADING STANDARDS

1200.3.1 Before construction begins all traffic control signs and barricades must be installed in accordance with the approved traffic control plan, construction plans, barricading detour plan or as directed by the OWNER. No construction signing and barricading shall commence until CONTRACTOR is assured that all equipment, manpower, and resources are available to start and complete the work. Where applicable, all signs, barricades, and/or barrels will be moved forward as the construction progresses.

1200.3.2 The name and telephone number of the owner shall be permanently stenciled on all barricades and traffic control equipment. The name and telephone number shall be a non-retroreflective color not over 2 inches in height, and be placed on a non-retroreflective surface of all equipment. Graffiti shall be promptly removed from any all barricades and traffic control equipment. If notified by the OWNER or the ENGINEER, graffiti shall be removed, or the equipment replaced with clean equipment, within four hours or the barricade permit is subject to revocation.

1200.3.3 All advance warning signs approaching a construction zone shall be double indicated (one sign each on left and right sides of approaching traffic) for all multiple-lane roadways with painted or raised medians and where adequate space is available. All double indicated signs shall be the same size. When a sign is placed in a painted median, especially a two-way continuous left-turn lane, a reflectorized barricade must be placed on the back side of the sign to alert motorists approaching from the opposite direction.

1200.3.4 It shall be the responsibility of the CONTRACTOR to remove all construction barricades, signing, and traffic control devices not required at the end of the working day.

1200.3.5 All advance warning signs shall be a minimum of thirty-six inches by thirty-six inches in size with super engineering grade sheeting or better. On high-speed (posted 45mph and above), rural section roadways where adequate pedestrian space is available, forty-eight inch by forty-eight inch signs is preferred. The use of forty-eight inch signs shall be required at locations as published on a list by the ENGINEER. All advance-warning signs not directly applicable shall be removed when not needed, and shall not be left in public right-of-way. All construction signing shall be black on a reflectorized orange field unless otherwise specified.

1200.3.6 Existing posts may be used at some locations, with approval of the ENGINEER. Portable sign supports will be acceptable as an alternate for signs which are to be in place for less than three (3) weeks. The bottom of advance warning signs mounted on barricades or temporary sign supports shall be no less than one foot above the traveled way. All regulatory and advisory signs shall be mounted on sign stands or as otherwise approved by ENGINEER . The placement of portable sign supports shall not block or impede pedestrian access. All signs ground mounted on single or double posts shall have the bottom of the sign seven (7) feet above pavement level.

1200.3.7 Barrels and different types of barricades are generally not intended to be intermixed in the same series of channelization. All barrels may have sand or water ballast limited to one hundred (100) pounds. All barricades shall be placed correctly with diagonal stripes sloping downwards in the direction traffic is to pass. Where barricades extend entirely across a roadway, the stripes must slope downward in the direction toward which traffic must turn. Where both right and left turns are provided, the stripes must slope downward in both directions from the center of the barricade or barricades. Where no turns are intended, the stripes must slope downward toward the center of the barricade or barricades.

1200.3.8 The CONTRACTOR shall inspect and maintain all barricades at least once each day except for barricades on or adjacent to arterial and collector streets which shall be checked twice daily, including inspection during hours of darkness. A log of these inspections showing project, location, date, and time shall be kept and a copy sent to the Construction Coordination Division upon request. Upon request, the CONTRACTOR shall immediately produce current traffic control logs. Failure to do so may result in suspension of work or revocation of barricade permit.

1200.3.9 All traffic control devices required within traveled lanes after dark are to be equipped with warning lights. Type (A) flashing warning lights shall be used on all devices which are intended to warn motorists or pedestrians of hazards or obstructions in or near the travel path. Type © steady burn lights shall be used on all devices which are intended to define the travel path. All lights shall be operational. Traffic control devices that are damaged, dirty or have substandard reflectorization shall be immediately brought up to standard. Reflectorized sheeted panels shall not be considered as a replacement for a required warning light. Warning lights shall be incidental to payment for traffic control.

1200.3.10 Equipment and materials are not to be stored within fifteen (15) feet of a traveled lane during non-working hours, unless approved by the ENGINEER, which approval cannot be unreasonably withheld.

1200.3.11 CONTRACTOR shall provide and maintain a safe and adequate means of channelizing pedestrian traffic around all work areas throughout the periods of construction. All such channelization shall be arranged to prevent pedestrians from having to enter the roadway in order to pass around the work area. Where required, pedestrian detour signs will be installed by the CONTRACTOR. Where construction impedes or obstructs sidewalk access, CONTRACTOR shall barricade sidewalks and place "Sidewalk Closed" signs accompanied with the appropriate pedestrian detour signing. Pedestrian detour signs shall be incidental to payment for traffic control.

1200.3.12 CONTRACTOR shall provide and maintain a safe and adequate means of channelizing bicycle traffic around all work area throughout the periods of construction when existing bicycle trails, lanes, or routes are designated. Where possible, adequate space for bicyclists must be provided, and bicycle detour signs, including "Share the Road" signs shall be installed. When adequate space is not available to provide for bicycle access, the bicycle facilities shall be adequately detoured around the construction site. The detour route shall minimize out-of-direction travel distance, and shall be adequately signed and directed. Bicycle detour signs shall be incidental to payment for traffic control.

1200.3.13 All barricades, signs, and traffic control equipment shall be properly and adequately ballasted for normal wind loads. For equipment placed for extended periods (seven days or more), or during the months of February through May, additional ballast shall be required.

1200.3.14 The use of roll-up advance warning signs is allowed, so long as the reflectivity required in the MUTCD is provided. Such signs shall be adequately braced to resist rotation under normal wind loads.

1200.3.15 The use of orange warning flags mounted atop construction warning signs is encouraged and is required in certain instances. Flags mounted atop construction signs is required on all "Reduced Speed Ahead (R2-5a)" signs, "Reduced Speed (R2-5b and R2-1)" signs, all "Double Fine Zone" signs, "Road Closed Ahead (W20-3)" signs, "Detour Ahead (W20-2)" signs, "Flagger Ahead (W20-7)" signs, "Flagger Symbol (W20-7a)" signs, and "Be Prepared to Stop (W20-7b") signs.

1200.3.16 Cones are an acceptable traffic control device under certain situations. Traffic cones are not to be used to separate traffic traveling in different directions. All cones must be a minimum of 28 inches tall. The use of cones as traffic control devices is not allowed during nighttime hours; however if used, all cones used at night must include white, reflectorized bands per MUTCD standards. The use of cones is encouraged for daytime moving closure operations, projects in duration of two hours or less, and special events.

1200.3.17 Type III barricades must be used at all road closures. Multiple type III barricades of the same configuration placed next to each other in the same direction is allowed. A type III barricade or illuminated arrow panel must be used for each lane closure. A minimum of two feet of exposed railing is required on the traveled side (open lanes) of type III barricades. The minimum length of type III barricade for each lane closure is eight (8) feet per lane twelve (12) feet or less in width, and the minimum length of type III barricade required for a sidewalk closure is four (4) feet. The minimum length of type III barricades for a double lane closure is sixteen (16) feet. Additional barricades above the minimum required may be required to fill in gaps for wide lanes, multiple lane closures, or shoulder areas.

1200.3.18 Road closures shall be pre-warned by the use of a "Road Closed to Through Traffic" (R11-4) sign, where appropriate. These signs shall be placed at intersections approaching the road closure with appropriate detour signing. When mounted on a three rail barricade support, the maximum width of sign support shall be six feet. If the detour route is more than one intersection before the road closure, then additional R11-4 signs shall be placed at each intersection between the detour route and the road closure. “Road Closed to Through Traffic” signs are encouraged to be placed on or near the center of the roadway, but R11-4 signs shall not be placed in an area that block sight distance for motorists and pedestrians. Where sight distance becomes a problem, low-volume intersections may be temporarily converted to a four-way Stop condition, with the approval of the ENGINEER.

1200.3.19 Illuminated arrow panels with a minimum size of 32 square feet may be used in lieu of type III barricades for lane and roadway closures. Arrow panels must be battery or solar powered. The use of diesel, or other noise generating power sources, is not allowed. For roadways with a previously posted speed limit of 35 mph or higher, the use of arrow panels is required for all lane closures. An arrow panel is required for each lane reduction, but is not required for shifting tapers. In residential areas where the arrow panel will be used at night, directional lighting limited to 30 degrees or less must be used to reduce glare into nearby properties. When illuminated arrow panels are used for a lane closure, then the use of vertical panels at the regular MUTCD minimum spacing for the lane reduction taper is allowed.

1200.3.20 For work expected to last one hour or less and for moving closures, reduced barricading may be allowed as approved by the ENGINEER. Reduced barricading on arterial or collector roads shall consist of a minimum of one advance warning sign, a minimum of a three barricade or cone taper, and an illuminated arrow panel.

1200.3.21 For emergency utility work on arterial or collector roadways, the CONTRACTOR must notify the traveling public. If a variable message board is not required by the ENGINEER, a “Utility Emergency Ahead” sign must be installed for each direction of arterial / collector traffic approaching the work site. The “Utility Emergency Ahead” sign must be placed in addition to, and preceding, the three normally required advance warning signs at the same spacing required in the MUTCD for advance warning signs.

1200.3.2 Double fine zones shall be delineated by the
use of “Double Fine Zone” signs as outlined in this section. Double fine zones shall be delineated for construction zones and construction curtilage zones at the request of either the OWNER or ENGINEER. In addition, double fine zones are required on all arterial / collector roadways where there is a: 1.) reduced speed limit; 2.) lane reduction; 3.) reduced design speed; or 4.) traffic hazard. Double fine zones are required for all flagging operations, and work zones with an imminent danger to workers, regardless of the roadway classification. The beginning of the double fine zone shall be clearly marked with a sign stating: “*Construction* – Begin Double Fine Zone”. The end of the double fine zone shall be clearly marked with a sign stating: “*Construction* – End Double Fine Zone”. If the double fine zone extends beyond one-half mile in length, intermittent signs must be placed no more than one-half mile apart stating: “*Construction* – Double Fine Zone”. Additional intermittent signs are needed following side street entrances. Details for the double fine zone signs are on file with the ENGINEER. Placement of the Begin Double Fine Zone sign shall be immediately following the “Road Work Ahead” sign. Placement of the End Double Fine Zone sign shall be immediately preceding the “End Road Work” sign.

1200.3.23 On arterial or collector roadways with multiple lane closures, the advance warning signs shall indicate the correct number of lanes closed. Arrow panels are required for each lane closure of multiple lane closures on arterial or collector roadways, regardless of the previously posted speed limit.

1200.4 CONFLICTS WITH EXISTING SIGNING, STRIPING, AND SIGNALS

1200.4.1 CONTRACTOR shall not remove, realign, or adjust any official OWNER traffic control device including stop signs, warning signs, or any other traffic or parking control signs, unless approved by the OWNER. CONTRACTOR shall give the OWNER three (3) working day’s prior notice of any official OWNER traffic control device that needs to be moved. The OWNER shall take all appropriate actions as soon as practical thereafter. When CONTRACTOR places regulatory signing reducing the posted speed limit as approved by the OWNER, the CONTRACTOR must temporarily cover any and all conflicting speed limit signs. Such covers must be immediately removed once the temporary speed limit reductions are removed.

1200.4.2 The CONTRACTOR is responsible for obliteration of any conflicting striping and responsible for all temporary striping. For temporary situations lasting seven days or less, conflicting pavement markings may be addressed with the proper use of channelization devices and signing, unless otherwise approved or required by the ENGINEER.

1200.4.3 When the construction activity or traffic detouring plans result in less than two signals being visible in any direction at a signalized intersection, additional temporary traffic signals shall be required. A minimum of two signals must be visible within a twenty degree horizontal and vertical cone of vision, as measured from the stop bar for each lane approaching a signalized intersection.

1200.5 STREET AND LANE CLOSURES

1200.5.1 CONTRACTOR shall maintain access to all public and private facilities adjacent to the construction area at all times, including businesses and/or residents. When denying access is unavoidable, CONTRACTOR must coordinate access restriction to times and locations that are reasonably convenient to the property owners and/or residents affected. CONTRACTOR shall construct and maintain access roads, including paved ramps, where deemed necessary by ENGINEER to maintain traffic flow. Business access signs may be required to direct traffic to existing businesses, as directed by ENGINEER or OWNER. No more than three businesses shall be placed on a single sign. In areas of multiple adjacent businesses, only generic "Business Access Only (arrow)" signs are required. For shopping centers with multiple business tenants, the name of the shopping center shall be placed on a sign at each access location. Access signs shall have 5 inch high, white letters with a directional arrow on a reflectorized blue background. Business access shall be rectangular in shape, no taller than wide, and shall be no larger than four feet wide by three feet tall. Business access signs shall not be placed where they block sight distance for either motorists or pedestrians.

1200.5.2 CONTRACTOR shall notify the following services forty-eight (48) hours in advance of any complete street or access closures: Police Department, Fire Department, U.S. Postal Service, Solid Waste Department, Ambulance Services, local schools, and the Transit Department. The CONTRACTOR shall also notify all businesses and residents directly affected by the road closure. For the total closure of arterial or collector roadways, a variable message board must be installed for a minimum of two days prior to the road closure notifying motorists of the dates and times for the closure. A minimum of one variable message board is required for each direction of closure. For the total closure of a local roadway, a sign must be installed for a minimum of two days prior to the road closure notifying motorists and residents of the dates and times of the closure. A minimum of one sign is required for each direction of closure.

1200.5.3 The CONTRACTOR shall be responsible, and shall make appropriate accommodation, for garbage and trash collection, mail delivery, and other essential services needed by residents and businesses affected by CONTRACTOR operations. This effort shall include coordination with U.S. Post Office, Solid Waste Department, and other agencies. Where required, CONTRACTOR shall notify all residents in writing at least two days prior. Such notice shall include at a minimum: dates and times of construction activities and the name and telephone number of the CONTRACTORS contact person. CONTRACTOR shall collect all trash and garbage in the project area and deliver to an accessible location for collection by 7:00 a.m. on the designated trash collection day. Such trash and garbage cannot be deposited onto private property, must not block access, and shall be immediately cleaned up by CONTRACTOR upon pick up by the Solid Waste Department or private trash collection company.

1200.5.4 Total or partial closure of some streets may be restricted to certain hours of the day by the OWNER. Streets having working hour limitations may be noted on the approved construction plans. In cases of emergency work or permit work, streets having working hour limitations will be designated by the ENGINEER. Waivers of the working hour limitations can be obtained from the ENGINEER.

1200.5.5 If construction on streets with working hour limitations is expected to extend past the allowed working hours, plating of the trench and/or temporary asphalt concrete pavement shall be provided so that the roadway is opened to traffic within the allowable work hours. Such excavations must be plated, temporarily patched or resurfaced prior to opening to traffic. A minimum width of 11 feet for each lane of traffic shall be provided, unless otherwise directed by the ENGINEER.

1200.5.6 When detouring low and moderate-volume traffic onto a previously unpaved area, see Table 1200.1 for surfacing requirements.

Table 1200.1

Time	Shoulder Residential	Shoulder (Other)	Local / Residential	Major Local	Collector	Arterial
Under one day	Compacted Subgrade	Compacted Subgrade	Compacted Subgrade	Compacted Subgrade	Gravel or millings	Gravel or millings
1-3 days	Compacted Subgrade	Gravel or millings	Gravel or millings	Gravel or millings	Treated Millings	2" Asphalt
4-7 days	Gravel or millings	2" Asphalt	Gravel or millings	Treated Millings	2" Asphalt	2" Asphalt
8-30 days	Treated Millings	2" Asphalt	Treated Millings	2" Asphalt	4" Asphalt	4" Asphalt

Table Notes:

The contractor shall be responsible to continually maintain all detours, providing a smooth, drained, and safe roadway surface. All compacted subgrade areas shall be graded regularly to provide a smooth driving surface, and must be treated regularly with water or other approved dust control palliative. During periods of dry and/or windy weather, a water truck must be on-site at all times, and frequent watering may be necessary.

Gravel, millings, or treated millings must be bladed and compacted to provide a stable, smooth driving surface prior to opening to traffic. Such surfacing shall be regularly maintained to provide a smooth and stable driving surface. All temporary asphalt pavement shall be placed upon a compacted subgrade which shall be graded to drain. Treated millings includes millings stabilized with an applied emulsive asphalt.

1200.6 MEASUREMENT AND PAYMENT

1200.6.1 Measurement and payment for barricading and temporary traffic control shall be per lump sum per project except for the items listed below. Payment of additional items will only be made if such traffic control device or services is either approved in the construction plan set or requested by the OWNER in writing. Payment shall include the cost of obtaining all permits and approvals; preparation of traffic control plans; working restricted or extended hours when required; notification to all affected residents, businesses, agencies, or other public contacts; setting and resetting barricades, maintaining barricades, daily removal of barricades when required, flagman operations when required, installation of temporary traffic signals when not required by the OWNER or in the construction plans; coordination with ENGINEER on traffic signal re-timing; hiring of off-duty Police Department Officers; and any and all other costs associated with temporary traffic control except the following:

1200.6.1.1 Measurement and payment of the installation of temporary striping shall be made per lineal foot of striping installed per four inch wide.

1200.6.1.2 Measurement and payment of business access and special signs shall be made on a per square foot basis project duration.

1200.6.1.3 Measurement and payment of Variable Message Boards shall be made per each on a per day (24-hour period) basis.

1200.6.1.4 Measurement and payment of illuminated arrow boards required by the OWNER, or required in the construction plans, shall be made per each on a per day (24-hour) basis.

1200.6.1.5 Measurement and payment of temporary wall barrier shall be made per lineal foot of wall barrier installed and removed at each location per project.

1200.6.1.6 Measurement and payment for temporary traffic signals required by the OWNER, or required in the construction plans, shall be made per each per project duration at each location.

SECTION 401: PAVEMENT SMOOTHNESS MEASUREMENT

401.1 DESCRIPTION

This Work consists of providing and using profile testing Equipment that incorporates the Mean Roughness Index (MRI) measurement for the established categories provided within this Section. The MRI is the average International Roughness Index (IRI) of left and right wheel paths.

Unless otherwise specified in the Contract, Category One (1) Table 401.5.1.1:1, "MRI Based Profile Pay Adjustment Schedule for Category I HMA/WMA Projects," will be applicable to all Hot Mix Asphalt (HMA)/Warm Mix Asphalt (WMA) Projects. Unless otherwise specified in the Contract, Table 401.5.1.2:1, "MRI Based Profile Pay Adjustment Schedule for PCCP Projects" – Category I will be applicable to all Portland Cement Concrete Pavement (PCCP) Projects.

This Specification applies to all construction Projects, with one (1) opportunity for pavement smoothness. An example of one (1) opportunity for pavement smoothness is a single lift of paving operations for HMA/WMA or PCCP.

References to Open Graded Friction Course (OGFC} in Section 401, "Pavement Smoothness Measurement" include OGFC, WMA-OGFC, and Rubberized Open Graded Friction Course (ROGFC).

401.2 MATERIALS—Reserved

401.3 CONSTRUCTION REQUIREMENTS

401.3.1 Inertial Profiler

The Contractor shall provide an inertial profiler that meets the requirements of AASHTO M 328 "Inertial Profiler," or a State Materials Bureau's approved equal. The Inertial Profiler shall use dual height and vertical acceleration sensors. The height sensors shall have a centerline distance of seventy (70.0) inches ± one (1.0) inch between sensors.

401.3.1.1 Inertial Profiler Calibration and Certification

The inertial profiler shall be certified in accordance with the Department's *Standard Practice "Certification of Inertial Profilers."* Inertial Profiler used for Acceptance testing on NMDOT Projects shall have a current TTCP annual calibration sticker or manufacturer's calibration and certification certificate. The manufacturer's certificate is valid only until the date of the next TTCP sponsored profile measuring device certification.

The Contractor shall verify the accuracy of the horizontal and vertical sensors daily in accordance with the manufacturer's and TTCP procedures. If the inertial profiler is used on multiple Projects in one (1) day, verification of the horizontal and vertical sensors will be required before use on each Project. The Contractor shall perform verifications in the presence of the representative designated by the Project Manager. The Project Manager may require additional verifications. The Contractor shall provide documentation to the Project Manager and maintain copies of the verifications documentation and manufacturer's procedures.

The Contractor shall remove the inertial profiler from the Project if it does not meet the manufacturer's verification and calibration requirements. The Project Manager will report the TTCP inertial profiler certification number to the TTCP Administrator in order to provide notification that the Contractor cannot use the machine on other Projects until inertial profiler obtains re-certification. Once the manufacturer re-certifies the inertial profiler, provide a copy of the certificate to the Department's TTCP Administrator. The TTCP Administrator will provide a temporary TTCP certification valid until the next scheduled certification.

401.3.1.2 Technician Certification

The Department's TTCP will certify individuals performing profile measurement. The Department will base certification on demonstrated ability and a written test. The TTCP will establish the term and expiration date of certification and requirements for renewal. The Department State Materials Engineer, through the TTCP, will investigate any concerns submitted in writing as to the competence of a certified individual and implement corrective action if necessary in accordance with the TTCP Board of Directors established procedures.

401.3.1.3 Profile Measurements

The Department will consider profile testing as part of the paving operation.

The Contractor shall provide the proposed frequency and schedule for profile testing to the Project Manager no later than the Pre-Paving Conference.

The Contractor shall collect raw profile data utilizing the initial profiler's settings used during the TTCP "Certification of Inertial Profilers" process. For HMA/WMA/OGFC data collection, an upper wavelength cutoff filter of 300 feet shall be applied. For PCCP data collection, the Contractor shall use a Butterworth Band-Pass filter short cutoff wavelength of 0.5 ft and a long cutoff wavelength of 300 ft. The Contractor shall allow the Department's Representative to witness the collection of raw data by riding in the vehicle while collecting the data.

The Contractor shall export all raw profile data to create files conforming to the University of Michigan Transportation Research Institute's Engineering Research Division (ERD) format. The Contractor shall provide the collected data in ERD format, along with the current calibration documentation on either a CD or Universal Serial Bus (USB) memory storage device to the accompanying Department representative, within one (1) hour after the data has been collected. The Contractor shall provide additional data files or text files upon request by the Project Manager or Department's Representative.

If the Contractor does not submit the profile measurements files within one (1) hour, the Department may alter the Pay Adjustments according to the pavement type and category established for the Project by applying an additional five percent (5%) price deduction to the total price reduction for the Profiled area in question.

The Contractor shall maintain the profile data files. Take additional profiles to retest paved surfaces that have received corrective Work. The Project Manager may require additional profiles to check previously submitted data or to identify the limits of surface irregularities. The Contractor shall include the following information for each data file:

1. Project number,
2. Date,
3. Lane profiled,
4. Beginning and ending stations,
5. Net total linear feet of each lane,
6. Filter settings, and

7. Operator’s signature.

401.3.1.4 Inertial Profiler Operations

The Contractor shall obtain the Project Manager’s approval and sweep the Roadway surface before beginning profile operations.

The Contractor shall operate and maintain the inertial profiler in accordance with AASHTO R 57 “Operating Inertial Profiling Systems” and manufacturer’s recommendations and procedures established by TTCP. The inertial profiler shall be equipped with dual-sensors, bar lasers up to four (4.0) inches long, that measures the profile traces for each wheel path.

The Contractor shall measure the longitudinal smoothness of the final surface of HMA, WMA, OGFC, and PCCP using a Department certified inertial profiler. The Contractor shall operate the device on the driving surface of the Roadway at the manufacturer's recommended speed without interfering with traffic or its own operation.

The Contractor shall measure the profile traces for each wheel path at the outside trace three (3) feet from and parallel to the approximate location of the pavement edge line.

For the transverse joints, at the beginning of Project (BOP) and end of project (EOP), the first one hundred (100) feet before and after the transverse joint shall be excluded from the data used to determine price adjustments. For Bridge approach and departure tie-ins, the one hundred (100) feet before approach and after departure shall be excluded from the data used to determine price adjustments. The areas excluded shall be evaluated in accordance with Section 401.3.1, “Straightedge Measurements (Category III).” See Section 401.5.1, “Pay Adjustments” for more information.

On HMA/WMA/OGFC Projects, the Contractor shall perform profile measurements and corrective actions on the final surface of HMA/WMA. The final surface is the surface immediately behind the paving operations prior to any surface modification. PCCP Projects, perform profile measurements and corrective actions on the finished surface after tining or grooving.

401.3.1.5 ProVAL Profile Data Analysis by the Department

The Department will use the current version of “ProVAL” software to determine the MRI for each 0.1 mile section of each lane, reported to the nearest 0.1 inch per mile using the average of the two (2) wheel paths’ IRI’s, using Ride Quality Analysis. Using the ProVAL software, the Department will apply the 250 mm filter in “ProVAL.” The Contractor shall export the data with no filters applied. Data obtained through analysis by the Department will be used for evaluations of all “Must Grind Work,” “Corrective Work,” and “Pay Adjustments.”

401.3.2 Straightedge Measurements (Category III)

The Contractor shall test the final surface of HMA, WMA, or PCCP with an approved profile measurement device that complies with Section 401.3.1, “Inertial Profiler.” The Project Manager will analyze the profile in the current version of ProVAL utilizing the Rolling Straightedge with a ten (10) foot straightedge length and Deviation Threshold of 0.25 inches. The Contractor shall correct surface deviations greater than ¼ inch within ten (10) ft, as directed by the Project Manager.

Upon completion of the profile measurement and before corrective measures, the Contractor may request in writing for approval by the Project Manager to drive the area profiled with the Project Manager to verify any surface deviations. Areas in question shall be validated with a ten (10) foot mechanical straightedge at both right angles and parallel to centerline to validate ¼ inch surface deviation. Areas ¼ inch and greater surface deviation in ten (10) feet shall be corrected.

In lieu of a profile measurement device the Contractor may request in writing for approval by the Project Manager to use a physical ten (10) foot straightedge. If approved the Contractor shall use Contractor's personnel, to measure with a physical ten (10) foot straightedge measurement at both right angles and parallel to the centerline, advancing the straightedge in five (5) foot increments in the presence of the Project Manager or his designee. The Contractor shall correct surface deviations greater than ¼ inch within ten (10) ft, as directed by the Project Manager.

Failure by Contractor to correct any and all validated surface deviations ¼ inch and greater will result in a fifty percent (50%) price reduction to all the HMA, WMA, or PCCP for the Project.

401.3.3 Evaluation for Must Grind Work and Corrective Work

The Contractor shall evaluate the pavement in 0.1-mile sections for determining needed Must Grind Work, Corrective Work, and Pay Adjustments.

401.3.4 Diamond Grinding

Diamond grinding Equipment uses diamond tipped saw blades, composed of industrial diamonds and metallurgical powder that are gang mounted on a cutting head ranging in width from 36 inches to 48 inches. The diamond grinding Equipment shall use water to cool the cutting head. The slurry or residue resulting from the grinding operation shall be continuously removed from the pavement with a wet vacuum process. The slurry or residue shall not be allowed to flow across lanes occupied by traffic or to flow into gutters or other drainage facilities. Diamond grinding Equipment shall be self-propelled, self-contained and without external attachments acting as cutting / grinding devices.

Diamond grinding operations of the final HMA/WMA lift shall not dislodge aggregate or binder creating rock pockets or deviations on pavement surface. If occurring, the Contractor shall cease operation and notify the Project Manager and submit a corrective action Plan for approval.

401.3.5 Corrective Work/Must Grind Work

The Contractor shall identify potential must grind locations using "Ride Quality Analysis" under the "Analysis Type" with the "Continuous" feature of the latest version of the FHWA's "ProVAL" software. The Contractor shall use a MRI threshold (inch/mi) of 105.00 and a segment length of 25.00 feet. The Contractor shall identify must grind locations for each lane using the "MRI" Ride Quality Index feature of ProVAL. Any locations with a MRI of 105.00 to 140.00 will be evaluated by the Project Manager and the Contractor, to determine if diamond grinding is required, final determination will be made by the Project Manager. All locations with an MRI above 140.00 must be corrected. Localized roughness defining the must grind areas shall be limited to the extent of the area to be corrected. Must grinds shall not extend the entire length of the 0.1-mile section.

The Contractor shall develop a written corrective Work/must grind Plan and submit for approval by the Project Manager. This plan shall include methods and procedures to be utilized to achieve the specified MRI values for "Corrective Work Required" (CWR) sections for the specified category indicated in the Contract or determined to be a must grind. Upon approval of the Plan, the Contractor shall complete corrective Work/must grinds, including necessary traffic control, at no additional cost to the Department. After completion of the corrective Work/must grinds, re-profile the corrected area to verify compliance with Specification requirements. Re-profiled areas will receive a maximum pay adjustment of 0.00 ($/sy).

The Contractor shall limit corrective Work/must grinds to diamond grinding, overlaying, or removing and replacing rejected 0.1-mile sections. The Contractor shall not begin corrective Work/must grinds until the Project Manager approves the methods and procedures in writing. The Project Manager's approval does not relieve the Contractor of the responsibility to comply with the Specifications.

The Contractor shall perform corrective Work/must grinds in accordance with the following:

1. Surface Diamond Grinding. Use diamond grinding to bring the measured "CWR" or must grind areas in accordance with the applicable table(s), category (ies), and Specifications as indicated in the Contract.

   Grind corrective Work/must grind areas to produce a smooth transition to the surrounding pavement. If the corrective Work or must grind areas are not the full width of the lane, only half of the lane containing the corrective Work or must grind area shall be ground and smoothly feathered into the surrounding pavement.

   Do not reduce planned pavement thickness by more than 0.3 inches without written approval of the Project Manager.

   For HMA/WMA, if the Contract does not require an OGFC/ROGFC/WOGFC, or OGFC will not be placed before Project Suspension, apply a fog seal to the ground areas as approved by the Project Manager. All operations necessary to apply fog seal will be Incidental to the Bid Item Unit Price for HMA/WMA; the Department will make no separate payment.

   For PCCP, perform additional diamond grinding as necessary in the following situations:

   1.1. The transverse direction, so the lateral diamond grinding limits are at a constant offset from and parallel to the nearest lane line or pavement edge; and

   1.2. The longitudinal direction, so the diamond grinding begins and ends at lines perpendicular to the pavement centerline. Maintain diamond grinding locations as neat rectangular areas of uniform appearance. If tining is eliminated by diamond grinding, machine groove the hardened concrete in the same pattern as adjacent tining at no additional cost to the Department.

2. Overlaying. If the Contractor uses an additional lift of HMA/WMA to correct rough pavement, the HMA/WMA shall meet the requirements of the appropriate Specification. Extend the overlay lift the full width of the underlying pavement surface to a finished compacted thickness sufficient to correct the existing pavement roughness.

   The Department will not allow a second overlay if the first overlay does not meet the longitudinal smoothness requirement.

   Correct a corrective overlay that does not meet the smoothness requirement by diamond grinding or removing and replacing as specified in Section 401.3.5, "Corrective Work/Must Grind Work."

3. Removing and Replacing. Remove pavement the full width of the lane and the full thickness of the course. The removal area shall begin and end with a transverse

saw cut perpendicular to centerline. Use the type of approved HMA, WMA or PCCP as originally specified in the Project Contract as replacement Material.

4. Extrapolation. For Category I and II, after grinding, in lieu of items 2 and 3 above, the Contractor may use this option with the Project Manager and District Construction Engineer's approval. The Contractor may request in writing, areas in CWR to remain in place and use an extrapolated value from the appropriate Table ## below.

The Contractor shall re-profile the 0.1 mile section of travel lane after performing corrective Work/must grinds and use the re-profile's reported measured smoothness data to represent the particular section for Pay Adjustment purposes in accordance with Section 401.5, "Basis of Payment."

401.3.6 OGFC Placement and Profile Measurement

The Contractor shall ensure HMA/WMA profile measurements, corrective work/must grinds have been completed before placing OGFC. Pay Adjustment will be based on the MRI of the final surface of HMA/WMA unless the measured MRI of the OGFC is greater than the measured MRI of the HMA/WMA on the same 0.1 mile section, then the Department will base the Pay Adjustment for the HMA/WMA section on the OGFC's measured MRI.

401.3.7 Independent Assurance Testing

The Department may perform Independent Assurance testing with a Department certified Inertial Profiler from a District Laboratory in order to verify and compare Contractor obtained data.

401.4 METHOD OF MEASUREMENT

The Department will determine smoothness Pay Adjustments on the calculated square yards of the surface area of the travel lane bound by the plan typical section travel lanes and 0.1-mile lane length.

401.5 BASIS OF PAYMENT

Surface smoothness testing and corrective Work/must grinds to bring the final surface within Specification smoothness in accordance with the applicable table(s) and category (ies) as indicated in the Contract is Incidental to the Bid Item Unit Price for HMA, WMA, or PCCP; the Department will make no separate payment. All traffic control required to determine and correct pavement smoothness is Incidental to the HMA, WMA, or PCCP item.

All adjustments of manhole and utility valves for the facilitation of pavement smoothness shall be performed after paving of the finish grade. This Work shall be paid in accordance with Section 662, "Manholes" and 663 "Utility Items."

401.5.1 Pay Adjustments

The Department will calculate a Pay Adjustment for each 0.1 mile section of travel lane. The Pay Adjustments will apply to the total Accepted area of each 0.1 mile section of HMA, WMA, or PCCP constructed for the Plan typical section travel lane width and Roadway length.

The Department will not include the following areas for payment adjustment purposes:

1. BOP and EOP transverse joint (tie-in) of existing pavement (100 feet on each side of transverse joint);

2. Bridge approach and departure tie-in (100 feet before and after approach and departure); and
3. Shoulders and turnouts.

The Contractor shall follow the requirements of Section 401.3.2, "Straightedge Measurements (Category III)" for areas one (1) and two (2) listed above. The Pay Adjustment will be determined utilizing the MRI data obtained after corrective Work/must grinds in accordance with Section 401.3.5, "Corrective Work/Must Grind Work" has been completed. Re-profiled areas will receive a maximum pay adjustment of 0.00($/sy). Pay Adjustment for a 0.1 mile section greater than 0.00($/sy) will be utilized to determine the overall Pay Adjustment for smoothness of the Project. If the overall Pay Adjustment calculated is greater than 0.00, the Pay Adjustment for smoothness will be 0.00 ($/sy).

401.5.1.1 Pay Adjustment for Category I and Category II HMA/WMA Projects

The Department will base Pay Adjustments on the final MRI for each 0.1 mile section in accordance with Table 401.5.1.1:1, "MRI Based Profile Pay Adjustment Schedule for Category I HMA/WMA Projects" and Table 401.5.1.1:2, "MRI Based Profile Pay Adjustment Schedule for Category II HMA/WMA Projects," after the Contractor performs and measures corrective Work. Re-profiled areas will receive a maximum pay adjustment of 0.00 ($/sy).

Table 401.5.1.1:1
MRI Based Profile Pay Adjustment Schedule
for Category I HMA/WMA/OGFC Projects

Pay Adjustment ($ per square Yard)			
MRI (Mean Roughness Index) inch/0.1mi			Category I
<46.1			+0.24
46.1	To	47.0	+0.20
47.1	To	48.0	+0.16
48.1	To	49.0	+0.12
49.1	To	50.0	+0.08
50.1	To	51.0	+0.04
51.1	To	52.0	0.00
52.1	To	53.0	-0.14
53.1	To	54.0	-0.28
54.1	To	55.0	-0.42
55.1	To	56.0	-0.56
56.1	To	57.0	-0.70
57.1	To	58.0	-0.84
58.1	To	59.0	-0.98
59.1	To	60.0	-1.12
>60.0			Corrective Work Required

Table 401.5.1.1:1
MRI Based Profile Pay Adjustment Schedule
for Category I HMA/WMA/OGFC Projects

Pay Adjustment ($ per square Yard)			
MRI (Mean Roughness Index) inch/0.1mi			Category I
60.1	to	61	-1.26
61.1	to	62	-1.40
62.1	to	63	-1.54
63.1	to	64	-1.68
64.1	to	65	-1.82
65.1	to	66	-1.96
66.1	to	67	-2.10
67.1	to	68	-2.24
68.1	to	69	-2.38
69.1	to	70	-2.52
70.1	to	71	-2.66
71.1	to	72	-2.80
72.1	to	73	-2.94
73.1	to	74	-3.08
74.1	to	75	-3.22
75.1	to	76	-3.36
76.1	to	77	-3.50
77.1	to	78	-3.64
78.1	to	79	-3.78
79.1	to	80	-3.92
80.1	to	81	-4.06
81.1	to	82	-4.20
82.1	to	83	-4.34
83.1	to	84	-4.48
84.1	to	85	-4.62
85.1	to	86	-4.76
86.1	to	87	-4.90
87.1	to	88	-5.04
88.1	to	89	-5.18

Table 401.5.1.1:1
MRI Based Profile Pay Adjustment Schedule
for Category I HMA/WMA/OGFC Projects

Pay Adjustment ($ per square Yard)			
MRI (Mean Roughness Index) inch/0.1mi			Category I
89.1	to	90	-5.32
90.1	to	91	-5.46
91.1	to	92	-5.60
92.1	to	93	-5.74
93.1	to	94	-5.88
94.1	to	95	-6.02
95.1	to	96	-6.16
96.1	to	97	-6.30
97.1	to	98	-6.44
98.1	to	99	-6.58
99.1	to	100	-6.72
100.1	to	101	-6.86
101.1	to	102	-7.00
102.1	to	103	-7.14
103.1	to	104	-7.28
104.1	to	105	-7.42
105.1	to	106	-7.56
106.1	to	107	-7.70
107.1	to	108	-7.84
108.1	to	109	-7.98
109.1	to	110	-8.12

Table 401.5.1.1:2
MRI Based Profile Pay Adjustment Schedule
for Category II HMA/WMA/OGFC Projects

Pay Adjustment ($ per square Yard)			
MRI (Mean Roughness Index) inch/0.1mi			Category II
<56.1			+0.18
56.1	To	57.0	+0.15
57.1	To	58.0	+0.12

Table 401.5.1.1:2
MRI Based Profile Pay Adjustment Schedule
for Category II HMA/WMA/OGFC Projects

Pay Adjustment ($ per square Yard)			
MRI (Mean Roughness Index) inch/0.1mi			Category II
58.1	To	59.0	+0.09
59.1	To	60.0	+0.06
60.1	To	61.0	+0.03
61.1	To	62.0	0.00
62.1	To	63.0	-0.12
63.1	To	64.0	-0.24
64.1	to	65.0	-0.36
65.1	to	66.0	-0.48
66.1	to	67.0	-0.60
67.1	to	68.0	-0.72
68.1	to	69.0	-0.84
69.1	to	70.0	-0.96
70.1	to	71.0	-1.08
71.1	to	72.0	-1.20
72.1	to	73.0	-1.32
73.1	to	74.0	-1.44
>74.0			Corrective Work Required
74.1	to	75	-1.56
75.1	to	76	-1.68
76.1	to	77	-1.80
77.1	to	78	-1.92
78.1	to	79	-2.04
79.1	to	80	-2.16
80.1	to	81	-2.28
81.1	to	82	-2.40
82.1	to	83	-2.52
83.1	to	84	-2.64
84.1	to	85	-2.76
85.1	to	86	-2.88

Table 401.5.1.1:2
MRI Based Profile Pay Adjustment Schedule
for Category II HMA/WMA/OGFC Projects

Pay Adjustment ($ per square Yard)			
MRI (Mean Roughness Index) inch/0.1mi			Category II
86.1	to	87	-3.00
87.1	to	88	-3.12
88.1	to	89	-3.24
89.1	to	90	-3.36
90.1	to	91	-3.48
91.1	to	92	-3.60
92.1	to	93	-3.72
93.1	to	94	-3.84
94.1	to	95	-3.96
95.1	to	96	-4.08
96.1	to	97	-4.20
97.1	to	98	-4.32
98.1	to	99	-4.44
99.1	to	100	-4.56
100.1	to	101	-4.68
101.1	to	102	-4.80
102.1	to	103	-4.92
103.1	to	104	-5.04
104.1	to	105	-5.16
105.1	to	106	-5.28
106.1	to	107	-5.40
107.1	to	108	-5.52
108.1	to	109	-5.64
109.1	to	110	-5.76
110.1	to	111	-5.88
111.1	to	112	-6.00
112.1	to	113	-6.12
113.1	to	114	-6.24
114.1	to	115	-6.36

Table 401.5.1.1:2
MRI Based Profile Pay Adjustment Schedule
for Category II HMA/WMA/OGFC Projects

Pay Adjustment ($ per square Yard)			
MRI (Mean Roughness Index) inch/0.1mi			Category II
115.1	to	116	-6.48
116.1	to	117	-6.60
117.1	to	118	-6.72
118.1	to	119	-6.84
119.1	to	120	-6.96
120.1	to	121	-7.08
121.1	to	122	-7.20
122.1	to	123	-7.32
123.1	to	124	-7.44

401.5.1.2 Pay Adjustment for Category I and Category II PCCP Pavement Projects

The Department will base Pay Adjustments and credit adjustments on the final average MRI for each 0.1 mile section in accordance with Table 401.5.1.2:1, “MRI Based Profile Pay Adjustment and Credit Ajustment Schedule for PCCP Projects,” after the Contractor performs and measures corrective Work. Re-profiled areas will receive a maximum pay adjustment of 0.00($/sy). Credits will not result in positive payment. Maximum positive payment is $0.00.

TABLE 401.5.1.2:1
MRI Based Profile Pay Adjustment Schedule
for PCCP Projects

Category II (Speed < 45 MPH)		Category I (Speed ≥ 45 MPH)	
MRI	Adjustment	MRI	Adjustment
<55	Credit Adjustment +$0.56/sq yd	<40	Credit Adjustment +$0.56/sq yd
55 to 74	Credit Adjustment ((75-MRI)*0.1125)/4	40 to 59	Credit Adjustment ((60-MRI)*0.1125)/4
75 to 90	0	60-75	0
91 to 110	Pay Adjustment (90-MRI)*0.1125	76 to 90	Pay Adjustment (75-MRI)*0.1125
>110	Corrective Action	>90	Corrective Action

401.5.1.3 Pay Adjustment for Category III HMA/WMA/OGFC/PCCP Projects

Failure by Contractor to correct any and all validated surface deviations ¼ inch and greater will result in a fifty percent (50%) price reduction to all the HMA, WMA, OGFC, or PCCP for the Project.

SECTION 402: ASPHALT MATERIALS AND MINERAL ADMIXTURES

402.1 DESCRIPTION

This Work consists of providing, mixing, and applying asphalt Materials and mineral admixtures (hydrated lime, anhydrite based Material, Portand cement or lubricating antistrip additive).

402.2 MATERIALS

402.2.1 Asphalt Binder

Asphalt binders are uncracked petroleum asphalts. The Supplier shall prepare asphalt binders by refining petroleum at a maximum temperature of 700 °F. The Supplier shall not use Materials that are prone to cracking. The asphalt binder will be:

1. Free of thermal decomposition products;
2. Free of residue from non-asphalt sources;
3. Homogeneous and free from water;
4. Non-foaming when heated to 350 °F; and
5. Conforming to the requirements of performance-graded asphalt binder.

402.2.1.1 Performance-Graded Asphalt Binder (PGAB)

The Supplier shall provide performance-graded asphalt binder in accordance with AASHTO M 320. The Contractor may substitute a performance-graded asphalt binder with a high-end or low-end temperature grade in excess of that shown in the Plans, at no additional cost to the Department.

402.2.1.2 Polymer-Modified Asphalt Binder

The Contractor shall provide a Polymer-Modified Asphalt Binder that meets the requirements for a PG 76-22+, PG 76-28+, PG 70-22+, PG 70-28+, PG 76-28R+ and PG 70-28R+ per AASHTO M 320 in addition to the requirements in Table 402.2.1.2:1, "Polymer-Modified Asphalt Binders."

Table 402.2.1.2:1
Polymer-Modified Asphalt Binders

Properties	**Requirements**	
	PG 76-22+, **PG 76-28+,** **PG 70-22+** **PG 70-28+**	**PG 76-28R+** **PG 70-28R+**
Terminal-Blended Tire Rubber Content, % minimum	------	5.0

Table 402.2.1.2:1
Polymer-Modified Asphalt Binders

Styrene-Butadiene-Styrene (SBS) Polymer Content by Weight of Total Formulation, % minimum	------	2.0
Solubility in Trichloroethylene, % minimum (Note 1), ASTM D 2042	97.5	97.5
Elastic Recovery @ 77ºF, % minimum, AASHTO T 301	65	65

Note 1: If the solubility of the binder is less than 97.5 percent, test the base asphalt binder. The solubility of the base asphalt binder shall be greater than 99 percent.

402.2.1.3 Tire Rubber Modifier (TRM)

Tire rubber modifier (TRM) shall be produced from the recycling of automobile and/or truck tires. The specific gravity of the TRM shall be 1.15 +/- 0.05. The fiber content shall be less than 0.5% by weight for all other applications. The TRM shall contain no metal particles. Mineral contaminates shall be less than 0.25% by weight.

402.2.1.3.1 Asphalt Rubber Binder Formulation Design

The asphalt rubber binder shall contain a minimum of five percent (5%) TRM. The terminal-blended asphalt rubber binder shall conform to the requirements of AASHTO M320, as well as the requirements in Table 402.2.1.2:1, “Polymer-Modified Asphalt Binders.” The Asphalt Rubber Binder Supplier shall perform the design for the asphalt rubber binder formulation. Testing shall be the responsibility of the Contractor, at no additional cost to the Department.

The Contractor shall provide the State Materials Bureau with a copy of the terminal-blended asphalt rubber binder formulation design at the time of mix design submittal.

The design shall include:

1. Source;
2. Grade;
3. Type;
4. Proportion expressed as a percentage of total weight of the formulation for each component material;
5. Physical properties of the asphalt rubber binder in accordance with Table 402.2.1.2:1, “Polymer-Modified Asphalt Binders;” and
6. Recommended mixing and compaction temperatures for intended use.

402.2.1.4 Shipping

The Contractor shall:

1. Ship asphalt Material in sealed, insulated tank vehicles with convenient access to the Material so that it may be sampled;

2. Keep the shipping tanks free of foreign matter. The Department will reject contaminated asphalt Material;
3. Ship the performance-graded binder as shown in the requirements of Department's *Standard Practice for Certifying Suppliers of Performance-Graded Asphalt Binders* and in accordance with Section 402.2.1.1, "Performance-Graded Asphalt Binder (PGAB)."

402.2.1.5 Sampling and Testing

402.2.1.5.1 Sampling of Asphalt Binder

The Contractor shall perform all Quality Assurance sampling using AASHTO T 40, Standard Method of Test for Sampling Bituminous Materials under the direct supervision of TTCP certified sampling personnel, and witnessed by the Project Manager or his designee. The samples will be taken either from the discharge side of the storage tank or from the delivery trucks. The samples will be taken after a sufficient amount, a minimum of one (1) gallon, of PGAB is run out to clear any residual PGAB or other asphalt Material and/or solvent that may have built up in the sampling valve. All approved sample containers shall be identified using Department Form A-1231.

The minimum sampling frequency for asphalt cement shall be one (1) sample during the test strip operation and every 5000 tons of HMA or WMA thereafter. One (1) sample of asphalt cement shall be taken representing OGFC, WOGFC, or ROGFC operations. A minimum of two (2) samples shall be taken per Project representing asphalt binder from HMA or WMA, and a minimum of one (1) sample representing asphalt binder for OGFC, WOGFC, or ROGFC. A sample shall consist of (3) separate one (1)-quart sub-samples. All samples shall be maintained in a secure, dry location at the Project office or at a pre-agreed upon location that is satisfactory to the Contractor and Project Manager.

402.2.1.5.2 Testing of Asphalt Cement

The Contractor shall sample and test performance-graded asphalt binders in accordance with the Department's *Standard Practice for Certifying Suppliers of Performance-Graded Asphalt Binders* and in accordance with Section 402.2.1.1, "Performance-Graded Asphalt Binder (PGAB)." The Department will assume no obligation to Accept the CTR's and may additionally test the certified Materials. The Department may test asphalt Materials at the manufacture shipping or Project storage location.

One (1) sub-sample shall be tested by NMDOT Chemistry Unit when the test strip is performed. Another randomly selected sub-sample shall be tested by the NMDOT Chemistry Unit during the course of the Project.

If the results of any of the sub-samples designate failing material, the second sub-sample shall be submitted to and tested by the NMDOT Chemistry Unit. If the second sub-sample does not meet Specifications in accordance with AASHTO M 320, Table 402.2.1.6:1, "Pay Adjustment Factor Based on PGAB Test Results" will be implemented by the Project Manager. The Pay Adjustment Factor will represent the total asphalt binder used for 5000 Tons of HMA or the tonnage of HMA used for the test strip. If there are multiple failures for each binder test on the same sample, the Project Manager will base the adjustment on the lowest pay factor of all the tests. The Price Adjustment will be executed with a Change Order (Field Sheet).

402.2.1.5.3 Appeal Procedure (Asphalt Binders – Only)

If desired, the Supplier at no expense to the Department may submit the third sub-sample (referee) to a mutually agreed upon Independent Laboratory. The Independent Laboratory shall be currently accredited to perform such testing by the AASHTO Accreditation Program (AAP).

If the Supplier desires to appeal the price adjustment for a particular PGAB grade production lot (5000 Tons of HMA or WMA), the Supplier shall submit a written request to the Project Manager, with a copy to the QC Engineer, within ten (10) Calendar Days of the reported test results. The request must describe in full the grounds of circumstances for the appeal. The appeal request will be reviewed by the Project Manager and Assistant District Engineer - Construction and either Accepted or denied. If the appeal is denied, a letter from the Project Manager stating the grounds for denial will be sent to the Contractor and the price adjustment will be executed with a Change Order (Field Sheet).

402.2.1.6 Acceptance

The Department will Accept asphalt cement in accordance with the Department's *Standard Practice for Certifying Suppliers of Performance-Graded Binders* and in accordance with Section 402.2.1.1, "Performance-Graded Asphalt Binder (PGAB)."

TABLE 402.2.1.6:1
Pay Adjustment Factor[1]
Based on Binder Test Results

Binder Property	Measured Value	Pay Factor Applied
DSR on Original Binder	<1.00 – 0.98	0.98
$G^*/\sin\delta$ (kPa)	<0.98 – 0.96	0.95
Min. 1.00 kPa	<0.96 – 0.94	0.92
	<0.94 – 0.90	0.85
	<0.90	0.75 or Removal[2]
DSR on RTFO Aged Material	<2.20 – 2.15	0.98
$G^*/\sin\delta$ (kPa)	<2.15 – 2.09	0.95
Min. 2.20 kPa	<2.09 – 2.02	0.92
	<2.02 – 2.00	0.85
	<2.00	0.75 or Removal[2]
DSR on PAV Aged Material	>5000 – 5100	0.98
$G^* \cdot \sin\delta$ (kPa)	>5100 – 5250	0.95
Max. 5000 kPa	>5250 – 5400	0.92
	>5400 – 5600	0.85
	>5600	0.75 or Removal[2]
BBR Slope value (m) of PAV Aged Binder	<0.300 – 0.298	0.98
Min. 0.300	<0.298 – 0.293	0.95
	<0.293 – 0.290	0.92
	<0.290 – 0.285	0.85
	<0.285	0.75 or Removal[2]
BBR Stiffness of PAV Aged Binder	>300 – 306	0.98
S (MPa)	>306 – 315	0.95

TABLE 402.2.1.6:1
Pay Adjustment Factor[1]
Based on Binder Test Results

Binder Property	Measured Value	Pay Factor Applied
Max. 300 MPa	>315 – 324 >324 – 330 >330	0.92 0.85 0.75 or Removal[2]
% Elastic Recovery on RTFO Aged Material[3] Min 65%	<65 – 60 <60	0.95 0.75 or Removal[2]

[1]Price Reduction will be applied to Contactor's invoice price of asphalt binder.

[2]The Assistant District Engineer - Construction will determine if the non-compliant HMA Material will be removed. Removal and replacement will be at no additional cost to the department. If the non-compliant Material is Accepted, a price reduction factor of 0.75 will apply.

[3]Elastic-Recovery is only applicable to PG+ and PGR+ Binders.

402.2.2 Emulsified Asphalt

Emulsified asphalt consists of uncracked petroleum asphalt uniformly emulsified with water and an emulsifying or stabilizing agent. The Contractor shall ensure that emulsified asphalt is homogenous after mixing. The Supplier shall provide anionic emulsified asphalt in accordance with AASHTO M 140 and cationic emulsified asphalt in accordance with AASHTO M 208.

402.2.2.1 High-Float Emulsions

The Supplier shall provide high-float emulsions (HFE-60, HFE-90, HFE-150, and HFE-300) in accordance with Table 402.2.2.1:1, "High-Float Emulsions Requirements."

Table 402.2.2.1:1
High-Float Emulsions Requirements

Test	HFE-60	HFE-90	HFE-150	HFE-300
Viscosity, Saybolt Furol at 122 °F, Seconds	50+	50+	50+	50+
Sieve Test, Retained on No. 20 Sieve, %	0.10-	0.10-	0.10-	0.10-
Settlement, 5 Days, %	5-	5-	5-	5-
Storage Stability Test, 1 Day, %	1-	1-	1-	1-
Demulsibility, 1.2 fl oz 0.10 N, CaCl, %	30+	30+	—	—
Residue from Distillation Test to 500 °F	65+	65+	65+	65+
Oil Distillate by Volume of Emulsion, %	1-	3-	7-	7-
Coating Test, 3 minutes	Grades, stones coated thoroughly			
Tests on Residue from Distillation Test				
Penetration at 77 °F, 3.5 oz., 5 sec, 0.1 mm	60–90	90–150	150–300	300+
Float Test at 140 °F, Seconds	1,200+	1,200+	1,200+	1,200+

402.2.2.2 Polymer-Modified High-Float Emulsions

This Material is a high-float emulsion containing polymer-modified asphalt and water in accordance with the requirements of Table 402.2.2.2:1, “Polymer-Modified High-Float Emulsions Requirements.”

Table 402.2.2.2:1
Polymer-Modified High-Float Emulsions Requirements

Test	HFE-60P	HFE-100P	HFE-150P	HFE-300P
Viscosity, Saybolt Furol at 122 °F, Seconds	50+	50+	50+	50+
Sieve Test, Retained on No. 20 Sieve, %	0.10-	0.10-	0.10-	0.10-
Storage Stability Test, 1 Day, %	1-	1-	1-	1-
Demulsibility, 1.2 fl oz 0.10 N, CaCl, %	30+	30+	—	—
Residue from Distillation Test to 400 °F	65+	65+	65+	65+
Oil Distillate by Volume of Emulsion, %	1-	3-	7-	7-
Tests on Residue from Distillation Test				
Penetration at 77 °F, 3.5 oz., 5 s, 0.1 mm	60–90	90–150	150–300	300+
Ductility 77 °F, 2 inch/min	40+	40+	40+	—
Elastic Recovery, %	55+[a]	58+[a]	25+[b]	25+[b]
Float Test @ 140 °F, Seconds	1,200+	1,200+	1,200+	1,200+

[a]Test in accordance with AASHTO T 301 at a test temperature of 50 °F.

[b]Test in accordance with AASHTO T 301 at a test temperature of 39.2 °F.

402.2.2.3 Polymer-Modified High-Float Emulsion, Rapid Set

The Supplier shall provide a high-float rapid-set, polymerized emulsion (HFRS-2P) that contains polymer-modified asphalt, water, and an emulsifier. The Supplier shall provide high-float rapid-set, polymerized emulsion (HFRS-2P) in accordance with Table 402.2.2.3:1, “Rapid-Set Polymer-Modified High-Float Emulsion Requirements.”

Table 402.2.2.3:1
Rapid-Set Polymer-Modified High-Float Emulsion Requirements

Test	HFRS-2P
Viscosity, Saybolt Furol at 122 °F, Seconds	100–400
Sieve Test, Retained on No. 20 Sieve, %	0.10
Demulsibility, 1.2 fl oz 0.02 N, CaCl, %	40+
Residue from Distillation Test to 450 °F	65+
Oil Distillate by Volume of Emulsion, %	3.0-
Tests on Residue from Distillation	
Penetration at 77 °F, 3.5 oz., 5 s, 0.1 mm	90–150
Ductility 39.2 °F, 2 inch/min	20+
Elastic Recovery, %[a]	58+
Float Test at 140 °F, Seconds	1,200+

[a]Test in accordance with AASHTO T 301 at a test temperature of 50 °F.

402.2.2.4 Asphalt-Emulsified Prime (AE-P)

The Supplier shall provide AE-P designated asphalt-emulsified prime in accordance with Table 402.2.2.4:1,"Asphalt Emulsified Prime."

Table 402.2.2.4:1
Asphalt Emulsified Prime

Test	AE-P
Viscosity Saybolt Furol at 122 °F, Seconds	15–150
Settlement 24 h, %	1-
Residue from Distillation Test, %	65+
Oil Distillate by volume of Emulsion, %	25-
Tests on Residue from Distillation	
Solubility in Trichloroethylene, %	97.5+

402.2.2.5 Penetrating Emulsified Prime (PE-P)

The Supplier shall provide PE-P designated penetrating emulsified prime in accordance with Table 402.2.2.5:1, "Penetrating Emulsified Prime."

Table 402.2.2.5:1
Penetrating Emulsified Prime

Test	PE-P
Viscosity, Saybolt Furol at 122 °F, Seconds	75-
Sieve Test, Retained on 0.35 in Sieve, %	0.1-
Residue from Distillation Test, %	38+
Oil Distillate by volume of Emulsion, %	0–4

402.2.2.6 Emulsified Petroleum Resin Prime (EPR-1)

The Supplier shall provide EPR-1 designated emulsified petroleum resin prime in accordance with Table 402.2.2.6:1, "Emulsified Petroleum Resin Prime."

Table 402.2.2.6:1
Emulsified Petroleum Resin Prime

Test	EPR-1
Particle Charge Test	Positive
Residue from Evaporation Test, %[a]	60+
Sieve Test, Retained on 0.850mm Sieve, %[b]	0.1-
Viscosity, Saybolt Furol at 77 °F, Seconds	14–60

[a]ASTM D-244 Evaporation Test for percent of residue is modified by heating 50 gram sample to 300°F until foaming ceases, then cool immediately and calculate results.

[b]Test procedure with ASTM except that distilled water shall be used in place of two percent (2%) sodium oleate solution.

402.2.2.7 Cutback Asphalts (Medium-Curing Type)

The Contractor shall provide cutback asphalt in accordance with AASHTO M 82. The Contractor shall not use MC-30.

402.2.3 Mineral Admixtures

402.2.3.1 Hydrated Lime

The Supplier shall provide hydrated lime in accordance with ASTM C 1097, with the following exception:

1. Delete ASTM C 1097, section 4.1, and
2. Substitute the following: "Hydrated lime, dry or slurry, will have a maximum of three percent (3%) retained on a No. 30 sieve and a maximum of 25% retained on a No. 200 sieve."

The Supplier shall determine the fineness of hydrated lime in accordance with AASHTO T 219. The Contractor shall use a ¼-pound sample to perform tests in accordance with AASHTO T 219 sections 6.1 and 6.1.1.

402.2.3.2 Anhydrite Based Material

The Supplier shall provide anhydrite based Material in accordance with Tables 402.2.3.2:1, "Anhydrite Based Material Chemical Composition" and Table 402.2.3.2:2, "Anhydrite Based Material Physical Properties." The Contractor shall use ASTM C 114 for the chemical analysis.

Table 402.2.3.2:1
Anhydrite Based Material Chemical Composition

Chemical Compound	Percent by Weight
SiO_2	6.7 to 10.7
Al_2O_3	1.0 to 3.0
Fe_2O_3	1.0 to 1.4
MgO	0.2 to 1.2
CaO	44.5 to 54.5
SO_3	32.3 to 42.3

Table 402.2.3.2:2
Anhydrite Based Material Physical Properties

Property	Range
LOI, %	0.37 to 1.37
Passing #200 Sieve, %	98.8 to 100.0
Passing #325 Sieve, %	98.0 to 100.0
Specific Gravity	2.970 to 3.030

402.2.3.3 Portland Cement

The Contractor shall provide Type I, Type II, or Type I/II Portland Cement in accordance with ASTM C 150.

402.2.3.4 Lubricating Antistrip Additive

Lubricating Antistrip Additive shall be tested and approved by the State Materials Bureau and be on the NMDOT's Approved Product List (APL). The State Materials Bureau will provide Hamburg Wheel Tracking Device and Tensile Strength (AASHTO T-283) testing in order to verify the additive will meet the requirements of an antistrip agent.

402.3 CONSTRUCTION REQUIREMENTS

The Contractor shall submit the Material Supplier's name and address to the Project Manager. If required by the Project Manager, the Contractor shall submit representative samples of each grade or classification of asphalt Materials for testing. The Contractor shall mix and apply asphalt Materials within the approved temperature range.

The Contractor shall not make changes in the crude stock source, manufacture method, or the Supplier without written approval from the Project Manager.

402.4 METHOD OF MEASUREMENT

If asphalt Materials are not stored in tanks for exclusive use on the Project, the Department will determine the Acceptable quantity of Virgin *Asphalt Material*, per lot, based on the following equation:

$$Q = T \times X \tag{1}$$

Where,

Q	is the quantity of Virgin *Asphalt Material* (in tons)
T	is the quantity of placed and Accepted asphalt pavement (in tons)
X	is the average percent virgin asphalt content in the asphalt pavement (per lot)

If mineral admixtures are not stored in silos for exclusive use on the Project, the Department will determine the Acceptable quantity of mineral admixture, per lot, based on the following equation:

$$MA = T \times XMA \tag{1}$$

Where,

MA	is the quantity of mineral admixture (in tons)
T	is the quantity of placed and Accepted asphalt pavement (in tons)
XMA	is the average percent mineral admixture content in the asphalt pavement (per lot)

402.5 BASIS OF PAYMENT

Pay Item	**Pay Unit**
Virgin Asphalt Material	Ton
Hydrated Lime	Ton
Anhydrite Based Material	Ton
Portland Cement	Ton

402.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Providing and mixing asphalt Materials and mineral admixtures (Hydrated lime, anhydrite based Material, Portland cement, or lubricating antistrip additive);
2. Shipping/Delivery to Project site;

3. Sampling and Testing;
4. Water; and

   Application of Asphalt Material onto roadbed.

SECTION 403: OPEN GRADED FRICTION COURSE

403.1 DESCRIPTION

This Work consists of constructing an Open-Graded Friction Course (OGFC), which includes Standard OGFC, Warm Mix Open-Graded Friction Course (WOGFC), or Rubberized Open-Graded Friction Course (ROGFC) on a prepared surface.

403.1.1 Definitions

Open-Graded Friction Course (OGFC) – type of asphalt surface mixture whose function is to provide a free-draining layer that permits surface water to migrate laterally through the mixture to the edge of the pavement.

Warm Mix Open-Graded Friction Course (WOGFC) – OGFC that utilizes a single or combination of Department approved WMA technologies to reduce the production, placement and compaction temperatures of the OGFC mixture.

Rubberized Open-Graded Friction Course (ROGFC) – OGFC that utilizes a Department approved tire rubber modifier (TRM) in the asphalt binder.

403.2 MATERIALS

403.2.1 General

The Contractor shall provide OGFC, WOGFC, or ROGFC composed of aggregate, asphalt binder, and mineral admixture.

403.2.2 Aggregate

The aggregate is crushed stone or crushed gravel, composed of hard durable particles or fragments.

Accepted aggregate Material must meet the following requirements:

1. Have a minimum of 75% two (2) Fractured Faces as determined in accordance with AASHTO T 335, *Fractured Face Determination for Coarse Aggregate;*
2. Be free of organic matter, lumps of clay, or other Material that prevents thorough coating with asphalt binder;
3. Have an Aggregate Index (AI) of 20 or less when determined in accordance with Section 910, “AGGREGATE INDEX;” and
4. The Department will allow the combination of Materials from two (2) or more sources if each source independently meets the requirements of items two (2) and three (3), above.

The Contractor shall ensure the aggregate meets the gradation requirements in Table 403.2.2:1, “OGFC Gradation Requirements,” when tested in accordance with AASHTO T 11 and AASHTO T 27. The Department will determine aggregate combined aggregate gradation acceptance by testing samples of the combined aggregates and mineral admixture taken before adding asphalt Materials.

Table 403.2.2:1
OGFC Gradation Requirements

Sieve size	% passing

Table 403.2.2:1
OGFC Gradation Requirements

Sieve size	% passing
1/2 inch	100
3/8 inch	90 – 100
No. 4	25 – 55
No. 8	4 – 20
No. 16	0 – 10
No. 50	0 – 6
No. 200	0 – 4

403.2.3 Asphalt Material

The Contractor shall use the binder type and grade as specified in the Contract, in accordance with Section 402, “Asphalt Materials and Mineral Admixture.”

403.2.4 Mineral Admixture Material

The Contractor shall provide hydrated lime, Portland cement, or anhydrite based Material in accordance with Section 402, “Asphalt Materials and Mineral Admixture.”

403.2.5 Mix Design

The Contractor shall develop the mix design at no additional cost to the Department.

The OGFC, WOGFC, or ROGFC mix design shall be developed in accordance with ASTM D 7064, “Standard Practice for Open Graded Friction Course (OGFC) Mix Design,” as modified by the New Mexico Department of Transportation State Asphalt Engineer by a Department-approved testing Laboratory. A list of approved private testing laboratories is available from the State Materials Bureau.

The mix design will establish:

1. A combined gradation (comprised of aggregate and mineral admixture) showing the percent passing each required sieve size that provides a JMF gradation that is within the master range as listed in Table 403.2.2:1, “OGFC Gradation Requirements” for the specified type of OFGC listed in the Contract;
2. A single target asphalt content (a minimum of five and one half percent (5.5%) asphalt Material is required); and
3. A single target mineral admixture content (a minimum of one percent (1%) mineral admixture is required).

The Mix Design shall identify the minimum and maximum mixing and placement temperatures of the mix.

The mix design shall be reviewed by a Professional Engineer licensed by the New Mexico Board of Registration for Professional Engineers and Land Surveyors.

The Contractor shall summarize the mix design results in a format approved by the State Materials Bureau and submit the design and supporting documentation for review and concurrence to the State Asphalt Engineer. Department concurrence of a mix design will not relieve the Contractor of full responsibility of producing an Acceptable mixture.

When Department Reviewed Commercial Mix Designs are used on the Project, the

Contractor shall submit a copy of proposed commercial mix design to the State Asphalt Engineer with the Project information to verify the proposed commercial mix design is appropriate for use and meets all the requirements for the for the specific Project. If the proposed commercial mix design meets all the requirements for the specific Project, the State Materials Bureau may re-issue the proposed commercial mix design as the Project specific mix design for that specific Project.

The State Materials Bureau may allow the Contractor to use a mix design up to one (1) year from the date of review by the State Materials Bureau, based upon the validity of the Aggregate Index. If the Aggregate Index expires before the one (1) year time frame, the review of mix design will expire on the date as indicated on the Summary of Design Sheet and may be renewed by submitting an updated Aggregate Index.

The Contractor may use or re-submit the design before the expiration of the one (1) year period.

The Contractor shall:

1. Not use a Mix Design beyond one (1) year after the State Materials Bureau's review date;
2. Submit Acceptable evidence to the State Materials Bureau verifying that the component Materials have not changed;
3. Submit a new mix design if changing the source of Materials; and
4. Obtain concurrence from the State Materials Bureau before using the new Materials.

403.2.6 Warm Mix Open-Graded Friction Course (WOGFC)

Only Warm Mix (WM) additives or technologies approved by the Product Evaluation Program and currently listed on the Approved Products List (APL) shall be used on Department Projects.

For foamed asphalt systems, water used as directed by the foamed asphalt system manufacturer shall be considered the Warm Mix additive. Only foamed asphalt systems approved by the State Asphalt Engineer shall be used.

To be placed on the APL, the WM additive Supplier shall verify that the asphalt binder with the warm mix additive meets the PG grade of the specified binder listed in the Contract. The potential additive Supplier shall demonstrate this to the Department by evaluating the Asphalt Binder and WM additive for compliance with the rheological properties for low and high temperatures for the specified PG grade in accordance with AASHTO M320, Table 1 and Section 402.2.1.1, "Polymer-Modified Asphalt Binder."

A technical representative of Warm Mix Additive Supplier, including contact information shall be designated in writing via the mix design submittal process. The representative is expected to ensure that the Warm Mix Additive is handled properly. The representative does not have the authority to allow any deviation from the Department Specifications and Project requirements.

Warm Mix additive dosage rates shall not deviate from those designated by the Warm Mix Additive Supplier. If a terminal blend Warm Mix additive is used, the dosage rate shall be shown on the Materials Certificate of Compliance.

The WM Additive supplier and the Asphalt Binder supplier will be consulted when establishing recommend mixing, compaction and maximum allowable temperatures to be used for the development of the mix design.

Some modification to HMA plants may be necessary to accommodate the WMA technologies.

403.2.7 Rubberized Open-Graded Friction Course (ROGFC)

ROGFC shall be produced with terminal blended asphalt rubber binder.

Terminal blended asphalt rubber binder shall consist of a homogeneous mixture of tire rubber obtained from recycled tires and compatible with PG 70-28+ asphalt binders or as specified in the Contract. All binder components shall be thoroughly blended and reacted prior to use.

The PG 70-28+ asphalt Material or as specified in the Contract for the asphalt rubber binder shall comply with the requirements of Section 402, "Asphalt Materials and Mineral Admixtures" for PG 70-28R+ or as specified in the Contract.

403.3 CONSTRUCTION REQUIREMENTS

403.3.1 General

The Contractor shall use the "strap method" or "meter reading" to determine the quantity of asphalt Material, and maintain the percentage of asphalt Material specified in the mix design in accordance limits shown in Table 403.3.6.2:1, "Acceptance Limits and Factors."

403.3.2 Preparation of Roadbed

Before placing OGFC, WOGFC, or ROGFC the Contractor shall clean Deleterious Materials from the existing surface.

403.3.3 Temperature and Weather Limitations

The Contractor shall:

1. Not place OGFC, WOGFC, or ROGFC on wet surfaces or when the Project Manager determines that the weather conditions prevent proper handling and finishing; and
2. Place OGFC or ROGFC when the Chill Factor is at least 60 °F and 55 °F for WOGFC. If the ambient air temperature is ≥90 °F the Chill Factor will not be applied.

403.3.4 Mixing Requirements

The Contractor shall ensure that:

1. Hot mix plants conform to the requirements of Section 423, "Hot-Mix Asphalt (HMA) (Major Paving)" or Section 424, "Warm Mix Asphalt (WMA);"
2. The mineral aggregate is free of deleterious coatings;
3. The moisture content of the combined aggregate and mineral admixture Material is in compliance with the "Combined Aggregate Water Absorption @ SSD" shown on the approved mix design;
4. The aggregate is mixed with asphalt Material until the aggregate particles are thoroughly and uniformly coated;

5. The mixture temperature does not does not exceed the asphalt binder Supplier's recommendation;
6. The placement temperature for the mixture does vary by more than 20 °F from the temperature established on the approved Mix Design, or fall below 220 °F; and
7. Mineral admixture, shall be added to the aggregate in accordance with Section 423, "Hot-Mix Asphalt (HMA) (Major Paving)" or Section 424, "Warm Mix Asphalt (WMA)" within the production tolerances specified in Table 403.3.6.2:1, "Acceptance Limits and Factors."

403.3.5 Placement and Finishing

The Contractor shall:

1. Place the OGFC, WOGFC, or ROGFC with a paving machine in accordance with Section 423.3.4.3, "Pavers;"
2. Roll the surface immediately following OGFC placement with a steel-wheeled, self-propelled roller that weighs enough to achieve adequate consolidation of the aggregate without excessive breakage. The finished surface shall be in accordance with Section 401, "Pavement Smoothness Measurement" and the Pavement Smoothness Category identified in the Contract Plans. For pavements that are not subject to Section 401. "Pavement Smoothness Measurement" the Contractor shall use a ten (10) foot straightedge to ensure the surface is free of irregularities larger than 1/4inch; and
3. Remove low and defective areas immediately, replace them with new OGFC, and compact the corrected Work to conform to the surrounding area.

403.3.5.1 Plan Surfacing Depths

The Contractor shall monitor and record Plan depths throughout the surfacing operations at intervals specified by the Project Manager. The Department will not pay for any excess course depth. Courses will be rejected, if less than 1/2 inch.

403.3.6 Sampling and Testing

403.3.6.1 Contractor Quality Control

After the mix design has been reviewed and issued, the Contractor shall control the mixture production on the project such that the tolerances of Table 403.3.6.2:1 "Acceptance Limits and Factors" are met.

The Contractor shall perform Quality control processes in accordance with Section 902 "Quality Control" and Section 906 "Minimum Testing Requirements."

403.3.6.1.1 Suspension of Operations

If one (1) or more properties listed in Subsection 403.3.6.2, "Department Quality Assurance," fail to meet the Specification requirements for a period of one (1) Day or a maximum production of 1000 tons; the production will be halted by the Project Manager.

The Contractor shall:

1. Use the gradation information to determine causes or factors that may be a contribution to the problem and prepare a plan to solve the problem. Approval of the Plan must be obtained from the Project Manager before resumption of paving operations. Upon approval of the proposed Plan, the Contractor may resume

operations to determine if the actions taken have corrected the problem;

2. Limit production to 1000 tons that will be tested in 500-ton increments. If that testing indicates that the problem has been corrected, the Contractor may resume full operations. If the problem has not been corrected, reduced production rates and testing as described above will be required; and
3. Take corrective action to remedy any property of the mix that is out of Specification. Contractors who elect to produce Material that is not within the Specification limits do so at their own risk. Price reductions due to out of Specification Material being placed will be deducted from the unit price of the item in accordance with the Department's current Acceptance and Price Reduction Procedures. All Material that is rejected shall be removed and replaced with Specification Material at the Contractor's expense. Material that is improperly graded or segregated or fails to meet the requirements herein provided shall be corrected or removed and disposed of immediately as directed by the Project Manager at the Contractor's expense.

403.3.6.2 Department Quality Assurance

403.3.6.2.1 Acceptance

The Department will conduct Quality Assurance sampling, testing, and monitoring to ensure that the Contractor provides a mix that meets the tolerances.

Acceptance for gradation will be based on testing of samples obtained from combined aggregates and mineral admixture, before addition of asphaltic Materials. Acceptance for asphalt content will be based on strap method or meter reading. Acceptance for mineral admixture content will be based on daily meter reading totals. The testing will be conducted in accordance Section 906, "Minimum Testing Requirements." Acceptance test results will be provided to the Contractor's Quality Control Representative or designee by the end of the Workday after the samples are taken.

Table 403.3.6.2:1
Acceptance Limits and Factors

Characteristic	Specification limits
Asphalt Content	± 0.3%[a]
Mineral Admixture Content	± 0.2%[a]
1/2 inch	100
3/8 inch	90-100
No. 4	25-55
No. 8	4 - 20
No. 16	0-10
No. 50	0-6
No. 200	0-4

[a]Percent difference from TV listed on approved JMF.

403.4 METHOD OF MEASUREMENT

403.4.1 OGFC, WOGFC, AND ROGFC

OGFC, WOGFC, AND ROGFC will be measured by the square yard or ton. The average width of the OGFC in place will be used in computing the quantities. The length used in computing the area shall be station to station along the centerline of the Roadway. All dimensions shall be as shown on the typical section of the Plans.

403.5 BASIS OF PAYMENT

The Accepted quantities of the OGFC, WOGFC, or ROGFC will be paid for at the Contract unit price per square yard or ton.

Pay Item	Pay Unit
Open-Graded Friction Course Complete	Square Yard or Ton
Warm Mix Open-Graded Friction Course Complete	Square Yard or Ton
Rubberized Open-Graded Friction Course Complete	Square Yard or Ton

403.5.1 Price Adjustments

A price reduction in accordance with the Department's Price Reduction Guidelines will be applied if the OGFC, WOGFC, or ROGFC, asphalt Material, or mineral admixture are not produced, mixed, or placed in accordance with the Contract requirements.

403.5.2 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Crushing and stockpiling of Material;
2. Asphalt Material, mineral admixtures, warm mix additives, and tire rubber modifiers;
3. Mix design;
4. Mixing, hauling, placement on a prepared surface; and
5. Process control testing and providing cold feeds.

SECTION 405: DETOUR PAVEMENTS

405.1 DESCRIPTION

This Work consists of the following:

1. Providing and placing surfacing Materials, including Subgrade preparation, Base Course, prime coat, asphalt Material, tack coat, and OGFC, as required in accordance with the Plans;
2. Maintaining, removing, hauling, and disposing of Detour pavements in an environmentally-Acceptable manner; and
3. Hauling and stockpiling salvageable Detour pavements as directed by the Project Manager.

Unless otherwise noted in the Contract, Detour pavements do not include Detour Embankments, drainage, and major Structures. Embankment, drainage, and major Structures will conform to their applicable sections.

405.2 MATERIALS

405.2.1 General

The Contractor shall obtain surfacing Material for the Detour construction from a suitable source in accordance with Section 106, “Control of Materials.”

405.2.2 Alternate Pavement Section

Two (2) weeks before constructing the Detour, the Contractor may submit an alternative detour pavement section proposal to the Project Manager for approval. The proposal shall include the surfacing thickness and the types of Materials.

The approved alternate Detour pavement section must have at least the same structural number specified in the Contract.

The Contractor shall determine the structural number in accordance with the values in Table 405.2.2:1, “Structural Coefficients.”

Table 405.2.2:1
Structural Coefficients

Description	Structural coefficient
Base Course	0.11
Hot-mix asphalt (HMA)	0.44
Cold-mixed asphalt pavement[a]	0.15

[a]The Contractor may use cold-mixed asphalt pavement in low-traffic areas, with the District Construction Engineer’s written approval.

405.3 CONSTRUCTION REQUIREMENTS

405.3.1 General

The Contractor shall construct the Detour pavement in accordance with the following applicable Specifications:

1. Section 207, “Subgrade Preparation;”

2. Section 303, “Base Course;”
3. Section 403, “Open Graded Friction Course;”
4. Section 407, “Tack Coat;”
5. Section 408, “Prime Coat;”
6. Section 416, “Minor Paving”
7. Section 423, “Hot Mix Asphalt (HMA) (Major Paving) ;” and
8. Section 424, “Warm Mix Asphalt (WMA).”

405.3.2 Contractor Testing/Design Requirements

The Contractor shall provide Subgrade R-values for the top two (2) ft of the Detour Subgrade by using AASHTO T-190.

405.3.3 Maintenance of Detour Section

The Contractor shall:

1. Ensure the maintenance and repair of the Detours minimizes the impact to the traveling public; and
2. Maintain safe traffic flow during construction.

If the Project Manager determines that the Detour surfacing is damaged, the Contractor shall correct the problem immediately. If the Project Manager determines that the corrective actions failed, overlay the Detour with additional HMA at no additional cost to the Department.

If the Contractor does not immediately fix the Detour surfacing as directed by the Project Manager, the Department will assess damages in accordance with the following Table for each Day that the Detour remains unacceptable to the Project Manager.

Table 405.3.3:1
Schedule of Damages

Total Original Contract Amount ($)	Charge ($) per Day
≤100,000	500
>100,000-500,000	1,000
>500,000-1,000,000	1,500
>1,000,000-2,000,000	2,000
>2,000,000-4,000,000	2,500
>4,000,000-7,000,000	3,000
>7,000,000-10,000,000	4,000
>10,000,000	5,000

405.3.4 Removal of Detours

When removing the Detour, the Contractor shall dispose of the surfacing Material in an environmentally Acceptable manner, or salvage the Material as shown in the Contract.

The salvage of the Detour pavement Material includes hauling and stockpiling.

405.4 METHOD OF MEASUREMENT

The Department will measure the *Detour Pavement Construction* actually placed and maintained on the top width and length of the detour if paid by the unit of the Contract Item. If no Contract Item exists for *Detour Pavement Construction*, payment will be Incidental to

Section 618, "Traffic Control Management" and Section 702, "Construction Control Devices."

405.5 BASIS OF PAYMENT

Pay Item	**Pay Unit**
Detour Pavement Construction	Square Yard

405.5.1 Work Included in Payment

The following Work or items will be considered as included in the payment for Detour Pavement Construction and will not be measured or paid for separately:

1. Submittals;
2. Maintenance of Detours;
3. Furnishing and placement of HMA/WMA, OGFC on Detours;
4. If designated in the Contract; Base Course; Removal of Detour Materials including surfacing, earthwork, and drainage Structures;
5. Furnishing and placement of prime and tack coat;
6. Subgrade preparation;
7. Testing (includes AASHTO T190); and
8. Hauling and stockpiling of salvageable Materials.

SECTION 407: TACK COAT

407.1 DESCRIPTION

This Work consists of providing and applying asphalt Material to an existing HMA, WMA, or portland cement concrete pavement surface.

407.2 MATERIALS

The Contractor shall use one (1) of the following asphalt Materials types for the tack coat:

1. CSS-1, CSS-1H, or SS-1, or SS-1H emulsified asphalt;
2. Performance-graded asphalt binder; or
3. Project Manager approved selection from the Department’s *Approved Products List*.

The Contractor shall provide the asphalt Materials in accordance with Section 402, “Asphalt Materials and Mineral Admixtures.”

407.3 CONSTRUCTION REQUIREMENTS

The Project Manager will determine the tack coat application rate and as indicated in Section 407.3.4, “Application of Asphalt Materials.”

407.3.1 Temperature and Weather Limitations

The Contractor shall:

1. Not apply tack coat on a wet surface.
2. Not apply emulsified asphalt when the air temperature is below the manufacturers recommended application temperature.

407.3.2 Equipment

The Equipment shall include an asphalt distributor and Equipment for heating asphalt Material. The Contractor shall provide Equipment that is in accordance with Section 408, “Prime Coat.”

407.3.3 Preparation of Surface

The surfaces and edges to be tack coated shall be dry, patched, cleaned, and free of dirt, surface moisture, vegetation and other Deleterious Materials or irregularities.

407.3.4 Application of Asphalt Material

The Contractor shall:

1. Uniformly apply asphalt Material with a pressure distributor at a rate determined by the Project Manager (to provide a “residual” asphalt cement content of from 0.04 gal per square yard to 0.08 gal per square yard);
2. Ensure that the nozzles on the pressure distributor are fully open and at the same angle from the spray bar, approximately 30°;
3. Keep the spray bar at a height above the pavement surface to provide for a double or triple lap of the applied asphalt Material;
4. Keep traffic off of the tack coat, unless otherwise approved by the Project Manager. If the Roadway being paved is closed to traffic, the Contractor may place tack coat a

maximum of 24 h ahead of the laydown operation. If the Roadway being paved is open to traffic, place the tack coat only over the area that can be paved during that Day's laydown operation. If the Contractor uses an emulsified asphalt tack coat, the Contractor may begin paving operations after the emulsified asphalt is cured.

5. Reapplication of tack coat damaged by traffic or construction Equipment will be at no cost to the Department.

407.4 METHOD OF MEASUREMENT

The Department will consider any water added to further dilute emulsified asphalts Incidental to *Asphalt Material for Tack Coat* and no separate payment will be made.

407.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Asphalt Material for Tack Coat	Ton

407.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Providing, mixing, heating, and applying asphalt Materials to the roadbed with an asphalt distributor;
2. Shipping/Delivery to Project site;
3. Sampling and Testing; and
4. Water.

SECTION 408: PRIME COAT

408.1 DESCRIPTION

This Work consists of providing and applying asphalt Material and blotter Material (if required) to an existing surface.

408.2 MATERIALS

The Contractor shall provide one (1) of the following types of prime coat asphalt Material:

1. Asphalt emulsified prime (AE-P);
2. Penetrating emulsified prime (PE-P);
3. Emulsified Petroleum Resin Prime (EPR-1)
4. MC-70; or
5. Other Material approved by the Project Manager.

The Contractor shall provide prime coat asphalt Material in accordance with Section 402, “Asphalt Materials and Mineral Admixtures.”

408.2.1 Certification

The Contractor shall provide a manufacturer’s written certification that the prime Material is chemically identical to those identified on the Department’s *Approved Products List*.

408.2.2 Blotter Material

The Contractor shall provide fine aggregate (sand) blotter Material in accordance with Table 408.2.2:1, “Blotter Material,” unless otherwise approved by the Project Manager.

Table 408.2.2:1
Blotter Material

Sieve size	% passing
3/8 inch	100
No. 4	80 – 100
No. 16	45 – 80
No. 50	10 – 30
No. 100	2 – 10

408.3 CONSTRUCTION REQUIREMENTS

The Project Manager will determine the prime coat application rate and as indicated in Section 408.3.4, “Application of Prime Material.”

408.3.1 Temperature and Weather Limitations

The Contractor shall not apply the prime Material in the following conditions:

1. If the surface has standing water;
2. If the air temperature is less than manufacturer’s recommendation; or
3. If weather conditions prevent the proper placement of the prime coat.

The Project Manager may waive these temperature and weather limitations due to wet weather conditions or to protect Work in progress during Department approved suspensions.

408.3.2 Equipment

The Contractor shall:

1. Provide a distributor and Equipment for heating bituminous Material. Ensure the distributor is capable of maintaining the prime Material at an even temperature and can uniformly distribute the Material on variable widths with uniform pressure;
2. Ensure that the distributor can apply the Material as required;
3. Ensure that the distributor circulates the prime Material within the tank, the spray bar, and other accessories when not spraying; and
4. Ensure that the distributor has a hand spray gun with a precise-control single or double nozzle and a positive shut-off valve.

The Contractor shall ensure that the distributor has the following Equipment:

1. A tachometer;
2. Pressure gauges;
3. Accurate volume-measuring devices or a calibrated tank;
4. A thermometer that measures the temperature of tank contents;
5. A power unit for the pump; and
6. Laterally and vertically adjustable spray bars.

408.3.3 Preparation of Surface

The Contractor shall:

1. Shape the surface to be primed in accordance with the Plans, and ensure that it is free of ruts, corrugations, segregated Materials, or other irregularities.
2. Uniformly compact the surface in accordance with Section 303, “Base Course.”
3. Ensure that the surface is slightly moist but not saturated when applying the prime.

408.3.4 Application of Prime Material

The Contractor shall:

1. Not apply the prime coat until the Project Manager has approved the quantities, application rates, Material temperature, and locations;
2. The Contractor shall apply the prime Material in a uniform and continuous layer using a pressure distributor;
3. Ensure the nozzles on the pressure distributor are fully open and at the same angle from the spray bar, approximately 30°;
4. Keep the spray bar at a height above the pavement surface to provide a double or triple lap of the prime Material;
5. If using a hand-held want, ensure the application is uniform; and
6. If distribution irregularities occur, cease operations and take corrective action.

If the Department allows traffic on the surface, the Contractor shall maintain one (1)-way traffic on the untreated section of the Roadbed until the treated surface has absorbed the prime Material, then transfer traffic to the treated portion and prime the untreated section.

The Contractor shall perform Work and procedures in accordance with manufacturer's recommendations.

408.3.5 Application of Blotter Material

If the prime Material fails to penetrate the surface within 24 h after its application, the Contractor shall spread blotter Material to absorb the excess Material. The Project Manager may approve the use of blotter Material on Roadway sections that must be opened to traffic before the 24 h waiting period.

408.4 METHOD OF MEASUREMENT

The Department will consider any water added to further dilute emulsified asphalts Incidental to *Asphalt Material for Prime Coat* and no separate payment will be made.

408.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Prime Coat Material	Ton

408.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Providing, mixing, heating, and applying asphalt Materials to the roadbed with an asphalt distributor;
2. Provide blotter Material as required;
3. Shipping/Delivery to Project site;
4. Sampling and Testing; and
5. Water.

SECTION 411: HOT-POURED CRACK SEALANT

411.1 DESCRIPTION

This Work consists of preparing and cleaning cracks and joints in the existing Roadway surface and sealing these cracks with hot-poured sealant.

411.2 MATERIALS

For crack and joint seals, the Contractor shall use hot-poured sealant in accordance with the general and physical requirements of ASTM D 6690, as specified in the Contract and shall be on the Departments *Approved Product List* (APL).

The Contractor shall have the Supplier sample and test the sealant in accordance with ASTM D 6690 and provide certified test results for each lot or batch of sealant supplied.

The Contractor shall provide sealant packaged in containers and labeled in accordance with ASTM D 6690. Bulk shipments of sealant must be accompanied by documents that state the following:

1. Manufacturer’s name;
2. Trade name of the sealant;
3. Batch or lot number;
4. Pouring temperature; and
5. Safe heating temperature.

The Contractor shall not mix more than one (1) lot or batch within a bulk shipment of sealant.

411.3 CONSTRUCTION REQUIREMENTS

411.3.1 Temperature and Weather Limitations

The Contractor shall apply the sealant in the following conditions:

1. When the air temperature is at least 40 °F and rising; and
2. When the temperature of the existing pavement surface is above 32 °F during application; or
3. As indicated on the manufacturers recommendations.

The Contractor shall not place the sealant during inclement weather, on wet surfaces, or when the wind conditions prevent satisfactory sealing.

411.3.2 Equipment

The Contractor shall:

1. Provide router bits of at least 1/2-inch diameter that cut to one (1) inch deep;
2. Use air compressors that provide uncontaminated air at a pressure capable of cleaning approved cracks; and
3. Equip air compressors with traps to prevent oil and moisture from entering the air stream.

The Equipment for heating and preparing the sealant mixture shall provide a continuous supply of the prepared mixture and maintain a continuous, uniform and homogeneous mixture during the sealing operation. The Contractor shall provide continuous mechanical agitation as necessary to maintain homogeneity.

The Contractor shall use application devices that provide uniform application of the sealant Materials without clogging, or causing other irregularities in distribution. Application devices and Equipment shall meet the requirements of the sealant manufacturer.

411.3.3 Preparation of Cracks

The Contractor shall:

1. Route and clean cracks to the satisfaction of the Project Manager;
2. Route cracks with an average clear opening less than 1/2 inch to provide a minimum sealant reservoir of 1/2 inch wide and to a depth of from 3/4 inch to one (1) inch, unless otherwise directed by the Project Manager. Center routers over the cracks during routing operations;
3. Clean cracks with an average clear opening 1/2 inch or greater with high-velocity compressed air to a depth of from 3/4 inch to one (1) inch, unless otherwise directed by the Project Manager; and
4. Clean loose particles, dust, and other Deleterious Materials, immediately before placing the sealant from the sealant reservoirs with high-velocity compressed air.

411.3.4 Application of Sealant

The Contractor shall:

1. Control the application to confine sealant within the reservoirs;
2. Apply sealant to the clean, dry-surfaced reservoirs to a depth of from 3/8 inch to 1/4 inch below the existing surface of the Roadway. If the Project Manager determines that the method of filling results in an excessive amount of sealant on the pavement surface, stop filling and change the method. Clean excess sealant Material from the pavement surface;
3. Halt operations if application devices clog or irregularities occur during application and take corrective action immediately; and
4. Follow special preparation or placement requirements indicated by the manufacturer.

411.3.5 Resumption of Traffic

The Contractor shall cure sealant in accordance with the manufacturer’s requirements, before placing traffic on the pavement surface.

411.4 METHOD OF MEASUREMENT

The Department will verify the measured quantity with the Contractor daily.

411.5 BASIS OF PAYMENT

Pay Item	**Pay Unit**
Hot-Poured Crack Sealing	Pound

411.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Prepare, clean, and fill cracks and joints with hot-poured sealant on the existing Roadway.

SECTION 412: HOT IN-PLACE RECYCLING OF ASPHALT PAVEMENT (REMIXING METHOD)

412.1 DESCRIPTION

This Work consists of recycling the existing in-place asphalt surface in a multi-step process of cleaning, heating, milling, rejuvenating (if required), spreading, and leveling. This Work also consists of placing and compacting the new HMA/WMA over the recycled surface. The Contract may require the Contractor to blend recycled Material with an asphalt-rejuvenating agent.

412.2 MATERIALS

412.2.1 Rejuvenating Agent

The Contractor shall provide an agent that will rejuvenate the existing Roadway's binder properties. The existing Roadway's asphalt Material shall be extracted, recovered, and combined with a virgin asphalt binder per AASHTO M 323, Appendix A such that the combination of the rejuvenating agent with the existing Roadway asphalt binder will meet the full AASHTO M 320 requirements for the required PG asphalt grade in the approved mix design.

412.2.2 HMA/WMA

The Contractor shall provide the HMA Material and mix design in accordance with Section 416, "Minor Paving;" Section 423, "Hot-Mix Asphalt (HMA) (Major Paving);" or Section 424, "Warm Mix Asphalt (WMA)."

412.3 CONSTRUCTION REQUIREMENTS

412.3.1 Equipment

412.3.1.1 General

At the Pre-Construction Conference, the Contractor shall:

1. Notify the Project Manager of the necessary types of Equipment;
2. Deliver the Equipment to the Project in time for the Project Manager's evaluation;
3. Demonstrate the rate, depth, and recycling operations on a Roadway test section before beginning production operations; and
4. Submit a Quality Control Plan in accordance with the most recent Department's Contractor Quality Control Guidelines for the Project Manager's approval.

If Equipment or recycling operations do not meet requirements, the Contractor shall correct or replace the deficiency.

412.3.1.2 Heating Units

The Contractor shall ensure the heating units can heat the existing asphalt pavement high enough to mill the Material to the minimum specified depth without the following results:

1. Breaking aggregate particles;
2. Charring the existing asphalt; or
3. Producing undesirable pollutants.

The Contractor shall apply the heat under an enclosed or shielded hood. The Contractor shall not heat the pavement surface with a direct flame.

412.3.1.3 Milling Units

The Contractor shall:

1. Use milling units that can mill to the specified depth;
2. Equip the units with automatic height controls to clear utility manholes and other obstructions in the pavement surface; and
3. Use units with enough power to mill through high spots and create a leveled surface.

412.3.1.4 Rejuvenating Agent Storage Unit

The Contractor shall use a thermostatically-controlled storage unit to maintain the rejuvenating agent at a constant, Supplier-specified temperature.

412.3.1.5 Metering Unit

The Contractor shall:

1. Use a unit that can uniformly apply the rejuvenating agent to the milled Material. The unit shall incorporate a meter for continuous quantity verification;
2. Vary the applied amount in direct proportion to the recycling system's operating speed and synchronize with the amount of Material milled; and
3. Not vary the rejuvenating agent's application tolerance by more than 0.5% of the specified application rate.

412.3.1.6 Blending Unit

The Contractor shall use a twin-shaft pugmill unit that can uniformly mix the milled Material, rejuvenating agent, and virgin HMA/WMA.

412.3.1.7 Spreading and Leveling Unit

The Contractor shall use a unit with automatic grade controls capable of spreading and leveling the Material uniformly over the specified surfaces.

412.3.1.8 Compaction Equipment

The Contractor shall use compaction Equipment in accordance with Section 423.3.4.4, "Compaction Equipment."

412.3.2 Construction Details

412.3.2.1 Cleaning of Existing Pavement Surface

Before beginning hot in-place recycling, the Contractor shall clean the existing pavement surface of non-asphalt Materials by blading and brooming or use methods approved by the Project Manager.

412.3.2.2 Heating, Milling, and Processing

The Contractor shall heat, mill, and process the in-place asphalt surface in a uniform manner to the widths and depths in accordance with the Plans. The Contractor shall control the heat to assure a uniform heat penetration without the following results:

1. Differential softening of the pavement;
2. Breaking of the aggregate particles;
3. Charring of the asphalt; or
4. Producing undesirable pollutants.

If required, the Contractor shall:

1. Uniformly apply the rejuvenating agent to the milled Material before the addition of new HMA or WMA;
2. Determine the actual amount of rejuvenating agent needed to address field conditions and to optimize the properties of the in-place pavement; and
3. Uniformly mix the milled Material, rejuvenating agent, and HMA or WMA to produce a homogeneous mixture.

412.3.2.3 Placing and Compacting

The Contractor shall uniformly spread and level the recycled mixture to the width, grade, and slope specified in the Plans. Immediately after leveling the recycled Material, compact the Material in accordance with Section 423.3.5, "Placement Operations."

412.3.2.4 Temperature Requirements

The Contractor shall ensure the temperature of the asphalt Materials immediately behind the laydown machine is between 225 °F and 300 °F.

412.3.2.5 Joints

The heating unit shall heat a minimum of four (4) inches beyond the width of recycling. The Contractor shall construct joints in accordance with Section 423.3.5.4, "Joints."

412.3.2.6 Debris and Waste Material Disposal

The Contractor shall dispose of debris and waste Material in an environmentally safe manner at locations approved by the Project Manager.

412.3.2.7 Weather Limitations

The Contractor shall not perform hot in-place recycling of asphalt pavement when the Roadway surface is wet or when weather conditions prevent the proper handling, finishing, and compacting of the asphalt mixture.

412.3.2.8 Surface Tolerance

The Contractor shall provide a compacted surface in accordance with Section 423.3.5.5, "Surface Tolerances."

412.3.2.9 Plan Surfacing Depths

The Contractor shall monitor and record the depth of the compacted recycled pavement Material (including new HMA Material, if specified) during the placement operations. The

Contractor shall perform this task in accordance with the Department's *Minimum Testing and Acceptance Requirements* and as approved by the Project Manager. The Project Manager will address deficiencies of more than 0.5 inches by:

1. Accepting the in-place compacted thickness at an adjusted price; or
2. Rejecting the in-place mixed Material and requiring the Contractor to remove and replace.

412.3.3 Contractor Quality Control

412.3.3.1 Contractor Quality Control for Materials

The Contractor shall provide new HMA or WMA Materials in accordance with Section 423.3.6.1, "Contractor Quality Control;" except take random test samples from the HMA/WMA windrow before the Material goes through the paver.

412.3.3.2 Contractor Quality Control for Compaction

See Section 423.3.6.1.2, "Contractor Quality Control for Compaction."

412.3.3.3 Suspension of Operations

See Section 423.3.6.3, "Acceptance."

412.3.3.4 Project Verification Testing

The Contractor shall place new HMA Materials in accordance with Section 423.3.6.4, "Independent Assurance Testing" or WMA Materials in accordance with Section 424.3.6.4, "Independent Assurance Testing."

412.3.4 Department Quality Assurance

412.3.4.1 Department Quality Assurance Testing for HMA Mix

New HMA Materials shall meet the requirements of Section 423.3.6, "Sampling and Testing," with the exception that the Department will base Acceptance on random test samples taken from the HMA windrow before the Material goes through the paver. New WMA Materials shall meet the requirements of Section 424.3.6, "Sampling and Testing," with the exception that the Department will base Acceptance on random test samples taken from the WMA windrow before the Material goes through the paver.

412.3.4.2 Department Quality Assurance Testing for HMA or WMA Compaction

The Department will test in accordance with Section 423.3.6, "Sampling and Testing" or 424.3.6, "Sampling and Testing." The target density is a mean density of at least 93% of the theoretical maximum density. The Project Manager will grant an exception to the target if the Contractor can demonstrate that the target density is not reasonably obtainable because of the conditions of the existing Pavement Structure or Subgrade Materials.

If the Department grants this exception, the Contractor shall construct a Roadway test strip and develop a HMA compaction process to obtain the highest possible target density based on an approved roller's density gain per pass, in accordance with Section 423.3.4.4, "Compaction Equipment." The Contractor shall not begin paving operations (except for the Roadway test strip) until the Project Manager approves the process. The in-place density shall not exceed 98% of the theoretical maximum density or be more than three percent (3%)

below the target density. If a lot's mean density does not meet this density requirement, the Project Manager may do the following:

1. Require the Contractor to remove and replace the defective lot of HMA or WMA at no additional cost to the Department; or
2. Accept the HMA or WMA Material and pay the Contractor 50% of the Bid Item Unit Price.

If the Project Manager determines that the mean measured densities are consistently higher, not exceeding 93% of the theoretical maximum density, or lower than the current lot's target density, the Project Manager may establish a new Acceptance lot on the Project.

412.3.4.3 Department Quality Assurance Testing for HMA/WMA Smoothness

If the Contract requires two (2) or more layers of new HMA/WMA Material, place in accordance with Section 401, "Pavement Smoothness Measurement." For the purposes of this section, Hot Recycled Insitu Material is not defined as HMA/WMA.

412.4 METHOD OF MEASUREMENT

The Department will measure HMA in accordance with Section 423.4, "Method of Measurement" or WMA in accordance with Section 424.3, "Method of Measurement."

412.5 BASIS OF PAYMENT

The Department will pay for new HMA Material in accordance with Section 423.5, "Basis of Payment" or WMA Material in accordance with Section 424.5, "Basis of Payment."

Pay Item	**Pay Unit**
Hot In-place Recycling of Asphalt Pavement	Square Yard
Rejuvenating Agent	Gallon

412.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Recycling existing in-place asphalt surface in a multi-step process of cleaning, heating, milling, and rejuvenating (if required), spreading and leveling;
2. Placing and compacting new HMA/WMA over recycled surface;
3. Shipping/Delivery of new HMA/WMA to Project site; and
4. Development of the Contractor Quality Control Plan in accordance with Section 902, "Quality Control."

413.1 DESCRIPTION

This Work consists of recycling the existing asphalt surface in a simultaneous multi-step process of cleaning, heating, milling, scarifying, rejuvenating (if required), spreading, and leveling. This Work also consists of placing and compacting new HMA or WMA Material over the recycled surface. The Contract may require the Contractor to blend the recycled Material with an asphalt-rejuvenating agent.

413.2 MATERIALS

413.2.1 Rejuvenating Agent

The Contractor shall provide an agent that will rejuvenate the existing Roadway binder properties. The Contractor shall extract, recover, and combine the existing Roadway's asphalt Material with a virgin asphalt binder per AASHTO M 323, Appendix A, such that the combination of the rejuvenating agent with the existing Roadway asphalt binder will meet the AASHTO M 320 requirements for the required PG asphalt grade in the approved mix design.

413.2.2 HMA

The Contractor shall provide HMA Material in accordance with Section 416 "Minor Paving", Section 423, "HOT MIX ASPHALT (HMA) (MAJOR PAVING)", or WMA Material in accordance with Section 424, "Warm Mix Asphalt (WMA)."

The Contractor shall provide a HMA mix design in accordance with Subsection 423.2, "Materials" or a WMA mix design in accordance with Subsection 424.2, "Materials." The State Materials Bureau must approve the HMA or WMA mix design before the beginning of the Work.

413.3 CONSTRUCTION REQUIREMENTS

413.3.1 Equipment

413.3.1.1 General

At the Pre-Construction Conference, the Contractor shall:

1. Notify the Project Manager of the type of Equipment that will be used;
2. Deliver the Equipment to the Project in time for the Project Manager's evaluation;
3. Submit a Quality Control Plan in accordance with the most recent Department's Contractor Quality Control Guidelines for the Project Manager's approval;
4. Provide a machine with a single, self-propelled mobile unit capable of heating, scarifying, rejuvenating, mixing, leveling the existing surface Material, and immediately laying new hot-mix Material over the recycled surface;
5. Demonstrate the rate, depth, and recycling capabilities on the Roadway before beginning operations; and
6. Correct or replace any deficiency, if the Equipment or recycling operations do not meet requirements.

413.3.1.2 Heating Unit

The Contractor shall use a height-adjustable heating unit that is specifically designed to heat the upper layer of asphalt pavement. The unit shall heat the asphalt pavement in a manner that:

1. Will not burn, char, coke, or scrub the recycled mix;
2. Will meet State and local air quality requirements;
3. Will not pose health risks or damage to property;
4. Will not break aggregate particles; and
5. Will produce enough heat to soften the pavement to at least a depth of one (1) inch.

The Contractor shall apply the heat under an enclosed or shielded hood so that blasting or scrubbing of the existing pavement is eliminated. The Contractor shall use Equipment that can apply heat uniformly under controlled atmospheric conditions to eliminate free oxygen under the heating chamber.

413.3.1.3 Milling/Scarifying Unit

The Contractor shall use a unit that can remove pavement to a minimum depth of one (1) inch. The unit shall loosen the in-place asphalt pavement to a minimum depth of one (1) inch without excessively breaking the aggregate. The Contractor shall use a unit equipped with automatic height, grade, and cross slope controls with enough power to push the scarifiers through the high spots and create a leveled surface.

413.3.1.4 Rejuvenating Agent Storage Unit

The Contractor shall use a thermostatically-controlled storage unit to maintain the rejuvenating agent at a constant, Supplier-specified temperature.

413.3.1.5 Metering Unit

The Contractor shall:

1. Use a unit that can uniformly apply the rejuvenating agent to the milled and scarified Material. The unit shall incorporate a meter for continuous quantity verification;
2. Vary the applied amount in direct proportion to the recycling system's operating speed and synchronize with the amount of Material milled or scarified; and
3. Not vary the rejuvenating agent's application rate by more than +/- 0.5% of the rate defined in the mix design.

413.3.1.6 Blending Unit

The Contractor shall use a unit that can mix the scarified Material with the rejuvenating agent to produce a uniform, consistent final product.

413.3.1.7 Spreading and Leveling Unit

The Contractor shall:

1. Use a unit equipped with automatic grade controls, capable of uniformly spreading and leveling the blended recycled Material;
2. Use a unit equipped with a leveling blade and auger capable of moving recycled Material in a transverse direction to the center of the windrow;
3. Equip the unit with a recycling screed to partially compact the recycled mix before placing the top layer of new HMA or WMA; and

4. Coordinate the repaver speed with the production of the HMA or WMA plant to achieve a continuous operation.

413.3.1.8 Compaction Equipment

The Contractor shall use Equipment in accordance with Section 423.3.4, “Equipment.”

413.3.2 Construction Details

413.3.2.1 Cleaning of Existing Pavement Surface

Before beginning hot in-place recycling, the Contractor shall clean the existing pavement surface of non-asphalt Materials by blading and brooming or other methods approved by the Project Manager.

413.3.2.2 Heating, Milling/Scarifying, and Processing

The Contractor shall:

1. Evenly heat, mill, scarify, and rework the in-place asphalt surface to a minimum depth of one (1) inch, in accordance with the Plans;
2. Heat the existing pavement surface with continuously moving heaters to scarify the pavement to at least a one (1) inch average depth in a single pass;
3. Keep the surface temperature of the remaining in-place pavement below 475 °F and produce reclaimed mix at a temperature of at least 225 °F;
4. Extend the heating operation at least four (4) inches beyond the width of scarification on both sides;
5. Immediately scarify the heated pavement with scarifying shanks spaced so that they cover the surface without leaving ridges;
6. Mount the shanks to allow control from the operator’s platform; and
7. Scarify and cut through the pavement at a level that comes within 1/4 inch of the finished pavement’s grade and cross slope.

If required, the Contractor shall uniformly apply the rejuvenating agent to the Material immediately after milling and scarifying.

413.3.2.3 Placing and Compacting

The Contractor shall:

1. Uniformly spread and level the recycled mixture to the width, finished grade, and cross slope, shown in the Contract;
2. Place a new layer of HMA or WMA on top of the recycled paving material using a four (4)-section vibratory screed after partially compacting the recycled mixture with the recycling screed;
3. Perform this in one (1) continuous operation while the temperature of the recycled mix is at least 225 °F; and
4. Compact the Material in accordance with Section 423.3.5, “Placement Operations.”

413.3.2.4 Temperature Requirements

The Contractor shall maintain the temperature of the asphalt Material between 225 °F and 300 °F when measured immediately behind the laydown machine.

413.3.2.5 Joints

The heating unit shall heat a minimum of four (4) inches beyond the width of recycling. The Contractor shall construct joints in accordance with Section 423.3.5.4, “Joints.”

413.3.2.6 Debris and Waste Material Disposal

The Contractor shall dispose of debris and waste material in an environmentally safe manner at locations approved by the Project Manager.

413.3.2.7 Weather Limitations

The Contractor shall not perform hot in-place recycling of asphalt pavement when the Roadway surface is wet or when weather conditions prevent the proper handling, finishing, and compacting of the asphalt mixture.

413.3.2.8 Surface Tolerance

The Contractor shall place the compacted surface of recycled pavement material or new HMA Material in accordance with Section 423.3.5.5, “Surface Tolerances.”

413.3.2.9 Plan Surfacing Depths

The Contractor shall monitor and record the Material depth of the compacted recycled pavement Material or new HMA or WMA Material throughout the placement operations. The Contractor shall perform this task in accordance with the Department’s *Minimum Testing and Acceptance Requirements* and as approved by the Project Manager. The Project Manager will address a deficiency of more than 0.5 inches in-place compacted thickness as follows:

1. Accept the in-place compacted thickness at a reduced payment; or
2. Reject the in-place mixed Material.

413.3.3 Contractor Quality Control

413.3.3.1 Contractor Quality Control for Materials

The Contractor shall place new HMA Materials in accordance with Section 423.3.6.1, “Contractor Quality Control” or WMA Materials in accordance with Section 424.3.6.1, “Contractor Quality Control,” except take random test samples from the HMA or WMA windrow before the Material goes through the paver.

413.3.3.2 Contractor Quality Control for Compaction

See Section 423.3.6.1.2, “Contractor Quality Control for Compaction.”

413.3.3.4 Project Verification Testing

New HMA Material is subject to Independent Assurance Testing in accordance with Section 423.3.6.4, “Independent Assurance Testing.” New WMA Material is subject to Independent Assurance Testing in accordance with Section 424.3.6.4, “Independent Assurance Testing.”

413.3.4 Department Quality Assurance

413.3.4.1 Department Quality Assurance for HMA

New HMA Materials shall meet the requirements of Section 423.3.6.2.1, "Acceptance," and new WMA Materials shall meet the requirements of Section 424.3.6.2.1, "Acceptance," with the exception that the Department will base Acceptance on random test samples taken from the HMA or WMA before the Material goes through the paver.

413.3.4.2 Department Quality Assurance Testing for HMA Compaction

The Contractor shall meet the requirements of Section 423.3.6.2.1 "Acceptance" or Section 424.3.6.2.1, "Acceptance." The Project Manager will grant an exception to the mean density requirement of at least 93% of the theoretical maximum density if the Contractor can demonstrate that a minimum of 93% cannot be reasonably obtained because of the conditions of the existing Pavement Structure or Subgrade Materials. If the Project Manager grants this exemption, the Contractor shall construct a Roadway test strip and develop a HMA or WMA compaction process to get the highest possible density based on an approved roller's density gain per pass, in accordance with Section 423.3.4.4, "Compaction Equipment." The Project Manager will approve the process (except for the Roadway test strip) before paving operations begin. In no case shall the percentage of theoretical maximum density exceed 98% nor fall more than three (3) percentage points lower than the target density. If a lot does not meet either of these density requirements, the Project Manager will do the following:

1. Accept and pay for the lot of HMA or WMA Material at 50% of the Bid Item Unit Price; or
2. Reject the in-place Material and require the Contractor to remove and replace.

If the Project Manager determines that the mean measured densities are consistently higher, but not to exceed 93%, or lower than the current lot's target density, the Project Manager may establish a new Acceptance lot on the Project.

413.3.4.3 Department Quality Assurance Testing for HMA/WMA Smoothness

If the Contract requires two (2) or more lifts of new HMA/WMA Material, place in accordance with Section 401, "Pavement Smoothness Measurement." For the purposes of this section, Hot Recycled Insitu Material is not defined as HMA.

413.4 METHOD OF MEASUREMENT

If the Contract requires HMA, the Department will measure it in accordance with Section 423.4, "Method of Measurement."

413.5 BASIS OF PAYMENT

The Department will pay for new HMA Material in accordance with Section 423.5, "Basis of Payment."

Pay Item	Pay Unit
Single-Machine Hot In-Place Surface Repaving	Square Yard
HMA or WMA Sampling and Testing by the Contractor	Lump Sum
Rejuvenating Agent	Gallon

413.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Recycling existing in-place asphalt surface in a multi-step process of cleaning, heating, milling, and rejuvenating (if required), spreading and leveling;
2. Placing and compacting new HMA/WMA over recycled surface;
3. Shipping/Delivery of new HMA/WMA to Project site; and
4. Development of the Contractor Quality Control Plan in accordance with Section 902, “Quality Control.”

SECTION 414: COLD MILLING

414.1 DESCRIPTION

This Work consists of cold milling pavement surfaces and removing, hauling, and disposing of cold-milled Materials.

414.2 MATERIALS—Reserved

414.3 CONSTRUCTION REQUIREMENTS

414.3.1 Equipment

The Contractor shall use a cold milling machine that accurately controls the cross section depth and cross-slope within a 1/4 inch tolerance, unless otherwise shown in the Contract. The Equipment must control cross section grade by using an independent grade control or a 40 ft minimum external reference.

The Contractor shall use Equipment that provides an enclosed cutting area and dust control.

The milling Equipment must produce a uniform milled surface. The Contractor shall maintain the Equipment's teeth and spacing to produce the desired texture. The Contractor shall immediately replace broken, damaged, or excessively worn teeth.

414.3.2 Operations

The Contractor shall cold mill the existing pavement surface in accordance with the Contract.

The Contractor shall adjust the specified depth in maximum increments of 1/4 inch, as directed by the Project Manager. The Contractor shall minimize gouges, grooves, and ridges to create a uniform surface without deviations greater than 1/2 inch when measured with a ten (10) ft straightedge. The Contractor shall keep the milled surface free of loose Material. The Contractor shall remove the cold milled pavement Material and dispose of the surfacing Material in an environmentally Acceptable manner or stockpile in accordance with the Contract.

The Contractor shall perform milling operations adjacent to the traveled lanes in accordance with the Department's Administrative Directive (AD) – 241, "Drop off Guidelines" current at time of bid. The Contractor shall not expose the milled surface to traffic for more than 48 hours before beginning further surface operations unless otherwise specified in the Contract. The Contractor shall remove any standing water.

The Contractor shall correct unacceptable Work and damage to adjacent Structures caused by the operations and obtain Project Manager's approval of corrected Work. Repair damage to the milled surface, as directed by the Project Manager. If the Project Manager determines that damage is due to conditions beyond the Contractor's control, the Department will pay for correcting the damage as Extra Work.

The Contractor may use cold milled pavement Material as RAP or recycled concrete (RC) in accordance with the Contract.

414.4 METHOD OF MEASUREMENT

The Department will measure cold milling to the nearest 1/4 inch, if by the square yard-inch.

414.5 BASIS OF PAYMENT

Pay Item	**Pay Unit**
Cold Milling (Asphalt)	Square Yard-Inch or Square Yard
Cold Milling (Concrete)	Square Yard-Inch or Square Yard
Patching of Milled Surface	Ton

414.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Water (hauling, supplying etc.);
2. Hauling & Stockpiling cold millings at Contract designated locations:
    a. Cross-sections shall be performed and sealed by a licensed NM Professional Surveyor of designated locations and provided to the Project Manager;
3. Debris cleaning & sweeping;
4. Disposal of cold millings not to be retained by the Department;
5. Dispose of removed asphalt pavement Materials, not including minor sweepings, belonging to the Department using one (1) or more of the following methods:
    a. Recycling and mixing it into Base Course, Subgrade or HMA of the new Roadway, with approval of the Project Manager;
    b. Break down asphalt surfacing removed from the Project to a nominal two (2) inch size, or smaller, haul and stockpile the Material at a location approved by the Project Manager or as indicated in the Plans; or
    c. If the Material is to be permanently placed within the Shoulder or Median, it shall be treated by using one (1) of the following methods:
        i. Machine-compacted; or
        ii. Sealed with an approved rejuvenating agent.

SECTION 415: PAVEMENT SURFACE RESTORATION

415.1 DESCRIPTION

415.1.1 General

This Specification covers the requirements for:

1. **Option A**: In-Situ Cold Recycling of Existing Surfacing; and
2. **Option B**: Cold Milling with Hot-Mix Asphalt (HMA) or Warm Mix Asphalt (WMA) Inlay.

Choose either option. The Contractor may change options once during the Project at no additional cost to the Department.

415.1.2 Option A: In-Situ Cold Recycling of Existing Surfacing

This Work consists of the following:

1. Pulverizing the existing surfacing;
2. Mixing an emulsified binder agent with the pulverized surfacing;
3. Mixing hot hydrated lime slurry with the pulverized surfacing;
4. Spreading and compacting the mixture; and
5. Sealing the compacted surface.

415.1.3 Option B: Cold Mill with HMA Inlay

This Work consists of the following:

1. Cold milling;
2. Applying a tack coat; and
3. Placing an inlay of HMA or WMA.

415.2 MATERIALS

415.2.1 Option A: In-Situ Cold Recycling of Existing Surfacing

The Contractor shall:

1. Use an emulsified binder agent that is polymerized high-float emulsion HFE-150P, unless otherwise specified. Changing one (1) grade up or down will change the Bid Item Unit Price based on the difference in invoice prices between the grades of emulsion;
2. Change the grade only with the approval of the Project Manager and District Laboratory supervisor;
3. Use polymerized high-float emulsion in accordance with Section 402, “Asphalt Materials and Mineral Admixtures;” and
4. Use cold recycled Material that meets the following gradation requirements:

Table 415.2.1:1
Cold Recycled Pavement Gradation Requirements

Sieve size	% passing
1 1/4 inch[a]	100
One (1) inch	90–100

Table 415.2.1:1
Cold Recycled Pavement Gradation Requirements

Sieve size	% passing
[a]Allow 1 1/2 inch if pavement with fabric is recycled.	

The Contractor shall use sealing emulsion that is diluted high-float emulsion, CSS-1, or another approved equal.

The Contractor shall use hot hydrated lime slurry meeting the following requirements:

1. High-calcium pebble quicklime meeting the requirements of ASTM C 977;
2. Clean water in accordance with Section 509.2.6, "Water;" and
3. Slurry with a minimum dry solids content of 35% by weight and consisting of a uniform, pumpable suspension of solids in water.

415.2.1.1 Option A Mix Design

The Contractor shall:

1. Provide a Laboratory mix design developed and tested in accordance with the Department's procedures. The mix design will establish the initial target addition rate for the emulsified binder agent and for the hot hydrated lime slurry;
2. Provide copies of the Laboratory mix design, along with supporting documentation, to the Project Manager, the District Laboratory supervisor, and the State Materials Bureau; and
3. Not use the mix design without State Materials Bureau approval. The Department will consider the Laboratory mix design a starting point only. The Contractor may adjust the target addition rates for emulsified binder agent and hot hydrated lime slurry as necessary, with the Project Manager's approval.

415.2.2 Option B: Cold Mill with HMA Inlay

Cold millings removed during the surface restoration process will become the property of the Department, unless used on the Project or otherwise specified. The Contractor may use cold milling Material from this Project as RAP in the HMA or WMA inlay.

The Contractor shall:

1. Provide HMA or WMA in accordance with a Department-recognized HMA/WMA mixture type, with a nominal size of at least 3/4 inch or greater, and Section 423, "HOT MIX ASPHALT (HMA) (MAJOR PAVING) or Section 424, "WARM MIX APSHALT (WMA);" and
2. Use a tack coat in accordance with Section 407, "Tack Coat." The Contractor shall use HMA mixture containing performance-graded asphalt Material in accordance with Section 402, "Asphalt Materials and Mineral Admixtures."

415.2.2.1 Option B Mix Design

The Contractor shall provide a mix design developed and approved in accordance with Section 423, "HOT MIX ASPHALT (HMA) (MAJOR PAVING or Section 424, "WARM MIX ASPHALT (WMA)."

415.2.3 Equipment

415.2.3.1 Option A: In-Situ Cold Recycling of Existing Surfacing

415.2.3.1.1 Cold In-Situ Machinery

The Contractor shall:

1. Use a self-propelled machine capable of pulverizing in-situ asphalt Materials to the specified depth in one (1) pass;
2. Ensure that the machine provides a minimum rotor cutting width of 12 ft with automatic grade and slope control;
3. Use machine with screening and crushing capabilities to reduce or remove oversized particles before mixing with emulsion. The Department will allow the removal of a maximum of two percent (2%) oversize Material before adding emulsion, with the Project Manager's approval;
4. Use a mixing machine capable of mixing the pulverized Material and the emulsified binder agent in a homogeneous mixture and placing in a windrow while preventing segregation;
5. Use a positive displacement pump capable of accurately metering the required quantity of emulsified binder agent into the pulverized Material;
6. Equip the pump with a positive interlock system that will permit addition of the emulsified binder agent only when the pulverized Material is present in the mixing chamber, and that will automatically shut off when the Material is not in the mixing chamber;
7. Equip each mixing machine with a meter capable of registering the rate of flow and total delivery of the emulsified binder agent introduced into the mixture; and
8. Calibrate the meter in the presence of the Project Manager before beginning recycling operations and check or calibrate the meter as directed by the Project Manager.

415.2.3.1.2 Lime Slurry Equipment

The Contractor shall:

1. Produce lime slurry at the job site using a batch type process;
2. Ensure the Equipment accurately proportions the quicklime and water, mixes the two (2) to obtain proper slaking, and maintains homogeneous slurry;
3. Provide horizontal mixing shafts in the transports used to convey the slurry to maintain a homogenous mixture;
4. Add the lime slurry to the pulverized surfacing with a spray bar located at the cutting head on the milling machine; and
5. Use a metering device that accurately measures the amount of slurry delivered to within ± ten percent (10%) by weight.

415.2.3.1.3 Pavers

The Contractor shall:

1. Place the recycled asphalt Base Course with a self-propelled asphalt paver in accordance with Section 423.3.4.3, "Pavers," except do not heat the screed; and
2. Use Equipment capable of spreading the recycled asphalt base in one (1) continuous pass, without segregation, to the section shown on the Plans.

When using a pick-up machine to feed the windrow into the paver's hopper, the Contractor shall ensure that it is capable of picking up the entire windrow, down to the underlying Materials.

415.2.3.1.4 Rollers

The Contractor shall:

1. Provide rollers in accordance with Section 423.3.4.4, "Compaction Equipment;"
2. Ensure that the number, weight, and types of rollers are sufficient to obtain the required compaction while the mixture is in a workable condition;
3. Use a pneumatic roller that weighs at least 30 ton for the breakdown roller; and
4. Equip rollers with pads and water systems that prevent the recycled mixture from sticking to the roller wheels.

415.2.3.1.5 Brooms

The Contractor shall maintain a working rotary power broom on site capable of removing aggregate that dislodges from the recycled surface.

415.2.3.2 Option B: Cold Mill with HMA or WMA Inlay

The Contractor shall provide and use Equipment in accordance with Section 423, "HOT MIX ASPHALT (HMA) (MAJOR PAVING)," Section 424, "WARM MIX ASPHALT (WMA)," Section 407, "Tack Coat," and Section 414, "Cold Milling."

415.3 CONSTRUCTION REQUIREMENTS

Before beginning the Pre-Paving Conference, the Contractor shall:

1. Submit a paving schedule to the Project Manager for pavement surface restoration operations (Option A or Option B);
2. Begin paving operations only after the Project Manager has given written approval; and
3. Monitor and record Plan depths throughout the pavement surface restoration operations and at intervals directed by the Project Manager. The Department will not pay for any depth in excess of the Contract-specified depth.

415.3.1 Option A: In-Situ Cold Recycling of Existing Surfacing

The Contractor shall ensure that Option A Work has a minimum depth of four (4) inches and the specified width, or as directed by the Project Manager. The Contractor shall begin placing the HMA or WMA overlay of the in-situ cold recycled layer within one (1) week of completing the in-situ cold recycled layer.

The Contractor shall:

1. Remove Deleterious Materials within the width of the pavement to be recycled before beginning recycling operations or other relevant Work;
2. Dispose of the debris as directed by the Project Manager;
3. Control water to the pulverized Material to facilitate uniform mixing with the emulsified binder agent;
4. Add water before or with the emulsified binder agent;

5. Provide a means to accurately meter and register the rate of flow of water into the pulverized Material;
6. Begin the initial pass of the milling Equipment at the lowest portion of the section and proceed in succession towards the higher side of the slope, if the typical section to be recycled is on a super elevated or sloped section;
7. Remove fillets of fine, pulverized Material that form adjacent to a vertical face before spreading the recycled mix; and
8. Remove fillets adjacent to existing pavement if the Contractor is to remove the fillets by overlapping during subsequent milling operation. If segregation occurs either in the windrow or behind the paver, the Project Manager may require the Contractor to make changes to the Equipment or operations.

If a section of recycled pavement contains a paving fabric, as identified in the Plans, the Contractor shall waste oversized Material as directed by the Project Manager. This may require changes in Equipment and procedures to obtain an Acceptable end product.

The Contractor shall make these changes at no additional cost to the Department.

When a section of recycled pavement contains a paving fabric, not identified in the Plans, or if the vertical location of the fabric varies by more than one (1) inch from that specified, the Contractor shall submit a written proposal to the Project Manager describing in detail the recommendations for addressing the fabric. The Contractor shall address the size of shredded fabric pieces, the removal of oversize fabric pieces, the removal of oversize RAP, and any anticipated changes to the emulsion addition rate.

Proposals that incorporate a reduction of the existing pavement thickness or a decrease in the depth of cold recycling must include an analysis addressing the structural adequacy of the proposed new pavement section. The Contractor shall submit the proposal to the State Materials Bureau for their review. The Contractor shall not begin Work until the Project Manager approves the proposal in writing.

The Contractor shall spread the recycled asphalt base in one (1) continuous pass, without segregation, in accordance with the typical section.

415.3.1.1 Surface Tolerance

The Contractor shall ensure that the final surface of recycled asphalt base does not deviate more than 1/4 inch when measured with a ten (10) ft straightedge.

415.3.1.2 Temperature and Weather Limitations

The Contractor shall not perform recycling operations in the following conditions:

1. The average daily air temperature is below 55 °F;
2. The Chill Factor is below 35 °F;
3. The weather is foggy or rainy; or
4. The weather conditions are such that proper mixing, spreading, and compaction requirements of the recycled Material cannot be accomplished.

415.3.1.3 Binder Application

The Contractor shall apply the emulsified binder agent to the pulverized Material at the target addition rate in accordance with Section 415.2.1.1, “Option A Mix Design.” The Contractor shall maintain an allowable tolerance of ± 0.2% from the target binder content.

415.3.1.4 Lime Slurry Addition

The Contractor shall add water to the quicklime and incorporate it uniformly into the pulverized surfacing Material at a rate that will result in 1.5% hydrated lime by dry weight of pulverized surfacing Material. The Contractor shall control the addition of lime slurry by continuously weighing the pulverized surfacing Material.

415.3.1.5 Density and Rolling Requirements

The Contractor shall establish a rolling pattern to obtain a minimum of 96% of the maximum theoretical density of a Laboratory briquette, prepared in accordance with Department molding and testing procedures. The Project Manager may require a re-demonstration of rolling capabilities for the following reasons:

1. The Project Manager observes a change in the recycled Materials;
2. The Contractor changes the rolling Equipment; or
3. The Contractor does not obtain proper densities.

The Contractor shall:

1. Perform initial rolling with a pneumatic roller until the mixture has no visible displacement;
2. Perform the final rolling, to eliminate pneumatic tire marks and achieve density, with steel wheel rollers, either in static or vibratory mode;
3. Perform rolling in accordance with Section 423.3.5, “Placement Operations;” and
4. Suspend rolling operations that result in cracking, movement, or other types of pavement damage, and correct the problem. The Project Manager will make suspension and resumption of rolling operations decisions.

415.3.1.6 Finishing Operations

The Contractor shall:

1. Not permit vehicles on the completed recycled asphalt base for at least two (2) hours after the recycled Material is spread and compacted;
2. Slow traffic on the recycled Material when approved by the Project Manager;
3. Allow the recycled Material to cure so that the free moisture in the recycled Material reduces to a maximum of one percent (1%) above the inherent moisture content of the existing pavement by the total weight of the mix; and
4. Determine the inherent moisture content of the existing pavement from samples taken at a maximum of one (1)-mile intervals, or as approved by the Project Manager.

The State will determine the free moisture content of the recycled pavement from samples taken from the same areas and same intervals sampled for the inherent moisture content. The Contractor shall:

1. Take the samples and determine the free moisture immediately before sealing or overlaying operations;

2. Seal the surface with emulsion at an approximate rate of 0.05 gal per square yard to 0.10 gal per square yard, in order to control surface raveling, if the free moisture content of the recycled Materials is on percent (1%) or less above the inherent moisture of the Material;
3. Repair unacceptable recycled Material, as directed by the Project Manager, before placing a subsequent surfacing course;
4. Ensure that the surface of the recycled pavement is safe for traffic; and
5. Remove loose aggregate that develops on the surface of the recycled pavement with a power-broom.

415.3.2 Option B: Cold Mill with HMA or WMA Inlay

The Contractor shall:

1. Ensure that Option B Work has a minimum depth of three (3) inches, unless otherwise specified in the Plans, and a width as specified in the Plans, or as directed by the Project Manager;
2. Mill the pavement surface to the grades, depths, and widths specified in the Plans, if required; and
3. Remove dirt and other objectionable Material from the surface of the pavement with blades, brooms, or other methods approved by the Project Manager in accordance with Section 423, “HOT MIX ASPHALT (HMA) (MAJOR PAVING),” Section 424, “WARM MIX ASPHALT (WMA)” Section 407, “Tack Coat,” and Section 414, “Cold Milling.”

415.3.3 Contractor Quality Control

415.3.3.1 Contractor Quality Control for Materials

The Contractor shall place new HMA Materials in accordance with Section 423.3.6.1, “Contractor Quality Control” or WMA in accordance with Section 424.3.6.1, “Contractor Quality Control” except take random test samples from the HMA windrow before the Material goes through the paver.

415.3.3.2 Contractor Quality Control for Compaction

See Section 423.3.6.1.2, “Contractor Quality Control for Compaction.”

415.3.3.3 Project Verification Testing

The Contractor shall place new HMA Material in accordance with Section 423.3.6.4, “Independent Assurance Testing” or WMA Material in accordance with Section 424.3.6.4, “Independent Assurance Testing.”

415.3.4 Department Quality Assurance

415.3.4.1 Department Quality Assurance for HMA/WMA

New HMA Materials shall meet the requirements of Section 423.3.6.2.1, “Acceptance” and new WMA Materials shall meet the requirements of Section 424.3.6.2.1, “Acceptance,” with the exception that the Department will base Acceptance on random test samples taken from the HMA or WMA before the Material goes through the paver.

415.3.4.2 Department Quality Assurance Testing for HMA or WMA Compaction

The Contractor shall meet the requirements of Section 423.3.6.2.1, “Acceptance” or Section 424.3.6.2.1, “Acceptance,” as appropriate. The Project Manager will grant an exception to the mean density requirement of at least 93% of the theoretical maximum density if the Contractor can demonstrate that a minimum of 93% cannot be reasonably obtained because of the conditions of the existing Pavement Structure or Subgrade Materials. If the Project Manager grants this exemption, the Contractor shall construct a Roadway test strip and develop a HMA or WMA compaction process to get the highest possible density based on an approved roller’s density gain per pass, in accordance with Section 423.3.4.4, “Compaction Equipment.” The Project Manager will approve the process (except for the Roadway test strip) before paving operations begin. In no case shall the percentage of theoretical maximum density exceed 98% nor fall more than three (3) percentage points lower than the target density. If a lot does not meet either of these density requirements, the Project Manager will do the following:

1. Accept and pay for the lot of HMA Material at 50% of the Bid Item Unit Price; or
2. Reject the in-place Material and require the Contractor to remove and replace.

If the Project Manager determines that the mean measured densities are consistently higher, but not to exceed 93%, or lower than the current lot’s target density, the Project Manager may establish a new Acceptance lot on the Project.

415.4 METHOD OF MEASUREMENT

Pavement surface restoration will be measured by the square yard.

415.5 BASIS OF PAYMENT

All Process Control and Quality Control Testing required shall be Incidental to Pavement Surface Restoration.

Pay Item	**Pay Unit**
Pavement Surface Restoration	Square Yard

415.5.1 Option A: In-Situ Cold Recycling of Existing Surfacing

If the actual quantity of polymerized high-float emulsion varies outside the range of one percent (1%) to two percent (2%), the Department will pay for or credit the actual amount of variation at the invoice cost for emulsion (per ton).

415.5.2 Work Included in Payment

The development of the Contractor Quality Control Plan shall be included in the payment and is considered incidental to the completion of this Bid Item. All references to Section 902, “Quality Control” are for reference only and no separate measurement will be made.

SECTION 416: MINOR PAVING

416.1 DESCRIPTION

This Work consists of constructing one (1) or more pavement courses of Hot Mix Asphalt (HMA) or Warm Mix Asphalt (WMA) on a prepared base or milled surface, and to include crushing, stockpiling, hauling, asphalt binder, mineral admixture, mix design, mixing, providing cold feeds, process control testing, and placement.

416.2 MATERIALS

The Contractor shall use Materials for minor paving in accordance with Section 423.2, “Materials.”

416.3 CONSTRUCTION REQUIREMENTS

The Contractor shall perform minor paving in accordance with the following 423 Sections or the correlating 424 Sections:

1. Section 423.3.1, “Construction Requirements, General;”
2. Section 423.3.2, “Mix Temperature Requirements;”
3. Section 423.3.3, “Addition of Mineral Admixtures;”
4. Section 423.3.4, “Equipment;” and
5. Section 423.3.5, “Placement Operations” excluding 423.3.5.7, “Test Strip & Shakedown Period.”

No referee testing will be required for Minor Paving, but may be used if both parties agree in writing at the Pre-Pave Conference. If used, referee testing will be done in accordance with Sections 423.3.7, “Dispute Resolution” and 424.3.7, “Dispute Resolution.”

416.3.1 Sampling and Testing

416.3.1.1 Contractor Quality Control

The Contractor shall provide quality control measures in accordance with Section 902, “Quality Control.”

416.3.1.2 Department Quality Assurance

The Department will provide quality assurance measures in accordance with Section 903, “Quality Assurance.”

416.3.1.2.1 Acceptance

The Department will Accept the constructed product based on inspection and on Laboratory testing for conformance with the Contract. The Department will test samples of HMA/WMA taken from the Roadway before compaction. The Department will Accept the constructed product based on the following criteria:

1. Air voids as determined from Laboratory-compacted specimens in accordance with AASHTO T 166 and AASHTO T 209;
2. Asphalt content as determined by the tank strap method or plant asphalt metering system defined in the Contractor’s Quality Control Plan (binder ignition oven calibration samples will not be required);

3. Final thickness of the compacted Material as measured from cores in accordance with ASTM D 3549; and
4. Density of the compacted Roadbed as determined in accordance with AASHTO T 310, Standard Method of Test for In-Place Density and Moisture Content of Soil-Aggregate by Nuclear Methods (Shallow Depth). Daily densities will be calculated using the current running average Gmm for the lot. The Contractor shall provide cores from three (3) locations designated by the Project Manager for correlation with the Nuclear Densometer. A new correlation factor can be requested if a change in Materials or conditions has occurred or if the accuracy of the established correlation factor is in question.

The Project Manager may reject Material that appears to be defective based on visual inspection.

Department representatives, certified in the relevant test procedures by the State Materials Bureau through TTCP, will perform Acceptance testing in accordance with AASHTO or Department methods, using the test methods and modifications in the current TTCP Manual.

416.3.1.2.1.1 Acceptance Lots and Pay Factor Determination

The Contractor shall identify the proposed Lot size in the Quality Control Plan for approval by the Project Manager. The Department will Accept density based on the average of all nuclear density tests per Lot, taken at a minimum of ten (10) nuclear density tests per Lot, and will Accept air voids and asphalt content based on the average of a minimum of three (3) tests per Lot.

The Department will determine pay factors in accordance with:

1. Table 416.3.1.2.1:1, "Price Adjustments for Density,"
2. Table 416.3.1.2.1:2, "Price Adjustments for Air Voids,"
3. Table 416.3.1.2.1:3, "Price Adjustments for Asphalt Content," and
4. Table 416.3.1.2.1:4 "Price Adjustment for Thickness."

The Department will obtain the TVs for asphalt content and air voids from the approved JMF and will determine payment for each Acceptance lot by multiplying the Bid Item Unit Price by the average of the pay factors per lot and multiplying the result by the total lot area or tonnage.

Table 416.3.1.2.1.1:1
Price Adjustments for Correlated In-place Nuclear Density

Percent density	Pay factor (%)
> 97.99	Reject
97.0 – 97.99	90
96.0 – 96.99	95
92.50 – 95.99	100
91.50 – 92.49	95
90.50 – 91.49	90
90.00 – 90.49	80
< 90.00	Reject

Table 416.3.1.2.1.1:2
Price Adjustment for Air Voids

Percent deviation from TV	Pay factor (%)
< 1.4	100
1.41 – 1.69	90
1.7 – 1.99	75
≥ 2.0	Reject

Table 416.3.1.2.1.1:3
Price Adjustment for Asphalt Content

Percent deviation from TV	Pay factor (%)
< 0.35	100
0.36 – 0.55	90
≥0.56	Reject

Table 416.3.1.2.1.1:4
Price Adjustment for Thickness

Deficiency from plan minimum thickness	Pay factor (%)
None (Plan Minimum or Thicker)	100
<1/4 inch	100
1/4 inch–1/2 inch	90
1/2 inch–3/4 inch	75
3/4 inch–one (1) inch	50
>one (1) inch	Corrective action

The Contractor shall remove and replace rejected Material identified in Table 416.3.1.2.1:1, "Price Adjustment for Density," Table 416.3.1.2.1:2, "Price Adjustment for Air Voids," and Table 416.3.1.2.1:3, "Price Adjustments for Asphalt Content." Instead of removing and replacing rejected Material, the Project Manager may allow the Material to remain in place at 50% of the Bid Item Unit Price, if in the best interest of the Department.

The Contractor shall take corrective action if specified in Table 416.3.1.2.1:4, "Price Adjustment for Thickness." Corrective action includes removal and replacement of the unacceptable Material, overlay of the unacceptable Material, or other corrective actions approved by the Project Manager. Thin or feathered edge surface patching is not Acceptable. Overlay lift thicknesses must meet the requirement of Table 416.3.1.2.1:5, "HMA/WMA Lift Thickness."

Table 416.3.1.2.1.1:5
HMA/WMA Lift Thickness

HMA Type	Lift Thickness (Inches)	
	Minimum	Maximum
SP-III	2.5	3.5
SP-IV	1.5	3.0
SP-V	0.75	1.5

416.3.1.3 Independent Assurance Testing

The Department will perform Independent Assurance sampling and testing in accordance with Section 906, “Minimum Testing Requirements.”

416.4 METHOD OF MEASUREMENT

If the Department measures by the square yard, the Department will measure minor pavement using the dimensions shown in the Contract or approved field measurements.

416.5 BASIS OF PAYMENT

The Department will adjust payment for minor pavement in accordance with Section 416.3.1.2.1.1, “Acceptance Lots and Pay Factor Determination.”

Pay Item	**Pay Unit**
Minor Pavement	Ton or Square Yard

416.5.1 Price Adjustments

The Department will pay for Accepted quantities of Minor Pavement at the Bid Item Unit Price, adjusted in accordance with this section. The Minor Pavement will be evaluated on a lot-by-lot basis at a price determined by multiplying the Bid Item Unit Price by the composite pay factor for the lot. The Department will use the sum of Table 416.5.1.1:1, “Weighting Factors,” multiplied by the Pay Factors of Table 416.3.1.2.1:1, “Pay factor for Correlated In-place Nuclear Density;” Table 416.3.1.2.1:2, “Pay factor for Air Voids;” Table 416.3.1.2.1:3, “Pay factor for Asphalt Content;” and Table 416.3.1.2.1:4, “Pay factor for Thickness” to calculate each lot’s composite pay factor. If the composite pay factor for a lot is greater than one (1.0), the pay factor will be set at one (1.0).

Table 416.5.1:1
Weighting Factors

Characteristic	“f” Factor (%)
Correlated In-place Nuclear Density Mat Density	35
Air voids	35
Asphalt Content	20
Thickness	10

416.5. 2 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Asphalt binder, aggregate, blending sand, mineral filler, mineral admixture, and WMA additive or process as appropriate;
2. Mixing, hauling, placement, and compaction of HMA or WMA;
3. Providing Mix Design in accordance with Section 423.2.8’ “Mix Design;”
4. Quality Control in accordance with Section 902, “Quality Control;”
5. Providing and transporting all cores for correlation; and
6. Providing storage container for samples and cores if referee testing is used.

SECTION 417: MISCELLANEOUS PAVING

417.1 DESCRIPTION

This Work consists of constructing one (1) or more courses of asphalt paving on a prepared surface.

Examples of miscellaneous paving include the following:

1. Ditch paving;
2. Median paving;
3. Slope paving;
4. Guardrail pads, bicycle/pedestrian paths and trails;
5. Asphalt curbs; or
6. As designated in the Plans.

417.2 MATERIALS

The asphalt paving consists of coarse and fine aggregates, asphalt binder, mineral filler, and hydrated lime or anhydrate based Material.

417.2.1 Aggregate

The Contractor shall use aggregate that meets the requirements in Table 417.2.1:1, "Aggregate Gradation Requirements."

Table 417.2.1:1
Aggregate Gradation Requirements

Sieve size	% passing
3/4 inch	100
No. 4	40 – 70
No. 200	< 10

Coarse aggregate shall have an AI of 30 or less in accordance with Section 910, "Aggregate Index." The combined aggregate shall have a minimum sand equivalent of 45.

417.2.2 Asphalt Material

The Contractor shall use the type and grade of asphalt Material specified in the Contract. If no grade is specified, the Contractor shall use any performance-graded asphalt binder in accordance with Section 402, "Asphalt Materials and Mineral Admixtures."

The Contractor shall use asphalt mixture with sufficient asphalt binder to produce a design air voids of four percent (4%) or less, except for ditch paving, which shall have a design air voids of three percent (3%) or less. The Contractor shall use the superpave gyratory compactor at N (design) of 75 gyrations to determine the percentage. The Contractor shall use asphalt Material content that meets requirements for workability and desired surface texture.

417.2.3 Reclaimed Asphalt Pavement (RAP)

The Contractor may use RAP miscellaneous paving in any amount up to 35% of the total weight of the mix, providing the other provisions of this specification are met.

417.2.4 Job Mix Formula

The Contractor shall submit a JMF proposal to the Project Manager for approval at least 14 Days before paving. The JMF shall include the following:

1. Stockpile combination percentages and resulting gradation;
2. Source, grade, and percentage of asphalt binder; and
3. Any other information that will assist the Project Manager in evaluating the appropriateness of the mix design.

The Contractor shall not begin miscellaneous paving until the Project Manager has approved the JMF.

The Contractor may substitute any approved mix design that complies with the requirements of Section 423, "HOT MIX ASPHALT (HMA) MAJOR PAIVING," Section 424, "WARM MIX ASPHALT (WMA)," or Section 416, "MINOR PAVING" instead of the requirements of this section.

The Contractor shall submit proposed changes to the approved JMF to the Project Manager for approval before placement.

417.3 CONSTRUCTION REQUIREMENTS

417.3.1 Mixing Plants

The Contractor shall prepare HMA or WMA for miscellaneous paving in an asphalt plant of typical configuration and in good repair. The Contractor may use drum or batch mixing plants in accordance with Section 423.3.4, "Equipment." No referee testing will be required for Miscellaneous Paving. Referee testing may be used if both parties agree in writing prior to commencing placement operations for Miscellaneous Paving.

417.3.2 Haul Equipment

The Contractor shall use haul Equipment in accordance with Section 423.3.4.2, "Haul Equipment."

417.3.3 Placement Operations

Unless otherwise specified in the Contract, the Contractor shall:

1. Prepare the surface by compacting the top six (6) inches of soil to 95% of maximum density in accordance with AASHTO T 180 (Modified Proctor), Method D (TTTCP Modified);
2. Place asphalt mixtures in accordance with the Plans, or as directed by the Project Manager. The surface of the placed mix shall be smooth and uniform in texture;
3. The Contractor shall compact with a mechanical roller of suitable type and size to obtain the density and surface texture specified in the Plans;
4. Cross-roll ditch paving with a pneumatic roller or by other approved means to produce a corrugated texture; and
5. Roll and consolidate Median and slope paving, and guardrail pads to a uniform texture.

417.3.4 Temperature and Weather Limitations

The Contractor shall perform miscellaneous paving in accordance with Section 423.3.5.1, “Temperature and Weather Limitations.”

417.3.5 Acceptance

The Contractor shall correct or remove Material that the Project Manager determines is improperly coated or segregated or that otherwise fails to meet the requirements of this Specification.

The Department will base Acceptance of miscellaneous paving on visual examination, verification of line and grade, and by density testing (if required). The Department will require density testing on bicycle/pedestrian paths and trails.

When densities are required the Contractor shall make three (3) passes in the first 100 feet of paving with compaction equipment to be used in production and three (3) densities will be taken. The three (3) densities will be averaged and used for the maximum density for the Project. Placement of the HMA/WMA shall meet the proper compaction temperature and thickness (as shown on the Plans).

Acceptance lots for density will be a maximum of 500 yd^2. The Contractor shall take three (3) nuclear density readings at random locations within the Acceptance lot and use the average of the three (3) tests for pay factor determination. The Department will determine the pay factor for each lot in accordance with Table 417.3.5:1, “Price Adjustments for Density.”

The Project Manager may reject Material that appears to be defective based on visual inspection.

Table 417.3.5:1
Price Adjustments for Density

Percent of Determined Maximum Density	Pay factor (%)
≥ 98	100
95.0 – 97.9	95
92.0 – 94.9	80
< 92.0	Reject

The Contractor shall remove and replace rejected Material identified in Table 417.3.5:1, “Price Adjustment for Density.” Instead of removing and replacing rejected Material, the Project Manager may allow the Material to remain in place at 50% of the Bid Item Unit Price, if in the best interest of the Department.

417.4 METHOD OF MEASUREMENT

The Department will measure all pay items using the dimensions shown in the Contract or approved modifications.

417.5 BASIS OF PAYMENT

The Department will adjust payment for miscellaneous paving in accordance with Section 417.3.5, “Acceptance.”

Pay Item	Pay Unit
Miscellaneous Paving	Square Yard

Asphalt Curb	Linear foot

417.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Asphalt binder, aggregate, blending sand, mineral filler, mineral admixture, and WMA additive or process as appropriate;
2. Mixing, hauling, placement, and compaction of HMA or WMA;
3. Quality Control in accordance with Section 902, “Quality Control;” and
4. Providing Mix Design in accordance with Section 423.2.8, “Mix Design.”

SECTION 423: HOT MIX ASPHALT (HMA) (MAJOR PAVING)

423.1 DESCRIPTION

This Work consists of constructing one (1) or more pavement courses of Hot-Mix Asphalt (HMA) on a prepared base, to include crushing, stockpiling, hauling, binder, mineral admixture, mix design, mixing, providing cold feeds, process control testing and placement.

423.2 MATERIALS

423.2.1 General

HMA is a mixture of asphalt binder, aggregate, blending sand, mineral filler, and mineral admixture. Unless otherwise prohibited in the Contract, the Department will allow Recycled Asphalt Pavement (RAP) in HMA mixtures as long as the resulting mixture conforms to all Specification requirements.

The Contractor shall size, uniformly grade, and combine aggregate fractions in accordance with the Contract. The Contractor shall test Materials in accordance with applicable AASHTO/ASTM methods, as modified by the Department (if applicable) or other test procedures as directed by the Department. The State Materials Bureau will decide all questions pertaining to the interpretation of test procedures.

423.2.2 Aggregate

The Contractor shall ensure the aggregate gradation of the HMA mixture meets the requirements of Table 540
.2.2.1:1, "HMA Aggregate Gradation Control Points." The Project Manager may require, at no additional cost to the Department, wet preparation, per AASHTO T 146, Method A, if the Project Manager determines there are Deleterious Materials present in the aggregate stockpiles before aggregate gradation testing. The Contract will specify the type of HMA the Contractor is to use. The Department will allow the Contractor to combine Materials from two (2) or more sources to produce aggregate only when each individual aggregate source meets all applicable quality requirements.

423.2.2.1 Gradation and Quality Requirements

Table 423.2.2.1:1
HMA Aggregate Gradation Control Points

	% passing per HMA type							
	SP-II		SP-III		SP-IV		SP-V	
Sieve size	Min	Max	Min	Max	Min	Max	Min	Max
Two (2) inch	—	—	—	—	—	—	—	—
1 1/2 inch	100	—	—	—	—	—	—	—
One (1) inch	90	100	100	—	—	—	—	—
3/4 inch	—	90	90	100	100	—	—	—
1/2 inch	—	—	—	90	90	100	100	
3/8 inch	—	—	—	—	—	90	90	100
No. 8	19	45	23	49	28	58	32	67
No. 200	1.0	7.0	2.0	8.0	2.0	10.0	2.0	10.0

423.2.2.1.1 Aggregate Quality

For each Material source, the Contractor shall ensure the HMA coarse aggregate has an AI of 25 or less when calculated in accordance with Section 901, "QUALITY CONTROL/QUALITY ASSURANCE (QC/QA)."

The Contractor shall regulate the crushing of aggregate to:

1. Minimum Fractured Faces content of the plus No. 4 Material complies with the requirements of Table 423.2.2.1.2:1, "Fractured Faces, Sand Equivalent, and Fine Aggregate Angularity," and evaluation by AASHTO 335-09, "*Fractured Face Determination for Coarse Aggregate;*"
2. Ensure the combined plus 3/8 inch material contains no more than 20% flat, elongated particles with a dimensional ratio of 3:1 or greater as determined by ASTM D 4791 (TTCP Modified);
3. Ensure the combined Material, excluding RAP; passing the No. 40 sieve is non-plastic;
4. Ensure that before the addition of mineral admixtures, the minimum sand equivalent value and the minimum fine aggregate angularity value of the combined aggregate, excluding RAP, complies with the requirements of Table 423.2.2.1.2:1, "Fractured Faces, Sand Equivalent, and Fine Aggregate Angularity;" and
5. Determine the Sand Equivalent value in accordance with AASTHO T 176, Alternate Method No. 1, and Fine Aggregate Angularity value in accordance with AASHTO T 304, Method A.

423.2.2.1.2 Fractured Faces

The Department will consider a face to be fractured when at least one-half of the projected particle area exhibits a rough, angular, or broken texture with well-defined edges.

Table 423.2.2.1.2:1
Minimum Fractured Faces, Sand Equivalent, and Fine Aggregate Angularity for Virgin Aggregates

Design Traffic, ESALs[a] x 10^6	Fractured Faces[b]	Sand Equivalent (%)	Fine Aggregate Angularity
< 3.0	75.0 / —	45.0	40.0
≥ 3.0 – < 10.0	85.0 / 80.0	45.0	45.0
≥ 10.0 – < 30.0	95.0 / 90.0	45.0	45.0
≥ 30.0	99.0 / 95.0	50.0	45.0

[a]ESALs are based on a 20-year design life for all scenarios.

[b]Under "Fractured Faces," 85.0 / 80.0 denotes that 85.0% of the coarse aggregate has at least one (1) Fractured Face and 80.0% has at least two (2) Fractured Faces.

Ensure RAP provided from sources outside the Project has at least 75% Fractured Faces (one (1) Fractured Face); however, Sand Equivalent and Fine Aggregate Angularity do not apply.

423.2.2.2 Production

When producing aggregates for HMA, the Contractor shall:

1. Remove natural fines by screening and stockpiling separately;

2. Use a No. 4 screen, minimum, or a larger screen if needed to properly control the crushing and screening operation;
3. Crush the aggregate retained on the scalping screen and separate the crushed Material into at least two (2) stockpiles of fine and coarse aggregates; and
4. Regulate crushing operations to produce Material that meets design requirements when combined.

423.2.2.3 Stockpiling

The following requirements apply to stockpiles, the Contractor shall:

1. Place stockpiles upon prepared sites;
2. Make stockpiles neat and regular to prevent segregation;
3. Provide enough storage space for each size of aggregate;
4. Separate the aggregate stockpiles far enough apart to prevent mixing, or with walls or partitions;
5. Prevent contamination (store stockpiles away from vehicular and Equipment traffic);
6. Keep the storage yard neat and orderly and keep the stockpiles accessible for sampling; and
7. Keep the aggregate sizes separated until delivered to the cold feed system that feeds the drier.

423.2.2.4 Combining

When combining crushed Materials from different stockpiles, including RAP (if in the mixture); the Contractor shall ensure the product is in accordance with the mix design gradation requirements. The Contractor shall use controlled feeders from each stockpile to combine crushed Material.

423.2.3 Asphalt Binder

The Contract will specify the type and grade of asphalt binder. The Contractor shall provide asphalt binders in accordance with Section 402, “Asphalt Materials and Mineral Admixtures.” The Contractor shall not change the asphalt source after approval of the mix design without written approval of the State Materials Bureau.

423.2.4 Mineral Admixtures

The Contractor shall provide mineral admixtures in accordance with Section 402, “Asphalt Materials and Mineral Admixtures.”

423.2.5 Blending Sand

Blending sand consists of the following:

1. Natural fines from the scalping process;
2. Concrete sand;
3. Sandy Material; or
4. A combination of these, graded to the mix design requirements.

The Contractor shall determine the need for and percentage (a maximum of 20.0%) of blending sand using mix design tests on samples taken from stockpiles during crushing operations and submitted to an approved testing Laboratory.

423.2.6 Mineral Filler

The Contractor shall, if required by mix design, provide mineral filler in accordance with AASHTO M 17 and approved by the State Materials Bureau. The Department will not allow fly ash as mineral filler for HMA.

423.2.7 Reclaimed Asphalt Pavement (RAP)

Unless otherwise specified in the Contract, the Contractor may use RAP removed under the Contract consisting of salvaged, milled, pulverized, broken, or crushed asphalt pavement. The Contractor may use RAP produced from outside sources provided the following is met: after the Contractor obtains sufficient quantities of RAP aggregate samples in accordance with AASHTO T 308; the Department will Accept RAP for which the coarse aggregate has a percent wear of 40.0 or less, at 500 revolutions, when tested in accordance with AASHTO T 96. The Contractor shall provide plus No. 4 RAP Material with a minimum of 75% Fractured Faces content (one (1) face). The Department will make no additional payment for the asphalt binder in the RAP or asphalt binder due to asphalt binder grade adjustment.

The Contractor may use a maximum of 15% RAP (by weight) in the production of HMA mixtures without changing the asphalt binder.

For quantities greater than 15% and up to 25% RAP, the Contractor shall:

1. Either lower the asphalt binder’s high and low temperature grades by one (1) grade (e.g. lower a PG 76-22 to a PG 70-28); or
2. Extract, recover, and combine the RAP’s asphalt binder with a virgin asphalt binder per AASHTO M 323, Appendix A, ensuring the resultant binder meets the entire AASHTO M 320 (excluding direct tension) required Project PG asphalt binder properties indicated on the approved mix design.

For quantities greater than 25% and up to 35% RAP, the Contractor shall:

1. Extract, recover, and combine the RAP’s asphalt binder with a virgin asphalt binder per AASHTO M 323, Appendix A; and
2. Ensure the resultant binder meets the entire AASHTO M 320 (excluding direct tension) required Project PG asphalt binder properties indicated on the approved mix design.

The Department will not allow the Contractor to use more than 35% RAP in the production of HMA mixtures.

For Projects of entirely new construction, the Contractor shall:

1. Limit the RAP to 15% in the top mat or extract, recover and combine the RAP’s asphalt binder with a virgin asphalt binder per AASHTO M323, Appendix A; and
2. Ensure the resultant binder meets the entire AASHTO M320 (excluding direct tension) required Project PG asphalt binder properties indicated on the approved mix design.

If Plus Grades of PG asphalt binder is specified on the project, for quantities greater than 15% RAP, the Contractor shall extract, recover, and combine the RAP’s asphalt binder with a virgin asphalt binder per AASHTO M 323, Appendix A. The Contactor shall ensure the resultant binder meets the entire AASHTO M 320 required Project PG asphalt binder properties indicated on the approved mix design including the additional Plus Grade requirements for Elastic Recovery and Solubility.

The Contractor shall:

1. Process RAP so that 100% passes a 1-1/2-inch sieve;
2. Maintain adequate stockpile management (i.e. sufficient quantities and shaping of the stockpiles);
3. Address in the Quality Control Plan how RAP will be controlled, such as which screen will be used to split into two (2) stockpiles, or by what method the RAP will be controlled to keep the resultant mix within Acceptable limits;
4. Account for the weight of the binder in the RAP when batching aggregates;
5. Provide RAP that is free of Deleterious Materials; and
6. Perform process control testing in accordance with Section 901, “Quality Control/Quality Assurance (QC/QA)” and Table 901.5:3, “Minimum Process Control Guidelines for Aggregates, Base Course, and RAP (QC);” as RAP is produced and prepared for inclusion in the HMA.

If problems with HMA consistency or compliance with Project Specifications occur, additional efforts taken to achieve Acceptable levels of consistency and compliance with Contract Specifications, at the Contractor’s discretion (at no additional cost to the Department), include, but are not limited to:

1. Reduce the top size of the RAP from 1-1/2 inch to one (1) inch;
2. Fractionate the aggregates on a second screen, such as the 3/8 inch or ¼ inch Screen so that the RAP is maintained in three (3) stockpiles, one being RAP larger than 1-1/2 inch to two (2) inches, Coarse RAP and the third being Fine RAP;
3. Ensure that the RAP used in the HMA mix design is representative of the RAP available on the Project;
4. Cover the RAP pile(s) so that ambient moisture is not absorbed; and
5. Process and maintain the stockpiles so that the RAP Material is equally and uniformly distributed throughout the entire stockpile(s) and is withdrawn such that uniform, non-segregated RAP is delivered to the hoppers.

423.2.8 Mix Design

The Contractor shall provide a mix design developed by a Department approved testing Laboratory, reviewed and signed by a professional Engineer licensed by the New Mexico Board of Registration for Professional Engineers and Land Surveyors. A list of approved private testing laboratories is available from the State Materials Bureau. The Contractor shall develop the mix design at no additional cost to the Department. The Contractor may develop the mix design at any time prior to the Project Pre-Paving Conference.

The Contractor shall provide to the State Asphalt Engineer the mix design developed in accordance with the Contract documents and AASHTO R35 as modified by NMDOT for review and concurrence. The Contractor shall summarize the mix design results from the Department approved testing Laboratory in a format approved by the State Materials Bureau. Department concurrence of a mix design will not relieve the Contractor of full responsibility for producing an Acceptable mixture. The mix design may require adjustment in accordance with Section 423.2.9, “Job Mix Formula.”

The Department will require a minimum of one percent (1.0%) for mix designs that include hydrated lime, anhydrite based Material, or Portland cement. The Contractor shall include these mineral admixtures in the gradation for developing the mix design. AASHTO T 354 may be used in lieu of AASHTO T 84/T 85. If lubricating antistrip is used as a mineral admixture, the percent dosage shall be done in accordance with the manufacturer's recommendation and approved by the Contractor's design Lab. Lubricating antistrip shall be approved by the Department and included in the most current Approved Products List (APL). The mix design shall be in accordance with Table 423.2.8:1, "HMA Superpave Design Requirements for Aggregates with Less Than three percent (3.0%) Absorption," or Table 423.2.8:2, "HMA Superpave Design Requirements for Aggregates with three percent (3.0%) or Greater Absorption."

The Contractor shall test the HMA in accordance with AASHTO T 283, as indicated below:

1. Use six (6) inch diameter specimens; Compact all test specimens in accordance with AASHTO T 312;
2. Conditioned specimens shall include one (1) freeze thaw cycle;
3. On the AASHTO T283 Section 11.3 scale of zero (0)-five (5), with five (5) exhibiting the most damage from moisture, visually estimate the amount of damage caused by moisture on the interior surfaces of each broken specimen; and
4. The tensile stress ratio shall be a minimum of 85%.

The Contractor shall provide a mixture that meets all applicable criteria. If tests indicate the need for additives or modifiers not specified in the Contract or a change in source of binder to satisfy mix design requirements, the Contractor shall perform the required changes at no additional cost to the Department.

Table 423.2.8:1
HMA Superpave Design Requirements for Aggregates with Less Than 3.0% Absorption

20-year design ESALs (a)	**N initial**	**N design** (b)	**N max**	**Percent Voids in the Mineral Aggregate (VMA) per nominal maximum aggregate size**			**3/8inch (SP-V)**	**Voids Filled with Asphalt (VFA) Range, %** (c)	**Dust to Binder Ratio Range**
				One (1) inch (SP-II)	**3/4 inch (SP-III)**	**1/2 inch (SP-IV)**			
< 0.3	<91.5	96.0	< 98.0	12.5 – 14.0	13.5 – 15.0	14.5 – 16.0	15.5 – 17.0	72.0–80.0	0.6 to 1.4
0.3-3.0	<90.5							68.0–78.0	
≥3.0	<89.0							68.0–75.0	

Table 423.2.8:1
HMA Superpave Design Requirements for Aggregates with Less Than 3.0% Absorption

20-year design ESALs	N initial	N design (b)	N max	Percent Voids in the Mineral Aggregate (VMA) per nominal maximum aggregate size	Voids Filled with Asphalt (VFA)	Dust to Binder Ratio Range

[a]In Millions.

[b]Design Air Void Content of four percent (4%).

[c]For one (1) inch nominal maximum size mixtures, the specified lower limit of the VFA shall be 70% for the design traffic level <0.3 million ESALs.

Table 423.2.8:2
HMA Superpave Design Requirements for Aggregates with 3.0% or Greater Absorption

20-year design ESALs (a)	N initial	N design (b)	N max	Percent Voids in the Mineral Aggregate (VMA) per nominal maximum aggregate size				Voids Filled with Asphalt (VFA) Range, % (c)	Dust to Binder Ratio Range
				One(1) inch (SP-II)	3/4 inch (SP-III)	1/2 inch (SP-IV)	3/8 inch (SP-V)		
<0.3	<91.5							70.0–80.0	
0.3–<3.0	<90.5	96.5	< 98.0	12.0 – 14.0	13.0 – 15.0	14.0 – 16.0	15.0 - 17.0	65.0–78.0	0.6 to 1.4
≥3.0	<89.0							65.0–78.0	

[a]In Millions.

[b]Design Air Void Content of 3.5%.

[c]For one (1) inch nominal maximum size mixtures, the specified lower limit of the VFA will be 70% for the design traffic level <0.3 million ESALs.

Department reviewed commercial mix designs are Acceptable for use on NMDOT Projects with the concurrence of the State Asphalt Engineer. The commercial mix design will be submitted for review and concurrence by the State Asphalt Engineer for conformance with the Contract documents and re-issued with Project information.

An approved mix design is valid up to one (1) year from the date of review. If the Aggregate Index expires within that year, a new Aggregate Index needs to be established in order to keep the mix design valid. The Contractor shall submit a new mix design if changing the source of Materials.

For Projects that are longer than one (1) year and aggregate Materials are produced and stockpiled the mix design and Aggregate Index (AI) may be approved for an extension by the State Asphalt Engineer.

423.2.9 Job Mix Formula

The Job Mix Formula (JMF) must be in accordance with all aggregate gradation requirements and result in a mix that meets all specified mix design requirements. The Department will refer to the result of the Laboratory mix design developed in accordance with Section 423.2.8, “Mix Design,” as JMF1.

423.2.9.1 Job Mix Formula Adjustment

The Contractor may request a modification to the JMF based on field testing of Material produced through the plant. Test results and calculations that verify a proposed JMF adjustment complies with the Specifications will be required prior to being reviewed by the Project Manager, District Lab Supervisor, and concurred by the State Asphalt Engineer. Review and concurrence of a JMF adjustment can only be made after:

1. JMF adjustment results in a new TV that is within the tolerance from the design TV. (Example: If design TV for No. 4 sieve is 30%, then a new TV may be approved in the field from 23% - 37%);
2. Submittal by the Testing Laboratory responsible for the original mix design to the Project Manager with a copy to the State Asphalt Engineer;
3. Confirmation by the Project Manager that the Quality Control Plan is being followed; and
4. If the JMF is adjusted after the Shakedown Period, the Contractor shall terminate the current lot. Once the adjusted JMF has been reviewed and concurred by the Project Manager, Assistant District Engineer for Construction and the State Asphalt Engineer; the Contractor shall begin a new lot with the adjusted JMF.

423.3 CONSTRUCTION REQUIREMENTS

423.3.1 General

The Contractor shall:

1. Provide sufficient storage space for each size of aggregate and RAP;
2. Keep the different sizes separate and ensure that segregation, degradation, or combination of Materials of different aggregate sizes does not occur until delivery to the cold feed system;
3. Re-screen or waste segregated or degraded Material;
4. Provide separate storage and feeder for mineral filler if the Contract requires mineral filler; and
5. If the Project Manager determines that uncoated aggregate exists, the Contractor shall take corrective action.

423.3.2 Mix and Laydown Temperature Requirements

The Contractor shall not allow the temperature of the HMA discharged from the mixer into the transport vehicle to be greater or less than ten percent (10%) of the target mixing temperature specified in the mix design, not to exceed 350° F, unless written concurrence by the asphalt binder supplier and design lab are provided to the Project Manager.

HMA delivered to the Project with mix temperatures outside the acceptable laydown temperature range as specified in the mix design shall, at the sole discretion of the Project Manager, be removed and replaced at no cost to the Department.

423.3.3 Addition of Mineral Admixtures

The Contractor shall:

1. Monitor the out feed of the mineral admixture with sensors that provide audible and visual signals to control the out feed with an accuracy of ± three percent (3.0 %) by weight;
2. Control the mineral admixture content such that it meets the range specified in the approved mix design;
3. Add the mineral admixture to the aggregate in an enclosed pug mill immediately after leaving the cold feed and just before introduction into the drier drum or aggregate drier; and
4. Minimize the loss of mineral admixture while adding to the aggregate.

When mixing the aggregate and mineral admixture, the Contractor shall maintain the moisture content of the combined aggregate at the recommended moisture content as shown on the approved mix design.

423.3.4 Equipment

423.3.4.1 Mixing Plants

423.3.4.1.1 Plant Scales

The Contractor shall ensure that the scales are accurate to 0.5% of the maximum allowable load in accordance with the Federal Motor Carrier Safety Administration (FMCSA) publication, as certified by a licensed scale technician. The Contractor shall submit a copy of the certification to the Project Manager.

423.3.4.1.2 Storage of Asphalt Binder Materials

The Contractor shall provide storage tanks for asphalt binder capable of holding, heating and circulating the asphalt at the required temperatures and measuring the temperature of the asphalt in the tank.

The Contractor shall allow measuring and sampling of asphalt binder from the delivery trucks upon arrival.

423.3.4.1.3 Feeder for Drier

The Contractor shall equip the plant with an accurate feeding mechanism to deliver the aggregate into the drier and maintain uniform production.

423.3.4.1.4 Drier

The Contractor shall equip the plant with a system to continuously agitate the aggregate during the heating and drying process. The Contractor shall use a drier that can dry and heat the aggregate and prevent fuel oil or carbon from coating the aggregate. The Contractor shall take corrective action if the aggregate becomes coated with burner fuel.

423.3.4.1.5 Bins

The Contractor shall equip the plant with storage bins large enough to supply the mixer when it is operating at full capacity and arrange the bins to ensure separate and adequate storage of the appropriate aggregate sizes. The Contractor shall equip the bins with warning devices that notify the control panel when the bins are low.

423.3.4.1.6 Asphalt Binder Control Unit

The Contractor shall equip the plant with a scale or meter to control the rate of flow to determine the amount of asphalt binder added to the mix.

423.3.4.1.7 Thermometers

The Contractor shall equip the discharge chute of the drier with a recording thermometer to register the temperature of the heated aggregates or mix. The Contractor shall provide the Project Manager with a record of discharge temperatures at the end of each week's production or as requested by the Project Manager.

423.3.4.1.8 Truck Scales

The Contractor shall weigh the HMA on approved plant or truck scales provided by the Contractor or public scales in accordance with Section 109.1, "Measurement of Quantity."

423.3.4.1.9 Requirements for Batching Plants

423.3.4.1.9.1 Weigh Box or Hopper

The Contractor shall provide a batching plant that can accurately weigh aggregate in a weigh box or hopper suspended on scales. The Contractor shall use a weigh box or hopper that can hold a full batch. The Contractor shall ensure that the gate of the weigh box or hopper does not allow Material to leak into the mixer while being weighed. The Contractor shall test the scales in accordance with Section 109.1, "Measurement of Quantity."

423.3.4.1.9.2 Mixer

The Contractor shall provide a batch mixer with a capacity of at least 2,000 lb, capable of producing a uniform mixture within specified tolerances.

423.3.4.1.9.3 Control of Mixing Time

The Contractor shall equip the mixer with an accurate timing device that signals the end of the mixing time.

423.3.4.1.10 Drum Mix Plants

The Contractor shall equip the drum mix plant with the following auxiliary Equipment and capabilities:

1. Separate cold feed controls for each Material;
2. An automatic interlocking device for cold feed, asphalt, and mineral admixtures;
3. A means for controlling moisture content of aggregate. A means for sampling individual cold feeds and provisions for sequential sampling of aggregate, RAP, asphalt binder, and mineral admixtures;
4. Equip the bins with mechanical or electrical devices that provide an audible or visual warning when the bins are less than 1/4 full;
5. Bins shall be designed and equipped to prevent segregation;

6. Equip the bin containing fine aggregate and filler, if required, with a device that prevents Material hang-up during plant operation;
7. A minimum of one (1) cold feed bin for each aggregate size in the mix;
8. Equip the cold feed with mechanical or electrical devices that indicate with an audible or visual warning when the cold feed belt is not carrying the proper amount of Material;
9. A separate cold feed for RAP Material. Introduce RAP so that it does not come into direct contact with the burner flame; and
10. Couple the asphalt feed control with the total-aggregate-weight measurement device to automatically vary the asphalt feed rate to maintain the required proportion.

423.3.4.2 Haul Equipment

The Contractor shall haul asphalt mixtures with trucks that are tarped and have tight, clean, smooth metal beds and a thin coat (a minimal amount) of a Department approved release agent in accordance with Section 423.3.4.2.1, "Asphalt Release Agent (ARA)."

423.3.4.2.1 Asphalt Release Agent (ARA)

The Contractor shall use Asphalt Release Agents (ARA) for prevention of asphalt mixtures adhering to haul trucks and any other type of Equipment that is used for asphalt paving operations. ARA shall meet the requirements of Table 423.3.4.2.1:1, "Asphalt Release Agent Properties" and shall be on the NMDOT's Approved Products List. All testing will be in accordance with NTPEP Evaluation of Asphalt Release Agents AASHTO ARA 14.

Table 423.3.4.2.1:1
Asphalt Release Agent Properties

Test	Result
7-Day Asphalt Stripping Test	
Diluted	No Stripping
Full Strength	No Stripping
Mixture Slide Test (truck beds)	10 g retained, maximum
Asphalt Performance Test	Does not fall after 3 pours

423.3.4.3 Pavers

The Contractor shall use self-contained, self-propelled pavers, with activated screeds or strike-off assemblies, heated if necessary, and capable of spreading and finishing courses of HMA in accordance with the Plans.

423.3.4.4 Compaction Equipment

The Contractor shall provide a sufficient number, weight, and type of rollers to obtain the required compaction and specified pavement density while the HMA is in a workable condition. All rollers must be capable of reversing direction without shoving or tearing the mixture.

423.3.5 Placement Operations

For cold milled surfaces, the Contractor shall prepare the surface in accordance with Section 414, "Cold Milling." The Contractor shall clean the existing surfaces and apply a tack coat as required in the Plans or at an application rate as approved by the Project Manager in accordance with Section 407, "Tack Coat."

The Contractor shall place HMA on prepared Base Course in accordance with Section 303, “Base Course.” The Contractor shall apply prime coat as required in the Plans or at an application rate as approved by the Project Manager in accordance with Section 408, “Prime Coat.”

The Contractor shall place the HMA on the Accepted surface, spread and compact to specified width, lift thickness, and cross slope in accordance with the Plans.

Materials Transfer Vehicle (MTV): The Contractor shall use a MTV with storage and remixing capabilities on all mainline construction that utilizes greater than 25% RAP when placing HMA State approved designs. The MTV will independently remix and deliver mixture from the hauling Equipment to the paving Equipment.

The Contractor shall furnish an MTV with the following capabilities:

1. An unloading system to receive mixtures from the hauling Equipment;
2. A minimum storage capacity of 13 tons with a remixing system in the MTV storage bin;
3. A discharge conveyor to deliver the mixture to the paver hopper; and
4. The MTV system cannot exceed maximum legal loading on Structures.

Pick-up machines, hopper inserts and Material transfer devices are not considered MTVs.

In the event the MTV malfunctions during paving operations, the Contractor can finish the Day without the MTV. The Contractor shall not resume further mainline mix placement until the MTV is operational.

Consistently overloading the HMA mix into the paving machine is not Acceptable. The Contractor shall coordinate the speed of the paving machine with the production of the plant and keep enough haul Equipment available to achieve continuous operation.

The Contractor shall use the control system on the paving machine to control the grade and the transverse slope by either of the following methods:

1. One end directly and the other indirectly through controlling the transverse slope; or
2. Each end independently, including screed attachments.

The Contractor shall suspend operations if the control system does not achieve the typical section in accordance with the Plans. The Contractor shall place, spread, and finish the courses of HMA according to the following:

1. Without segregation or tearing;
2. True to the line, grade, and crown in accordance with the Plans; and
3. With self-propelled pavers, except as otherwise directed.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing Equipment impracticable, the Contractor shall dump, spread, and level the HMA by other methods to achieve the required compacted thickness.

423.3.5.1 Weather Limitations

The Contractor shall not place HMA on wet or frozen surfaces or if weather conditions prevent proper handling, finishing, and compacting. The Contractor shall place HMA when the

Chill Factor is at least 40 °F and rising. If the air temperature is 60 °F or warmer do not consider the Chill Factor.

423.3.5.2 Compaction

The Contractor shall:

1. Compact the HMA thoroughly and uniformly immediately after placement. Operate rollers at speeds slow enough to minimize displacement of the HMA, including the lines and grades of the asphalt edges. Remove marks from pneumatic rollers;
2. Prevent the HMA from sticking to the roller wheels by keeping the wheels moistened with water; water mixed with very small quantities of detergent or other approved Material. Do not use diesel fuel or other petroleum diluents;
3. At locations inaccessible to the rollers, the Contractor shall compact the HMA with hot hand tampers, smoothing irons, or mechanical tampers;
4. Use a trench roller or cleated compression strips under the roller to transmit compression to depressed areas; and
5. Remove areas that become loose, broken, mixed with dirt, segregated or defective, replace with fresh HMA, and compact to match the surrounding area, at no additional cost to the Department.

423.3.5.3 Not Used

423.3.5.4 Joints

The Contractor shall off set longitudinal joints at least six (6) inches relative to the longitudinal joints of the underlying course.

Unless otherwise specified, the Contractor shall taper transverse and longitudinal joints as follows:

1. At least a three (3) ft taper for transverse joints, with a taper slope no steeper than 24:1;
2. At least a one (1) ft taper or a notched taper, for longitudinal joints, with a taper slope no steeper than 6:1 or a notched taper with a one (1) inch vertical edge at the top of the taper connected to a slope no steeper than 6:1;
3. Cut and square off transverse tapers before commencing new Work;
4. Clean and tack coat longitudinal joints from previous operations; and
5. Avoid placing longitudinal joints in the wheel paths, unless approved by the Project Manager.

The Contractor shall completely bond joints and provide smooth surface for each course at the joints. The Department will not allow deviations greater than 3/16 inch when tested with a ten (10) ft straightedge in any direction. When paving under traffic, the Contractor shall schedule the daily surfacing operations so that tapered longitudinal joints are not exposed for longer than seven (7) Days.

423.3.5.5 Surface Tolerances

The Contractor shall provide a final HMA surfacing course that conforms to Section 401, “Pavement Smoothness Measurement.”

423.3.5.6 Plan Surfacing Thickness

The Contractor shall:

1. Place pavement at the thickness specified in the Contract;
2. Monitor thickness by calculating continuous production yields using the formula found in the MT-1, as maintained by the State Materials Bureau;
3. Calculate the required yield and the corresponding yields for 0.25 inch increase (upper limit) and decrease (lower limit). The Project Manager may adjust the required yield to fit field conditions. If adjusted, the new target yield will be communicated to the Contractor in writing;
4. Control production to keep yield within the upper and lower limits;
5. Correct deficiencies at no cost to the Department;
6. Correct deficient depths during placement; and
7. Address Plan Surfacing thickness in the Quality Control Plan.

423.3.5.7 Test Strip & Shakedown Period

Prior to the Test Strip & Shakedown Period, the Contractor shall provide binder ignition oven calibration samples in accordance with the State Materials Bureau's, current *Binder Ignition Calibration Procedure.* All Quality Control, Quality Assurance and Independent Assurance ovens must be calibrated by this procedure. The Project Manager will suspend paving operations until calibration of the ovens has been completed. No additional time or compensation will be granted for completion of this requirement.

The "NMDOT Binder Ignition Calibration Procedure" is available by accessing the NMDOT website, and navigating within the Construction and Civil Rights Bureau's (CCRB) link.

The Contractor shall construct a test strip for each HMA mix design to be incorporated in the Project prior to placing the Material on mainline. The test strip will consist of a maximum of 1,000 tons, the minimum test strip size will be 500 tons or as approved by the Project Manager. The Contractor shall construct test strip on shoulders, low volume segments of the pavement, or area approved by the Project Manager.

The Contractor shall obtain a minimum of three (3) Contractor and three (3) agency samples to evaluate the JMF, process control, and placement operations. If necessary, based on the results obtained from the test strip, the Contractor shall develop a revised JMF, modify placement operations, and/or implement adjustments to process control procedures. Production and placement operations performed prior to approval of a revised JMF are at the Contractor's risk.

The test strip will be evaluated for Acceptance according to Table 423.3.5.7:1, "Test Strip Acceptance Limits." If Accepted, the test strip will be paid at the unit price for HMA Complete or HMA per Section 423.5, "Basis of Payment." If rejected, said Material shall be handled in accordance with Section 423.3.6.3.2," Adherence to Specifications and Rejection of Non-Specification Material." The Contractor shall remove rejected test strip Material placed within the Roadway Prism at no cost to the Department. If the Contractor disagrees with removing and replacing unacceptable Material placed in test strips outside the Roadway Prism, the Assistant District Engineer for Construction, based on engineering judgment, will decide if the Material can remain in place with a maximum pay factor of 50%, or shall be removed and replaced at no cost to the Department.

If the test strip is rejected, the Contractor shall construct a subsequent test strip. The Contractor shall not proceed to full production until an Accepted test strip is produced. After the test strip is Accepted, the Contractor shall continue to evaluate the mix properties and the JMF during the placement of the first two (2) sublots in the first lot. Changes may be made to the JMF or the mix proportions and/or properties with the concurrence of the State Materials Bureau, Project Manager, and Assistant District Engineer for Construction. For changes made prior to the completion of the first two (2) sublots, the adjustments will be applied to the entire lot for purposes of payment.

The Project Manager may waive test strip requirements for the Project, if requested by the Contractor based on prior experience with the JMF.

The Shakedown Period is defined as the first two (2) sublots produced in the first lot.

As the test strip is placed, the Contractor shall evaluate the mix properties and the JMF. Changes may be made to the JMF or the mix proportions and/or properties with the concurrence of the State Materials Bureau, Project Manager, and the Assistant District Engineer for Construction.

Table 423.3.5.7:1
Test Strip Acceptance Testing Limits [a,c]

Characteristic	Allowable Tolerances from TV
Air Voids, %	± 2.0
Pavement Density %[c]	90% to 97%
Mineral Admixture %	±0.2%
Voids in the Mineral Aggregate (VMA), % [a]	± 2.0
Asphalt Content %[a,b]	± 0.50

[a] Asphalt Content will be determined using AASHTO T308 as modified by TTCP.

[b] HMA will not be rejected based on Asphalt Content Determined by AASHTO T 308.

[c] Acceptance will be based on the average test values.

423.3.6 Sampling and Testing

The Contractor shall sample and test in accordance with Section 901, “Quality Control Quality Assurance General Provisions,” and Section 906, “Minimum Testing Requirements.” The Department will sample and test in accordance with Section 901, “Quality Control /Quality Assurance General Provisions,” and Section 906, “Minimum Testing Requirements.”

423.3.6.1 Contractor Quality Control

The Contractor shall administer a Quality Control Plan, referred to hereafter as “the Plan”. The Contractor shall ensure the Plan conforms to Section 902, “Quality Control.” The Contractor shall submit the Plan a minimum of two (2) weeks prior to commencement of crushing operations and at a minimum comply with “Contractor Quality Control Plan Guidelines.” No HMA operations are allowed until the Plan has been approved by the Project Manager and the District Lab Supervisor. The Contractor shall sample and test the mixture and pavement on a statistically random basis in accordance with Section 906, “Minimum Testing Requirements.”

423.3.6.1.1 Contractor Quality Control of Aggregate

The Contractor shall obtain samples in accordance with Section 902.5, “Sampling.”

The Project Manager may sample and test the aggregate at any time during production or stockpiling, or may request to split samples with the Contractor.

423.3.6.1.2 Contractor Quality Control for Compaction

The Contractor shall:

1. Monitor the compaction process by determining the density of the HMA with a portable densometer in accordance with the Plan;
2. Establish calibration of the portable densometer from cut pavement samples;
3. Determine the density readings of the cut pavement samples in accordance with AASHTO T 166 (weight, volume method); determine the density readings of the pavement with the portable densometer and correlate these test results;
4. Conduct Quality Control testing in accordance with Division 900, “QUALITY CRITERIA” and provide test results to the Project Manager;
5. Perform Quality Control density testing while the asphalt mixture is hot enough to permit further compaction;
6. Not roll for compaction when it becomes ineffective or damages the HMA; and
7. Not use vibratory mode when it becomes ineffective or damages the HMA.

423.3.6.2 Department Quality Assurance

The Department will sample and test the mixture and pavement on a statistically random basis in accordance with Section 906, “Minimum Testing Requirements.”

423.3.6.3 Acceptance

The Department will evaluate Materials using Contractor and Department test data from each Random sampling Plan for Acceptance in accordance with this section.

Table 423.3.6.3:1
Acceptance Testing Tolerances[a]

Characteristic	Specification limit, percentage points from TV
Air Voids, %	± 1.4
Pavement Density %[c]	± 2.5
Mineral Admixture%[e]	Minimum of JMF Target Value
Voids in the Mineral Aggregate (VMA), % [a,d]	± 1.6
Asphalt Content %[a,b]	± 0.50

[a] All gradation, Asphalt Content, VMA, and VFA values shall be determined using the AASHTO T 308 testing results.

[b] HMA will not be rejected based on Asphalt Content Determined by AASHTO T 308.

[c] Density payment will be adjusted in accordance with Section 901.3.11, “QLA.”

[d] If Gmm fluctuates more than ±0.03 on a consistent basis, it is recommended that the Specific Gravity of the aggregates be checked in order to verify VMA.

[e] If Mineral Admixture is below Design TV cease hot mix production, investigate and correct.

Department personnel may test locations other than the random locations generated for statistical analysis. These tests will not be used for pay factor determination, but may be used to determine Acceptance or rejection of localized Material.

423.3.6.3.1 Quality Level Analysis (QLA)

The Department will determine Acceptance of the Materials in accordance with Section 904, "Quality Level Analysis (QLA)," using the Acceptance limits in Table 423.3.6.3, "Acceptance Testing Tolerances." Acceptance lot sizes shall be determined at the Pre-Paving Conference. The Department will have the final authority for determination of Acceptance lot size. For all QLA Projects, if a composite pay factor of more than one (1.00) is calculated, the composite pay factor will be a one (1.00) for the purposes of payment.

423.3.6.3.1.1 Acceptance of Pavement Density

The target density for Acceptance of HMA will be 94.50% of the theoretical maximum density as determined from AASHTO T 209. For determination of maximum specific gravity, the Contractor shall obtain and test a minimum of two (2) samples and ensure the Department obtains and tests a minimum of one (1) sample for each Day that the HMA is placed, in accordance with the random sampling Plan. Each individual density test value obtained less than 92.0% or more than 97.0% of the theoretical maximum density will be evaluated in accordance with Section 423.3.6.3.2, "Adherence to Specifications and Rejection of Non-specification Material."

For purposes of Acceptance and pay factor determination:

1. Determine the density from cut pavement sections (cores) with six (6) inch diameters extending through the full thickness of the HMA;
2. Determine the pay factor in accordance with Section 904, "Quality Level Analysis;"
3. To be prepared for dispute resolution, the Contractor shall provide one (1) additional core for each core tested by the Department for Acceptance of density in accordance with section 423.3.7, "Dispute Resolution;" and
4. If a composite pay factor of more than one (1.00) is calculated, the composite pay factor will be a one (1.00) for the purposes of payment.

For Projects consisting of single lift overlays or mill and inlay with a single lift of two and a half inches or less, the Project Manager may grant an exception to the mean density target requirement of at least 94.5% of the theoretical maximum density if the Contractor can demonstrate that a minimum of 92.0% cannot be reasonably obtained because of the existing conditions of the Pavement Structure or Subgrade Materials. The Contractor demonstrates this by providing non-destructive density results obtained during paving operations witnessed by a State Inspector at the location in question. If the Project Manager grants this exemption, the Contractor shall construct a Roadway test strip and develop an HMA compaction process to get the highest possible density based on an approved roller's density gain per pass, in accordance with Section 423.3.4.4, "Compaction Equipment." The Project Manager will approve the process, establish a new target value for density and establish a new Acceptance lot only for the portion of the Project addressed herein (except for the Roadway test strip) before paving begins or continues. Lot density shall not fall below 91%. If a lot does not meet either of the revised density requirements, the Project Manager will, with the concurrence of the Assistant District Engineer for Construction do the following:

1. Accept and pay for the lot of HMA at 50% of the Bid Item Unit Price; or
2. Reject the in-place Material and require the Contractor to remove and replace at no cost to the Department.

423.3.6.3.2 Adherence to Specifications and Rejection of Non-Specification Material

The Contractor shall produce Material in substantial compliance with all Specification requirements. The Department will evaluate Air Voids, Pavement Density, Void in Mineral Aggregate (VMA), and Asphalt Content test results for Specification compliance. Evaluation of Material that does not meet Specifications will be in accordance with the following:

Individual Test Results. If an individual test is outside the Specification limits but is less than two (2) standard deviations from the mean of previously produced Material of the current lot, investigate and propose corrective actions but production may continue and the result will be entered into QLA. If an individual test result (for the current lot) is outside the Specification limits and is two (2) or more standard deviations from the mean of previously produced Material, the Contractor shall cease production, investigate the causes of the failure, and propose corrective actions. The Contractor shall not resume production until the proposed corrections are approved by the Project Manager.

Consecutive Test Results. If two (2) consecutive test results of the same property (for the current lot) are outside the Specification limits, cease production, investigate the causes of the failure, and propose corrective action. The Contractor shall not resume production until the proposed corrections are Accepted by the Project Manager in writing. Limit production to a maximum of 1,000 tons, production will include a minimum of two (2) Contractor tests and one (1) Department test. If testing indicates that the problem has been corrected, the Contractor shall resume full operations. If the problem has not been corrected, the Contractor shall perform further trial runs and testing.

Pavement Density Below 90.000%. All pavement density tests that are below 90.000% are rejected and the Contractor shall remove and replace all Material represented by the test with Specification Material at the Contractors expense. The Contactor shall submit a Plan in writing for approval by the Project Manager that determines the limits of Material to be removed within 48 hours of reporting a Quality Control test or receiving a Quality Assurance test for pavement density below 90.000% density. If the test below 90.000% is a Department test, the Department will obtain a new test from the Material replaced by the Contractor to replace the density test reported by the Department. If the test below 90.000% is a Contractor test, the Contractor shall obtain a new test from the Material replaced by the Contractor to replace the test reported by the Contractor. The test obtained from the replaced Material will be input into the QLA to replace the test below 90.000%.

All Material that is rejected, at the sole discretion of the Department, shall be removed and replaced with Specification Material at the Contractor's expense. If the Material is allowed to remain in place by the Department all random, sample data will be entered into QLA, this does not apply to pavement density below 90.000% that shall be removed and replaced. Sampling for corrective action will not be entered into QLA.

The Project Manager may reject Material that appears to be defective based on visual inspection.

423.3.6.4 Independent Assurance Testing

The Department will perform Independent Assurance sampling and testing in accordance with Section 906, "Minimum Testing Requirements."

423.3.7 Dispute Resolution

For any test incorporated into the pay factor, if a dispute exists the Project Manager and Contractor will investigate to determine why and make corrections if possible. If the discrepancy cannot be resolved, then either party may invoke the dispute resolution process. The State Asphalt Engineer will maintain a list of labs that are willing and capable of performing referee testing. All referee Labs shall be AASHTO Materials Reference Laboratory (AASHTO RE: SOURCE) certified for the test(s) to be performed. Neither the Department's Project staff, nor the Contractor will know who is performing the referee testing. The State Asphalt Engineer will select a Laboratory, without disclosing the name of the Lab to Department Project personnel or Contractor personnel, from the following, not in priority order:

1. A District Laboratory not from the District in which the Project resides;
2. A Laboratory currently listed on the State Material's Bureau's list of approved testing labs not involved in the subject Project in any manner, such as mix design submittal, preliminary testing for design, etc. Only Laboratories that are in the routine business of providing testing and designs will be considered; or
3. State Materials Bureau Laboratory.

For all testing incorporated into the pay factor, an additional sample from the Department's Acceptance Samples and the Contractor's Quality Control Samples shall be obtained for referee testing purposes. Failure to provide the referee samples will result in the Project Manager suspending the Project at no cost to the Department. Additional time will not be added to the Contract for Project suspension caused by failure to comply with Dispute Resolution Process. Work shall not resume until the Contractor provides the sample(s) and satisfies the Project Manager, in writing, that future samples will be provided in compliance with this requirement. The referee sample(s) is (are) to be retained by the Department. The Department will retain the referee samples at a location determined by the Project Manager. Once the pay factor is determined, the Contractor shall dispose of the unused samples at no cost to the Department. In no case will the unused samples be disposed of prior to the ten (10) Calendar Day period in which the Dispute Resolution process may be invoked.

For Pavement Density, the additional core(s) will be stored and retained in a location approved by the Project Manager. Should the Dispute Resolution Process for Density be invoked, the additional core will be provided to the Referee Lab per the NMDOT REFEREE TESTING POLICY. The original density value obtained will be replaced by the data obtained from the Referee Lab result.

When a referee Lab is used, the referee Lab's test results will be used in determining the pay factor. The request to referee must be invoked in writing within ten (10) Calendar Days of receiving the test results from the other party. If not invoked within ten (10) Calendar Days, the test results are deemed Accepted. The test results from the referee Lab will replace the Department's or the Contractor's test results for the sample in question. If the composite pay factor decreases from applying the referee Lab's results, the Contractor shall pay for the testing performed by the referee Lab. If the composite pay factor increases from applying the referee Lab's results, the Department will pay for the testing performed by the referee Lab. If the composite pay factor remains unchanged, the cost shall be split with each party responsible for 50% of the total cost.

The "NMDOT REFEREE TESTING POLICY" will be used to coordinate the efforts of managing Dispute Resolution by both the Department and Contractor. This policy is made available by accessing the NMDOT website, and navigating within the Construction and Civil Rights Bureau's (CCRB) link.

Failure to comply with the requirements contained herein will result in the pay factor being calculated in accordance with the applicable Sections of 423, "Hot Mix Asphalt (HMA) (Major Paving) and 904, "Quality Level Analysis" and no test results will be replaced by referee results.

423.4 METHOD OF MEASUREMENT

If the Department measures *HMA* by the square yard, the Department will use the average width of the HMA in place and the length from station to station along the centerline of the Roadway when calculating quantities.

423.5 BASIS OF PAYMENT

Pay Item	Pay Unit
HMA Complete	Ton or Square Yard
HMA	Ton or Square Yard

The Department will pay for Accepted quantities at the Bid Item Unit Price, adjusted in accordance with Section 423.5.1, "Price Adjustments." Providing and transporting all cores, samples and storage containers shall be Incidental to the Pay Items above.

423.5.1 Price Adjustments

The Department will pay for Accepted quantities of *HMA* or HMA Complete at the Bid Item Unit Price, adjusted in accordance with Section 904, "Quality Level Analysis (QLA)." The HMA will be evaluated on a lot-by-lot basis at a price determined by multiplying the Bid Item Unit Price by the weighting factor. The Department will use Table 904.1:1, "Weighting Factors," to calculate each lot's composite pay factor. The pay factor for the entire Project will be calculated by applying weighted averages, based on tonnage contained within each lot, to each lot's composite pay factor. If the composite pay factor for a lot is greater than one (1.0), the pay factor will be set at one (1.0).

423.5. 2 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Asphalt binder, aggregate, blending sand, mineral filler, mineral admixture, and WMA additive or process as appropriate;
2. Mixing, hauling, placement, and compaction of HMA or WMA;
3. Quality Control in accordance with Section 902, "Quality Control;"
4. Providing and transporting all cores for correlation;
5. Providing Mix Design in accordance with Section 423.2.8, "Mix Design;" and
6. Providing storage container for samples and cores if referee testing is used.

SECTION 424: WARM MIX ASPHALT (WMA) (MAJOR PAVING)

424.1 DESCRIPTION

This Work consists of constructing one (1) or more pavement courses of Warm Mix Asphalt (WMA) on a prepared base milled surface.

WMA shall be produced in a mixing plant and stored, hauled, placed and compacted in accordance with the requirements of this Section and as shown in the Contract.

Section 423, “Hot Mix Asphalt – Superpave (Major Paving)” shall be complied with except as modified herein.

424.1.1 Definition

Warm Mix Asphalt (WMA) is a generic term used to describe the reduction in production paving and compaction temperatures achieved through the use of one (1) of the approved WMA Technologies.

Some modification to WMA plants may be necessary to accommodate the WMA Technologies as noted in Section 424.3, “Construction Requirements.”

424.2 MATERIALS

424.2.1 General

WMA may be produced by one (1) or a combination of several technologies which may include WMA plant foaming processes and Equipment, mineral additives or chemicals that allow the reduction of the production temperatures.

WMA is a mixture of asphalt binder, Warm Mix Additive (or technologies), aggregate, blending sand, mineral filler, and mineral admixture Material. The warm mix additive, or technology, shall be approved by the Department and included in the most current Approved Products List (APL). Unless otherwise prohibited in the Contract, the Department will allow Recycled Asphalt Pavement (RAP) in WMA mixes as long as the resulting mixture conforms to all Specification requirements.

A technical representative of Warm Mix Additive Supplier, including contact information shall be designated in writing via the mix design submittal process. The representative is expected to ensure that the Warm Mix Additive is handled properly. The representative does not have the authority to allow any deviation from the Department Specifications and Project requirements.

424.2.2 Aggregate

Refer to Section 423.2.2, “Aggregate.”

Note: HMA will be replaced with WMA.

424.2.3 Asphalt Binder

Refer to Section 423.2.3, “Asphalt Binder.”

424.2.3.1 Warm Mix Additive or Technology

Only Warm Mix Additives or Technologies approved by the Product Evaluation Program and listed on the NMDOT Approved Products List (APL) can be used on Department Projects.

To be placed on the APL, the WMA additive Supplier shall verify that the binder with the additive meets the PG grade of the specified binder. The potential additive Supplier shall demonstrate this to the Department by evaluating the Asphalt Binder containing the WMA additive at the expected additive dosage rates for compliance with the specified PG grade in accordance with AASHTO M320, Table 1 and Section 402.2.2.1.1, "Performance Graded Asphalt Binder."

The type and dosage rate of Warm Mix Additives shall comply with the recommendations of the Warm Mix Additive Supplier. Warm Mix Additive dosage rates shall not deviate from those recommended by the Warm Mix Additive Supplier. If a terminal blend Warm Mix Additive is used, the dosage rate shall be shown on the Materials Certificate of Compliance.

After the Warm Mix Additive is introduced, the PG grade of the binder shall comply with the PG grade as specified in the Contract.

For foamed asphalt systems, only foam systems that approved by the State Asphalt Engineer shall be used. Foamed asphalt systems, are not part of the NMDOT APL.

424.2.4 Mineral Admixtures

Refer to Section 423.2.4, "Mineral Admixture."

424.2.5 Blending Sand

Refer to Section 423.2.5, "Blending Sand."

424.2.6 Mineral Filler

Refer to Section 423.6, "Mineral Filler."

Note: HMA will be replaced with WMA.

424.2.7 Reclaimed Asphalt Pavement

Refer to Section 423.2.7, "Reclaimed Asphalt Pavement."

Note: HMA will be replaced with WMA.

424.2.8 Mix Design

Refer to Section 423.2.8, "Mix Design."

Note: HMA will be replaced with WMA.

In addition to the above reference, the Contactor shall provide documentation confirming the WMA additive or technology blended with the asphalt binder results in asphalt cement that meets the specified PG Grade Asphalt Binder.

The WMA Additive or Technology Supplier and the Asphalt Binder Supplier will recommend mixing, compaction, and maximum allowable temperatures to be used for the development of the mix design.

424.2.9 Job Mix Formula

Refer to Section 423.2.9, "Job Mix Formula."

424.3 CONSTRUCTION REQUIREMENTS

424.3.1 General

Refer to Section 423.3.1, "General."

Note: HMA will be replaced with WMA.

424.3.2 Mix Temperature Requirements

The Contractor shall not allow the temperature of the WMA to be less than 215 degrees F or greater than 275 degrees F behind the laydown machine. WMA delivered to the Project with mix temperatures outside the Acceptable range shall, at the sole discretion of the Project Manager, be removed and replaced at no cost to the Department.

424.3.3 Addition of Mineral Admixtures

Refer to Section 423.3.3, "Addition of Mineral Admixture."

424.3.4 Equipment

Refer to Section 423.3.4, "Equipment."

Note: HMA will be replaced with WMA.

The Contractor shall use Equipment and WMA technologies capable of producing an asphalt mixture that meets Specification requirements and is workable at the minimum placement and compaction temperatures desired, regardless of storage or haul distance considerations.

424.3.4.1 Mixing Plants

The Contractor shall modify the asphalt mixing plant as required by the manufacturer to introduce the WMA technology.

424.3.4.1.1 Plant Scales

Refer to Section 423.3.4.1.1, "Plant Scales."

In addition to the above reference, the Contractor shall modify the asphalt mixing plant as required by the manufacture to introduce the WMA additive or technology.

424.3.5 Placement Operations

Refer to Section 423.3.5, "Placement Operations" except the following subsections as modified herein.

Note: HMA will be replaced with WMA.

424.3.5.1 Weather Limitations

The Contractor shall not place WMA on wet or frozen surfaces or if weather conditions prevent proper handling, finishing, and compacting. The Contractor shall place WMA when the Chill Factor is at least 35 °F and rising. If the air temperature is 55 °F or warmer, the Contractor shall not consider the Chill Factor.

424.3.6 Sampling and Testing

Refer to Section 423.3.6, “Sampling and Testing.”

Note: HMA will be replaced with WMA.

In addition to the above referenced section the following shall be complied:

If the WMA additive Supplier indicates that the additive makes mix properties time defendant; the Plan must include how all of the required testing will be completed in the designated time frame. This Plan will include how the Contractor will comply with the required testing within the Supplier’s specified time frames. It will also include how the Department will be supported, if necessary, to complete their tests within the time frame required if the testing cannot be performed at Department established facilities. This Plan must be reviewed and approved by the Project Manager and by the District Laboratory Supervisor prior to the placed of any WMA on the Project. If the Job Mix Formula changes, it shall be addressed in conformance with Section 423.2.9.1, “Job Mix Formula Adjustments.”

424.3.7 Dispute Resolution

Refer to Section 423.3.7, “Dispute Resolution.”

Note: HMA will be replaced with WMA.

424.4 METHOD OF MEASUREMENT

If the Department measures WMA by the square yard, the Department will use the average width of the WMA in place and the length from station to station along the centerline of the Roadway when calculating quantities.

424.5 BASIS OF PAYMENT

Pay Item	**Pay Unit**
WMA Complete	Ton or Square Yard
WMA	Ton or Square Yard

The Department will pay for Accepted quantities at the Bid Item Unit Price, adjusted in accordance with Section 424.5.1, “Price Adjustments.” Providing and transporting all cores, samples and storage containers shall be Incidental to the Pay Items above.

424.5.1 Price Adjustments

Refer to Section 423.5.1, “Price Adjustments.”

Note: HMA will be replaced with WMA.

424.5. 2 Work Included in Payment

Refer to Section 423.5.2, “Work Included in Payment.”

SECTION 450: PORTLAND CEMENT CONCRETE PAVEMENT (PCCP) (QLA)

450.1 DESCRIPTION

This Work consists of constructing Portland Cement Concrete Pavement (PCCP) on a prepared Subgrade, Base Course or HMA/WMA.

450.2 MATERIALS

Portland cement, air-entraining admixtures, chemical admixtures, mineral pozzolans, water, and aggregate will meet the requirements of Section 509, "Portland Cement Concrete."

450.2.1 Dowels and Tie Bars

Dowels and tie bars will meet the applicable requirements of Section 540.2, "Steel Reinforcement Materials."

450.2.2 Joint Sealing Material

Joint sealing Material will meet the requirements of Section 452, "Sealing and Resealing Concrete Pavement Joints."

450.2.3 Curing Compound

The Contractor shall use curing compound that complies with the requirements of ASTM C309 for Type 1-D or Type 2.

450.3 CONSTRUCTION REQUIREMENTS

450.3.1 Proportioning

The Contractor shall use a Class P concrete mix that has been reviewed and approved in accordance with Section 509, “Portland Cement Concrete Mix Designs” by the State Concrete Engineer. If the concrete is not slip-formed, an approved Class HPD concrete mix shall be used instead of Class P.

The Contractor shall mix and place all concrete in accordance with Section 510.3, “Construction Requirements” except for Subsection 510.3.5.5, “Price Adjustments.” The Contractor shall use a concrete mix that has been approved for use in the Freeze-Thaw zone, as defined in Section 509.2.7.4, “Freeze-Thaw Risk Zones” in which the Project is located.

The Contractor shall keep a copy of the approved mix design available on the jobsite when using the concrete mix.

450.3.2 EQUIPMENT

450.3.2.1 Batching Plant

The Contractor shall Use batching plants and Equipment that meet the requirements of Section 510.3.2.1, “Batching Plant.”

450.3.2.2 Mixers

The Contractor shall use mixers that meet the requirements of Section 510.3.2.6, "Mixing."

450.3.2.3 Transporting

The Contractor shall use truck mixers, truck agitators or non-agitating trucks that comply with Section 510.3.2, “Transporting.”

450.3.2.4 Slip-Form Paver

The Contractor shall place the concrete with an approved slip-form paver designed to spread, consolidate screed, float, and finish the concrete in one (1) complete pass to create a dense and homogeneous pavement. Minimize the use of hand finishing.

The vibrators of the slip-form paver must be located behind the auger. The Contractor shall not use pavers with vibrators in front of the auger.

The Contractor shall equip slip-form pavers with internal vibrators that meet or exceed the following Specifications at 8,000 cycles per minute (cpm) under no-load conditions:

1. Amplitude (peak to peak) = 0.070 inch; and
2. Centrifugal force = 1,200 lb.

The Contractor shall equip the slip-form paver with an electronic monitoring device capable of the following:

1. Displaying the operating frequency of each internal vibrator; and
2. Continuously recording at a minimum the following:
    a. Time of Day,
    b. Station location,
    c. Paver track speed, and
    d. Operating frequency of each vibrator.

The Contractor shall store all information captured by the electronic monitoring system throughout the Project. This information is to be used only for Project information by the Department and will be provided to the Project Manager at his request during the course of the Project and at the completion of the Project.

The Contractor shall position the vibrators no further apart than the manufacturer’s recommendations for horizontal spacing of the vibrators; but do not exceed 18 inches, center-to-center. The Contractor shall ensure that the space from the outer edge of the pavement to the center of the outside vibrator does not exceed nine (9) inches, or ½ the maximum recommended spacing, whichever is less.

450.3.2.5 Concrete Jointing Equipment

The Contractor shall provide enough sawing Equipment to complete the Work within the allotted time. The Contractor may use a water-cooled diamond edge saw blade, or an “early entry dry cut” type with a skid plate, as defined by ACI 302. The Contractor shall provide at least one (1) additional saw in good working order. The Contractor shall keep an ample supply of saw blades (and skid plates, if the "early entry dry cut" saws are used) at the Work site during sawing operations.

450.3.2.6 Curing Compound Application Equipment

The Contractor shall apply curing compounds with Equipment that uses a pressure tank or pump. The Contractor shall ensure that the Equipment has a feed tank agitator that provides continuous agitation of the compound during spraying operations. The Contractor shall use a nozzle that contains enough air to thoroughly atomize the compound.

450.3.3 Operations

For slip-form paving, the Contractor shall construct a padline of sufficient width and stability to accommodate the slip-form paving Equipment.

The Contractor shall provide enough lateral support to construct the section in accordance with the Contract. The Contractor shall maintain the smoothness and compaction of the Base Course in the specified condition until the concrete placement is completed. The Contractor shall moisten untreated aggregate base layer, if used, before paving standing water will not be allowed.

The Contractor shall control the paver alignment and grade by using a string line pulled from pin to pin in front of the paver at intervals not greater than 25 feet, or by automatic machine control (stringless system).

450.3.3.1 Handling, Measuring, Batching, and Mixing Materials

The Contractor shall handle, measure, batch, and mix the Materials in accordance with Section 510, "Portland Cement Concrete." The maximum mixing time for either truck mixers or non-agitating mixers is specified in Section 510.3.4.2, “Mixing Time."

450.3.3.2 Placing, Spreading, and Consolidating Concrete

The Contractor shall place concrete with the specified thickness along the full width of the lane or area being paved. The Contractor shall prevent segregation and minimize redistribution. The Contractor shall place the concrete continuously between transverse joints without using intermediate bulkheads.

When using dowel baskets, the Contractor shall not end-dump the concrete directly onto the dowel baskets. The Contractor may use end-dumps to transfer the concrete to the Equipment designed to place it completely across the grade. The Contractor shall not windrow the concrete.

When placing concrete adjacent to a newly constructed PCCP lane, the Contractor shall not operate Equipment or traffic on the lane until the concrete has achieved a compressive strength of at least 3,000 psi, as determined by the Maturity Method, as described in Section 510.3.5.2, "In-Place Concrete Strength Measurements."

When working on existing pavement, the Contractor shall use Equipment with protective pads on crawler tracks or rubber-tire wheels. The Contractor shall set the crawler tracks or rubber-tire wheels far enough from the pavement edge to prevent damage to the pavement.

The Contractor shall receive delivery tickets, monitor and maintain yield to achieve the minimum required thickness. Copy of tickets shall be delivered to NMDOT at the end of each Days paving.

Additional concrete Material shall be placed at locations of grade adjustments and irregularities as approved by NMDOT.

450.3.3.2.1 Slip-Form Paving

The Contractor shall use a slip-form paver that complies with Section 450.3.2.4, “Slip-Form Paver” to distribute the concrete uniformly. The Contractor shall vibrate the full width and depth of the concrete to consolidate the concrete without causing segregation. The Contractor shall ensure that the vibration produces uniform concrete that will stand normal to the surface with sharp well-defined edges.

The Contractor shall coordinate concrete mixing, delivering, and spreading operations in order to provide uniform progress and to minimize stopping and starting of the paver. If it is necessary to stop the paver, the Contractor shall also stop the vibratory and tamping elements immediately. The Contractor shall not apply external tractive force to the machine; the machine must be propelled only by its own mechanisms.

450.3.3.2.2 Other Paving

For paving operations that are not slip-formed, the Contractor will place Class HPD concrete between stationary side forms. The Contractor shall consolidate the concrete by internal vibration and finish it to the required surface smoothness using the hand-float method or other suitable means. The Contractor shall cure the concrete with approved methods.

The Contractor shall leave wood or metal forms in place at least 12 hours after placing the concrete. If necessary, the Contractor shall take additional efforts to prevent thermal cracking of the concrete. The Contractor shall clean and oil the forms each time they are used. The Contractor shall apply a curing compound to the concrete surfaces exposed by removal of the forms immediately after removing the forms.

The Contractor shall check the form’s alignment and grade elevations and make the necessary corrections before placing the concrete. If a form is disturbed or if the Base Course under a form becomes unstable, the Contractor shall reset and recheck the form, as directed by the Project Manager.

450.3.3.3 Temperature and Weather Limitations

Temperature and weather limitations are defined in Section 511.3.4, "Temperature and Weather Limitations." The Contractor shall keep the concrete temperature between 50 °F to 90 °F at the time of placement. For cold weather placement refer to Section 511.3.3.1, “Cold Weather Concrete.” The Contractor shall provide the Project Manager with Hot Weather and Cold Weather Concrete Placement and Curing Plan(s) in accordance with Section 51.3.4, “Temperature and Weather Limitations” for review and approval by the State Concrete Engineer.

450.3.3.4 Rate of Evaporation Limitations

The Contractor shall continuously monitor the evaporation potential at a height not to exceed five (5) ft above the surface of the concrete as determined from Figure 511.3.4.3:1, "Surface Evaporation from Concrete" at the actual placement location. Computerized Equipment furnished by the Contractor must have the capability to automatically take the required readings. Readings shall be taken at least once every five (5) minutes beginning at least 15 minutes before the placement begins and continuing until the final application of the curing compound has been completed. All readings shall be graphically plotted on a continuous time scale.

The Contractor shall not place (or continue to place) PCCP if the average evaporation potential over any ten (10) minute period of time is greater than 0.2 lb per square ft per hour.

If the evaporation exceeds the 0.15 lb per square foot per hour, one (1) or more of the following actions shall be implemented to reduce the rate of evaporation, as approved by the Project Manager:

1. The Contractor shall use an evaporation retarder (If used, this cannot be used as a finishing aid).
2. The Contractor shall erect windbreaks to reduce the wind velocity over the concrete surface.
3. The Contractor shall place concrete during nighttime or early morning hours.
4. The Contractor shall lower the fresh concrete temperature during hot weather. This can be accomplished by using cool aggregate and chilled water, by adding ice as part of the mixing water, or by adding liquid nitrogen to the concrete mix after all mix ingredients have been placed into the ready mix truck.
5. The Contractor shall increase the relative humidity at the site with a fog spray maintained over the entire concrete surface until the final finish has been achieved and the curing system has been applied.

450.3.3.5 Change in Atmospheric Conditions

Placement of any PCCP by the Contractor during marginal weather placement is at the Contractor’s risk. The Contractor shall repair or replace at no additional cost to the Department any concrete that is determined by the Assistant District Engineer (Construction) to be damaged due to weather conditions.

450.3.4 Joints

The Contractor shall submit the proposed joint layout plan in .pdf format to the Project Manager, State Pavement Engineer, and the State Materials Bureau for review and approval at least four (4) weeks before starting concrete slab construction. The proposed joint layout plan shall have the lane markings clearly depicted. Attempts shall be made in the submitted jointing plan for mainline paving not to place longitudinal joints in the wheel path. After receiving the recommendations and/or responses from the State Pavement Engineer and from the State Materials Bureau the Project Manager will either approve or reject the submittal within ten (10) Working Days from the date of submittal.

The Contractor shall construct joints at the locations, intervals, and dimensions shown in the approved joint layout Plan, and seal them in accordance with Section 452, "Sealing and Resealing Concrete Pavement Joints." The Contractor shall ensure no re-entrant corners. For typical slabs, the longitudinal joint spacing shall not exceed 12 feet and the transverse joint spacing shall not exceed 15 feet.

The Contractor shall avoid taper joints if possible. If a tapered joint is formed, the Contractor shall place a control joint at:

1. One-half the distance between the end of the taper and the opposite end, if the baseleg is less than or equal to ten (10) ft and longer than five (5) ft; or
2. Third points along the base leg, if the base leg is longer than ten (10) ft.

Additional Jointing Guidance:

1. No slabs will have angles less than 60 degrees.
2. Joints shall be “dog-legged” through curve radius points. Dog leg should be at least 24 inches in length to the radius point.
3. The Contractor shall construct joint faces perpendicular to the PCCP surface.

The Contractor shall install dowels at any joints added to control cracking in exactly the same way as the standard joints.

The Contractor shall construct transverse and longitudinal contraction joints by inserting control joints while the concrete is still plastic or by sawing the freshly hardened concrete as soon as possible after placing it. The Contractor shall make the initial sawcut at least one third the pavement depth. The Contractor shall not allow the saw to cut so deep that any reinforcement is damaged.

The Contractor shall saw joints in a sequence and with a timing that will eliminate the possibility of uncontrolled cracking.

Time to cut longitudinal and transverse joints is to be determined by the Contractor. Approval of jointing Plan by NMDOT does not absolve the Contractor from responsibility of PCCP panels containing uncontrolled cracks. The Project shall not be granted Substantial Completion until all panels containing cracks have been removed and replaced.

The Contractor shall make transverse contraction and longitudinal joints in two (2) phases. The Contractor shall make the initial saw cut or inserted joint wide enough and deep enough to ensure that a sufficiently weakened cross-section exists, but not less than 1/3 the thickness of the concrete. The Contractor shall make the second sealant reservoir-shaping saw cut in accordance with the details shown in the Plans. The Contractor shall not damage the steel reinforcement with any saw cut.

The Contractor shall saw joints sequentially. However, the Contractor may saw control transverse joints at intervals shown in the Contract, or at intervals that will most effectively minimize the possibility of uncontrolled cracking.

If necessary, the Contractor shall perform the sawing operations day and night, regardless of weather conditions. The Contractor shall not saw a joint if a crack occurs at or near the joint location before sawing. The Contractor shall immediately discontinue sawing of a joint when a crack develops ahead of the saw.

The Contractor shall install dowels at transverse construction joints.

The Contractor shall construct transverse contraction joints by sawing the freshly hardened concrete as soon as possible after placement. The Contractor shall make the saw cut at least one third (1/3) the pavement depth as shown on the typical drawing included in the Project documents, or 1 ¼ inch depth for early entry sawing. The Contractor shall not allow the saw to cut so deep as to damage any reinforcement.

All PCCP panels containing full-depth uncontrolled cracks shall be removed and replaced at no additional cost or time to the Department. The Project shall not be granted Substantial Completion until all panels containing full-depth cracks have been removed and replaced.

The Contractor shall change saw blades (and skid plates, when using the early entry dry cut saws) as often as required to control and minimize spalling. The Contractor shall maintain a sufficient supply of replacement saw blades and skid plates at the Project site to insure that the sawing operations will proceed without interruption until completed.

450.3.4.1 Longitudinal Joints

The Contractor shall place tie bars in accordance with the current NMDOT Standard Drawings, perpendicular to the longitudinal joints using approved Equipment, or secure the joints with chairs or baskets. The Contractor shall not place tie bars within 15 inches of transverse joints.

The combined width of all concrete slabs tied together in any one (1) placement shall not be more than 40 feet.

The Contractor shall use straight full-length tie bars, a two (2) part threaded tie bar and splice coupler system, or bent the tie bars. The Contractor shall only bend tie bars made of Grade 420 steel. The Contractor shall bend tie bars at right angles against the form of the first lane constructed and then straighten them into final position before placing the concrete of the adjacent lane.

If construction of PCCP abuts existing pavement, the Contractor shall drill the holes at mid-depth of the thinner slab. The Contractor shall drill the face of the existing PCCP to accept half of the tie bar length. The Contractor shall ensure that the drill holes are a diameter that allows easy insertion of the tie bar but minimizes the requirement for grout or epoxy anchor Materials. The Contractor shall construct joints with tie bars as shown on the Plans.

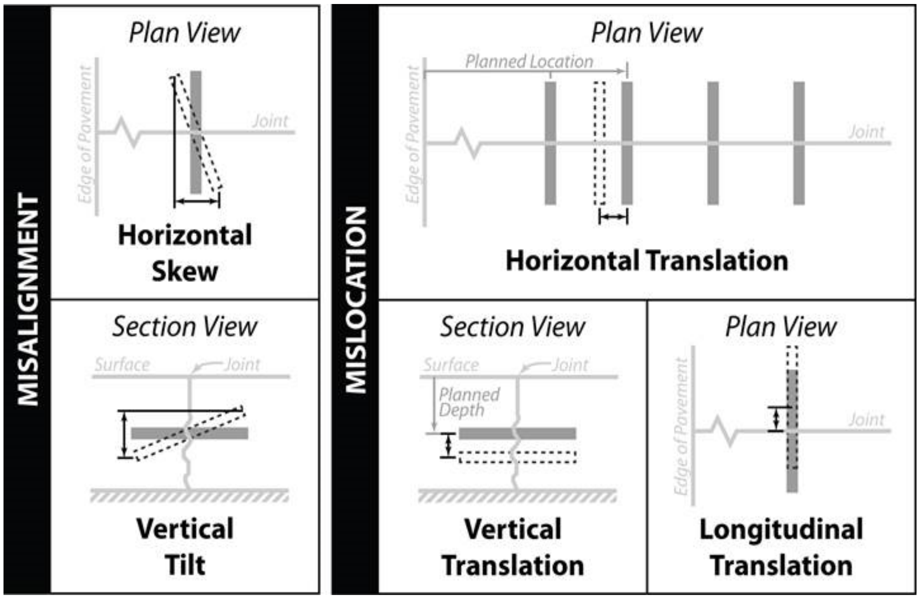
450.3.4.2 Transverse Joints

The Contractor shall construct transverse contraction joints with load transfer devices (dowels). The Contractor shall hold dowels in position parallel to the surface and centerline of the slab with chairs or other approved supports as approved by the Project Manager. The Contractor shall submit shop drawings of the welded dowel assemblies to the Project Manager for approval by State Pavement Engineer. The Contractor shall not place concrete until the Department approves the welded dowel assemblies.

Dowel bars shall be installed within the tolerances and of the size, grade and spacing specified. Horizontal support wires or shipping braces shall be non-deformed bars or wires with a diameter less than or equal to 0.307 inches (gauge 0 wire). The number of horizontal support wires or shipping braces shall be limited to a maximum of five (5) per assembly. The center of the dowel assembly or insertion location shall be marked on both sides of the pavement slab for reference in sawing the joint. Dowel bars shall be furnished in a rigid welded assembly or, when the Contractor demonstrates that the placement can be made within required tolerances, placed by a dowel insertion machine. Assembly should be securely fastened to the Base/Subbase and constructed to firmly hold all the centerline of all dowel bars at T/2 depth with a minimum of three (3) inches cover, parallel to each other and to the pavement grade and alignment. See Detail indicated in the Contract Plans or standard Plan serials for the applicable section.

450.3.4.2.1 Individual Dowel Placement Tolerances

- Horizontal Skew (Rotational Alignment) = 1 ½” inches
- Vertical Tilt (Rotational Alignment) = 1 ½” inches
- Horizontal Translation = Two (2) inches
- Vertical Translation (Depth) = One (1) inch
- Longitudinal Translation = Three (3) inches



- Horizontal Skew – The deviation of the dowel bar from true parallel alignment from the edge of the pavement, measured over the entire length of the dowel bar.
- Vertical Tilt – The deviation of the dowel bar from true parallel alignment from the surface of the pavement, measured over the entire length of the dowel bar.
- Alignment – The degree to which a dowel bar aligns true (e.g., parallel) to the horizontal and vertical planes of the pavement.
- Misalignment – Any deviation in either the horizontal or vertical plane from a true alignment condition (e.g., horizontal skew or vertical tilt).
- Mislocation – Any deviation of the dowel bar from its planned location other than misalignment.

The Contractor is responsible for ensuring that the dowels remain properly aligned and in the proper locations before and during the placing procedure. The Contractor shall not cut the tie wires holding the baskets together before placing the concrete.

The Contractor shall thoroughly and uniformly coat each dowel and each tie wire along its full length with an approved form release agent not more than twelve (12) hours before concrete placement. The Contractor shall not use grease to lubricate the dowels. If the concrete placement is postponed or Delayed; the dowels will be re-coated.

Ground Penetrating Radar equipped with dual side-by-side antennas or approved equal by the Project Manager and State Concrete Engineer can be used for all embedded steel reinforcement. Magnetic Tomography (i.e. MIT Scan 2) may be utilized. Regardless of the equipment used, the results from the nondestructive testing shall be confirmed by drilling or coring for at least three (3) dowel bars within the first 120 linear feet of paving.

450.3.4.2.2 Joint Score

The Joint Score is the means of assessing locking potential. The Joint Score is evaluated for a single transverse joint between adjacent longitudinal joints and/or pavement edges.

Table 450.3.4.2.2:1
WEIGHTING FACTORS USED TO DETERMINE JOINT SCORE

Range of Rotational Misalignment	Weight
< 0.6 in.	0
≥ 0.6 in and < 0.8 in.	2
≥ 0.8 in and < 1 in.	4
≥ 1 in	5
Joint Rejection Criteria: 1. Any joint with a Joint Score greater than ten (10) is considered rejected. An individual joint may be allowed if the two (2) longitudinally adjacent joints each have a joint score less than or equal to ten (10). 2. Any joint that does not have at least three (3) acceptable dowel bars in each wheel path.	

450.3.4.2.3 Individual Dowel Bar Rejection Criteria

Rotational Alignment (Vertical Tilt and Horizontal Skew):

- Any bar with a misalignment greater than 1.5 inches.

Longitudinal Translation:

- Any bar with a mislocation greater than three (3) inches.
- Any bar that is not embedded at least six (6) inches on each side of the joint.

Vertical Translation (Depth):

- Any bar within the top three (3) inches of the pavement or at a depth less than the saw-cut depth.
- Any bar within the bottom three (3) inches of the pavement.
- Any bar with a mislocation of greater than one (1) inch.

Horizontal Translation:

- Any bar with a mislocation of greater than two (2) inches.

When rigid assemblies are used to install dowel bars and the bars are rejected for depth, the Contractor may core the pavement to verify the MIT 2 Scan depth results.

450.3.4.2.4 Dowel Bar Corrective Measures

The following corrective measures will be allowed for the bars or joints that are rejected:

- Rotational Misalignment:
  - o Saw-cut the misaligned bars. Joints with less than three (3) un-cut bars in each wheel path will require the addition of dowel bars using an approved dowel bar retrofit method.

- Longitudinal and Horizontal Mislocation:
  - o Addition of dowel bars using an approved dowel bar retrofit method.

- Depth:
  - o Inadequate cover above the bar - Remove the bar and install a replacement bar using an approved dowel bar retrofit method.
  - o Inadequate cover below the bar - Addition of dowel bars using an approved dowel bar retrofit method.

- Missing Dowel Bars:
  - o Addition of dowel bars using an approved dowel bar retrofit method.

Retrofitted dowel bars shall not exceed the dowel bar rejection criteria.

In addition to the above procedures, the Contractor may propose removal and replacement of the affected slabs.

The Contractor shall submit the method of repair to the Project Manager for approval.

The Contractor shall demonstrate his ability to place dowel bars in conformance with the specifications by placement of a test section.

The test section shall be a minimum of 120 feet in length. Upon completion of the test section, the Contractor shall shut down paving operations. During the shutdown period, the Contractor shall evaluate all joints in the test section using the Ground Penetrating Radar, analyze the results and submit the results to the Project Manager. Paving operations shall not be restarted until the Project Manager approves the test section results. The test section will be found acceptable if 85% of the dowel bars placed are found to be within the acceptable tolerances stated in the rejection criteria. All dowel bars exceeding the Rejection Criteria must be addressed using the above corrective measures.

If the Project has less than 500 linear feet of pavement, the test section will not be required. If a Project does not have sections of continuous pavement greater than 45 linear feet, the test section will not be required.

Upon completion of the test section(s) and for each week of production, the Contractor shall prepare an electronic report generated using MagnoProof or equivalent software and submit it to the Project Manager at the start of each working week during production for the previous week's Work. All data shall be submitted in the manufacturer's native file format, along with the calibration files.

The electronic report shall include the following:

1. Control number, date, highway number and direction of traffic.
2. Joint number, lane number and station.
3. Bar number and x-location of dowel bar.
4. Horizontal and vertical misalignment of each bar in inches.
5. Overall misalignment of each bar in inches of each bar.
6. Side shift of each bar in inches.
7. Depth to center of each bar in inches.
8. Joint Score.

9. All measurements exceeding the rejection criteria shall be highlighted in red.

In addition to the electronic report provide all information required in the report as listed above on the final joint layout plan and provide to the Project Manager for Final Acceptance of the PCCP.

Due to potential magnetic interference from tie bars, dowel bars located within 15 inches of a tied joint shall not be included in the evaluation.

When the test section is found to be unacceptable, the Contractor shall perform corrective actions and place a second test section. If the second test section is found to be unacceptable, the Contractor shall pave no more than 500 feet per day until an acceptable test section has been achieved.

Once a test section is successfully completed, Dowel Bar Placement testing frequency shall be a minimum of one (1) location per 1,250 linear feet of each continuous lane including climbing lanes, passing lanes, acceleration and deceleration lanes and ramps or at the discretion of the Project Manager. Sections greater than 45 linear feet and less than 1,250 linear feet require a minimum of one (1) test location. Testing locations shall be determined by a random procedure so that each area has a randomly selected transverse joint location. At each location, five (5) consecutive joints shall be tested.

Sections of continuous pavement constructed less than 45 linear feet will not require Dowel Bar Placement Testing.

When any joint score is greater than ten (10) or any one (1) bar in a single joint exceeds the rejection criteria, joints shall be tested in each direction from the rejected joint, until two (2) consecutive joints in each direction are found to be within the rejection criteria.

All Delays or costs associated with dowel bar rejection will not be paid for by the Department.

The Contractor will be responsible for providing the appropriate equipment and qualified personnel to provide the specified tests and reports to the Project Manager. This work will be incidental to concrete pavement.

450.3.5 Finishing

After the concrete has been discharged from the truck, no additional water will be added to the concrete.

The Contractor shall provide a final surface finish that complies with the Project requirements for MRI, measured in accordance with Section 401, “Pavement Smoothness Measurement.”

The Contractor shall correct pavement edge slumping (exclusive of specified edging) in excess of ¼ inch before the concrete hardens. If edge slump exceeds ¼ inch within ten (10) ft, or less, of hardened concrete, replace the entire panel between the transverse and longitudinal joints.

Before the concrete’s initial set, the Contractor shall work the edges and joints with the appropriate tools to produce a well-defined and continuous radius with a smooth and dense mortar finish that is not segregated nor prematurely sealed. The Contractor shall minimize disturbance of the slab surface during finishing operations. It is the Contractor’s responsibility not to over-work the surface of the fresh concrete. Any plastic shrinkage cracks that occur shall be repaired or replaced at the discretion of the Project Manager at no cost in time or money to the Department.

The Contractor shall thoroughly clean the sawed area and, after completion of the sawing process. The Contractor shall seal the joint immediately, if required by the Project Manager.

The Contractor shall give the pavement a final wearing surface by tining or grooving as required in Section 450.3.5.1, “Texturing of PCCP.”

450.3.5.1 Texturing of PCCP

Texturing of PCCP will be longitudinal tining.

When tining, the Contractor shall use a mechanical device such as a wire broom or comb having a single row of tines 1/8 inch +/- 1/64 inch width. The depth of groove in the plastic concrete shall be 1/8 inch +/- 1/16 inch. Tining will be Longitudinal unless otherwise specified in the Contract.

Longitudinal Tining: The tines shall be uniformly spaced at ¾-inch intervals. The Contractor shall use Equipment with horizontal and vertical controls to ensure straight, uniform depth grooves. A two (2) inch to three (3) inch wide strip of pavement surface shall be protected from longitudinal surface grooving for the length of and centered over the longitudinal joints.

Transverse Tining: The tines shall be randomly spaced from 3/8 inch to 1 5/8 inch with no more than 50% of the spacing exceeding one (1) inch. The Contractor shall leave a four (4) inch to six (6) inch wide un-tined strip of pavement surface centered over each transverse joint.

The Contractor shall perform the tining operation at such time and manner that the desired surface texture will be achieved while minimizing displacement of the larger aggregate particles and before the surface permanently sets. Where abutting pavement is to be placed, the texturing shall extend as close to the edge as possible without damaging the edge. If abutting pavement is not to be placed, the six (6) inch area nearest the edge or one (1) foot from the face of the curb shall not be textured. All uniform width slabs of 20 feet or narrower and less than 600 feet in length, as well as mainline and ramp pavement during Equipment breakdowns, may be textured by hand methods.

When diamond grooving is specified or allowed in the Contract Plans, the Contractor shall allow concrete to cure, but no sooner than 48 hours groove the surface of the concrete in accordance with Section 455, "Diamond Grinding and Grooving of Portland Concrete Cement Pavement." Unless otherwise approved by the Project Manager, make grooves as required by the Project Specifications.

The Contractor shall stamp the concrete surface near the right hand edge of the panel at the start and end of paving each Day, indicating the date, month, and year of placement.

The Contractor shall stamp the concrete surface at 500-foot intervals near the right-hand edge of the pavement indicating the Roadway station.

450.3.5.2 Protection of Fresh Concrete

To protect the fresh concrete from unanticipated storm events, the Contractor shall keep enough waterproof sheeting at the placement location to cover the maximum anticipated amount of pavement that can be placed in a three (3) hour period. The Contractor shall reserve this sheeting exclusively to protect the pavement.

450.3.5.3 Surfacing Smoothness Requirements

The Contractor shall test the longitudinal smoothness of the PCCP finished surface in each through traffic lane and passing lane with an approved Profile, in accordance with Section 401, "Pavement Smoothness Measurement."

The Department will exclude the following locations from the Profiler measurement (The Contractor shall evaluate them using a straightedge in accordance with Section 401, "Pavement Smoothness Measurement."):

1. Shoulders, ramps, tapers, holding lanes, turn-outs, Medians, concrete pavement slab removal and replacement Projects, intersections not paved integrally with the mainline, and other non-mainline pavement.

450.3.5.4 Straightedge Measurements

The Contractor shall measure the surface of PCCP not subject to Profiler measurements using an approved ten (10) foot straightedge at both right angles and parallel to the centerline. The Contractor shall correct surface deviations greater than ¼ inch within ten (10) feet.

450.3.6 Curing

For Curing, the Contractor Shall use Method 2 as described in Section 511.3.10.2, “Method 2, Curing Compound” except as amended here.

The Contractor shall apply curing compound in accordance with the Manufacturer’s instructions. If the Manufacturer does not specify when application should begin, the Contractor shall apply the curing compound immediately after finishing and texturing but no later than 30 minutes. The Contractor shall maintain curing compounds in place as specified below until such time as the pavement is to be opened for traffic or until the concrete has reached 3,000 psi compressive strength, whichever occurs first. The Contractor shall not apply the curing compound in rainy conditions.

450.3.6.1 Application of Curing Compound

The Contractor shall thoroughly mix the membrane forming curing compound within an hour of use and agitate it during spraying operations. Before placing the curing compound in the spray tank, the Contractor shall thoroughly agitate it with compressed air, or other approved means, until the pigments in the original container are uniformly suspended. The Contractor shall not dilute or alter the curing compound in any way. The Contractor shall not use a curing compound that exhibits separation, segregation, or skinning.

The Contractor shall apply curing compound to the entire area of the exposed concrete surface with an approved mechanical spray machine. The Contractor shall protect the fog spray from the wind with an adequate shield and apply uniformly until it completely covers the entire surface without gaps or openings in the coverage. The Contractor shall spray the concrete surface uniformly with two (2) coats of approved curing compound at an individual application rate of not more than 180 sq. ft. per gallon. The Contractor shall apply the first coat within ten (10) minutes after completing texturing operations. The Contractor shall apply the second coat within 30 minutes after completing texturing operations. The Contractor shall immediately reapply the curing compound over any control joints that were cut through previously applied coatings of curing compound.

The Contractor shall protect all surfaces covered with curing compound for three (3) Days after application. The Contractor shall re-apply curing compound in areas damaged by subsequent work activities.

The Contractor shall place the curing compound directly into the spray tanks from the manufacturer's original containers bearing the manufacturer's name, brand, and lot number.

If, because of cold temperature, the curing compound becomes too viscous for proper stiffening or application, or if portions of the curing compound have been precipitated from solution, the Contractor shall follow the manufacturer's recommendations to restore proper fluidity and dispersion.

If rain falls on freshly applied curing compound before it has dried enough to resist damage, or if the surface is otherwise damaged, the Contractor shall apply an additional coat of curing compound.

450.3.7—Reserved

450.3.8 Protections from and Opening to Traffic

The Contractor shall protect new pavement against public traffic and operational and employee traffic. The Contractor shall provide personnel to direct traffic. The Contractor shall erect and maintain warning signs, lights, pavement Bridges, or crossovers in accordance with the Contract's traffic control requirements.

The Contractor shall not open to traffic for a least three (3) Calendar Days or until the concrete has reached a compressive strength of 3,000 psi as determined by the Maturity Method, in accordance with Section 510.3.4.2.2, "In-Place Concrete Strength Measurements," unless the Project Manager directs otherwise.

The Contractor shall clean the pavement of loose Materials and debris before opening to traffic.

450.3.9 Test Strip

The Contractor shall construct a test strip a minimum of 0.1 mile, but not more than 0.2 mile in length for each CPPC mix design with a minimum of three (3) Contractor and three (3) agency samples to evaluate the process control, and placement operations. The Contractor shall construct test strip on shoulder, low volume segments of the pavement, or area approved by the Project Manager. The Contractor shall correct and modify non-complying placement operations and produce necessary process control adjustments. The Contractor shall develop a revised placement method if necessary based on the results of the test strip. Production and placement operations prior to approval of the revised placement operations are at the Contractor's risk.

The test strip will be evaluated in conformance in accordance with this Section. If accepted, the test strip will have a pay factor of one (1.0). If rejected, said Material shall be handled in accordance with Table 450.3.10.2.1:1, "Acceptance Limits." The Contractor shall remove unaccepted test strip Material placed within the Roadway Prism at no cost to the Department. If the Contractor disagrees with removing and replacing unacceptable Material placed in test strips outside the Roadway Prism, the Assistant District Engineer for Construction, based on his or her engineering judgment, will decide if the Material can remain in place with a maximum pay factor of 50%, or shall be removed and replaced at no cost to the

Department. If the test strip is rejected, the Contractor shall construct a subsequent test strip. The Contractor shall not proceed to full production until an Accepted test strip is produced.

450.3.10 Sampling and Testing

The Contractor shall sample and test the aggregate production and PCC mixture in accordance with Section 902, “Quality Control;” Section 903, “Quality Assurance;” and Section 906,”Minimum Testing Requirements.” Department personnel may test locations other than the random locations generated for statistical analysis. These tests will not be used for pay factor determination, but may be used to determine Acceptance or rejection of localized Material.

450.3.10.1 Contractor Quality Control

The Contractor shall administer a Quality Control Plan, referred to hereafter as “the Plan” to provide a product in accordance with the Contract. The Contractor shall ensure the Plan conforms to Section 902, "Quality Control." The Contractor shall submit the Plan a minimum of two (2) weeks prior to PCCP pre-placement meeting. No PCCP operations are allowed until the Plan has been approved by the Project Manager and District Lab Supervisor.

The Contractor shall ensure the plan addresses all elements that affect the quality of the Portland cement concrete paving, including but not limited to:

1. Mix designs;
2. Aggregate production;
3. Quality of components;
4. Stockpile management;
5. Batching;
6. Mixing;
7. Transporting;
8. Placing;
9. Vibration and consolidation;
10. Finishing;
11. Joints;
12. Smoothness;
13. Hot/Cold Weather Placement and Curing Plan(s);
14. Curing method;
15. Thickness;
16. Placement phasing;
17. Rumble strips if required; and
18. Non Destructive Testing Methods (including Project calibration process).

The Contractor shall make sure the Plan identifies personnel responsible for sampling and testing of PCCP, and how to contact them at any time. The Contractor shall make sure that qualified sampling and testing personnel perform PCCP sampling and testing in accordance with Section 906, "Minimum Testing Requirements." The Contractor shall provide at least two (2) qualified technicians, as follows:

1. The Process Control Technician (PCT) is responsible for performing inspection, sampling, and testing at the concrete batching facility and at the Contractor’s field

Laboratory. The PCT shall use Laboratory test results and other Quality Control practices to assure the quality of aggregate sources and other mix components, and adjust and control mix proportioning to meet the mix designs. The PCT shall periodically inspect Equipment used in proportioning and mixing to assure its proper operating condition and to assure that the Contractor performs proportioning and mixing in accordance with the mix design and other requirements.

2. The Quality Control Technician (QCT) is responsible for inspection, sampling, and testing at the paving site. The QCT shall assure that the delivered Materials comply with the requirements of the Contract. The QCT shall periodically inspect Equipment used to transport, place, and finish the concrete to assure its proper operating condition, and to assure that the Contractor provides a final constructed product in accordance with the Contract.

The Plan must coordinate and document the activities of the PCT and QCT. This includes the frequencies for each test, the criteria to reject or correct unsatisfactory Materials, and a description of what corrective actions can be taken, and how and when the actions will be initiated.

The Plan will detail the sampling and testing programs, including methods to determine and apply random sampling locations. The Contractor shall perform sampling and testing in accordance with Section 906, “Minimum Testing Requirements.”

450.3.10.2 Department Quality Assurance

The Department will sample and test the Material on a statistically random basis in accordance with Section 903, “Quality Assurance” and Section 906, “Minimum Testing Requirements.”

450.3.10.2.1 Acceptance

The Department will evaluate and Accept Materials using Contractor and Department test data in accordance with Section 904, “Quality Level Analysis” and Section 906, ”Minimum Testing Requirements.”

In addition to as indicated above, the thickness of the plastic concrete shall be determined by the Contractor by taking stab depth measurements during paving at intervals not greater than 100 feet intervals. The recorded depth shall be the average of three (3) depths taken per location and the three (3) locations shall be within 18 inches of one another. The Contactor shall stab and measure at the lane lines. When the edge of the concrete being placed falls at a lane line; the measurement shall be offset two (2) ft from that line. The Contractor shall keep a log (date, before or behind paver, depth station and offset) of these measurements and provide the NMDOT a copy ever week, unless otherwise requested.

Table 450.3.10.2.1:1
Acceptance Limits

Characteristic	**Specification limits, from TV**
Entrained air (from the appropriate Freeze/Thaw Risk Zone)	± 1.5%
*Target Compressive Strength (From approved mix design)	± 1,000 psi
Thickness (From Project Specifications)	+ 1 inch/-1/4 inch
Unless otherwise provided in the Contract, target values for Acceptance shall be as follows:	

Table 450.3.10.2.1:1
Acceptance Limits

Entrained air	Target Air Content for the Freeze/Thaw Risk Zone in which the Project is located
Compressive strength	Target strength from mix design
Thickness	Nominal plan thickness +1 inch/-1/4 inch
*Target Compressive Strength will be the average compressive strength of the first thirty (30) tests from the Contractor's QLA testing program. If the Contractor's data does not validate with the departments data, the Target Compressive Strength will be the average of the first ten (10) Department tests.	

450.3.10.3 Independent Assurance Testing

The Department will perform Independent Assurance sampling and testing in accordance with Section 906, "Minimum Testing Requirements."

450.4 METHOD OF MEASUREMENT

The Department will only pay for the average thickness of pavement in accordance with the Plans.

The Department considers dowels, tie bars, joint Materials, and required coring, including the filling of core holes with concrete, Incidental to the Work in accordance with section 450, "Portland Cement Concrete Pavement ."

The quantities for PCCP will be measured in square yards (Sq Yd) completed and Accepted. The width for measurement will be the width of the pavement shown on the typical cross section of the Plans, including additional widening where called for, or as otherwise directed by the Project Manager in writing. The length will be measured horizontally along the centerline of each roadway and ramp.

450.5 BASIS OF PAYMENT

The Department will adjust the PCCP unit bid price in accordance with Section 904, "Quality Level Analysis." The Department will pay for PCCP on a lot-by-lot basis at a price determined by multiplying the unit bid price by the composite pay factor. The Department will use Table 450.5:1, "Composite Pay Factor," to calculate the composite pay factor. Composite Pay factors greater than one (1.0) will be paid for as one (1.0).

Table 450.5:1
Composite Pay Factors

Measured characteristic	Factor "f"
Entrained air	25
Compressive strength	25
Thickness	25
Dowel bar tolerances	25

Pay Item	**Pay Unit**
Concrete Pavement	Square Yard

450.5.1 Work Included in Payment

The Department will consider as included in the payment for pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Dowels, tie bars, and joint Materials.
2. Mixing, hauling, placement, jointing, texturing, finishing, and curing of concrete pavement.
3. Quality Control in accordance with Section 902, “Quality Control.”
4. Required coring and filling core holes with concrete.
5. Providing Mix Design in accordance with Section 509, “Portland Cement Concrete Mix Designs.”

SECTION 451: PORTLAND CEMENT CONCRETE PAVEMENT (PCCP) (Non-QLA)

451.1 DESCRIPTION

See Section 450.1, “Description.”

451.2 MATERIALS

See Section 450.2, “Materials.”

451.3 CONSTRUCTION REQUIREMENTS

451.3.1 Proportioning

See Section 450.3.1, “Proportioning.”

451.3.2 Equipment

See Section 450.3.2, “Equipment.”

451.3.3 Operations

See Section 450.3.3, “Operations.”

451.3.4 Joints

See Section 450.3.4, “Joints.”

451.3.5 Finishing

See Section 450.3.5, “Finishing.”

451.3.6 Curing

See Section 450.3.6, “Curing.”

451.3.7 Grooving of PCCP

See Section 450.3.5.1, “Texturing of PCCP.”

451.3.8 Protection from, and Opening to, Traffic

See Section 450.3.8, “Protection from, and Opening to, Traffic.”

451.3.9 Sampling and Testing

451.3.9.1 Contractor Quality Control

451.3.9.2 Department Quality Assurance

451.3.9.2.1 Acceptance

The Department will Accept the finished pavement, with respect to strength, in accordance with Section 510.3.4.3, “Concrete Sampling and Testing.” The Department will Accept the finished pavement, with respect to thickness, based on test areas less than

2,400 yd2 in size, randomly selected by the Project Manager. The Department will make thickness determinations either using cores located in a random pattern with at least two (2) cores in each test area or by drilling holes greater than ½ inch diameter completely through the PCCP and determining the thickness from the drilled hole. Core holes shall be filled with self-leveling sealant Material as specified in Section 452, “Sealing and Resealing Concrete Pavement Joints” including round closed-cell bondbreaker as described in Section 452.2.3, “Bondbreaker.” These repairs shall be considered Incidental. The Contractor shall complete all corrective Work in accordance with Section 450.3.5.2, “Surfacing Smoothness Requirements,” before the Department determines pavement thickness.

The Department will Accept test areas when an average of the measurements is not less than 1/4 inch from the required thickness, and when any measurement is not less than 3/4 inch from the required thickness.

451.3.9.3 Independent Assurance Testing

The Department will perform Independent Assurance sampling and testing in accordance with Section 906, “Minimum Testing Requirements.”

451.4 METHOD OF MEASUREMENT

The Department will measure concrete pavement using the dimensions shown in the Contract or approved modifications.

451.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Concrete Pavement __ *inch*	Square Yard

The Department will only pay for the average thickness of pavement in accordance with the Plans.

The Department considers dowels, tie bars, joint Materials, and required coring, including filling the core holes with concrete, Incidental to the Work in accordance with Section 452, “Sealing and Resealing Concrete Pavement Joints.”

451.5.1 Price Adjustments

451.5.1.1 Thickness

The Department will apply price adjustment for concrete pavement with deficient thickness based on a structural engineering analysis conducted by the Department that will determine the percent loss of traffic carrying ability based on the original design ESAL.

451.5.1.2 Strength

See Section 510.3.5.5, “Price Adjustments.”

451.5.1.3 Final Adjustment in Bid Item Unit Price per Lot

When test results allow price adjustments, the resultant adjustment will be cumulative.

451.5.2 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Dowels, tie bars, and joint Materials;
2. Mixing, hauling, placement, jointing, texturing, finishing, and curing of concrete pavement;
3. Required coring and filling core holes with concrete; and
4. Providing Mix Design in accordance with Section 509, “Portland Cement Concrete Mix Designs.”

SECTION 452: SEALING AND RESEALING CONCRETE PAVEMENT JOINTS

452.1 DESCRIPTION

This Work consists of cleaning, priming, and sealing concrete pavement joints. This Work also consists of removing joint sealant, sawing, cleaning, priming, and resealing joints.

The Contractor shall seal only joints between adjacent portland cement concrete surfaces. The Contractor shall seal joints between PCCP and asphalt pavement in accordance with Section 411, "Hot-Poured Crack Sealant," unless otherwise shown on the Plans.

452.2 MATERIALS

452.2.1 Sealant

Joint sealant Material will either be a Type NS or SL single component silicone formulation meeting the requirements of ASTM D 5893 or a single component low modulus polyurethane formulation meeting the requirements of ASTM C 920 and Table 452.2.2:1, "Polyurethane Sealant Physical Requirements."

The Contractor shall provide a qualified manufacturer's representative on the Project for at least the first Day of sealant application. The Contractor shall prepare and seal the joints in accordance with proper procedures approved by the manufacturer's representative.

The Contractor shall obtain the manufacturer's written verification of primer, backer, and sealant compatibility.

452.2.2 Certification

For each lot of sealant applied to concrete pavement joints, the Contractor shall provide certified test results in accordance with ASTM D 5893 or ASTM C 920 and Table 452.2.2:1, "Polyurethane Sealant Physical Requirements," except as otherwise provided in the Contract.

The Contractor shall provide sealant test results and verification that the product is currently within the manufacturer's recommended shelf life to the Project Manager at least ten (10) Days before sealant installation. Certification will show areas of primer use.

Table 452.2.2:1
Polyurethane Sealant Physical Requirements

Property	Test Method	Requirement
Tensile Stress, 150% Elongation, 21 Day cure @ 77oF and 45 – 55% R.H., psi	ASTM D 412 Die C	150 - 200
Tack-Free Time, h, maximum	ASTM C 679	2 - 6
Adhesion & Cohesion under cyclic movement	ASTM C 719	Pass
Artificial Weathering	ASTM C 793	Pass
Weight (mass) Loss, %, maximum	ASTM C 792	10
Ozone and U.V. Resistance	ASTM C 793	Note 1
Movement Capability and Adhesion	Note 2	

Note 1: The sealant shall show no chalking, cracking, or bond loss after 250 hours.

Note 2: The sealant shall show no adhesive or cohesive failure after ten (10) cycles of ± 50%

Table 452.2.2:1
Polyurethane Sealant Physical Requirements

of joint width with the rate of extension or compression being no greater than 1/8 inch per hour.

452.2.3 Bondbreaker

The bondbreaker is a round closed cell, nonabsorbent Material compatible with the sealant Material, that is at least 1/8 inch larger in diameter than the width of the joint being sealed. If primer is required, the Contractor shall ensure that no adverse reaction occurs between the bondbreaker and sealant or primer.

452.3 CONSTRUCTION REQUIREMENTS

452.3.1 General

The Contractor shall repair damage to the pavement surface, at no additional cost to the Department. The Contractor shall perform these repairs to the concrete surfaces before beginning sealing operations, as directed by the Project Manager.

The Contractor shall dispose of old sealant Materials in accordance with Section 107, "Legal Relations, Environmental Requirements, and Responsibility to Public."

452.3.2 Temperature and Weather Limitations

The Contractor shall perform joint sealing or resealing only under the following conditions:

1. The air and pavement temperatures are 40 °F or higher;
2. The pavement temperature is above the dew point;
3. The pavement and joint faces are dry and frost free; and
4. Weather conditions are dry.

452.3.3 Resealing Operations

The Contractor shall saw the transverse and longitudinal joints to the specified width, depth, and configuration.

452.3.4 Joint Preparation

The Contractor shall use a router to follow the path of random cracks and widen the top of the crack to the required section.

The Contractor shall sandblast joints and clean with compressed air.

The Contractor shall provide a one (1) inch wide border of clean, dry, newly exposed concrete before applying the bondbreaker and sealant at the joint and adjacent pavement.

The Contractor shall use cleaning wands that provide compressed air with at least 100 psi of pressure at the outlet nozzle. The Contractor shall ensure that the compressed air is free of oil and moisture.

452.3.5 Sealant Application

The Contractor shall apply the sealant according to the manufacturer's recommendations, unless otherwise specified and approved by the Project Manager. The Contractor shall obtain Project Manager approval of the manufacturer's sealant application instructions before beginning Work.

The Contractor shall place the bondbreaker to maintain the specified depth of the sealant Material.

The Contractor shall provide a finished joint seal surface that is concave and 1/4 inch ± 1/8 inch below the surface of the concrete pavement.

The Project Manager will cease operations if the Contractor seals joints inconsistently. The Contractor shall correct inconsistencies in joint sealing operations and remove and replace non-conforming sealant at no additional cost to the Department.

452.4 METHOD OF MEASUREMENT

Sealing concrete pavement joints and resealing concrete pavement joints will be measured by the linear foot.

452.5 BASIS OF PAYMENT

Pay Item	**Pay Unit**
Sealing Concrete Pavement Joints	Linear Foot
Resealing Concrete Pavement Joints	Linear Foot

452.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Cleaning, priming, and sealing concrete pavement joints;
2. Removing joint sealant, sawing, cleaning, priming, and resealing joints; and
3. Provide sealant Material.

SECTION 454: CRACKING AND SEATING CONCRETE PAVEMENT

454.1 DESCRIPTION

This Work consists of cracking and seating existing portland cement concrete pavement.

454.2 MATERIALS—Reserved

454.3 CONSTRUCTION REQUIREMENTS

454.3.1 Equipment

The Contractor shall use impact hammers capable of cracking the pavement's full depth. The Contractor shall equip the breaker with a plate-type shoe or use one designed to prevent penetration, spalling, and shattering of the existing surface, the Contractor shall use other Equipment approved by the Project Manager. The Contractor shall not use a headache, drop ball, or whip hammer.

If required, the Contractor shall provide a screen to protect vehicles in the adjacent lane from flying chips during the cracking process.

The Contractor shall use pneumatic tire rollers that weigh a minimum of 50 ton.

454.3.2 Cracking Operations

Before cracking the concrete, the Contractor shall remove existing asphalt patches. Before cracking, the Project Manager will designate test sections. The Contractor shall crack the test sections using varying energy and striking patterns to establish an optimum pattern for cracking the pavement. The Contractor shall wet the pavement surface test section to determine the extent and pattern of cracking.

The Contractor shall use the established pattern to crack the pavement on the remainder of the Project, provided the cracked pavement continues to meet the specified size requirements. The Contractor shall adjust the energy and striking pattern as directed by the Project Manager. The Contractor shall wet pavement surfaces at least once an hour to determine the extent and pattern of cracking.

The Contractor shall crack the existing concrete pavement so that the dimensions of the majority of pieces of pavement are from 18 inches to 24 inches, with a maximum dimension of 30 inches. The Contractor shall ensure that 80% of pavement pieces are smaller than 24 inch. The Project Manager will determine the adequacy of pavement breakage.

The Contractor shall perform cracking one (1) lane at a time with an impact hammer.

The Contractor shall prevent damage to underground utilities, drainage facilities, Bridge approach slabs, and Bridge decks. The Contractor shall repair damage at no additional cost to the Department.

454.3.3 Seating Operations

After cracking the concrete pavement, the Contractor shall clean the surface of loose and spalled concrete and foreign Material.

The Contractor shall roll the cracked concrete with a pneumatic tire roller within 24 h before overlaying with HMA until it is well seated and thoroughly and uniformly compacted.

The Contractor shall crack slab sections (that do not seat well under the roller) into smaller sections and roll them again. The Project Manager will determine when the pavement is properly cracked and seated.

The Department will allow traffic on the cracked pavement before overlaying. When routing traffic over the cracked pavement, the Contractor shall ensure the pavement's condition is satisfactory to carry the traffic.

454.4 METHOD OF MEASUREMENT

Cracking and seating concrete pavement will be measured by the square yard.

454.5 BASIS OF PAYMENT

Pay Item	**Pay Unit**
Cracking and Seating Concrete Pavement	Square Yard

454.5.1 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Cracking concrete pavement full depth;
2. Remove existing asphalt patches;
3. Clean cracked concrete surface of loose debris; and
4. Roll cracked concrete pavement.

SECTION 455: DIAMOND-GRINDING AND DIAMOND-GROOVING OF PORTLAND CEMENT CONCRETE PAVEMENT (PCCP)

455.1 DESCRIPTION

This Work consists of diamond-grinding and/or diamond-grooving PCCP, and includes the removal of slurry and residue resulting from the Work.

Diamond grinding is a pavement preservation technique that corrects a variety of surface imperfections on both concrete and asphalt pavements. The diamond blades used for grinding are composed of industrial diamonds and metallurgical powder.

455.2 MATERIALS—Reserved

455.3 CONSTRUCTION REQUIREMENTS

455.3.1 Equipment

The Contractor shall use power-driven, self-propelled machines equipped with diamond blades specifically designed to grind, groove, and texture PCCP. The Contractor shall ensure the grinder has a depth control device to detect variations in the concrete surface and adjust the cutting head height to maintain the depth of the specified groove. The Contractor shall equip the diamond grinding machine with alignment control devices.

The Contractor shall ensure the Equipment grinds and grooves the pavement surface to the specified smoothness tolerances and textures, without causing excessive raveling of the joints or cracking or fracturing of the aggregates.

455.3.2 Diamond Grinding and Grooving Operations

The Contractor shall begin and end longitudinal diamond grinding and grooving at lines normal to the pavement centerline, unless otherwise specified in the Contract.

The Contractor shall grind designated areas until the pavement surfaces on both sides of transverse joints and cracks are on the same plane. The Contractor shall ensure that diamond grinding produces a uniform finished surface, eliminates joint or crack faults, and provides positive lateral surface drainage by maintaining a constant cross-slope within the diamond grinding limits of each lane.

The Contractor shall grind auxiliary or ramp lane transitions from the mainline edge to provide positive drainage and an Acceptable riding surface.

The Contractor shall make grooving patterns in accordance with Section 512.3.10.3, “Grooving of Hardened Concrete,” unless otherwise specified in the Contract.

455.3.3 Slurry Removal

The Contractor shall continuously remove the slurry from the Work.

The Contractor shall not allow the slurry to flow across lanes open to traffic or into gutters or other drainage facilities.

455.3.4 Final Surface Finish

The Contractor shall produce a pavement surface in accordance with Section 450.3.5.3, “Surfacing Smoothness Requirements.”

The Contractor shall ensure the texture has parallel longitudinal corrugations that present a narrow ridge corduroy-type appearance. The Contractor shall make the peaks and grooves approximately 0.08 inch apart in elevation. The Contractor shall make the grooves from 0.08 inch to 0.16 inch wide, and the peaks from 0.08 inch to 0.12 inch wide. The Contractor shall determine the appropriate number of grooves per yard to produce the specified surface requirements.

455.3.5 Acceptance

The Contractor shall inspect transverse joints and random cracks to ensure that adjacent surfaces are in the same plane. The Contractor shall regrind as directed by the Project Manager, at no additional cost to the Department.

455.4 METHOD OF MEASUREMENT

The Department will measure the Diamond Grinding and Diamond Grooving of Portland Cement Concrete Pavement actually ground or grooved on the top width and length of the pavement if paid by the unit. If no Bid Item exists for Diamond Grinding and Diamond Grooving of Portland Cement Concrete Pavement, payment will be Incidental to Section 450, “Portland Cement Concrete Pavement (QLA)” or Section 451, “Portland Cement Concrete Pavement,” as applicable.

455.5 BASIS OF PAYMENT

Pay Item	**Pay Unit**
Diamond Grinding of PCCP	Square Yard
Diamond Grooving of PCCP	Square Yard

SECTION 603: TEMPORARY EROSION AND SEDIMENT CONTROL

603.1 DESCRIPTION

This Work consists of preparing a Storm Water Pollution Prevention Plan (SWPPP), and constructing, inspecting, and maintaining erosion, sediment control, and storm water pollution prevention facilities for the discharge of storm water associated with construction activity. This Work includes construction phase activities through final stabilization.

The Contractor shall comply with requirements of Section 603, "Temporary Erosion and Sediment Control," and the requirements of NPDES, and if performing Work along or adjacent to live streams, the Contractor shall do so in accordance with the Federal Clean Water Act (33 USC 1251 et seq.), the regulations and requirements of other authorities with jurisdiction.

603.1.1 Storm Water Pollution Prevention Plan

The Storm Water Pollution Prevention Plan (SWPPP) must satisfy the requirements of the current Construction General Permit, applicable EPA municipal separate storm sewer system (MS-4 Permit) and must contain the following sections, forms, and information sheet:

SWPPP REQUIRED SECTIONS

1. Storm Water Team;
2. Nature of Construction Activities;
3. Emergency Related Projects (if applicable);
4. Identification of Other Site Operators;
5. Sequence and Estimated Dates of Construction Activities;
6. Site Map;
7. Construction Site Pollutants;
8. Non-Storm Water Discharges;
9. Buffer Documentation;
10. Temporary Erosion and Sediment Control Plan and Description of Storm Water Control Measures (Construction Phase & Final Stabilization);
11. Pollution Prevention Procedures;
12. Procedures for Inspection, Maintenance, and Corrective Action;
13. Staff Training;
14. Documentation of Compliance and Other Federal Requirements;
15. SWPPP Certification; and
16. Post-Authorization Additions to the SWPPP.

SWPPP REQUIRED FORMS

1. Notice of Intent (NOI);
2. Storm Water Program;
3. Storm Water Management;
4. NPDES *General Construction Storm Water Permit Checklist*; and
5. Contractor Certification for NPDES *General Permit for Storm Water Discharges from Construction Sites*.

An information sheet provided by the NMDOT provides the following:

1. A site description;
2. NOI inputs;
3. Drainage parameters;
4. Runoff, discharge, and volume calculations; and
5. General notes.

The information sheet is included in the Plans. For more information on SWPPP, see Section 603.1.1.2, "Department Responsibilities." The NPDES Construction General Permit, issued by the EPA, requires a SWPPP and submittal of the NOI for construction Projects with one (1) acre or more of earth disturbance as defined in the NPDES Construction General Permit.

603.1.1.1 Final Erosion and Sediment Control Plan

The Final Stabilization Temporary Erosion and Sediment Control Plan (TESCP) prepared by the Department depicts the location, type, and length of temporary erosion control measures, off-site flows, discharge locations, and flow paths within the Right of Way on plan sheets at final placement prior to seeding operations. For more details on the Final Stabilization TESCP, see Section 603.1.1.2, "Department Responsibilities."

The Construction Phase Temporary Erosion and Sediment Control Plan (TESCP) prepared by the Contractor depicts the location, type, and length of temporary erosion control measures, off-site flows, discharge locations, and flow paths within the Work area of the Right of Way on construction phasing plan sheets. For more details on the Construction Phasing TESCP, see Section 603.1.1.3, "Contractor Responsibilities."

603.1.1.2 Department Responsibilities

The Department will prepare and include in the Plans a Final Stabilization TESCP, a Re-vegetation/Erosion Control Plan, and a SWPPP information sheet. The Final Stabilization TESCP sheets will include the following:

1. Site maps;
2. Drainage patterns;
3. Discharge locations;
4. Approximate slopes;
5. Areas of soil disturbance;
6. Major controls locations;
7. Structural practices;
8. Surface waters (including wetlands);
9. Conditions before and after construction;
10. Right of Way lines;
11. Easements;
12. Existing and new Structures;
13. Existing and proposed Roadway grades; and
14. Detours outside of the Right of Way.

The Re-vegetation/Erosion Control Plan sheet will provide a description and timing of final stabilization practices.

The SWPPP information sheet will include the following information:

1. Nature of the activity;
2. Total site area;
3. Total disturbed area;
4. Runoff coefficient for pre/post construction;
5. Receiving waters;
6. Latitude and longitude of the site;
7. Estimate of likelihood of discharge;
8. Endangered species or critical habitat;
9. Part 3 of the NPDES General Permit, Water Quality-Based Effluent Limitations;
10. Basic drainage and site information required for SWPPP development;
11. MS4 areas; and
12. 303d impaired list.

603.1.1.3 Contractor Responsibilities

Before disturbing any soil, the Contractor shall prepare and submit to the Project Manager a Contractor developed SWPPP based on the planned construction phasing and schedule. The Contractor shall prepare amendments to the SWPPP as Work progresses or as phasing or scheduling changes are made. Specifically, the Contractor shall prepare a Construction Phase TESCP stamped by a Professional Engineer for each construction phase, complying with provisions of the NPDES Construction General Permit, and include at least the following items or activities:

1. Develop the SWPPP using a combination of structural, non-structural, and vegetative best management practices (BMPs) appropriate for the identified location to control erosion and sedimentation and manage storm water during construction activities;
2. Include proposed methods for minimizing or eliminating pollution of streams, lakes, reservoirs, canals, and other water impoundments from storm water discharge associated with construction activities;
3. Do not start earth—disturbing activities until the Contractor developed SWPPP has been submitted and the NOI is active;
4. Refer to the recommendations in the current version of the Department's National Pollutant Discharge Elimination System Manual: Storm Water Management Guidelines for Construction and Industrial Activities;
5. Provide a signed, certified statement that states the terms and conditions of the NPDES General Permit are fully understood. Include a statement of intent to fully implement the SWPPP as proposed or modified at the pre-construction meeting in the certification; and
6. Maintain the SWPPP in accordance with the NPDES Construction General Permit until final grading, erosion control, and seeding operation completion.

603.1.2 Retention of Records

The Contractor shall retain and maintain SWPPP changes as required by the NPDES General Permit. The Contractor shall include copies of the permit language and inspection and maintenance reports in the SWPPP. The Contractor shall prepare inspection and maintenance reports from commencement of earthwork activities to Project completion. The Contractor shall deliver the SWPPP to the Project Manager at Project completion. The

Contractor shall ensure that these records are available to the public at all times.

603.1.3 Notice of Intent (NOI)

The Contractor shall provide a copy of the electronic NOI (eNOI) to the Project Manager that meets the NPDES General Permit requirements for discharge of storm water associated with construction activities.

The Department and the Contractor will prepare and submit separate eNOIs to the EPA, designating the status of owner/operator. The Contractor shall not begin earth-disturbing activities until the eNOIs are listed on the EPA website as “active.” The EPA will post eNOI approvals on their website. The Contractor shall submit a copy of the Contractor’s eNOI to the Project Manager.

603.1.4 Notice to Termination (NOT)

The Contractor shall prepare and submit a NOT to the EPA within 30 Days after Project completion, indicating that the operator of the Project has changed to the NMDOT. The Contractor shall provide a copy of the submittal to the Project Manager.

603.1.5 Off-Site Pollution Prevention Plan

The Contractor shall prepare and submit a SWPPP, eNOI, and NOT, if required, to appropriate agencies for Work performed outside the Project Right of Way. The Contractor is responsible for all associated NPDES requirements for the off-site locations. The Contractor shall comply with NPDES requirements for off-site locations. The Contractor shall provide a copy of each off-site submittal to the Project Manager.

603.1.6 Liquidated Damages

Failure to comply with the NPDES program may result in EPA citations.

If the Contractor does any of the following, the Department will assess liquidated damages in accordance with Table 603.1.6:1, “Liquidated Damages Schedule:”

1. Fails to maintain temporary erosion control measures in accordance with Section 603.3.6, “Erosion Control Inspection and Maintenance;”
2. Fails to document inspection and maintenance activities (as required by the General Permit); or
3. Fails to document, in a Corrective Action Report (as required by the General Permit), field changes of erosion control measures as directed in writing by the Project Manager.

Table 603.1.6:1
Schedule of Liquidated Damages

Total Original Contract Amount ($)	Charge ($) per Day
≤2,000,000	500
>2,000,000–5,000,000	1,000
>5,000,000–10,000,000	1,500
>10,000,000	2,000

The Project Manager will keep a schedule of noncompliance that the Department will use to calculate liquidated damages. The Department will assess liquidated damages until the

Project Manager issues a written notice of compliance to the Contractor.

If the Contractor's failure to adhere to the NPDES General Permit requirements results in a fine assessed against the Department, the Contractor shall reimburse the Department within ten (10) Days of the assessment. If the Contractor does not reimburse the Department within the ten (10) Days, the Department may pay the fine assessed and withhold the fine amount from the Contractor's next partial payment.

603.2 MATERIALS

603.2.1 General

The Contractor shall provide Materials for erosion, sediment control, and storm water pollution prevention measures that consist of siltation fences, socks, rock, riprap, soil retention blankets, or other Acceptable measures approved by the Project Manager.

603.2.2 Slope Drains

The Contractor shall provide Materials for slope drains that consist of pipe, flexible pipe, and riprap. The Project Manager may approve the use of other Materials.

603.2.2.1 Pipe

See Section 570, "Pipe Culverts" for approved types of pipe.

603.2.3 Geotextiles

603.2.3.1 Drainage Geotextiles

The Contractor shall provide drainage geotextiles (Class B drainage applications) for silt fence in accordance with Section 604, "Soil and Drainage Geotextiles," unless otherwise specified in the Contract.

603.2.3.2 Soil Retention Blanket

The Contractor shall provide a soil retention blanket from the Department's *Approved Products List,* or as specified in the Contract and approved by the Project Manager.

603.2.4 Riprap

The Contractor shall provide riprap and rock plating in accordance with Section 602, "Slope and Erosion Protection Structures."

603.2.5 Temporary Soil Stabilant

The Contractor shall provide a temporary soil stabilant from the Department's *Approved Products List,* or as specified in the Contract and approved by the Project Manager.

The Contractor shall ensure that the soil stabilant contains an anti-foaming agent and color additive to assist in its uniform application and disappears from the surface within 36 hours after application.

603.2.6 Composted Mulch Socks

The Contractor shall core Material (Composted Mulch): See Section 632, "Revegetation" for composted mulch Specifications. The core Material shall be 100% composted mulch as per Section 632, "Revegetation."

Containment Mesh: The Contractor shall furnish containment mesh 100% biodegradable, photodegradable such as burlap, twine, UV photodegradable plastic, polyester, or other Acceptable Material as directed by the Project Manager.

The mesh should not exceed 3/8 inch in diameter.

The Contractor shall furnish biodegradable or photodegradable containment mesh when the socks will remain in place as part of the permanent or temporary vegetative Plan. The containment mesh shall be greater than nine (9) inches in height after being packed. The containment mesh shall be densely packed so that the socks do not deform.

603.3 CONSTRUCTION REQUIREMENTS

603.3.1 General

The Contractor shall apply appropriate erosion and sediment control measures for construction activities per the Accepted Contractor developed SWPPP.

The Contractor shall install temporary erosion and sediment control features and maintain until final grading, erosion control, and seeding operations completion.

The Contractor shall incorporate permanent erosion and sediment control measures, such as riprap pads or other forms of energy dissipaters at the outlets of Structures, into the Project at the earliest practical time, as directed by the Project Manager.

603.3.2 Contractor's Operations

The Contractor shall keep construction activity to a minimum within the Project Right of Way, adjacent to the Project, to prevent damage to vegetation. The Contractor shall repair damage or disturbance to areas, not necessary for construction of the Project, at no additional cost to the Department.

The Contractor shall keep construction areas in an orderly condition and promptly dispose of refuse and discarded Materials.

As directed by the Project Manager, the Contractor shall provide erosion and sediment control measures necessary to correct negligent or improper installation, at no additional cost to the Department.

603.3.2.1 Sequence of Operations

Before Work begins, the Project Manager and the Contractor will conduct a site inspection to review the planned erosion control protections. The Contractor shall use the Contractor developed SWPPP for this review.

The Contractor shall coordinate the placement and maintenance of the temporary and permanent erosion and sediment control measures shown in the Contractor developed SWPPP.

The Department will assess liquidated damages, in accordance with Section 603.1.6, "Liquidated Damages," if the Contractor begins earth-disturbing Work before the following:

1. Submission of the eNOI and obtaining notification of permit coverage; or
2. Placing erosion control measures.

603.3.2.2 Watercourse Protection

The Contractor shall provide filtration or settling basins to treat water used to wash aggregate or water used for similar operations.

The Contractor shall locate and construct waste disposal areas and haul Roads to prevent sediment from entering streams and water impoundment areas, or leaving the Project.

The Contractor shall not operate mechanized Equipment in perennial streams, unless otherwise specified in the Contract.

The Contractor shall use temporary Bridges or other crossing Structures constructed of non-erodible Material, where frequent stream crossings are necessary.

The Contractor shall clear false Work, piling, debris, and other obstructions placed during construction from streambeds, arroyos, and watercourses as soon as possible. The Contractor shall not allow waste from haul truck cleaning to drain into watercourses.

The Contractor shall provide the necessary buffer protection for adjacent surface waters as required by the General Permit.

603.3.3 Temporary Soil Stabilant Application

The Contractor shall apply temporary soil stabilant to exposed areas not being worked. The Contractor shall begin stabilization within one (1) Work Day after Work ceases, unless construction resumes within 14 Days after Work ceases.

The Contractor shall follow the manufacturer's recommendations for storage and application of the soil stabilant. The Contractor shall maintain the rate of application recommended by the manufacturer. If the soil stabilant does not produce the required results; the Project Manager and the Department's Landscape Architect may modify the manufacturer's application rate.

The Contractor shall reapply stabilant to areas of continued erosion and Contractor activity within four (4) weeks after the initial application at no additional cost to the Department, as directed by the Project Manager.

603.3.4 Composted Mulch Socks

The Contractor shall install the socks near the downstream perimeter of the disturbed area as shown on the final SWPPP to intercept sediment from sheet flow or as inlet protection as directed by the Project Manager. Close contact between the earth and sock should be maintained by removing remaining vegetation, rocks, debris, and dirt clods. The socks will be interlocked or overlapped at the ends.

Anchoring should be adequate to prevent displacement during design rain events and to prevent flow under the socks. The anchors will be two (2) inch by two (2) inch wooden stakes, APL product, or as approved by the Project Manager. Wooden stakes shall be placed at ten (10) ft maximum spacing on all flat areas and four (4) ft maximum spacing on slopes to prevent the sock from sagging. Stakes shall be driven in the ground 12 inches' with four (4) inches extending out of sock.

603.3.5 Earthwork Operations

The Contractor shall protect slopes as excavation or Embankment construction progresses.

The Contractor shall maintain and protect the earthwork in Roadway sections through all construction stages to prevent sediment from leaving the construction limits.

The Contractor shall provide temporary slope drain facilities that can collect runoff and carry it to the slope bottoms. The Contractor shall use drain Materials capable of length change as earthwork operations progress.

603.3.6 SWPPP Inspection and Maintenance

The Contractor shall inspect and maintain the Project site for NPDES compliance during the Project. The Contractor shall inspect and maintain installations at the following frequencies, per the General Permit:

1. At least once every seven (7) Calendar Days; or
2. Once every 14 Calendar Days and within 24 hours of a 0.25 inch or greater rainfall event; or
3. For Arid, Semi-Arid, or Drought-Stricken Areas. The Contractor may reduce the frequency of inspections to once per month and within 24 hours of the occurrence of a storm event of 0.25 inches or greater if your site is located in an arid, semi-arid, or drought-stricken area, as these terms are defined in Appendix A of the Construction General Permit, and construction is occurring during the seasonally dry period or during a period in which drought is predicted to occur. The Contractor must document that they are using this reduced schedule and the beginning and ending dates of the seasonally dry period in the SWPPP.

Maintenance Work includes, but is not limited to, repair of damaged installations, removal of trapped sediment, and cleaning of any silt fence. The Contractor shall remove accumulated silt when the control installation becomes 50% filled. The Contractor shall inspect disturbed areas, Material storage areas, discharge locations, and structural control measures. The Contractor shall inspect vehicle entrances and exits for Material being tracked off-site. The Contractor shall document each inspection on the *SWPPP Inspection Form* provided by the Department. The Contractor shall submit the inspection report signed by a NPDES-trained and qualified person to the Project Manager within 24 hours after the inspection. The Contractor shall include copies in the Contractor's SWPPP.

The Contractor shall install a rain gauge at the Project site to track rainfall amounts for the inspection schedule.

The Contractor shall designate the person responsible for the SWPPP on the qualification form provided by the Department, and sign. The Contractor shall ensure that the person is familiar with the Project SWPPP and document the responsible person's experience and training on the qualification form. The Contractor shall include it with the SWPPP. The Project Manager will assign a qualified Department representative (with qualification form) experienced and trained in implementing BMPs.

The Contractor shall repair damaged erosion and sediment control installations within three (3) Days of an inspection or following notification by the Project Manager that repairs are required.

If a damaged erosion control installation could result in sediment discharge into a live stream, water impoundment, or other body of water, the Contractor shall initiate repairs within 24 hours or sooner, as necessary or as directed by the Project Manager.

The Contractor shall maintain erosion and sediment control installations specified to remain following completion of the Work until the Project is completed.

The Contractor shall dispose of erosion and sediment control installations in accordance with the Contract or as directed by the Project Manager.

603.3.7 Removal of Control Installations

The Contractor shall remove temporary erosion and sediment control installations and features from the Project area when no longer required, unless otherwise specified in the Contract or directed by the Project Manager. After removing temporary erosion control installations, the Contractor shall restore ground lines, cover, and features as closely as possible to original condition.

Removed sediment may be deposited at locations within the Right of Way, if approved by the Project Manager. Where removed sediment is deposited in previously undisturbed areas, the Contractor shall reseed those areas at no additional cost to the Department.

603.4 METHOD OF MEASUREMENT

The Department will measure check dams along the crest of the dam.

603.4.1 SWPPP Plan Preparation and Maintenance

The Department will reimburse the cost to prepare the SWPPP, prepare and install all BMPs for the Construction Phase TESCP, and maintain the Construction Phase TESCP BMPs under pay item SWPPP Plan Preparation and Maintenance.

603.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Silt Fence	Linear Foot
Check Dam Type ____	Linear Foot
Earth Dike	Linear Foot
Pipe Slope Drain	Linear Foot
Sediment Trap	Cubic Yard
Soil Retention Blanket	Square Yard
Temporary Soil Stabilant	Acre
Culvert Protection	Square Yard
Drop Inlet Protection Type ____	Each
SWPPP Plan Preparation and Maintenance	Lump Sum
Composted Mulch Socks	Linear Foot

SWPPP Plan Preparation and Maintenance includes SWPPP preparation, BMPs, installation of BMPs, inspection, and maintenance of erosion and sediment control measures, preparation of inspection reports, updating and/or modifying, maintaining, and retaining the SWPPP and other related records.

SECTION 621: MOBILIZATION

621.1 DESCRIPTION

This Work consists of mobilization, remobilization and demobilization to and from a Project.

621.2 MATERIALS

The Contractor shall provide personnel, Equipment, Materials, and operating supplies to the Project site.

621.3 CONSTRUCTION REQUIREMENTS

Mobilization and demobilization shall consist of obtaining all required insurance, bonds and permits; preparatory Work and operations necessary for the movement of personnel, Equipment, supplies, and Incidentals to and from the Project site; this item shall also include the establishment of offices, buildings, and other facilities necessary for the Project, before beginning Work on the Project. It does not include mobilization and demobilization for specific items of Work for which payment is provided elsewhere in the Contract.

621.4 METHOD OF MEASUREMENT

The Accepted quantities complete in place will be considered for compensation as directed by the Project Manager.

621.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Mobilization	Lump Sum

621.5.1 Work Included in Payment

The Department will pay the Contractor partial payments using the following procedure:

1. When five percent (5%) or more of the Total Original Contract Amount less mobilization is earned, 25 percent of the amount Bid for mobilization will be paid.
2. When ten percent (10%) or more of the Total Original Contract Amount less mobilization is earned, up to 50 percent, less previous amounts paid, of the amount Bid for mobilization will be paid.
3. When 25 percent or more of the Total Original Contract Amount less mobilization is earned, up to 75 percent, less previous amounts paid, of the amount Bid for mobilization will be paid.
4. When 50 percent or more of the Total Original Contract Amount less mobilization is earned, up to 100 percent, less previous amounts paid, of the amount Bid for mobilization will be paid.

The total sum of all Mobilization payments shall not exceed the Original Contract Amount Bid for the item.

The Department will not make additional payments for demobilization and remobilization due to shutdowns, whole or partial suspensions of the Work or for other mobilization activities required for satisfactory completion of the Contract.

SECTION 801: CONSTRUCTION STAKING BY THE CONTRACTOR

801.1 DESCRIPTION

801.1.1 General

This Work consists of construction staking, essential for the control and completion of the Project.

801.1.2 Department-Supplied Documents and Services

The Department will provide the Contractor with survey data sufficient to layout, control, and complete the Project (this data may not be required for some book Projects). Survey data includes, but is not limited to, the following:

1. Location notes;
2. Design grades;
3. Elevations;
4. Slopes;
5. Projected locations of slope stake catch points; and
6. Lines and grades.

The Department will supply the data as printout sheets, field books, electronic pdf files (when available, and at the discretion of the Department), Right of Way maps, or Plans. The Contractor shall locate and verify required data points.

801.1.3 Contractor-Supplied Personnel & Services

The Contractor shall provide qualified personnel who are experienced in Highway construction staking to perform the staking. Per NMSA 61-23-27.13, Surveying Public Work. A New Mexico licensed professional surveyor is required to be in responsible charge of construction staking surveys for the construction of any public Work involving surveying.

The Contractor shall locate and establish control points with the data given in the Plans.

The Contractor shall verify Department-provided survey data, and submit changes or adjustments (including recorded data) to the PM for approval at no cost to the Department.

801.2 MATERIALS—Reserved

801.3 CONSTRUCTION REQUIREMENTS

801.3.1 General

The Contractor shall not disturb, cover, or remove reference marks without providing written documentation of the disturbed, covered, or removed reference mark to the Project Manager for approval. The Contractor shall reference marks include the following:

1. Triangulation stations;
2. Benchmarks;
3. Corner;
4. Monuments;
5. Stake;

6. Witness marks; or
7. Other reference marks located within the construction limits (including the limits of Temporary Construction Permits) or on the Right of Way line of this Project.

The Contractor shall coordinate the reestablishment of removed or destroyed markers with the Department. When directed, the Contractor shall reset destroyed reference markers, at no additional cost to the Department, in accordance with 61-23-28 NMSA, reference marks; removal or obliteration; replacement, and 12.8.2 NMAC, *Minimum Standards for Surveying in New Mexico* and the *Geodetic Mark Preservation Guidebook*, as prepared by the National Geodetic Survey.

The Contractor shall submit notes regarding the referencing of monuments to the Project Manager.

The Department will charge the Contractor $1,000 for each monument the Contractor improperly referenced before disturbing, covering, or removing.

801.3.2 Construction Staking Documentation

The Contractor shall complete construction staking field notes and other documentation in accordance with the Department's current *NMDOT Survey Handbook* and accepted industry methods achieving required accuracy.

The Contractor shall keep field notes in a standard field notebook in a clear, orderly, and neat manner, consistent with professional surveying practices, unless stated otherwise in the Contract.

Construction staking documentation will become the property of the Department when the Work is complete. The Contractor shall provide construction staking documentation to the Project Manager. The Contractor shall submit earthwork quantities, slope staking, surface extracted cross sections, and earthwork calculations to the Project Manager for review before completing that phase of the Work. The Contractor shall ensure a New Mexico licensed professional surveyor or professional Engineer stamps and certifies the quantities and all submittals. The Department will not Accept earthwork quantities until the Project Manager receives all necessary survey data and reviews and approves these quantities.

The Contractor shall submit earthwork quantity information in hard copy using double-end area or prismoidal computations, or using Department-approved computer software.

801.3.3 Control Points

The Contractor shall use the reference control points provided by the Department or set by the Contractor's personnel to establish construction staking points and to layout and control the Work.

The Contractor shall notify the Project Manager of errors and omissions discovered in the control points before beginning affected Work.

The Contractor shall move and re-establish benchmarks, control points, or monuments belonging to agencies of the United States, State, or local governments in accordance with the accepted procedures of the respective agency. If the Project Manager directs the Contractor to perform this Work, the Department will, unless due to Contractor operations or if detailed in the Contract, pay in accordance with Section 104.4, "Extra Work."

The Contractor shall preserve and reference the provided survey control points in such a manner, that their location can be reestablished by the Contractor in cases of weather related disturbances or vandalism.

The Contractor shall perform necessary transformation/calibration utilizing the referenced control points provided by the Department so that all survey Work is in the coordinate system provided by the DOT.

801.3.4 Accuracy Requirements

The Contractor shall meet accuracy requirements dictated by the individual elements of the Work.

801.3.5 Accuracy Verification

The Project Manager will spot check the accuracy of the construction stakes, lines, grades, and layouts but will assume no responsibility for the accuracy or the final result. The Project Manager will inform the Contractor of discrepancies immediately.

801.3.6 Non-Specified Re-staking and Re-establishment of Control

The Contractor shall perform re-staking due to the following conditions, at no additional cost to the Department:

1. Errors or omissions by Contractor personnel, or
2. The Contractor’s negligence.

The Department will review re-staking in accordance with Section 104.2, “Significant Changes in the Character of Work,” Section 104.3, “Differing Site Conditions,” and Section 104.4, “Extra Work” when due to the following conditions:

1. Resulting from errors or omissions by the Department;
2. At the Department’s request, or
3. Circumstances beyond the Contractor's control.

801.3.7 Construction Staking

801.3.7.1 Locations and Elevations

The Contractor shall verify locations and elevations of control points and benchmarks provided; establish as necessary.

801.3.7.2 Centerline

The Contractor shall establish necessary construction centerline Project stationing and reference stakes for use in setting the grade and finishing stakes, and re-establishing the construction centerline. The Contractor shall establish necessary Right of Way centerline Project stationing and reference stakes for use in determining the location of the Right of Way for construction staking purposes, and re-establishing the Right of Way centerline.

801.3.7.3 Slope Stakes, Initial Ground Topographic Survey, and Clearing Stakes

The Contractor shall set slope stakes, and stationing at intervals no greater than 100 ft. The Contractor shall perform initial ground topographic survey before beginning construction.

801.3.7.4 Grade Finishing Stakes

The Contractor shall set grade finishing stakes (blue tops) to establish grade elevations and horizontal alignment at the top of Subgrade, top of Base Course, and top of Subbase. The Contractor shall set the finish stakes at intervals no more than 50 ft. If the Contractor uses automatic grade Equipment, the Contractor shall provide Equipment Specifications that will allow interval adjustments as per manufactures recommendation.

801.3.7.5 Drainage Structures

The Contractor shall survey and plot drainage Structure locations and prepare Structure drawings to verify the accuracy of the Structure sections shown on the Plans. The Contractor shall submit the plotted drainage Structure profiles, along with a revised Structure list, to the Project Manager for review and Acceptance prior to drainage Structure construction.

801.3.7.6 Bridges

The Contractor shall perform all Bridge staking using the vertical and horizontal control points provided by the Department. The Contractor shall stake, plot, and submit a Profile Grade for the Roadway approaches, departures, approach slabs, and Bridges. The Contractor shall identify any necessary adjustments before submitting to the Project Manager.

801.3.7.7 Sign Structures

The Contractor shall stake all new sign locations. The Contractor shall stake and plot locations for extruded and overhead sign Structures. The Contractor shall submit the plotted profile to the Project Manager for Acceptance before submitting shop drawings for extruded and overhead sign Structures, and before ordering the Materials.

801.3.7.8 Slope Stake Changes

The Contractor shall perform routine slope stake changes as needed to blend slopes into the existing terrain as approved by the Project Manager.

The Contractor shall perform slope stake changes required to blend slopes into the existing terrain as approved by the Project Manager for additional Work as defined per Section 104.2, “Significant Changes in the Character of Work,” Section 104.3, “Differing Site Conditions,” and Section 104.4, “Extra Work.”

801.3.7.9 Curbs and Gutters

The Contractor shall perform staking using vertical and horizontal control points provided by the Department.

801.3.7.10 Miscellaneous Staking

The Contractor shall perform miscellaneous staking using vertical and horizontal control points provided by the Department. Miscellaneous staking includes staking for the following:

1. Material and Borrow Pits required for contract payment;
2. Guardrails;
3. Riprap,
4. Construction signs;
5. Delineators;

SECTION 901: QUALITY CONTROL/QUALITY ASSURANCE (QC/QA) - GENERAL PROVISIONS

DEFINITIONS

TTCP Direct Supervision. The required supervision of a TTCP trainee by a certified TTCP technician who is on a Project with the trainee and who is both signing off and is personally responsible for all of that trainee's sampling and testing procedures, results and reports.

Qualified Sampling and Testing Technician. A technician who has been certified under TTCP to independently perform inspections, sampling, and testing in specified Materials testing area(s) for either Quality Control or Assurance testing. The term "qualified" and "certified" have the same meaning.

TTCP Trainee. A technician who has attended the appropriate TTCP training class and has a certificate of completion, and is receiving required "on-the-job-training" under the direct supervision of a TTCP certified technician, as such is eligible to take a particular TTCP certification exam.

QLA Validation. A procedure using statistical methods to compare the Contractor's and the Department's test results, specifically, the *F-test* to compare variances and *T-test* to compare means.

901.1 INSPECTIONS AND TESTING OF MATERIALS

901.1.1 General

Materials are subject to inspection, sampling, and testing before Acceptance of the Work. References in the Contract to test methods or Specifications are to the latest versions as of the Bid Advertisement date, unless otherwise noted. Test methods may be subject to modification at the discretion of the State Materials Bureau. The Department's current *TTCP Manual* contains AASHTO and ASTM test method modifications. Testing frequency must be equal to or greater than in accordance with Section 906, "Minimum Testing Requirements."

901.1.2 Technician Certification

Certification is based on demonstration of abilities for test methods and procedures, and a written test. The TTCP Board of Directors, in conjunction with the State Materials Bureau and the State Construction Bureau, will establish term and expiration date of certification and requirements for renewal of certification.

SECTION 902: QUALITY CONTROL

902.1 DESCRIPTION

902.1.1 General

This Work consists of the Contractor performing Quality Control which includes sampling, testing, and inspection to monitor and adjust its processes.

902.2 Quality Control Plan

Where a Contractor Quality Control Plan is required in the specifications, the Contractor shall provide a Quality Control plan as specified in this section. At the Pre-Construction Conference, the Contractor shall be prepared to discuss Quality Control responsibilities for specific Contract Items. The Contractor shall submit the Quality Control plan to the Project Manager at least two (2) weeks before starting Work on requiring the Plan. The Contractor shall not begin Work on HMA, WMA, OGFC, Base Course and PCCP that requires a Quality Control Plan until the Plan is reviewed and approved by the Project Manager and the District Laboratory Supervisor. The Quality Control Plan shall itemize inspections, testing procedures, sampling and testing frequencies, and corrective action strategies that the Contractor will use to control the Work. The Contractor shall develop the Quality Control Plan in accordance with Section 902.2.1, "Contractor Process Quality Control Plan."

902.2.1 Contactor Quality Control Plan for HMA/WMA and Base Course

The Plan shall address pertinent specifications.

902.2.1.1 Contractor Organization

Contractor Organization:

1. The Plan shall address authority levels/duties by position and name of persons holding those positions.
2. The Plan shall include those who can be contacted by State personnel and have decision making authority with regard to Quality Control, Materials, sampling and testing.

902.2.1.2 Sampling, Testing and Lab Facilities

Sampling, Testing and Lab Facilities:

1. The Plan shall include copies of TTCP certification or Wallet Card of all personnel who will be performing Process Quality Control testing for the Contractor.
2. The Plan shall identify lab location.
3. The Plan shall identify person(s) responsible for identifying random sampling locations.
4. The Plan shall identify how and when lab Equipment will be calibrated.
5. The Plan shall identify person(s) responsible for contacting Project Manager when lab facilities are ready for inspection.
6. The Plan shall identify person(s) responsible for maintaining control charts and all records associated with Materials sampling, testing and calibration of lab Equipment.
7. The Plan shall identify person(s) responsible for dispute resolution.

902.2.1.3 HMA/WMA Mix Design

HMA/WMA Mix Design:

1. The Plan shall identify which Department approved testing lab is responsible for mix design(s).
2. The Plan shall identify amount of Material that will be crushed or stockpiled prior to mix design submittal.
3. The Plan shall identify asphalt supplier.
4. The Plan shall outline asphalt sampling program to include frequency, storage and person(s) responsible for obtaining samples.
5. The Plan shall outline asphalt storage tank inspection procedure prior to initial loading, it shall identify the person responsible for storage tank inspection.

902.2.1.4 Aggregate Production

Aggregate Production:

1. The Plan shall identify pit location(s), and type of Material.
2. The Plan shall identify which approved testing lab is responsible for determining aggregate index (HMA, WMA, Base Course, and OGFC).
3. The Plan shall identify anticipated production rate during crushing.
4. The Plan shall identify number of stockpiles anticipated to be utilized in HMA/WMA mix design.
5. The Plan shall identify crushing Equipment that will be used to produce aggregate for HMA, WMA, Base Course and OGFC.
6. The Plan shall identify smallest sieve used to remove natural fines.
7. The Plan shall describe how test data will be utilized to identify inconsistencies and changes in aggregate being produced.
8. The Plan shall describe corrections that will be made when test data indicates Material properties have changed.
9. The Plan shall identify testing/sampling methods and frequencies that will be performed during crushing.

902.2.1.5 Stockpile Management, Stockpiled Material, and Quality Components

Stockpile Management, Stockpiled Material, and Quality Components:

1. The Plan shall describe how stockpiles will be constructed. Describe as a minimum how each requirement in Section 423.2.2.3, "Stockpiling" or Section 424.2.2.3, "Stockpiling" will be achieved.
2. The Plan shall identify testing/sampling methods and frequencies that was performed on stockpiled Material (LL, PL, FF, SE, flat & elongated, fine aggregate angularity, wet prep, gradation) for HMA, WMA, Base Course and OGFC.
3. The Plan shall describe how test data will be utilized to identify out of specification Material and what corrective actions will be taken.

902.2.1.6 Recycled Asphalt Pavement

Recycled Asphalt Pavement:

1. The Plan shall define RAP source and how representative samples will be obtained of sufficient quantity for mix design development.

2. The Plan shall identify approved testing lab that will perform AASHTO T-96 LA Wear, FF, Flat & Elongated and any additional testing that will be performed.
3. The Plan shall identify percent of RAP that will be used in each mix design.
4. The Plan shall describe process that will be used to develop mix design when using less 15% RAP.
5. The Plan shall describe process that will be used to develop mix design when using greater than 15% but less than 25% RAP.
6. The Plan shall describe process that will be used to develop mix design when using 25% to 35% RAP.
7. The Plan shall identify stockpile management and how many stockpiles will be maintained (minimum of two (2)).
8. The Plan shall identify what fractionation each stockpile will be divided into.
9. The Plan shall describe where RAP will be introduced into mixing drum.

902.2.1.7 Production of HMA/WMA

Production of HMA/WMA:

1. The Plan shall describe Equipment that will be used to produce HMA/WMA.
2. The Plan shall identify plant production rate.
3. The Plan shall describe how lime/anhydrite will be introduced into the mix and protected from wind loss.
4. The Plan shall describe how and when moisture will be added to activate lime/anhydrite.
5. The Plan shall identify amount of moisture that will be added and how cold feed moisture will be measured.
6. The Plan shall describe how consistent mixing temperature will be maintained.
7. The Plan shall describe how samples will be taken on combined Material (cold feed), excluding RAP and before addition of lime/anhydrite based Material.
8. The Plan shall identify sampling and testing frequency on combined Material for determination of Material passing the No. 40 sieve to be non-plastic, the plus 3/8” Material to contain a maximum of 20% flat, elongated particles with a dimensional ratio of 3:1 or greater, determination of fine aggregate angularity, SE, FF.
9. The Plan shall describe how test data will be used to identify consistency and changes in HMA/WMA being produced.
10. The Plan shall describe what corrective action process will start when test results are out of specification; this will include what increased frequency of testing is until corrective measures have brought mix back into specification.
11. The Plan shall describe method of loading and Equipment used to transport HMA/WMA.
12. The Plan shall describe length of haul and how adequate Material temperatures will be maintained.
13. The Plan shall identify specific WMA technology (must be on approved products list) and how it will be introduced in the production of WMA.
14. The Plan shall describe process used to manage WMA temperatures.

902.2.1.8 Placement of HMA/WMA

Placement of HMA/WMA:

1. The Plan shall identify how Material will be transferred from haul vehicles to placement Equipment.
2. The Plan shall describe how segregation will be prevented during placement.
3. The Plan shall describe paver speed, roller speed, number of rollers, number of trucks and plant production that will maintain a continuation of placement operations without stopping and starting.
4. The Plan shall describe proper use of auger extensions, if required and how proper amount of head in front of augers will be maintained.
5. The Plan shall describe pull widths and placement sequence that will achieve quantities/dimensions as shown on the plans.
6. The Plan shall describe how joints will be constructed and compaction of taper joints will be obtained.
7. The Plan shall describe how hand Work such as raking will be conducted on joints and how broadcasting aggregate onto mat will be prevented.
8. The Plan shall describe how acceptable compaction will be achieved including roller pattern and compaction monitoring process.
9. The Plan shall identify person(s) who will be tracking yield and person authorized to make adjustment to prevent overruns.
10. The Plan shall identify Department approved release agent that will be used to prevent mix from adhering to truck beds and other Equipment.
11. The Plan shall describe random sampling plan that will be utilized.
12. The Plan shall identify lot and sub lot sizes.
13. The Plan shall define how and where test strip will be constructed and evaluated for compliance with mix design.
14. The Plan shall define shakedown period and how it will be evaluated for compliance with mix design.
15. The Plan shall describe Process Quality Control sampling and testing frequency for each test that will be performed on the placed HMA/WMA.
16. The Plan shall identify time periods when WMA mixture can be sampled and testing can be performed.
17. The Plan shall describe how test data will be used to identify consistency and changes in HMA/WMA being placed.
18. The Plan shall describe what information will be utilized to make JMF changes.
19. The Plan shall describe what corrective action process will start when test results are out of specification; this will include what increased frequency of testing is until corrective measures have brought mix back into specification.

902.2.1.9 Base Course Placement

Base Course Placement:

1. The Plan shall identify any mixing and processing that will take place before Base Course (BC) is transported to the Roadway.
2. The Plan shall describe how BC will be transported to the Roadway.
3. The Plan shall describe how BC will be placed and spread.
4. The Plan shall describe how compaction will be monitored and achieve.
5. The Plan shall describe how line and grade control will be achieved.
6. The Plan shall identify lot and sub lot sizes.

7. The Plan shall identify person(s) who will be tracking yield and person authorized to make adjustment to prevent overruns.
8. The Plan shall describe random sampling plan that will be utilized.
9. The Plan shall describe Process Quality Control sampling and testing frequency for each test that will performed on the placed BC (FF, gradation, LL, PI, moisture content, thickness, and density).
10. The Plan shall describe what corrective action process will start when test results are out of specification; this will include what increased frequency of testing is until corrective measures have brought BC back into specification.

902.2.1.10 OGFC Placement

OGFC Placement:

1. The Plan shall identify that the Contractor shall develop the mix design at no additional cost to the Department.
2. The Plan shall identify any anticipated differences in plan quantity tonnage due to Material types.
3. The Plan shall describe how plan depth will be maintained.
4. The Plan shall describe how design target AC content will be maintained.
5. The Plan shall define how low and defective areas will be corrected with hot OGFC before compaction.
6. The Plan shall define how finished surface will be smooth and free of irregularities larger than 1/8”.

902.2.1.11 Smoothness

Smoothness:

1. The Plan shall identify if smoothness specification applies to this Project.
2. The Plan shall identify Department approved profiler that will be utilized.
3. The Plan shall identify Roadway surface preparation prior to profiling.
4. The Plan shall describe sequence measurements will be taken with accompanying NMDOT representative and submission of data.
5. The Plan shall describe evaluation of profile data using ProVAL for must grind Work and corrective Work required.
6. The Plan shall describe format of written corrective Work plan that will be submitted to the Project Manager.

Changes and data not available at time of submittal of the Plan can be added, although need to be approved by the Project Manager and District Lab Supervisor.

902.2.2 Contactor Quality Control Plan for PCCP

The plan shall address pertinent specifications.

902.2.2.1 Contractor Organization

Contractor Organization:

1. The Plan shall address authority levels/duties by position and name of persons holding those positions.

2. The Plan shall include those who can be contacted by State personnel and have decision making authority with regard to Quality Control, Materials, sampling and testing.
3. The Plan shall identify when Joint Layout Plan will be submitted in accordance with Section 450.3.4, “Joints.”

902.2.2.2 Sampling, Testing and Lab Facilities

Sampling, Testing and Lab Facilities:

1. The Plan shall include copies of TTCP certification of all personnel who will be performing Process Quality Control testing for the Contractor.
2. The Plan shall identify lab location.
3. The Plan shall identify person(s) responsible for determining random sampling locations, and how the original random sampling locations will be confirmed.
4. The Plan shall identify how and when lab Equipment will be calibrated.
5. The Plan shall identify person(s) responsible for contacting the Project Manager when lab facilities are ready for inspection in accordance with Section 901, “Quality Control/Quality Assurance (QC/QA) - General Provisions.”
6. The Plan shall identify person(s) responsible for maintaining control charts and all records associated with Materials sampling, testing and calibration of lab Equipment.
7. The Plan shall identify person(s) responsible for dispute resolution.

902.2.2.3 Concrete Mix Design

Concrete Mix Design:

1. The Plan shall identify concrete supplier.
2. The Plan shall provide copies of all approved mix designs and field report forms to be used;
    a. If approved mix design is not available, the Plan shall identify how and when the approved mix will become available.

902.2.2.4 Aggregate Production

Aggregate Production:

1. If concrete mix design is approved using Standard Stockpile procedures, the Plan shall identify how stockpiles will be maintained and monitored to comply with;
    a. Required master-band gradations; and
    b. Fineness-modulus requirements.
2. If concrete mix design is approved using the Combined Gradation procedures, the Plan shall identify;
    a. How the required gradations will be performed;
    b. Who will perform the required gradations;
    c. Where the required gradations will be performed;
    d. How often the required gradations will be performed; and
    e. How the information will be provided to the Department.
3. The Plan shall describe aggregate production and compliance. Includes control charts tracking items as indicated in Section 906, “Minimum Testing Requirements” and Section 902.8, “Control Charts.”

4. The Plan shall describe stockpile management.

902.2.2.5 Batching & Hauling

Batching & Hauling:

1. The Plan shall identify manufacturer and type of Equipment.
2. The Plan shall define all batching procedures, including order of addition of individual ingredients.
3. The Plan shall identify how cement and fly ash will be:
    a. Stored;
    b. Kept separate;
    c. Kept dry; and
    d. Maximum anticipated time on-site before use.
4. The Plan shall identify how chemical admixtures will be stored and protected; and introduced into the mix.
5. The Plan shall identify the process used to manage concrete temperatures.
6. The Plan shall identify how aggregate moistures will be determined, monitored and communicated to the Department.
7. The Plan shall describe wash-down and final mixing procedures; after concrete mix has been loaded into trucks. Include process control performed, if any, at this point.
8. The Plan shall identify pre-departure procedures for all delivery trucks.
9. The Plan shall provide written approval of Batch Plant and all operations by NMDOT; to include scale certification.
10. The Plan shall identify proposed delivery rate.
11. The Plan shall identify Certificate of Inspection and Certification of all mixer trucks to be used on the Project.
12. The Plan shall identify proposed delivery route (haul road).
13. The Plan shall describe how Material temperatures will be maintained.
14. The Plan shall describe the corrective action process if batch weights are out of specification. This will include how the problem will be recognized, and at what point production will cease and a written corrective action Plan will be presented and approved by the Project Manager before resuming production.

902.2.2.6 Placement and Finishing of Concrete

Placement and Finishing of Concrete:

1. The Plan shall address verification process that subgrade/base has been approved and grades have been verified prior to concrete placement.
2. The Plan shall identify and describe placement method (slip form or construction by form).
3. The Plan shall describe placement and securing of dowels and tie bars.
4. The Plan shall describe Equipment and tools to be utilized.
5. The Plan shall identify how Material will be transferred from haul vehicles to placement location.
6. The Plan shall describe how Material handling Equipment will prevent segregation.
    a. Include discussion on how segregation will be recognized, and how it will be eliminated, if detected; and

b. Indicate how much Material will be maintained and monitored in front of the paver to prevent paste segregation.

7. The Plan shall describe method(s) for vibrating and consolidating concrete.
8. The Plan shall provide balance sheets that demonstrate how paver speed, number of trucks and plant production will maintain a continuation of placement operations without stopping and starting.
9. The Plan shall describe pull widths and placement sequence that will achieve quantities/dimensions as shown on the Plans.
10. The Plan shall describe method used to measure and maintain plan thickness.
11. The Plan shall describe joint Construction, longitudinal and transverse.
12. The Plan shall describe sawing operations.
    a. What kind of sawing Equipment will be used;
    b. How many units will be used;
    c. How sawing operations will insure initial saw-cuts are made within the allotted time; and
    d. How many and what kind of spare Equipment and parts will be maintained on-site.
13. The Plan shall describe joint sealing operations and Materials.
14. The Plan shall describe grooving or tining operations.
15. The Plan shall describe method(s) for curing concrete.
16. The Plan shall describe how evaporation potential will be monitored and provided to the Project Manager.
17. The Plan shall describe random sampling plan that will be utilized and documented.
18. The Plan shall identify lot and sub lot sizes.
19. The Plan shall define Shakedown Period and how it will be evaluated for compliance with mix design.
20. The Plan shall describe Process Quality Control sampling and testing used for compliance and control charts for tracking items in Section 906, “Minimum Testing Requirements” and Section 902.8, “Control Charts.”
21. The Plan shall describe what corrective action process will be taken, and when it will be started when test results are out of specification; this will include what increased frequency of testing is until corrective measures have brought mix back into compliance. This will include a measure of threshold at which time concrete placement will cease and a written corrective action Plan will be presented and approved by the Project Manager before resuming placement.
22. The Plan shall describe method and Material available for constructing a bulk-head if it becomes necessary. This should just be that the concrete is cut back to the nearest joint that the surface plane meets the ten (10) ft straightedge tolerance.
23. The Plan shall describe what emergency covering and protective measures will be available in case of unforeseen weather or other events forcing unanticipated protection of the concrete.

902.2.2.7 Smoothness

Smoothness:

1. The Plan shall identify measures to be taken to insure smoothness.
2. The Plan shall identify if profiler smoothness specification applies to this Project.

3. The Plan shall identify Department approved profiler that will be utilized.
4. The Plan shall identify Roadway surface preparation prior to profiling.
5. The Plan shall describe sequence measurements will be taken with accompanying NMDOT representative and submission of data.
6. The Plan shall describe evaluation of profile data using ProVAL for must grind Work and corrective Work required.
   a. The Plan shall insure proper version of ProVAL is available before Project begins. As with HMA we should be considering the filter to be used also.
7. The Plan shall describe format of written corrective Work Plan that will be submitted to the Project Manager.

Changes and data not available at time of submittal of the Plan can be added, although need to be approved by the Project Manager and District Lab Supervisor.

902.3 Quality Control Laboratory

The Contractor shall perform the Quality Control testing using a private testing Laboratory or a Contractor provided Laboratory. The Contractor shall use, at minimum, a portable or permanent Quality Control Type II Laboratory in accordance with Section 622.3.2.2, “Field Office Equipment.” The Contractor shall calibrate or check testing Equipment in accordance with AASHTO R-18. The Contractor shall provide written documentation that testing Equipment is calibrated and meets the applicable Specifications.

The Contractor shall allow the Department unrestricted access to the Laboratory. The Department may conduct an independent inspection of the Contractor’s field Laboratory. The Project Manager in conjunction with the District Lab Supervisor may determine acceptability of the Quality Control Laboratory. The Project Manager will provide the Contractor a written accounting of Laboratory deficiencies, if any.

902.4 Plan Administration and Technician Qualification

The Contractor shall identify the individual who will administer the Plan. The individual shall have full authority to take actions necessary for the successful operation of the Plan. Quality Control Technicians (QCT’s) performing the actual sampling, testing, or inspection shall be TTCP certified as described in Section 901.1.2, “Technician Certification.” The Contractor shall cease production if certified personnel are unavailable on the Project.

902.5 Sampling

The sampling plan shall contain a random sampling selection technique in accordance with specified Department, AASHTO, or ASTM procedures, as modified by the State Materials Bureau. The sampling plan shall be submitted as a component of the Quality Control Plan. The Contractor shall allow the Project Manager to witness all sampling and testing. The Contractor shall take additional samples if directed by the Project Manager.

902.6 Testing

The Department will use only test results from the random sampling plan in the quality level analysis for pay factor determination. Additional informational test results will not be used in the quality level analysis. The Contractor shall provide original Quality Control test results (on approved forms and to include all calculations, scratch sheets, internal forms etc.) to the Project Manager within two (2) Working Days of sampling. Failure to provide the test