WEST VIRGINIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATIONS

TO ACCOMPANY THE 2010 EDITION OF
THE STANDARD SPECIFICATIONS
Roads and Bridges

ISSUED JANUARY 1, 2015

V. 20150102

TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE #
	DIVISION 100	
102	**BIDDING REQUIREMENTS AND CONDITIONS**	**1**
102.10	Withdrawal of Proposals	1
102.16	Pre-Construction Data	1
104	**SCOPE OF WORK**	**2**
104.12	Value Engineering Change Proposal and Practical Design Change Proposal	2
107	**LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC**	**5**
107.1	Laws To Be Observed	5
107.2	Permits, Licenses, and Taxes	5
107.14	Responsibility For Damage Claims	5
107.21	Protection of Rivers, Streams, and Impoundments	6
107.21.1	Erosion and Sedimentation Control	6
108	**PROSECUTION AND PROGRESS**	**9**
108.3	Prosecution of the Work	9
109	**MEASUREMENT AND PAYMENT**	**22**
109.9	Price Adjustment of Fuels	22
109.10.1	Table-Price Adjustment of Asphalt Binder	22
	DIVISION 200	
203	**DISMANTLING STRUCTURES**	**27**
203.1	Description	27
203.3	Construction Methods	27
207	**EXCAVATION AND EMBANKMENT**	**27**
207.6.5	Construction/Demolition Waste Material	27
207.9	Subgrade	29
207.9.1	Tolerance	29
211	**BORROW EXCAVATION**	**30**
211.2	Materials	30
211.2.4	Impervious Core	30
211.3	General	30
211.3.1	Borrow Within WVDOH R/W Limits	30
211.3.2	Borrow Outside WVDOH R/W Limits	31

SECTION		DESCRIPTION	PAGE #
	211.3.3	Impervious Core	31
	211.5	Rock Borrow Excavation	31
218	**SLOPE AND FOUNDATION PROTECTION**		**33**
	218.4.1	Scour Protection	33
	218.7	Pay Items	33
		DIVISION 300	
311	**OPEN GRADED FREE DRAINING BASE COURSE**		**35**
	311.2	Materials	35
	311.4	Composition of Optional Stabilizing Mixtures	35
	311.11	Curing	35
		DIVISION 400	
401	**BITUMINOUS ASPHALT BASE, WEARING, AND PATCHING AND LEVELING COURSES**		**37**
402	**BITUMINOUS ASPHALT SKID RESISTANT PAVEMENT**		**60**
408	**TACK COAT**		
	408.9	JOINTS	60
		DIVISION 500	
501	**PORTLAND CEMENT CONCRETE PAYMENT**		**63**
	501.1	Description	63
	501.4	Testing	63
	501.4.4	Testing for Opening Pavement to Traffic	63
	501.4.5	Compressive Strength Tests for Acceptance	63
	501.6	Preparation of Grade, Setting Forms, and Conditioning of Subgrade or Base	64
	501.6.3.1	Conditioning of Surfaces Receiving an Unbonded Concrete Overlay	64
	501.9	Placing Concrete	64
	501.11	Joints	65
	501.11.1	Longitudinal Joints	66
	501.11.2	Transverse Expansion Joints (Type B or Type C Joint)	67
	501.11.3	Transverse Contraction Joint	67

SECTION		DESCRIPTION	PAGE #
	501.11.4	Transverse Construction Joints	67
	501.11.5	Coated Dowel Bars	68
	501.11.6	Expansion Joints Around Structures	69
	501.11.7	Random Cracks	69
	501.11.9	Transverse Joints in Concrete Shoulders	69
	501.14	Curing	69
	501.14.4	White Pigmented Impervious Membrane	69
	501.16	Sealing Joints	70
	501.16.1	Silicone Sealant	70
	501.22	Method of Measurement	70
	501.23	Basis of Payment	70
	501.23.1	General	70
	501.24	Pay Items	71
503	**SEALING CRACKS IN CONCRETE PAVEMENT**		**71**
	503.1	Description	71
	503.2	Materials	71
	503.3	Construction Methods	71
	503.4	Preparation of Material Before Use	71
	503.5	Preparation of Joints for Sealing	72
	503.6	Equipment for Applying Sealer	72
	503.7	Placement Requirements	72
	503.8	Method of Measurement	73
	503.9	Basis of Payment	73
	503.10	Pay Item	73
506	**CONCRETE PAVEMENT REPAIR**		**73**
	506.1	Description	73
	506.2	Materials	74
	506.3	Proportioning	74
	506.4	Testing	75
	506.5	Equipment and Tools	75
	506.6	Construction Methods	75
	506.6.1	Removal of Existing Pavement	75
	506.6.2	Conditioning Existing Subbase	76
	506.6.3	Placing Concrete	76
	506.6.4	Straighedge Checking and Surface Correction	76
	506.6.5	Curing	77
	506.6.6	Sealing Joints	77
	506.6.7	Repair of Adjacent Shoulders	77
	506.6.8	Specific Construction Methods	77
	506.6.8.1	Type I Repairs	77

SECTION		DESCRIPTION	PAGE #
	506.6.8.2	Type II Repairs	78
	506.6.8.3	Type III Repairs	79
	506.7	Ride Acceptance	80
	506.8	Method of Measurement	80
	506.9	Basis of Payment	80
	506.10	Pay Items	81
509	**RE-SAWING AND SEALING LONGITUDICAL CONCRETE PAVEMENT JOINTS**		**81**
510	**RE-SEALING CONCRETE PAVEMENT JOINTS**		**81**
	510.1	Description	81
	510.2	Materials	81
	510.3	Construction Methods	82
	510.3.1	Joint Preparation	82
	510.3.2	Joint Sealing	82
	510.4	Method of Measurement	83
	510.5	Basis of Payment	83
	510.6	Pay Items	83
514	**ROLLER COMPACTED CONCRETE**		**83**

DIVISION 600

601	**STRUCTURAL CONCRETE**		**101**
	601.1	Description	101
	601.2	Materials	101
	601.3	Proportioning	102
	601.3.1	Mix Design Requirements	102
	601.3.2.3	Yield	103
	601.3.2.4	Total Solids Ā	103
	601.4	Testing	104
	601.4.1	Sampling and Testing Methods	104
	601.4.2	Contractor's Quality Control	104
	601.4.5	Tests for permeability acceptance of Class H Concrete	104
	601.7	Mixing	105
	601.8	Forms	105
	601.8.1	General	105
	601.8.7	Removal of Forms and Construction of Superimposed Elements	105
	601.8.9	Stay-In-Place Fabricated Metal Forms for Concrete Bridge Decks	106
	601.8.9.4	Placement of Concrete	106
	601.10.1.1	Pre-Pour Meeting	106
	601.10.1.2	Concrete Placement Limitations	106

SECTION		DESCRIPTION	PAGE #
	601.10.1.3	Concrete Placement at Night	107
	601.11	Finishing Concrete Surfaces	107
	601.11.4	Finishing Concrete Bridge Decks	107
	601.11.4.1	Class K Bridge Decks	107
	601.11.4.2	Class H Bridge Decks	108
	601.11.4.3	Straightedge Testing of Hardened Bridge Decks	108
	601.11.4.4	Class H Concrete Finished Deck Grooving	109
	601.11.4.4.1	Transverse Grooving	109
	601.11.4.4.2	Longitudinal Grooving	109
	601.12	Curing and Protecting Concrete	111
	601.12.1	Curing Under Normal Conditions	111
	601.12.3	Protection of Finished Surfaces	111
	601.12.4	Curing Class H Concrete	111
	601.12.5	Protecting Concrete Decks	112
	601.13	Protective Surface Treatments	112
	601.13.1	Silane Treatment for Bridge Superstructure	112
	601.13.1.1	Silane Treatment for Bridge Substructure	112
	601.13.3	Concrete Protective Coating	113
	601.13.3.1	Concrete Surface Preparation	113
	601.14	Method of Measurement	113
	601.15	Basis of Payment	114
	601.15.1	General	114
	601.16	Pay Items	114
602	**REINFORCING STEEL**		**115**
	602.6.1	General	115
	602.7.1	Lapping	115
603	**PRESTRESSED CONCETE MEMBERS**		**116**
	603.6.5	Strength of Concrete	116
	603.14.2.1	Price Adjustments	116
	603.15	Pay Items	117
606	**UNDERDRAINS**		**117**
	606.2	Materials	117
607	**GUARDRAIL**		**117**
	607.2	Materials	117
610	**PLAIN CONCRETE CURBING, INTEGRAL CONCRETE CURBING, AND COMBINATION CONCRETE CURB AND GUTTER**		**113**
	610.3.4	Sections	117
614	**PILING WALLS**		**118**
	614.8	Method of Measurement	118

SECTION		DESCRIPTION	PAGE #
615	**STEEL STRUCTURES**		**118**
	615.3	Materials	118
	615.3.2	High-Strength Fasteners	118
	615.3.2.1	Weathering Steel Bridges	118
	615.3.7	Coating of Anchor Bolts, Nuts and Washers	118
	615.4	Fabrication	119
	615.4.2	Storage of Materials	119
	615.5	Assembly	119
	615.5.7	Welding	119
	615.6	Erection	119
	615.6.9	Final Cleaning of Weathering Steel Bridges	120
620	**THREE-SIDED REINFORCED CONCRETE BRIDGE/CULVERT**		**120**
	620.2	General	120
625	**DRILLED CAISSON FOUNDATIONS**		**121**
	625.4.1	Concrete	121
626	**RETAINING WALL SYSTEMS**		121
	626.5	Materials	121
	626.5.1.1.2.3	Sealers	121
	626.5.3.1	Test Requirements	121
633	**CONCRETE GUTTER, INVERT PIPE GUTTER, OR DUMPED ROCK GUTTER**		**122**
	633.2	Materials	122
	633.6	Dumped Rock Gutter	122
	633.6.1	Grout for Dumped Rock Gutter	122
	633.7	Method of Measurement	122
	633.9	Pay Items	122
636	**MAINTAINING TRAFFIC**		**122**
	636.5	Temporary Structures	123
	636.12	Temporary Impact Attenuating Device	123
	636.14	Temporary Barrier	124
	636.14.1	Materials	124
	636.14.2	Installation	124
	636.15	Removing and Resetting Temporary Barriers	125
	636.23	Method of Measurement	125
	636.23.4	Temporary Structures	125
	636.23.17	Temporary Barrier	126
	636.23.18	Removing and Resetting Temporary Barrier	126

SECTION		DESCRIPTION	PAGE #
	636.23.27	Temporary Impact Attenuating Device	126
	636.23.28	Remove and Reset Attenuator Device	126
	636.25	Pay Items	127
638	**PROJECT MARKERS, RIGHT-OF-WAY MARKERS, SURVEY MARKERS, AND OUTLET MARKERS**		**128**
	638.1	Description	128
	638.2	Materials	128
	638.6	Outlet Markers	128
	638.6.1	General	128
	638.6.2	Location and Content	129
	638.6.3	Installation	129
	638.7	Method of Measurement	129
	638.8	Basis of Payment	130
	638.9	Pay Items	130
640	**FIELD OFFICE AND STORAGE BUILDING**		**130**
	640.4.1	General	130
642	**TEMPORARY POLLUTION CONTROL**		**131**
	642.6	Temporary Pipe, Contour Ditches, Berms, Slope Drains, Ditch Checks & Silt Fence, Premanufactured Ditch Checks & Super Silt Fence	131
	642.6.8	Super Silt Fence	131
	642.7	Method of Measurement	131
	642.8	Basis of Payment	131
	642.9	Pay Items	132
657	**ROADSIDE SIGN SUPPORTS**		**133**
	657.2	Materials	133
	657.2.5	U-Channel Breakaway Mounting Device	132
	657.4.2	Setting Posts	132
	657.5.12	U-Channel Breakaway Mounting Device	132
660	**TRAFFIC SIGNALS**		**133**
	660.2	Materials	133
	660.9	Loop Traffic Detectors	133
	660.10	Signal Heads	133
	660.10.1	Light Emitting Diode Signal Modules (L.E.D.)	133
	660.15	Junction Boxes	136
	660.19	Method of Measurement	136
	660.19.10	Priority Control System Emitter	136
	660.19.11	Priority Control System Detector	136

SECTION		DESCRIPTION	PAGE #
	660.21	Pay Items	137
661	**TRAFFIC SIGNS AND DELINEATORS**		**137**
	661.3.7.1	Flat Sheet	137
	661.17	Pay Items	137
662	**ROADWAY LIGHTING**		**138**
	662.11	Lighting Supports	138
	662.14	Testing	138
664	**TRAFFIC SAFETY DEVICES RUBLE STRIPS**		**138**
	664.2	Materials	138
	664.3	Construction Methods	139
	664.3.1.1	Crash Cushion, Quad Guard Terminal Devices, Reusable Energy Absorbing Crash Terminal, Trinity Attenuating Crash Cushion, SCI Impact Attenuating, and TAU-11 Impact Attenuating Devices	139
	664.3.2	Rumble Strips	139
	664.3.2.1	Rumble Strip Equipment	140
	664.4	Method of Measurement	140
	664.4.2	Rumble Strips	140
	664.5	Basis of Payment	140
	664.6	Pay Items	140
679	**OVERLAYING OR PORTLAND CEMENT CONCRETE BRIDGE DECKS**		**141**
	679.2.2	Specialized Concrete Mix Design and Testing	141
	679.2.2.1	Latex Modified Concrete	141
	679.2.2.2	Microsilica Concrete	142
	679.2.2.4	Test Slab Requirements	142
	679.3	Construction Methods	142
	679.3.1.1	Removal of Existing Deck Surface Phase I	142
	679.3.1.2	Removal of Existing Deck Surface Phase II	143
	679.3.1.2.1	Full Depth Removal of Materials	143
	679.3.1.4	Disposal	143
	679.3.7.5.1	Curing Latex Modified Concrete	144
	679.3.7.5.2	Curing Microsilica Concrete	144
	679.6	Method of Measurement	144
	679.6.2.2	Untitled Section	144
	679.6.2.3	Full Depth Removal	144

SECTION		DESCRIPTION	PAGE #
		DIVISION 700	
701	**HYDRAULIC CEMENT**		**147**
	701.3	Blended Hydraulic Cements	147
707	**CONCRETE ADMIXTURES, CURING AND COATINGS MATERIALS**		147
	707.9	Liquid Membrane-Forming Compounds for Curing Concrete	147
	707.15	Hydration Control Stabilizing Admixtures for Concrete	147
	707.15.1	Acceptance Requirements for Approval of Hydration Control Stabilizing Admixtures	147
	707.15.2	Performance Requirements for Concrete Hydration Control Stabilizing Admixtures	147
	707.15.3	Certification of Hydration Control Stabilizing Admixtures	148
	707.14.4	Additional Test Requirements for Hydration Control Stabilizing Admixtures (Optional)	148
	707.17	Specific Performance Admixtures for Concrete	148
	707.17.1	Acceptance Requirements for Approval of Specific Performance Admixtures	148
	707.17.2	Performance Requirements for Concrete Accelerators	148
	707.17.3	Certification of Specific Performance Admixtures	149
	707.17.4	Additional Test Requirements for Accelerating Admixtures (Optional)	149
708	**JOINT MATERIALS**		**149**
	708.2	Preformed Elastomeric Joint Seals; Lubricant-Adhesives	149
	708.2.2	Joint Seals for Bridges	149
709	**METALS**		**149**
	709.51	U-Channel Breakaway Mounting Devices	149
	709.51.1	General Description and Requirements	149
	709.51.2	General Design and Functionality	150
	709.51.3	Individual Component Features	150
	709.51.3.1	Breakaway Coupler	150

SECTION		DESCRIPTION	PAGE #
	709.51.3.2	Anchor	151
	709.51.3.3	Receiver	151
	709.51.4	Component Materials and Coatings	151
710	**WOOD MATERIALS**		**151**
	710.1	Structural Materials	151
	710.2	Species and Grade	152
	710.3	Preservative Treatment	152
	710.4	Treatment Plants	152
	710.4.1	Certified Plants	152
	710.4.2	Noncertified Plants	152
	710.5	Wood Posts	153
	710.6	Plywood	153
	710.7	Common Lumber	154
	710.8	Service and Lighting Poles	154
714	**CONCRETE, CLAY, FIBER AND PLASTIC CULVERTS**		**154**
	714.23	Precast Reinforced Concrete Box Culverts	154
715	**MISCELLANEOUS MATERIALS**		**154**
	715.6	Hydrated Lime	154
	715.6.1	General Use	154
	715.6.2	Soil Stabilization or Pavement Preservation Purposes	154
	715.8	Waterproofing Fabric	154
	715.10	Prefabricated Drainage Systems	155
	715.10.1	Prefabricated Pavement Edge Drain	155
	715.10.1.1	General	155
	715.10.1.2	Core	155
	715.10.1.3	Fabric	155
	715.10.1.4	Fittings	155
	715.10.1.5	Outlet Pipe	155
	715.10.1.6	Acceptance	155
	715.11	Engineering Fabric	156
	715.11.1	General	156
	715.11.2	Acceptance	156
	715.11.3	Maintenance and Repairs	156
	715.11.4	Engineering Fabric for Subsurface Drainage	156
	715.11.5	Engineering Fabric for Sediment Control (Silt Fence)	156
	715.11.6	Engineering Fabric for Erosion Control	156
	715.11.7	Engineering Fabric for Paving	156
	715.11.8	Engineering Fabric for Separation	156

SECTION	DESCRIPTION	PAGE #
715.11.9	Engineering Fabric for Stabilization	157
715.11.10	Engineering Fabric for Pumped Sediment and Erosion Control (Dewatering Device)	157
715.12	Concrete for Miscellaneous Users	157
715.14	Elastomeric Bearing Pads	158
715.14.1	Sampling Frequency for Elastomeric Bearing Pads	158
715.40	Pavement Marking Material	158
715.40.6	Raised Pavement Markers (RPM's)	158
715.40.6.1	Type P-2 Markers	158
715.40.6.1.1	Casting Requirements	159
715.40.6.1.2	Lens Requirements	160
715.40.6.1.3	Adhesive Requirements	161
715.40.6.1.4	Product Submission and Approval	161
715.40.6.2	Type R-4 Markers	162
715.40.6.2.1	Adhesive Requirements	164
715.40.6.2.2	Product Submission and Approval	164
715.40.6.3	Temporary Markers	165
715.41	Traffic Safety Devices	165
715.41.4	Quad Guard Impact Attenuating Device (Type VIII)	165
715.41.7	SCI Impact Attenuating Device (Type III)	166
715.41.7.1	Description	166
715.41.7.2	Performance	166
715.41.8	TAU-II Impact Attenuating Device (Type IX)	167
715.41.8.1	Description	167
715.41.8.2	Performance	168
715.41.9	Acceptance	168
715.42	Traffic Signal Materials and Equipment	168
715.42.7	Preemption	168
715.42.7.4.1	Implementation	168
715.42.7.4.1.1	Optical Emitter	169
715.42.7.4.1.2	Detector	169
715.42.7.4.1.3	Card Rack Mounted Interface Unit	169
715.42.7.4.1.4	Control Equipment	169
715.42.7.4.1.5	System Requirements	169
715.42.7.4.1.6	Warranty	170
715.42.7.4.1.7	Codes and Basis of Payment	170

DIVISION 100
GENERAL PROVISIONS

SECTION 102
BIDDING REQUIRMENTS AND CONDITIONS

102.10 - WITHDRAWAL OF PROPOSALS:

DELETE THE CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

Bidders may withdraw Proposals in a manner approved by the electronic bidding service provider and the Division prior to the letting.

On projects requiring prequalification, a bidder may alternatively request to withdraw its bid under the conditions and in the same manner as described for projects where Prequalification is waived provided the bidder provides written notice to the Division 2:00PM of the business day preceding the letting and the bidder receives confirmation from the Division stating the bidder will be allowed to do so.

For projects where Prequalification is waived, and after the time provided for the opening of proposals, a bidder may withdraw its bid during the course of reading of bids prior to the actual reading of bids on the project for which the bid is withdrawn only by providing a written document at the site of the letting in the following form:

"I, the undersigned, of _____, Contractor(s) hereby acknowledge that I have this day withdrawn the sealed bid of _____, Contractor(s) on West Virginia Division of Highways Project No. _____."

Contractors who are found to be low bidders on a number of projects of which the total exceeds the Contractor's rating may withdraw, with the approval of the Commissioner, bids on such project or projects as will bring the remaining total to within the limit of the rating. At their discretion, the Commissioner may award contracts for the project or projects on which bids have been so withdrawn to the next lowest qualified bidder.

102.16-PRE-CONSTRUCTION DATA:

ADD THE FOLLOWING SUBSECTION TO THE PROPOSAL:

102.16.1-Questions Regarding Advertised Proposals: All projects advertised by the Division will require any questions to be asked using the Question and Answer feature of the electronic bidding service in accordance

with any listed requirements. The various contact information required shall be filled out and completed with valid and applicable information which the Division may verify. If the contact information is unable to be verified then any questions associated with this information may not be answered.

Questions and Answers are for informational purposes only. Any posted questions or answers do not alter the terms and conditions of the advertised Contract in question. Official changes to the Contract shall only be issued by the Division through an addendum to the applicable Contract.

Potential Bidders may ask questions up until the time of the posted letting with no exceptions. However it should be noted that any questions that may necessitate a change to the Contract should be asked seven (7) days prior to the posted letting date to allow the Division to issue an addendum to modify the Contract, if necessary. Questions received three (3) working days or more in advance of a posted Letting should be answered prior to the time of the posted letting. Questions received within three (3) working days of the posted time of Letting may or may not be answered as time allows.

SECTION 104
SCOPE OF WORK

104.12-VALUE ENGINEERING:

DELETE THE TITLE AND CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

104.12-VALUE ENGINEERING CHANGE PROPOSAL AND PRACTICAL DESIGN CHANGE PROPOSAL:

The Contractor may submit to the Engineer, in writing, Value Engineering Change Proposals (VECP) for modifying the plans, specifications or other requirements of the contract for the purpose of reducing the total cost of construction without reducing design capacity or quality of the finished product. If accepted by the Division, the cost savings difference between the original contract work being modified and the final cost of the proposed new work shall be shared between the Contractor and the Division on a fifty-fifty basis.

The Contractor may submit to the Engineer, in writing, a Practical Design Change Proposal (PDCP) for modifying the plans, specifications or other requirements of the contract for the purpose of reducing the total cost of construction. A Practical Design Change Proposal may provide a finished product with a justifiably revised scope change, as compared to the as-bid product. The PDCP may modify construction sequences, re-use existing roadway elements or underrun contract items. The PDCP shall not adversely affect safety or function of the final product. The cost savings to the Division shall be negotiated to be at least 60% of the cost difference between the original contract

work being modified and the final cost of the proposed new work listed in the change order for a PDCP.

The contractor is encouraged to submit to the engineer, in writing, VECP's and PDCP's for modifying the plans, specifications or other requirements of the contract. Proposed modifications should not impair, in any manner, essential functions or characteristics of the project, including but not limited to, service life, economy of operation, ease of maintenance, and shall not impair design or safety standards, and shall not significantly delay the completion of the project.

This subsection applies to all VECPs / PDCPs initiated and developed by the Contractor and which are identified as such by the Contractor at the time of their submission to the Engineer; however, nothing shall be construed as requiring the Engineer to consider or approve a VECP/PDCP submitted hereunder.

As a minimum, the following information shall be submitted, in quadruplicate, with each VECP/PDCP along with all information additionally submitted in electronic format:

i. a statement that this proposal is submitted as a VECP or PDCP;
ii. a description of the difference between the existing contract requirements and the proposed change;
iii. a statement concerning the basis for the VECP/PDCP and benefits to the Division together with an itemization of the contract items and requirements affected by the VECP/PDCP;
iv. separate detailed cost estimates for both the existing contract requirements and the proposed change;
v. an itemization of plan details, design standards or specifications to be changed if the VECP/PDCP is adopted;
vi. an estimate of the effect on collateral costs to the Division. Collateral costs are defined to be reduced costs of operation, maintenance or repair and extended useful service life; and
vii. a statement of the time by which approval must be issued to obtain the total cost reduction during remainder of Contract, noting any effect on contract completion time or delivery schedule;
viii. a description of any previous use or submission of the same proposal by the Contractor, including dates, job numbers, results, and/or outcome of proposal if previously submitted;
ix. final submittals for VECPs and PDCPs shall be signed and sealed by a West Virginia Registered Professional Engineer, and that individual will become the Engineer of Record for the work described in the VECP/PDCP.

It should be noted that on a case by case basis, the Contractor may be required to do presentations to the Division addressing the above issues and clarifying any additional information requested by the Division.

If approved by the Division, the Division will process the VECP/PDCP in the same manner as prescribed for any other proposal which would necessitate

issuance of a Contract change order. The Division may accept in whole or in part any VECP/PDCP by issuing a change order which will identify the VECP/PDCP on which it is based. The Division will not be liable to the Contractor for failure to accept or act upon any VECP/PDCP submitted pursuant to this provision nor for any delays to the work attributable to any such proposal. The Division has the right to reject any VECP/PDCP without explanation. Additionally there may be other regulatory agencies outside of the Division that may need to review the proposed VECP/PDCP and have the authority to reject/accept the proposed VECP/PDCP. The Division accepts no responsibility in delays or costs attributed to any such reviews by outside agencies and it is the responsibility of the Contractor to get approval from said organizations.

Until a proposal is effected by change order, the Contractor shall remain obligated to the terms and conditions of the existing contract. When an executed change order has not been issued by the date upon which the Contractor's proposal specifies that a decision should be made, or such other date as the Contractor may subsequently have specified in writing, such proposal may be deemed rejected.

The change order affecting the necessary Contract modification will establish the estimated savings agreed upon, will provide for adjustment in the Contract prices and will indicate the savings be divided between the Contractor and the Division as per the negotiated agreements. The Contractor shall absorb all costs incurred in preparing a VECP/PDCP for submission to the Division. All reasonably incurred costs of reviewing and administering the VECP/PDCP will be borne by the Division. The Division reserves the right to include in the change order any conditions it deems appropriate for consideration, approval and implementation of the proposal. The Contractor's share of the savings shall constitute full compensation for effecting all changes pursuant to the change order.

Acceptance of the VECP/PDCP and performance of the work thereunder will not change the Contract completion date as a result of the VECP/PDCP, unless specifically provided for in the change order authorizing the VECP/PDCP.

The Division expressly reserves the right to adopt a VECP/PDCP for general use in contracts administered by the Division when it determines the VECP/PDCP is suitable for application to other contracts without obligation or compensation of any kind to the Contractor.

The Engineer shall be sole judge of the acceptability of a VECP/PDCP.

When a VECP/PDCP is accepted by the Division, the provisions of 104.2 pertaining to adjustment of Contract unit price due to alterations of Contract quantities will not apply to the items adjusted or deleted as a result of affecting the VECP/PDCP by change order.

The cost of the revised work, as determined in the value engineering change order, will be paid on current estimates.

In addition to such payment for VECP items, the Contractor will be paid, on a Lump Sum basis by a separate item, one half of the difference of the cost of the original contract work and the final cost of the new work listed in the change order In addition to such payment for PDCP items, the Contractor shall be paid on

a Lump Sum basis by separate item the negotiated contractor portion of the savings.

For VECP, one half of contractor portion of the estimated savings will be paid to the Contractor upon approval of the change order. For PDCP, one half of the negotiated contractor portion of the estimated savings will be paid to the Contractor upon approval of the change order. The remainder of the savings due the Contractor will be paid upon completion of all items of work included in the change order. This final Lump Sum payment will be determined by the actual quantities for items paid by the unit. Final payment for other lump sum or proposal quantity items will be the change order amount, subject to 109.2.

SECTION 107
LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

107.1-LAWS TO BE OBSERVED:

DELETE THE LAST SENTENCE AND REPLACE WITH THE FOLLOWING:

The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders and decrees; and shall protect and indemnify, defend and hold DOH harmless from any and all claims, liabilities and causes of action for any fines or penalties imposed on DOH by any state or federal agency because of violation by CONTRACTOR or any of its subcontractors and/or consultants of any state or federal law or regulation.

107.2-PERMITS, LICENSES, AND TAXES:

ADD THE FOLLOWING PARAGRAPH TO THE SECTION:

The Contractor shall provide the Division with sufficient documentation that all applicable taxes have been paid within 120 days of the project acceptance as provided for in 105.16. The Division shall have the right to revoke the Contractor's Prequalification until the Contractor provides sufficient documentation that all taxes have been paid or are the subject of a timely filed dispute currently pending in a court or other body having legal authority and jurisdiction to hear the dispute.

107.14-RESPONSIBILITY FOR DAMAGE CLAIMS:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

107.14-RESPONSIBILITY FOR DAMAGE CLAIMS:

The Contractor shall indemnify and save harmless the Division, its officers and employees, from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor, its subcontractors and/or consultants; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of the Contractor its subcontractors and/or consultants; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Worker's Compensation Act," or any other law, ordinance, order, or decree; and so much of the money due the Contractor under and by virtue of their Contract as may be considered necessary by the Division for such purpose may be retained for the use of the Division or, in case no money is due, their surety may be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Division; except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that the Contractor is adequately protected by public liability and property damage insurance.

107.21-PROTECTION OF RIVERS, STREAMS, AND IMPOUNDMENTS:

107.21.1-Erosion and Siltation Control:

DELETE THE ENTIRE SUB-SUBSECTION AND TITLE AND REPLACE WITH THE FOLLOWING:

107.21.1-Erosion and Sedimentation Control:

The Contractor shall be responsible for water quality throughout the duration of construction in accordance with the National Pollutant Discharge Elimination System (NPDES) permit registration with the West Virginia Department of Environmental Protection Agency (WVDEP). The Contractor will responsible for the following:

i. Developing and implementing an effective erosion and sediment control plan.

ii. Directing the construction, operation, maintenance and dismantling of temporary erosion and sediment control features.

iii. Implementing remedial action to correct and/or repair failing erosion and sediment control features.

iv. Implementing storm and winter shutdown procedures.

v. Shaping the earthwork prior to the suspension of grading operations each day in a manner that will permit storm runoff with minimum erosion.

vi. Installing, operating and maintaining erosion and sediment control features in an acceptable condition.

vii. Cleaning out and restoring to original conditions any erosion or sediment control feature that has reached half of its capacity. For sediment basins, one half of its capacity is considered as wet volume storage.

The Contractor shall prepare a Spill Prevention, Control and Countermeasures (SPCC) plan that itemizes specific measures that will be implemented to prevent and clean up chemical and petroleum product spills that may occur during all phases of construction. Fuel storage and refueling activities, equipment maintenance activities and equipment washing will be kept at least 500 feet away from any watercourse or wetland.

Any details not shown in the plans shall be in accordance with the latest version of the West Virginia Division of Highways Erosion and Sediment Control Manual. In the event that temporary erosion and sediment control measures are necessary due to the Contractors negligence, carelessness or failure to install permanent controls as part of the work as scheduled, such work shall be performed by the Contractor at his own expense.

In addition to the above, the Contractor shall make themselves familiar with all requirements contained within the WVDEP's General Water Pollution Control Permit, Stormwater Associated with Construction Activities Permit Number WV0115924. A copy of this permit can be found at the following internet address:

http://www.dep.wv.gov/WWE/Programs/stormwater

Noncompliance with permit conditions constitutes a violation of the Clean Water Act and State Code and is subject to enforcement action by the WVDEP.

At the Project's Pre-Construction Conference, the Contractor shall submit to the Department in addition to the appropriate number of Erosion and Sediment Control Plans, the Co-Applicant #1 signature page (Exhibit 1) and the Contractor's E&S Manager Contact.

The Contractor's E&S Contact shall contain the following information: the name, title, mailing address and telephone number of the person who will be responsible for the Erosion and Sediment Control plans, implementation, maintenance, etc., for the life of the NPDES registration.

Upon completion of the Pre-Construction Conference, the Department will modify the existing NPDES registration for this project to make the

Contractor the number one Co-Applicant to the permit. Once this has been completed, the Contractor shall be responsible for any and all fees, violations and fines assessed against the project that is a result of the Contractor's negligence, carelessness, or failure to install permanent controls as part of the work as scheduled.

Once the project is complete, the Contractor will still bear responsibility for the NPDES registration until either a Notice of Termination (NOT) is received from the WVDEP or the Contractor has received final payment for the project. If an NOT has not been received by the time the final payment is made, the Department will modify the NPDES registration to remove the Contractor's name from the registration.

The exhibit can be located online at:

http://www.transportation.wv.gov/highways/contractadmin/specifications/107.21.1EnSExhibit1/Pages/default.aspx

SECTION 107.21.1 EXHIBIT 1
COAPPLICANT #1 SIGNATURE PAGE

dep	Co-Applicant #1: Co-Applicant #1 Signature Page	New NPDES Storm Water Construction Project Name:

BY COMPLETING AND SUBMITTING THIS APPLICATION, I HAVE REVIEWED AND UNDERSTAND AND AGREE TO THE TERMS AND CONDITIONS OF THE GENERAL PERMIT ISSUED ON NOVEMBER 5, 2007. I UNDERSTAND THAT PROVISIONS OF THE PERMIT ARE ENFORCEABLE BY LAW. VIOLATION OF ANY TERM AND CONDITION OF THE GENERAL PERMIT AND/OR OTHER APPLICABLE LAW OR REGULATIONS CAN LEAD TO ENFORCEMENT ACTION.

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED ON THIS FORM AND ALL ATTACHMENTS AND THAT, BASED ON MY INQUIRING OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

_____
(CO-APPLICANT #1 SIGNATURE)

Print Name:

Print Title:

Date:

PRIOR TO FILING THIS APPLICATION, YOU MAY WISH TO OBTAIN A COPY OF THE LEGISLATIVE RULES OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION, TITLE 47, SERIES 26, WATER POLLUTION CONTROL PERMIT FEE SCHEDULE IN ORDER TO DETERMINE THE APPROPRIATE PERMIT APPLICATION FEE REQUIRED TO ACCOMPANY YOUR SUBMISSION OF THIS APPLICATION. YOU CAN OBTAIN A COPY OF THE REGULATION FROM THE SECRETARY OF STATE'S OFFICE, STATE CAPITOL BUILDING, CHARLESTON, WV 25305. HOWEVER, YOU MAY WISH TO USE THE TABLE FOUND IN ITEM V. OF THE ATTACHED INSTRUCTIONS.

ALL SPILLS OR ACCIDENTAL DISCHARGES ARE REQUIRED TO BE REPORTED IMMEDIATELY TO THE EMERGENCY RESPONSE SPILL ALERT SYSTEM TOLL FREE TELEPHONE NUMBER 1-800-642-3074. CALLS FROM OUT OF STATE SHOULD BE MADE TO 304-348-8899.

SECTION 108
PROSECUTION AND PROGRESS

108.3-PROSECUTION OF THE WORK:

108.3.1-General:

DELETE THE SUBSECTION SUBSECTIONS AND REPLACE WITH THE FOLLOWING:

108.3-PROSECUTION OF THE WORK:

108.3.1-General: The Contractor shall provide sufficient resources (materials, equipment, and labor, etc.) to guarantee the completion of the project in accordance with the Plans and Specifications within the time set forth in the Proposal.

The Contractor shall submit a Detailed Construction Schedule and any subsequent schedules, as required by this specification, in the form more clearly defined in section 108.3.2 with all graphic and tabular supporting documentation, hereinafter referred to as "Schedule."

Schedules will be required for all projects where the Contract Bid Amount is greater than $2,000,000. Additionally any Project that contains an Incentive/Disincentive clause, and all Design Build projects and Public Private Partnership projects shall require a Schedule.

Unless otherwise specified, Schedules will not be required for projects on which the major portion of the work is resurfacing, landscaping, signing, lighting, installing signals, guardrail or bridge painting, or on which the Contract Bid Amount is $2,000,000 or less.

The submitted Schedule shall include a written certification on the face of the Schedule, as well as on any diagrams and drawings, stating that the Schedule is within the contractual limits and that the submitted Schedule is the only Schedule the Contractor will use for all critical work activities, interdependent work activities, phase construction, stage construction, resource needs, transmittals for Contractor designs, drawings and other submissions, activities for subcontractors, vendors, and suppliers, and all other controlling and subsequent activities. This same written certification shall be included on all Schedule updates and revisions.

The Schedule shall show the interdependent and logical sequence of construction activities. The Schedule shall reflect that all contract time requirements are essential conditions of the Contract and shall also include allowances for seasonal weather conditions, the influence of high or low ambient temperatures, as well as any extra shifts, overtime, or additional manpower and equipment necessary to complete the critical and non-critical activities within the allotted Contract time without additional cost to the Division.

The Contractor shall provide a milestone that designates the substantial completion date of the project. Except as noted below, the substantial completion date shall equal the contract completion date. Additional activities that do not impact the project's substantial completion may be included in the Schedule subsequent to the contract completion date**.** However, these additional activities shall not impact the float of any preceding portion of the Schedule.

The Contractor may submit a Schedule with a Substantial Completion date earlier than the Contract Completion Date set forth in the Proposal. However, the Division will not be liable in any way for the Contractor's failure to complete the Project prior to the specified Contract Time except as when provided in Section 108.6. Any additional cost, including extended overhead incurred between the Contractor's scheduled completion date and the Contract Completion Date set forth in the Proposal, shall be the responsibility of the Contractor.

Should the Schedule indicate an earlier completion date than the time for completion set forth in the Contract, the Schedule shall define any positive float developed between an early completion point and the Contract Completion Date as part of the overall project float. It is understood by the Contractor and the Division that positive float is a shared commodity, not for the exclusive use or benefit of either party. Either party has the full use of the positive float until it is depleted.

The Division's review of the Schedule does not represent approval of the Contractor's estimate of resources (labor, material and equipment), method of operation, or production rates.

108.3.1.1-Submission Of Construction Schedules: The Contractor shall designate a competent representative, hereinafter referred to as Construction Coordinator, who shall have the decision-making authority for the Contractor to control the work in accordance with the Schedule(s) for the duration of the Contract.

With the exception of the following preliminary items: establishing the field office, setting up traffic control, and mobilizing equipment, no item of work under the contract may be pursued following the Notice to Proceed or the Conditional Notice to Proceed until a Preliminary Construction Schedule or Detailed Construction Schedule has been submitted by the Contractor and reviewed by the Engineer. The Engineer may withhold estimates until such time as a Schedule has been received and reviewed.

108.3.1.2-Preliminary Construction Schedule: Within thirty (30) calendar days of the contract award date, the Contractor may submit a sixty (60) calendar day Preliminary Construction Schedule for review by the Engineer. The Preliminary Schedule shall include a generalized project schedule for the balance of the work in summary form indicating the contract completion date. The Contractor shall maintain and submit

monthly a sixty (60) calendar day Preliminary Construction Schedule until the Schedule is submitted by the Contractor and reviewed by the Engineer.

108.3.1.3-Detailed Construction Schedule (Schedule): The detailed construction Schedule shall include a report system that is maintained throughout the life of the project to measure all factors that affect the completion date. Within sixty (60) calendar days of the contract award date, the Contractor shall submit a Schedule indicating the contract completion date for review by the Engineer.

The Engineer will review the Schedule and supporting documentation for compliance with the Contract within fourteen (14) calendar days after receipt in accordance with provision 108.6.2. The Contractor shall provide the Engineer with a revised Schedule incorporating any compliance recommendations made in the Engineer's review. This schedule shall become the official Schedule and shall be used by the Contractor. The official Schedule must be completed within ninety (90) calendar days of the Contract award date. The Engineer may withhold estimate payments for any item of work under the Contract after ninety (90) calendar days until the Contractor's Schedule has been reviewed and all comments have been addressed.

108.3.1.4-Construction Schedule Requirements: The Preliminary Schedule and the official Schedule shall be submitted in electronic /digital format (.XER file) and in hard copy and shall include a legend for symbols and abbreviations used. Activities with duration times in excess of fifteen (15) working days, except for non-construction activities, shall be kept to a minimum and be subject to review by the Engineer. The Schedule shall provide a minimum of ten (*10)* activities or categories, hereafter referred to as "Activities," per million dollar value of the Contract and a maximum of three hundred (300) activities or as directed by the Engineer.

The Schedule shall indicate the interdependence of Activities (how the start of a given activity depends on the completion of preceding Activities) and the sequence of work (how failure to complete a given activity may restrain the start of successive activities).

The Schedule shall include the Contract completion date and any interim completion dates contained in the Contract, as well as any coordination and cooperation requirements, construction restrictions, or other requirements of the Contract.

The Schedule shall include Activities for all work required by the Contract, including Activities for subcontractors, vendors, and suppliers. In addition to construction activities, the Schedule shall include as a minimum the procurement, fabrication, and delivery of critical or special materials and equipment, as well as submission and review of all shop/work drawings, Contractor designs, and all other submissions required by the Contract.

The Activities are to be described by Contract item number, location, phase, and sequence so that the work is readily identifiable and the progress of each Activity can be measured. For Schedules requiring resource loading, the Contractor shall provide the labor and equipment involved with each Activity.

For all Schedules, each Activity will have an associated dollar amount documented on the Schedule. This Activity dollar amount will be in direct relation to the bid items and quantity of work included in the Activity. Activity duration shall be logical and consistent with the Contract documents and shall be based on realistic and available resources of the Contractor. The above requirements are applicable for all Schedules, including the official Schedules, required updates, and any revised Schedules.

Requiring the Contractor to submit Schedules allocating resources to project Activities does not imply acceptance, approval, or agreement by the Division that the Contractor's scheduled allocation of resources is sufficient to complete either the project or a scheduled activity in a scheduled time.

The Division's review and acceptance of the Schedule and progress updates does not preclude a later review of any previously submitted Schedule. If upon later review the Division discovers an issue of non-compliance with the specification or a discrepancy in the Schedule that is skewing the logic calculations and schedule results, the Division reserves the right to request a revised Schedule as per Section 108.3.5."

108.3.2-Detailed Construction Schedule (Schedule): The Schedules shall be prepared using the version of the scheduling and cost control system specified at the time of letting in Section 640.11.

The Schedule shall be submitted on standard D size sheets (24" x 36"). The critical path shall be distinguished from other paths on the Schedule. All back-up data used to generate the Schedule shall be submitted in digital form on acceptable media that is compatible with the computer system.

The submitted Print Out of the Schedule shall include the following data for each activity in the initial submittal and in all updates and revisions:

1. Activity number, as well as preceding and following activity numbers;
2. Activity description;
3. Duration of activity, in working days;
4. All quantities in accordance with pay items;
5. Dollar value of activity;
6. Remaining duration of activity, in working days;
7. Earliest start date, by calendar date;
8. Earliest finish date, by calendar date;
9. Actual start date, by calendar date;
10. Actual finish date, by calendar date;
11. Latest start date, by calendar date;
12. Latest finish date, by calendar date;

13. Total float for activity;
14. Free float for activity;

In addition to the above, the following information and data shall be included with the submission of the digital form to the Division:

15. Number of shifts per work day**,** hours per shift for activity;
16. Number of work days per week for activity;
17. Major equipment and corresponding hours for activity;
18. Manpower by Trade or entity and corresponding hours for activity;
19. Activity Usage Profile Cost of Contractor's Income**.**
20. The following criteria shall apply to the development and maintenance of the Schedule:
    a. all Resources shall be grouped in a Project Resource Tree. This tree structure shall have one main heading name that begins with the Project's specific 7 digit Contract ID Number followed by an underscore, followed by the Project Name.
    b. Individual Resource names shall be shown as a sublevel to the main heading name. The Individual Resource names shall begin with the Project's specific 7 digit Contract ID Number followed by an underscore, followed by the Project Name. Any additional description may follow the underscore.
    c. the use of Project Codes is prohibited.
    d. the use of Global Activity Codes are prohibited, however Project Activity Codes may be used. The Project Activity Code name's shall begin with the Project's specific 7 digit Contract ID Number followed by an underscore. Any additional description may follow the underscore.
    e. Global Calendars are prohibited (except as noted below in bullet g). However, Project Calendars may be used. The Project Calendar names shall begin with the Project's specific seven (7) digit Contract ID Number followed by an underscore. Any additional description may follow the underscore. Additionally, the Project Default Calendar shall be assigned as a Project Calendar.
    f. The use of Cost Accounts is not required. However if the Contractor elects to use them, then all Cost Account names shall be grouped in a Project Cost Accounts Tree. This tree structure shall have one main heading name that begins with the Project's specific seven (7) digit Contract ID Number followed by an underscore, followed by the Project Name.
        (i) Individual cost account names shall be shown as a sublevel to the main heading name. The individual cost account names shall begin with the Project's specific seven (7) digit Contract ID Number followed by an underscore. Any additional description may follow the underscore.
    g. The Contractor Resource Calendar shall be linked to the WVDOT Standard Calendar. The WVDOT Standard Calendar shall be assigned to each resource and shall be allowable as the only

calendar for all Schedule Resources. This shall be accomplished by creating a Global Calendar named and formatted exactly as follows:

WVDOT Standard 5 Day Workweek w/holidays

h. The first activity on the Schedule shall be Contract letting which shall be designated as a milestone starting on the actual contract letting date.
i. The second activity on the Schedule shall be Project Award which shall be designated as a milestone with a 30 day lag from the Contract Letting milestone.
j. The third activity on the Schedule shall be Notice to Proceed which shall be designated as a milestone with a 30 day lag from the Project Award milestone (or with a 7 day lag from Project Award on projects with an Incentive/Disincentive clause).
k. Subsequent to the Notice to Proceed milestone, the logic and duration of remaining activities shall be developed and tied to the Substantial Completion milestone described in Section 108.3.1.
l. Schedule calculation will be computed by *Retained Logic* method.
m. Only contractual *Constraints* can be used on activities when preparing the Schedule, otherwise the use of *Constraints* is prohibited.
n. All Actual Start Dates and Actual Finish Dates shall be reasonably captured in updated schedules.
o. The activity costs described in Section 108.3.4 shall be incorporated into the Schedule via Resource Section. The use of Expenses for costs is prohibited.

108.3.3-Schedule Resource Loading Criteria: The following criteria shall be incorporated in the development and maintenance of Schedules and Schedule updates:

108.3.3.1-Non-Resource Loaded Schedules: For projects where the Contract Bid Amount is between $2,000,000 and $7,500,000, the Schedule shall meet the requirements of a Schedule as described in Section 108.3.2 with the exception of Bullet 17 (Major equipment and corresponding hours for activity) and Bullet 18 (Manpower by Trade or entity and corresponding hours for activity).

108.3.3.2-Resource Loaded Schedules: Schedule resource loading will be required for all projects on which the Contract Bid Amount is equal to or exceeding $7,500,000. Additionally all Design Build Projects and Public Private Partnerships will require Schedule resource loading regardless of the Contract Bid Amount.

The Contractor is advised that the specific details of Major Equipment (bullet #17) and Manpower (bullet #18) may be provided on a separate attachment to the Schedule. However this information must be referenced to the Schedule so that in the determination of the Engineer relevant resource evaluation can be ascertained.

108.3.4-Progress Reporting And Schedule Updating: The Contractor shall submit weekly a summary of work force by Trade including all workmen and subcontractors together with a weekly summary of all equipment used on the project. The Division shall maintain the Contractor's resource information in a confidential manner. The Contractor's certified payrolls may be a substitute for the work force summary. A Project Control Meeting shall be held monthly by the Engineer with the Contractor's Construction Coordinator to review actual progress, planned progress for the next period, and any changes since the previous update(s). Non-Resource Loaded Projects as described in 108.3.3 that require a Schedules may hold Project Control Meetings less frequently if deemed appropriate by the Regional Engineer, but not less than quarterly.

For projects where the Contract Bid Amount is greater than or equal to $7,500,000 that require a Schedule, at least five (5) working days before the meeting, the Construction Coordinator shall provide the Engineer with a complete update of all schedule activity information included in 108.3.2. The Engineer may withhold estimate payments until the Contractor submits a Schedule update five (5) working days prior to the next Project Control meeting.

For projects that require Non-Resource Loaded Schedules as described in 108.3.3, the Construction Coordinator shall provide the Engineer with a complete update of all Schedule activity information included in 108.3.2 and 108.3.3 within five (5) working days after the end of the month. The Engineer may withhold estimate payments until the Contractor submits a Schedule update within five (5) working days after the end of the month.

The Contractor shall submit with the monthly update a narrative report which shall include, but not be limited to, a description of progress along the critical path in terms of days ahead or behind the Schedule dates, any problem areas (current and anticipated), any delaying factors and their impact, and an explanation of any corrective actions taken or proposed. The narrative report shall state any and all changes made in the Schedule since the previous update(s) and detail all activities or portions of activities, including dollar value, completed during the update period.

The original accepted Schedule shall have the sum of all activity costs equal to the Contract Bid Amount. Change Orders, Value Engineering and other required project modifications shall be incorporated into the Schedule as necessary to reflect the actual cost and scope of work being performed. Total Project costs expended and remaining should be ostensibly accurate on Schedule updates. However, the Schedule updates shall be maintained in such a way as to accurately reflect the progress of the project by the duration of remaining work.

Extension of Interim Completion Dates, the Contract Completion Date, or the revised Contract Completion Date will be governed by the provisions of 108.6.

If the Division revises work which would affect the sequence of operations or duration of time on work activities, the Contractor shall submit to the Engineer, within seven (7) calendar days after receipt of the revision, a written report in accordance with 108.6 outlining the effect on work time and cost that the revision is expected to have on the Schedule.

108.3.5-Submission of Revised Construction Schedule: The Engineer shall request the Contractor to submit a revised Schedule when any one of the following conditions is reflected by the latest Schedule:

1. A delay greater than ten (10) calendar days in the completion of any critical activity;
2. The performance of any work in a sequence or manner which varies from that represented on the Schedule;
3. The addition, deletion, or revision of activities required by Contract modification.

The revised Schedule shall indicate all the requirements described in Section 108.3.2 and shall include all additional resources (labor, material, and equipment) and modification(s) of operations necessary to meet the contract time requirements.

The Engineer will review the revised Schedule and supporting documentation for compliance with the Contract. The Contractor shall incorporate any compliance recommendations made in the Engineer's review. Should the Contractor fail to submit a revised Schedule within seven (7) calendar days of the Engineer's written request, the Engineer may withhold estimate payments for any item of work under the Contract until such Schedule is submitted.

108.6-DETERMINATION AND EXTENSION OF CONTRACT TIME:

DELETE THE SUBSECTIONS AND REPLACE WITH THE FOLLOWING:

108.6.1-General: The Division shall determine and specify in the Contract the number of working days and/or a fixed calendar date allowed for completion of the Work, hereinafter called Contract Time.

A potential working day is every day on the calendar except Saturday, Sunday and holidays as set forth in 101.2.

When the Contract Time is specified on a working day basis, the Engineer will inform the Contractor weekly, by written statement, of the number of working days charged for the preceding week, the accumulated number of working days charged against the Contract, and the number of working days remaining for completion of the Contract. The Contractor shall submit in writing to the Engineer any protest concerning the weekly statement within seven (7) calendar days after receipt of the statement. The written protest

shall set forth what the Contractor considered incorrect, along with supporting information; otherwise, the statement shall be deemed to have been accepted by the Contractor as correct. The Engineer shall review any such protest and supporting information and shall render a decision either affirming or correcting the number of working days previously reported for the contested week, within fourteen (14) calendar days after receipt of the written protest.

When the Contract Time is specified on a fixed calendar date basis, it will consist of the number of calendar days counting from the effective date of the Engineer's issuance of the Notice to Proceed or Conditional Notice to Proceed to the calendar date specified for completion of the project, including all Saturdays, Sundays, holidays, and non-working days. All calendar days elapsing between the effective dates of any orders of the Engineer to suspend work and to resume work for suspensions not the fault of the Contractor shall be excluded.

The work on the Contract will be considered substantially complete when the Project could be opened continuously for the safe, convenient, and unimpeded use of the traveling public, or the Project has met the intention of the plans, as reasonably determined by the Engineer. When the Project is considered substantially complete, the Contract time charges shall be discontinued prior to final acceptance being made by the Engineer as prescribed in 105.16.

108.6.2-Extension of Contract Time: The Contractor shall be responsible for any delays caused by failing to start a work activity on the earliest date any activity can begin after its predecessors have been completed, unless the activity has float. The Contractor shall also be responsible for any delays caused by lack of continuous effort, inadequate allocation and scheduling of resources and coordination of the work, inadequate or insufficient application of resources, or inability to meet interim completion dates due to Contractor's approach to the work. Such delays shall not be considered for an extension of Interim Completion Dates, Contract Completion Date, or the Revised Contract Completion Date.

If the Contractor finds it impossible for reasons beyond his control to complete an activity or the work within the Contract time as specified or as extended according to the provisions of this Section, the Contractor shall notify the Engineer, in writing, within seven (7) calendar days of the Contractor becoming aware of the following:

1) a problem that develops requiring direction to the Contractor by the Engineer;
2) the occurrence of any delay including delays in critical path activities;
3) in the absence of a Schedule, delays in the controlling operation during the prosecution of Work that the Contractor believes may warrant revision of an Interim Completion date or the Contract Completion Date.

The notification shall set forth the reasons that shall justify the granting of the request, and as a minimum, identify the cause(s) for the delay, the particular critical path activity(s) or controlling operation(s) affected, the effect of any Division act or omission on each activity or operation delayed, and the significant dates that encompass the periods of delay. On projects with Schedules, the Contractor shall submit a Schedule update within seven (7) calendar days of becoming aware of the delay and another Schedule update when the Contractor indicates or the Engineer believes the delay has been resolved. In instances where controlling or critical path activities are claimed by the Contractor or determined by the Division to be delayed, the notification and Schedule update shall be considered by the Division as a request by the Contractor for a Contract time extension. If the Schedule updates relating to the delays, are not received as mentioned above, the Contractor forfeits his rights to any claims or time extensions.

In the absence of a Schedule, the controlling item will be determined from the Division's records. The Engineer will inform the Contractor weekly, by written statement, of controlling items identified for the previous week. The Contractor shall submit in writing to the Engineer any protest concerning the weekly statement within seven (7) calendar days after receipt of the statement. The written protest shall set forth what the Contractor considered incorrect, along with supporting information; otherwise, the statement shall be deemed to have been accepted by the Contractor as correct. The Engineer shall review any such protest and supporting information and shall render a decision either affirming or correcting the controlling items reported for the contested week.

If notification is not given by the Contractor within the prescribed time of the Contractor becoming aware of any delay, or if, having given notification as provided herein, the Contractor does not afford the Engineer proper facilities for keeping strict account of actual costs and loss of time, the Contractor waives any claim for additional compensation and Contract time extension. Delay costs allegedly incurred more than the allowable seven (7) days before the Contractor notifies the Engineer in accordance with this provision shall not be allowed.

If the Engineer determines that the Work was delayed because of conditions beyond the control of and without the fault or negligence of the Contractor, the Engineer may extend the time for project completion as the conditions justify.

Only delays in the activities on the critical path, or in the absence of scheduling requirements, delays in the controlling operation will be considered for a Contract time extension, provided when required, the Contractor has submitted proper notification and supporting documentation justifying the request. For projects with Schedule requirements, Time Extension reviews will be evaluated along the critical path, as determined by the project's longest path. Time Extension reviews will consider the free float and total float of all relevant activities in determining the actual project delay. The Engineer shall within fourteen (14) Calendar Days advise the Contractor in writing of the approval or rejection of the time extension request. If

approved, the extended time for completion shall then be in full force and effect the same as though it were the original time for completion.

108.6.2.1-Excusable Noncompensable Delays: An excusable noncompensable delay is a delay in the critical path activity, or in the absence of a project Schedule, a delay in the controlling operation that was beyond the Contractor's control and not caused by the Contractor's fault or negligence. Consideration may be given to an adjustment in Contract time, but no consideration shall be given for additional monetary compensation. Excusable non-compensable delays include, but are not limited to:

1. Delay of Notice to Proceed or Conditional Notice to Proceed of more than thirty (30) calendar days after the contract award date for reasons beyond the control of and without the fault or negligence of the Contractor. Consideration for an adjustment of Contract time will be limited to the number of calendar days in excess of thirty (30) calendar days, counting from the Contract award date to the effective date of the Engineer's issuance of the Notice to Proceed.
2. Delay of the Notice to Proceed more than seven (7) calendar days after the contract award date for contracts with Incentive/Disincentive clauses, as long as the reasons are beyond the control of and without the fault or negligence of the Contractor. Consideration for an adjustment of Contract time will be limited to the number of calendar days in excess of seven (7) calendar days on contracts with Incentive/Disincentive clauses, counting from the Contract award date to the effective date of the Engineer's issuance of the Notice to Proceed.
3. Delays due to acts of God, labor strikes (not within the Contractor's power to settle) freight embargoes, states of national emergency, or other reasons beyond the control of the Contractor. Consideration for an adjustment of contract time shall be limited to the number of potential working days lost as determined by the Engineer.
4. Delays in obtaining materials due to extraordinary market conditions caused by industry- wide strike, natural disaster, area-wide shortage, official federal declaration that a material is critical due to national defense efforts, or for other reasons beyond the control of the Contractor. Consideration for an adjustment of contract time shall be limited to the number of potential working days lost as determined by the Engineer.
5. Delays due to adverse weather. Lost days due to adverse weather may include:

(1) Days with inclement weather or conditions beyond the Contractor's control that prevent the involvement of their normal working forces engaged in performing critical or controlling item(s) of work for at least sixty (60) percent of the total scheduled daily hours, and
(2) Days when weather conditions prevent work from beginning at the regular time and the crew is dismissed, regardless of whether or not conditions improve for the rest of the day.

An adjustment of Contract time shall not be considered for loss of time due to adverse weather:

a. before the start of construction operations;
b. during periods when no on site- work on a controlling operation or critical path activity occurs;
c. after November 30 and before April 1 of the following year;
d. after the Contract completion date or the Revised Contract completion date.

6. Consideration for an adjustment of contract time shall be limited to the number of potential working days lost each month, as determined by the Engineer. Notification by the Contractor of weather related delays may be consolidated into a single request that shall be included in the narrative letter transmitting the monthly Schedule update. In addition, only weather related delays that correspond to an actual project delay will be allowable for consideration.

   On projects that do not require Schedules, the request shall be received within seven (7) calendar days of the end of the month in which the weather delays occurred. If a Schedule is not required for the project, any time extensions granted by the Engineer shall be on the basis of an additional working day for each potential working day lost.

The allowable time required for the Division to take action on properly prepared submissions shall be fourteen (14) calendar days after receipt unless otherwise specified in the Contract documents.

108.6.2.2-Excusable Compensable Delays: An excusable compensable delay is a delay in the critical path activity, or in the absence of a project Schedule, a delay in the controlling operation that was caused solely by the Department. An adjustment in Contract time may be

considered along with additional monetary compensation, if entitled. Excusable compensable delays include:

1. Delays in a critical path activity, or in the absence of a project Schedule, a delay in the controlling operation due to contract modifications resulting in the performance of added work, revised work, or work in greater quantities than those set forth in the Proposal except as provided in 104.11. The Division reserves the right to negotiate unit prices that include the cost for additional resources (labor, material and equipment) required to complete added work, revised work, or work in greater quantities within the originally scheduled dates, thereby negating the need for a Contract time adjustment.

Should a substantial delay be anticipated, the Department may request the Contractor to submit his/her costs and conditions for demobilization and remobilization. The Department may pay the Contractor for demobilization/remobilization expenses in lieu of further idle equipment costs.

Consideration for adjustment of Contract time for added or revised work shall be limited to the extra time allowances as agreed on and specified in the Change Order that covers the added or revised work. Mark-up for the added or revised work will be negotiated and specified in the Change Order. The adjustment of contract time and the allowable mark-up will be full and just compensation for any and all claims that the

Contractor may have regarding the added or revised work. No additional consideration will be given for Home office overhead and/or Field office overhead.

Any adjustment of Contract time for Work authorized in accordance with 104.11 that requires the performance of work in greater quantities than those specified in the Contract shall be made at the discretion of the Engineer in accordance with one of the two options below:

a. The extra time allowances as agreed on and specified in the Change Order that covers the additional or increased work; or
b. The same ratio that the total cost of the added or increased work shall bear to the total contract bid amount, provided the added or increased work is judged to be a critical path activity or, in the absence of a project Schedule, a controlling operation.

2. Loss of time due to differing site conditions. Consideration for adjustment of Contract time shall be according to Section 104.9.

3. Loss of time due to any written orders of the Engineer suspending work or delaying critical path activities on the project not the fault of the Contractor. Consideration for adjustment of Contract time shall be according to Section 104.10.
4. Loss of time due solely to acts or omissions by the Division and not caused or contributed to by the Contractor's fault or negligence.

The allowable time required for the Division to take action on properly prepared submissions shall be fourteen (14) calendar days after receipt unless otherwise specified in the Contract documents.

Consideration for an adjustment of Contract time shall be limited to the number of potential working days lost as determined by the Engineer.

SECTION 109
MEASUREMENT AND PAYMENT

109.9-PRICE ADJUSTMENT OF FUELS:

DELETE PARAGRAPH TWO AND REPLACE WITH THE FOLLOWING:

Product price quotations for Fuel Oil No. 2 (diesel fuel) as published by the Oil Price Information Service **(OPIS)** will be utilized to establish the Contract Base Price **(Cbp)** as well as the Monthly Base Price **(Mbp)** thereafter. These prices will be the average of the individual prices for the following locations:

Charleston, West Virginia
Ashland, Kentucky
Pittsburgh, Pennsylvania
Roanoke, Virginia
Marietta, Ohio

as published on the Wednesday prior to the first day of the month, with the effective date of the index being the first day of the month. If the Wednesday prior to the first day of the month falls on a holiday or the price is otherwise not published for that date, the index prices will be based on the next earliest date as published by **OPIS**.

109.10-PRICE ADJUSTMENT OF ASPHALT BINDER:

DELETE THE PARAGRAPH TWO AND REPLACE WITH THE FOLLOWING:

Because of the uncertainty in estimating the cost of petroleum products that will be used during the life of this contract, adjustments in compensation for certain contract items is provided for as follows:

The contract items listed in Table 109.10.1, will be adjusted in accordance with the Division's indices for asphalt binder. The bidding index (Ib) for asphalt binder will be equal to the placement index as listed on the Contract Administrations website for Fuel and Asphalt adjustments for the Wednesday prior to the first day of the month, with the effective date of the index being the first day of the month. If the Wednesday prior to the first day of the month falls on a holiday or the price is otherwise not published for that date, the index will be based on the next earliest date as reported. The placement index (Ip) will be the price in effect on the first of the month in which the specific adjustable material was actually placed. Both the bidding index (Ib) and the placement index (Ip) will be based on the average of the posted prices of PG 64-22 asphalt binder per ton/megagram as reported from the following sources on the Wednesday prior to the first day of each calendar month:

Marathon Petroleum Company, LLC, Catlettsburg, Kentucky
Marathon Petroleum Company, LLC, Floreffe, Pennsylvania
Asphalt materials, Inc., Marietta, Ohio
NuStar Asphalt Refining Company, Baltimore, Maryland
Associated Asphalt, Martinsburg, West Virginia

The bidding index **(lb)** and the placement index **(Ip)** may be found posted on Contract Administration's website for Fuel And Asphalt Prices at the following link:

http://www.transportation.wv.gov/highways/contractadmin/Lettings/Pages/FuelandAsphaltPrices.aspx.

If one of the sources listed above changes ownership and/or name the posted price for that terminal will continue in use as though the ownership and/or name change had not occurred.

If one of the sources used for determining either the bidding index or the placement index goes out of business, any future index will be based on the average of the remaining sources. Thus, the bidding index **(Ib)** could be based on the average of five sources and the placement index **(Ip)** on the average of four sources or vice-versa. If a source that goes out of business reopens at a later date, the placement index would once again be based on the average of five sources as indicated above.

The posted price for each source will be compared to the average of all sources. If the difference between the average and the individual price is greater than 25 % of the average, that individual source will be excluded from the calculation of the average price **(Ib)** or **(Ip)** and a new average will be calculated using the remaining sources.

Sources chosen for the index are required to report their posting to the Division no later than the Wednesday prior to the first day the month. Failure to report in a timely manner may impact source approval.

The portion of the contract unit price which reflects the cost of the specified material will be adjusted for the change in accordance with the following formulae:

$$\mathbf{Pa = Q*AC*(Ip - Ib)}$$

Where:

Pa	=	*Price Adjustment*
Ip	=	*Price Index at time of placement*
Ib	=	*Price Index for Bidding*
***AC*[1]**	=	*Asphalt Content (see Table 109.10.1)*
Q	=	*"As Constructed" Quantity*

The price index for determining price adjustments for all work performed after the contract completion date, as revised by approved time extensions, will be determined as follows: The price index **(Ip)** shall be for the month in which the contract completion date (as extended) falls, or the price index for the month in which the work was performed, whichever is less.

Table 109.10.1-TABLE OF MATERIALS TO BE ADJUSTED FOR PRICE OF ASPHALT AT THE TIME OF PLACEMENT
(English & Metric)

Item Number	Asphalt Content (%)	Item Number	Asphalt Content (%)	Item Number	Asphalt Content (%)	Item Number	Asphalt Content (%)
311006-001	3.2%	401002-021	5.7%	401003-015	5.0%	402001-026	4.9%
401001-020	3.9%	401002-022	5.7%	401007-020	5.7%	402001-027	4.9%
401001-021	3.9%	401002-023	7.6%	401007-021	5.7%	402001-028	4.9%
401001-022	3.9%	401002-024	7.6%	401007-022	5.7%	402001-029	6.7%
401001-023	5.0%	401002-025	7.6%	401007-023	5.7%	402001-030	6.2%
401001-024	5.0%	401002-026	5.7%	401007-024	5.7%	402001-031	7.6%
401001-025	5.0%	401002-027	5.7%	401007-025	5.7%	402001-032	7.6%
401001-030	3.9%	401002-028	5.7%	401007-030	7.6%	402001-033	7.6%
401001-031	3.9%	401002-029	7.6%	401007-031	7.6%	402001-034	4.9%
401001-032	3.9%	401002-030	7.6%	401007-032	7.6%	402001-035	5.2%
401001-033	5.0%	401002-031	7.6%	401007-033	7.6%	402001-036	5.0%
401001-034	5.0%	402001-035	4.9%	401007-034	7.6%	402001-038	7.6%
401001-035	5.0%	402001-036	4.9%	401007-035	7.6%	402001-039	7.6%
401001-040	5.0%	402001-037	4.9%	401007-040	6.0%	402001-040	6.0%
401001-041	5.0%	401002-040	4.9%	401007-041	6.0%	402001-041	6.0%
401001-042	4.5%	401002-041	4.9%	401007-043	6.0%	402001-045	5.5%
401001-043	4.5%	401002-042	4.9%	401007-044	6.0%	402001-046	5.5%
401001-044	5.0%	401003-001	5.0%	401007-050	7.6%	402001-050	5.0%
401001-045	5.0%	401003-002	5.0%	401007-051	7.6%	402001-051	5.0%
401001-046	4.5%	401003-003	5.0%	401007-053	7.6%	402001-055	7.6%
401001-047	4.5%	401003-006	5.0%	401007-054	7.6%	402001-056	7.6%
401001-050	4.1%	401003-007	5.0%	402001-020	6.2%	402001-060	6.0%
401001-051	4.1%	401003-008	5.0%	402001-021	6.2%	402001-061	6.0%
401001-055	4.1%	401003-011	5.0%	402001-022	6.2%	402001-065	5.5%
401001-056	4.1%	401003-012	5.0%	402001-023	7.6%	402001-066	5.5%
401002-020	5.7%	401003-013	5.0%	402001-024	7.6%	402001-070	5.0%
		401003-014	5.0%	402001-025	7.6%	402001-071	5.0%

The bidding Indexes (Ib) and the placement indexes (Ip) may be found posted on Contract Administrations website for Fuel And Asphalt Prices at the following link:

http://www.transportation.wv.gov/highways/contractadmin/Lettings/Pages/FuelandAsphaltPrices.aspx

The bidding index (Ib) for asphalt binder will be listed on the Contract Administrations website for Fuel and Asphalt adjustments for the Wednesday prior to the first day of the month, with the effective date of the index being the first day of the month for which the contract is let.

Any dispute concerning the bidding index shall be resolved during the first voucher estimate review.

DIVISION 200
EARTHWORK

SECTION 203
DISMANTLING STRUCTURES

203.1-DESCRIPTION:

DELETE PARAGRAPH ONE AND REPLACE WITH THE FOLLOWING:

This work shall consist of dismantling such structure or structures specifically designated on the Plans for removal, match marking, handling and storage if called for, or disposal if required.

203.3-CONSTRUCTION METHODS:

DELETE PARAGRPAH ONE AND REPLACE WITH THE FOLLOWING:

The work shall include dismantling and storing, or disposing of designated structures by such methods as specified on the Plans. If the old structure is remain the property of the Division, it shall be carefully dismantled without unnecessary damage, the parts match marked, and carefully stored or erected as required by the Plans or as directed by the Engineer.

Unless otherwise noted in the plans, all material removed shall become the property of the contractor and shall be removed. Disposal, if required, shall be accomplished in accordance with the provisions of 201. The final ground around dismantled structures shall conform to the final grading plan or shall be graded to drain as directed by the Engineer. The bridge may contain lead base paint and the Contractor shall provide protection for their Workers as per the requirements of 29 CFR 1926.62.

SECTION 207
EXCAVATION AND EMBANKMENT

DELETE THE CONTENTS AND REPLACE WITH THE FOLLOWING:

207.6.5-Construction/Demolition Waste Material: The Code of State Rules for the West Virginia Department of Environmental Protection Title 33 Series 1 Section 2.38 defines "Construction/Demolition Waste" as waste building materials, packaging, and grubbing waste, resulting from construction, remodeling, repair and demolition operations on houses,

commercial and industrial buildings, including, but not limited to, wood, plaster, bricks, blocks and concrete, and other masonry materials, but does not include asbestos-containing materials, household furnishings, burnt debris, material containing lead-based paint, pressure-treated wood, contaminated solid waste, yard waste or waste tires, and other items listed in subdivision 5.4.a of the Title 33, Series 1, in the Code of State Rules.

The Code of State Rules for the West Virginia Department of Environmental Protection Title 33 Series 1 Section 3.16.e.2.C. provides an One-Half Acre Exemption for Division of Highways Projects. The Division of Highways or its contractors working on highway construction that dispose of construction/demolition waste material, which, for the purpose of this paragraph, includes Category I Nonfriable Roofing, are exempt from the permitting requirements of the rule, provided that the disposal area does not exceed one-half acre, does not fill natural wetlands, adheres to best management practices for construction, maintains cover over the material, and the parties are obligated by contract to comply with all disposal provisions specified by the West Virginia Division of Highways Standard Specifications, Roads and Bridges, including supplemental specifications published by the Division of Highways (Standard Specifications). This exemption does not apply to multiple one-half acre sites on the same parcel of land, or to disposal of material not generated by the highway project. Eligibility for this exemption requires the Division of Highways or its contractors provide the Secretary for the West Virginia Department of Environmental Protection with seven (7) days' notice prior to disposal and a copy of the landowner agreement. Eligibility also requires proper management of the site by the Division of Highways.

Hazardous Waste disposal shall be conducted in accordance with State and Federal Laws and Regulations. Hazardous Waste shall be taken to an EPA approved Hazardous Waste Disposal facility.

The legitimate beneficial reuse of clean bituminous (asphaltic) concrete, Portland cement concrete and other clean masonry substances for the purpose of fill, riprap, road surfacing or road base material is exempt from the West Virginia Department of Environmental Protection permitting requirements of the rule, provided that any such fill will not be placed in natural wetlands, adheres to the best management practices for construction and maintains cover over the material when used as a structural component of a fill, and provided further that bituminous (asphaltic) concrete may not be used for riprap material.

For the purpose of the above paragraph, "clean" will be defined as uncontaminated bituminous (asphaltic) concrete, Portland cement concrete, or masonry material that does not have protruding metal prior to its reuse. In cases where Portland cement concrete is used as riprap and that concrete contains metal, the Secretary of the West Virginia Department of Environmental Protection will decide on a case-by-case basis whether this reuse is eligible for an exemption under this rule.

Concrete, stone, brick, and other masonry materials which have been broken into pieces not exceeding 2 ft. (600 mm) in any dimension may be permitted in embankments but not within 2 ft. (600 mm) of the subgrade 1 ½ ft. (450 mm) of the top of the side slopes. Material such as wood, steel, and broken concrete matted together by steel reinforcement will not be permitted in any portion of the embankment. All voids shall be completely filled with suitable material and compacted to the density specified in 207.

Portland cement concrete and bituminous (asphaltic) concrete removed from a project may be used as fill in a waste site provided the placement is in accordance with Section 207.7.3.2.3-Rock. All Portland cement concrete and bituminous (asphaltic) concrete in the waste site shall be covered with a minimum of 2 ft. (600 mm) of soil. The fill area of Portland cement concrete and bituminous (asphaltic) concrete shall not be within 300 feet (91m) of a wetland, a perennial stream, or within the 100-year floodplain.

The Contractor shall take all precautions for the stability of slopes in any waste site containing Construction/Demolition waste by benching or other methods to prevent slides and slip outs. It may be necessary to compact the Construction/Demolition waste to ensure stability. Construction/Demolition waste materials shall not be burned. Construction/Demolition waste materials which do not qualify for the Exemptions in the Code of State Rules for the West Virginia Department of Environmental Protection Title 33 Series 1 must be recycled or disposed of in a DEP approved landfill.

The Contractor shall not allow any temporary disposal sites on the right-of-way to remain after construction is completed and must dispose of all Construction/Demolition waste in accordance with this section.

207.9-SUBGRADE

DELETE SENTENCE TWO OF PARAGRAPH TWO AND REPLACE WITH THE FOLLOWING:

The tolerance set forth in section 207.9.1 shall apply.

ADD THE FOLLOWING SUBSECTION TO THE SECTION:

207.9.1-Tolerance: The completed surface shall not vary more than ½ inch (13mm) above or below plan grade. Deviations shall be corrected by scarifying, adding additional approved aggregate if necessary, and recompacting.

The subbase course shall be checked for proper thickness after final compaction. The Contractor shall refill all test holes with approved material and adequately recompact the material.

Any deficiency in total thickness of the subbase in excess of 1 inch (25mm) shall be corrected.

SECTION 211
BORROW EXCAVATION

211.2-MATERIALS:

ADD THE FOLLOWING:

211.2.4-Impervious Core: Materials shall meet the requirements specified in Section 211.3.3.

CONSTRUCTION METHODS

211.3-GENERAL:

DELETE ALL AND REPLACE WITH THE FOLLOWING:

The Contractor shall locate and furnish all borrow sites to obtain materials in the amounts directed, by the methods and subject to the same provisions as prescribed in 207 except as modified or amended within. Borrow excavation should not be obtained or placed until after all available roadway excavation has been utilized in the embankments and there is no likelihood of slip or excess material. The Contractor will have the option to borrow within the WVDOH right-of-way limits (R/W) or on private property located outside the R/W. If the Contractor chooses to borrow within the R/W, the following procedure must be adhered to before any borrow will be allowed:

211.3.1-Borrow within WVDOH R/W Limits: The Contractor shall submit copies of a site plan for any borrow within the R/W and each page/sheet of all submittals shall be signed by a professional Engineer Registered in the State of West Virginia. The submittals and the approving Engineers' signature block shall be as per Section 105.2.1.2 for shop drawing submittals.

The plan for the site shall include, but not be limited to:

1. The location and approximate boundaries of the borrow site, including any adjacent landowner property information;
2. Topographical features including existing and final ground slopes, drainage structures, etc.;
3. Storm water features, roads, access to properties, utilities, etc.;
4. An erosion and sediment control plan utilizing the best management practices consistent with all phases of operation of the borrow site;
5. Restoration or cover vegetation plan of the site;
6. If the borrow site requires the modification of an existing US Army Corps of Engineers permit, the Contractor shall provide the necessary revised permit drawings to show the proposed changes to the DOH in order to modify the existing 404 permit and to obtain a 401 Water Quality Certification if necessary. A minimum of 2 months may be required to get approval.

Steepening of slopes will not be allowed for borrow sites within the R/W without a geotechnical analysis.

Upon receipt of the Contractor's complete borrow site submission, the Engineer shall follow the guidelines as set forth in the latest edition of the Erosion and Sediment Control Manual for review and acceptance by the Division. The Contractor may be required to revise the site plan prior to acceptance by the Division. The Contractor's borrow site plan must be approved as per section 105.2.1.2 and the West Virginia Department of Environmental Protection before any borrow material can be obtained from the site.

The DOH will bear the cost of all features associated with the borrow site except for necessary revisions to drainage structures (i.e. lengthening of culverts, etc.).

Upon completion of work, all borrow sites shall be neatly trimmed and drained and all debris and spoil disposed of in accordance with the approved plan. No material shall be borrowed from places other than those approved, except as provided. Slopes shall be trimmed neatly to present a uniform surface, free from hollows or protrusions and loose or overhanging rocks. The Contractor shall take precautions by benching or other methods to prevent slides and slip outs. Borrow areas shall be graded by the Contractor then fertilized, seeded and mulched in accordance with the applicable Specifications and will be paid for in accordance with the pay items within the contract.

The Contractor shall minimize pollution or sedimentation of rivers, streams, lakes, ponds, and other bodies of water while conducting borrow operations.

211.3.2-Borrow outside of WVDOH R/W Limits: For borrow sites outside the R/W, the Contractor and/or property owner shall bear all costs and responsibilities associated with the site. Appropriate Traffic Control items within the Project Limits will be paid accordingly. The Contractor and/or property owner shall comply with existing laws and/or regulations to include approval from the State Historic Preservation Officer and save the State harmless from any claims for damages which may result from the borrow.

The Contractor shall minimize pollution or sedimentation of rivers, streams, lakes, ponds, and other bodies of water while conducting borrow operations.

Borrow pits shall not be excavated below the level of the natural drainage for the area, and the drainage ditches required to keep the pit free from standing water during the progress of the work and upon completion and shall be constructed without extra compensation.

211.3.3-Impervious Core: Imperious cores shall be constructed for all sediment dams built of rock, gravel, and pervious soils.

The impervious core shall have a minimum dimensions as set forth in Item 5, par. 20.3.4.3.1 *Erosion and Sediment Control Manual*, West Virginia Division of Highways, latest edition.

When a key is necessary for the sediment dam, the impervious core shall be made an integral part of the key. When the impervious core is not constructed of soil, the core shall be anchored into the key by trenching for a minimum depth of 2 feet (610 mm).

The impervious core may be constructed using one of the following methods:

a) Soil Impervious Core: Soil impervious cores may be shaped to facilitate placement and compaction. The coefficient of permeability of the soil used for the impervious core must be 10^{-4} cm per sec or less. A key, a minimum of 4 feet (1.2 m) in depth, must be constructed into the original ground. The compaction of the impervious core shall be as in accordance with Section 716.3.

b) Concrete Impervious Core: When concrete is used for the impervious core, Class B Concrete shall be used. The requirements of Section 601, Structural Concrete shall control the mixture and placement of the concrete. The Engineer may waive the testing of the Class B Concrete if the concrete is from an approved plant.

c) HDPE or LLDPE Impervious Core: When the impervious core is constructed of High Density Polyethylene (HDPE) or Low Linear Density Polyethylene (LLDPE), the liner shall be manufactured to be suitable for buried conditions and may be either smooth or textured. The Contractor shall obtain recommendations from a liner manufacturer for the material best suited for impervious cores, handling, storage, and construction procedures. The manufacturer of the liner shall furnish the Engineer a Letter of Certification stating the liner is suitable for the intended use.

d) Other Methods for an Impervious Core: The Contractor may design and use other methods of preventing the seepage of water from the wet area. The Engineer must approve the design of the alternative method.

When the impervious core is not constructed used the Soil Impervious Core method the Contractor shall submit a plan containing construction details and materials to be used for the impervious core(s) for the approval of the Engineer prior to the start of work and the purchase of any materials. This submittal will be part of the temporary and permanent pollution control schedules and methods required by Section 642.3-Preconstruction Conference, Construction Methods, Section 642, Temporary Pollution Control, of the *West Virginia Division of Highways Standard Specifications Roads and Bridges,* latest edition.

211.5-ROCK BORROW EXCAVATION:

ADD THE FOLLOWING TO THE SECTION AS THE LAST SENTENCE TO PARAGRAPH ONE:

Stones used for scour protection shall be in accordance with section 218.4.1.

SECTION 218
SLOPE AND FOUNDATION PROTECTION

218.4-FOUNDATION PROTECTION:

ADD THE FOLLOWING TO THE SECTION:

218.4.1-Scour Protection: Stones used for scour protection shall be well graded throughout the thickness as determined by Engineer via visual inspection. Stones smaller than the specified lowest gradation as specified in the plans are not allowed in an amount exceeding 20% by weight. Material quality shall be satisfactory to Engineer. The use of shale is not permitted.

218.7-PAY ITEMS

REVISE ITEM 218006-* IN THE TABLE TO READ AS FOLLOWS:

ITEM NUMBER	DESCRIPTION	UNIT
218006-*	Foundation Protection	Cubic Yards (Meter)

DIVISION 300
BASES

SECTION 311
OPEN GRADED FREE DRAINING BASE COURSE

311.2-MATERIALS:

DELETE THE FIRST ROW OF THE TABLE FOR "AGGREGATE" AND REPLACE WITH THE FOLLOWING:

MATERIAL	SUBSECTION	UNIT
Aggregate*	703.1, 703.2, 703.3, 703.4	AASHTO 57, 67, 357, or 467

311.4-COMPOSITION OF OPTIONAL STABILIZING MIXTURES:

DELETE THE SECOND PARAGRAPH AND REPLACE WITH THE FOLLOWING:

If the Portland cement stabilized alternative is chosen, the cement shall be Type 1 and shall have a minimum cement content of 150 ± 5 pounds per cubic yard (90 ± 2 kg per cubic meter). This base course shall be capable of withstanding construction operations without showing any detrimental effects.

311.11-CURING:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

No curing is required for Portland cement stabilized based.

DIVISION 400
BITUMINOUS PAYMENTS

SECTION 401
HOT-MIX ASPHALT BASE, WEARING, AND PATCHING AND LEVELING COURSES

DELETE THE TITLE OF THE SECTION, THE SECTION, AND REPLACE WITH THE FOLLOWING.

SECTION 401
BITUMINOUS ASPHALT BASE, WEARING, AND PATCHING AND LEVELING COURSES

401.1-DESCRIPTION:

This work shall consist of constructing one or more courses of hot-mix asphalt (HMA) or warm-mix asphalt (WMA), mixed mechanically in a plant, composed of aggregate and asphalt material designed in accordance with either the Marshall or Superpave Design System as specified in the contract documents, on a prepared foundation in accordance with these specifications and in reasonable close conformity with the lines, grades, weights or thicknesses, and cross sections shown on the Plans or established by the Engineer.

The unit of measurement for HMA or WMA will be by the ton (megagram), square yard (square meter) or cubic yard (cubic meter).

The work will be accepted in accordance with these Specifications and the applicable requirements of Sections 105, 106, and 109.

401.2-MATERIALS:

The materials shall conform to the following requirements:

MATERIAL	SUBSECTION	PG BINDER GRADE
Performance Graded Binders	705.5	Standard grade shall be a PG 64-22.
Coarse Aggregate	703.1 thru 703.3 [Note 1] and [Note 3] (See MP 401.02.28 for exceptions and additions required for Superpave Items.)	PG 70-22 [Note 2] shall be used on projects specified with over 20 million ESALs.
Fine Aggregate	702.3 (See MP 401.02.28 for additions required for Superpave Items)	Any deviation from the above criteria will be specified in contract documents.
Mineral Filler	702.4	

Note 1 The total shale, coal and other lightweight deleterious material and friable particles shall not exceed 3%.

Note 2 PG 64-22 Binder may be used in asphalt placed below the top two lifts. Scratch course and patching-and-leveling are not identified as lifts

Note 3 When slag is specified in the contract, the coarse aggregate shall be slag which meets the requirements of 703.3, except as amended in this subsection

CONSTRUCTION METHODS

401.3-GENERAL:

Construction methods to be used in performing the work shall be submitted to the Engineer for review prior to the start of work. This review may require modification of the proposed methods to provide the desired end product. All equipment, tools, machinery, and plant shall be maintained in a satisfactory working condition.

401.4-COMPOSITION OF MIXTURES:

401.4.1-General: The aggregate for use in the designated mixture shall consist of a mixture of aggregate (coarse, fine, reclaimed asphalt pavement (RAP) if desired, or mixture thereof) and mineral filler if required. It shall be the responsibility of the Contractor to determine the percentage of RAP to be used in the mix. The amount and grade of virgin PG Binder to be used in the RAP designs shall be determined in accordance with Materials Procedure (MP) 401.02.24.

401.4.2-Job Mix Formula: Job Mix Formula (JMF) is the specification for a single mix produced at a single plant. This mix may be specific to a single project or be used on multiple projects if the basic design criteria (design compaction level and PG Binder grade) are the same.

The Contractor shall submit a proposed JMF for each combination of aggregate and asphalt material for each type of HMA to be produced. Depending on the design type, the JMF gradations shall be within the tolerances set forth in either Table 401.4.2A or Table 401.4.2B. Marshall mix designs shall be developed in accordance with MP 401.02.22. Superpave mix designs shall be developed in accordance with MP 401.02.28.

Each proposed JMF must be documented on the Division Form T400 or T400SP and the entire JMF package shall be forwarded for review to the District Materials Engineer/Supervisor. The T400/T400SP and JMF package shall then be transmitted to the Materials Control, Soils and Testing Division for final review. If the JMF requires revision, it will be returned to the designer through the District. The T400/T400SP Form shall contain the following information:

i. Identification of the source and type of materials used in the design.
ii. The aggregate blend percentages and the percentage for each sieve fraction of aggregate considered the desirable target for that fraction.
iii. The percentage of asphalt binder representing the optimum asphalt content for the JMF submitted, which is to be considered the desirable target percentage.
iv. The temperature of the completed mixture at the plant which shall be within ± 25° F (± 14° C) of the median mix temperature established by the temperature-viscosity chart or as recommended by the asphalt supplier.

v. The ratio (calculated to the nearest one-tenth percent) of the Fines to Asphalt (FA). For Marshall mixes the ratio is defined as the percentage of aggregate passing the No. 200 (75 µm) sieve, divided by the percentage of asphalt content calculated at the percentage optimum asphalt content of the design. For Superpave mixes the ratio is defined as the percentage of aggregate passing the 75 µm (No. 200) sieve, divided by the percentage of effective asphalt content calculated at the percentage optimum asphalt content of the design.

TABLE 401.4.2A
DESIGN AGGREGATE GRADATION REQUIREMENTS FOR MARSHALL MIX DESIGNS

TYPE OF MIX	Base-I	Base-II (Patch & Level)	Wearing IV	Wearing-I (Scratch-I)	Wearing -III (Scratch -III)
SIEVE SIZE	Nominal Maximum Size				
	1 ½ in (37.5 mm)	¾ in (19 mm)	¾ in (19 mm)	3/8 in (9.5 mm)	No. 4 (4.75 mm)
2 in (50 mm)	100	–	–	–	–
1 ½ in (37.5) mm)	90-100	–	–	–	–
1 in (25 mm)	90 max	100	100	–	–
¾ in (19 mm)	–	90-100	90-100	–	–
½ in (12.5 mm)	–	90 max	90 max	100	–
3/8 in (9.5 mm)	–	–	–	85-100	100
No. 4 (4.75 mm)	–	–	47 min	80 max	90-100
No. 8 (2.36 mm)	15-36	20-50	20-50	30-55	90 max
No. 16 (1.18 mm)	–	–	–	–	40-65
No. 30 (600 µm)	–	–	–	–	–
No. 50 (300 µm)	–	–	–	–	–
No. 200 (75 µm)	1.0- 6.0	2.0-8.0	2.0-8.0	2.0-9.0	3.0-11.0

TABLE 401.4.2B
DESIGN AGGREGATE GRADATION REQUIREMENTS FOR SUPERPAVE MIX DESIGNS

Type of Mix	37.5	25	19 [Note 1] (Patch & Level)	12.5	9.5 (Scratch)	4.75 (Scratch)
Standard Sieve Size	Nominal Maximum Size					
	37.5 mm (1 ½ inch)	25 mm (1 inch)	19 mm (3/4 inch)	12.5 mm (1/2 inch)	9.5 mm (3/8 inch)	4.75 (No. 4)
50 mm (2”)	100	–	–	–	–	–
37.5 mm (1½”)	90-100	100	–	–	–	–
25 mm (1”)	90 max	90-100	100	–	–	–
19 mm (3/4”)	–	90 max	90-100	100	–	–
12.5 mm (1/2”)	–	–	90 max	90-100	100	100
9.5 mm (3/8”)	–	–	–	90 max	90-100	95-100
4.75 mm (No.4)	–	–	–	–	90 max	90-100
2.36 mm (No.8)	15-41	19-45	23- 49	28-58	32-67	
1.18 mm (No.16)	–	–	–	–	–	30-60
600 µm (No.30)	–	–	–	–	–	–
300 µm (No. 50)	–	–	–	–	–	–
75 µm (No.200)	0.0-6.0	1.0-7.0	2.0-8.0	2.0-10.0	2.0-10.0	6.0-12.0

Note 1 When a 19 mm mix is specified for use as a heavy duty surface mix, it shall be designed as a fine graded mix with the additional requirement of a minimum of 47% passing the 4.75 mm (No.4) screen.

If it becomes necessary to change aggregate sources, a new mix design shall be developed and submitted for approval. When using neat (unmodified) PG Binders, the binder source may be changed without requiring a new mix design, but the binder grade must always remain the same for each design. If a source change results in the use of an additive-enhanced modified binder of the same grade, a new mix design will be required.

If a modified binder source is changed or if the modification process is changed, a new mix design shall be developed and submitted for approval. A source change to a new location with the original manufacturer/supplier and the original modification process will not require a new mix design.

At no time shall different grades of PG Binders be mixed together in the same storage tank. When it is necessary to switch to a new binder grade the tank shall be drawn down as far as possible, normally to the top of heating coils, before refilling with the new binder. The new binder shall be circulated thoroughly before restarting production.

401.4.2.1-Warm Mix Asphalt: When the Division allows an approved HMA design to be produced as warm-mix asphalt (WMA) using the water injection system, the temperature of the completed mixture at the plant may be lowered to an established range that has previously been determined through trial production. The allowable temperature range specified on the approved T400 mix design form shall be adjusted accordingly when producing WMA. In addition, all references to the minimum compaction temperatures in Sections 401.10.3 and 401.10.4 of this specification and in MP 401.05.20, Compaction Testing of HMA Pavements, may be waived if it can be established that additional density can be obtained at lower temperatures without damaging the pavement. Intermingling of WMA and HMA on the same course should be avoided. If circumstances result in the need for intermingling, it must be approved by the Engineer. Upon approval, the location where intermingling occurs on the project shall be clearly defined and documented by the Contractor and submitted to the Engineer. Also, if the intermingling occurs on a project where the density of the pavement is being controlled by the rollerpass compaction method, then a new test section shall be established on the new material beginning at the point where the WMA and HMA meet. All testing requirements established for HMA mix designs and quality assurance/quality control testing shall also apply to WMA.

401.5-TESTING:

401.5.1-Test Methods:

MP 700.00.06	Aggregate Sampling Procedures
AASHTO T168	Sampling Hot-Mix Asphalt
AASHTO T11	Materials Finer than No. 200 (75 µm) Sieve in Mineral Aggregates by Washing
AASHTO T27	Sieve Analysis of Fine and Coarse Aggregates
AASHTO T30	Mechanical Analysis of Extracted Aggregate
AASHTO T164	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
AASHTO T308	Asphalt Content of HMA by the Ignition Method (Test Method A)
AASHTO T245	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D5581	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (For Base-I Marshall designs only)
AASHTO T166	Bulk Specific Gravity of Compacted Bituminous Mixtures
AASHTO T209	Maximum Specific Gravity of Bituminous Paving Mixtures
AASHTO T312	Determining the Density of HMA Specimens by Means of the Superpave Gyratory Compactor

401.6-CONTRACTORS QUALITY CONTROL:

401.6.1-Quality Control Testing: Quality control of bituminous asphalt is the responsibility of the Contractor. The Contractor shall maintain equipment and qualified personnel including at least one certified asphalt technician at each plant. The technician shall be in charge of all plant quality control

activities such as mix proportioning and adjustment and all sampling and testing activities necessary to maintain the various properties of asphalt within the limits of the specification. A certified asphalt inspector may handle sampling and testing activities under the supervision of the plant technician.

The Contractor shall maintain equipment and qualified personnel including at least one certified Compaction Technician at each project. A certified Compaction Technician shall perform all testing necessary to assure compaction of the asphalt meets specification requirements. The Contractor, or Contractor-Producer, shall design a workable Quality Control Plan, detailing the type and frequency of sampling and testing deemed necessary to measure and control the magnitude of the various properties of the asphalt governed by these specifications. This plan, prepared in accordance with MP 401.03.50 shall be submitted to the Engineer for review prior to production of material under this specification.

401.6.2-Job Mix Formula (JMF) Field Verification: For each JMF, a mix design field verification shall be conducted during the first days of plant production. For Marshall designs, the verification shall be in accordance with the guidelines established in MP 401.02.27. For Superpave, designs it shall be in accordance with MP 401.02.29. The field verification is for the purpose of demonstrating that the JMF can be produced within the specified tolerances set forth in the MP. If the mix cannot be produce within these requirements, a new mix design will be required.

401.6.3-Quality Control Testing Requirements: After the JMF design field verification has been successfully completed, sampling frequency and test requirements for quality control shall be as set forth in MP 401.02.27 for Marshall designs and MP 401.02.29 for Superpave designs. If the Division determines that a mix cannot be consistently produced within the tolerance limits of the specified design properties, approval of the mix may be revoked and the contractor will be required to provide a new mix design.

401.7-ACCEPTANCE TESTING:

401.7.1-Acceptance Testing of HMA: Acceptance testing of asphalt is the responsibility of the Division. For Superpave mixes, the acceptance sampling and testing requirements for the mixture shall be as set forth in MP 401.02.29.

401.7.2-Surface Tolerance: It is the intent of these specifications that projects with a total new pavement thickness of 3 inches (75 mm) or more and minimum length of two lots (1100 ft. (340 m)) shall be constructed to provide a smooth riding surface. The smoothness of the riding surface will be determined by the Engineer using an inertial profilometer or Mays Ride Meter. The smoothness testing will generally be accomplished within 30 days after the project is complete. On urban projects with numerous side streets where traffic must cross through the paving operation, the Engineer shall determine if it is practical to evaluate the pavement for smoothness.

The pavement will be divided into sampling LOTS of one-tenth (0.1) lane-mile (0.16 km) each. Each LOT shall exhibit a smoothness measurement, expressed in inches per mile (millimeters per kilometer) equal to or less than that shown in the appropriate Table 401.7.2E or 401.7.2M. When a LOT is represented by a smoothness number greater than that shown in Tables 401.7.2E or 401.7.2M, the unit price shall be adjusted as in 401.13.2.

TABLE 401.7.2E

Total New Pavement Thickness	**Smoothness**
3 inches to 4 inches	81 inches per mile or less
4 inches or greater	65 inches per mile or less

TABLE 401.7.2M

Total New Pavement Thickness	Smoothness
75 mm to 100 mm	1 250 mm/km or less
100 mm or greater	1 000 mm/km or less

When compaction is completed on the course, it shall present a uniform surface, true line and grade, conforming to the cross section shown on the Plans. When tested with a straightedge of approximately 10 feet (3 meters) in length and a template of the specified dimensions, the finished base course shall not show a deviation greater than ¼ inch (6 mm) and the finished wearing course shall not show a deviation from the required surface greater than 3/16 inch (5 mm).

The Contractor shall provide the straightedge and template for checking the surfaces and an employee to use them under the direction of the Engineer. Any irregularity of the surface exceeding the limits specified shall be corrected. Depressions which develop after the initial rolling shall be corrected by loosening the mixture and adding new material. High places shall be corrected by removing excess material.

Areas of completed courses found to be defective shall be removed and replaced with approved mixtures laid in accordance with these specifications, and no additional compensation will be allowed for materials used or work involved in replacing defective areas.

401.7.3-Compaction: Acceptance testing for compaction shall be performed in accordance with either the Lot-by-Lot method described in Section 401.7.3.1 or the rollerpass procedure described in MP 401.05.20, based the following criteria:

Roadway Type	Compaction Method
Interstate and Expressways	Lot By Lot
APD Routes	Lot By Lot
NHS Routes	Lot By Lot
All other routes and roadways	Determined by Table 401.7.3.A

Patching-and-leveling and scratch courses shall not be included in determining the total new pavement thickness. When asphalt is placed in areas that require a non-uniform thickness or is tapered to a thin edge, the method of acceptance testing shall be determined by the Engineer. Acceptance testing is not required on areas in which a full-size roller is restricted from properly compacting the mat. These areas shall be compacted to the satisfaction of the Engineer.

Table 401.7.3A
Mainline Compaction Methods

Traffic Type	Total New Pavement Thickness	Marshall Lift Thickness	Superpave Lift Thickness	Compaction Method Notes -1, 2
Heavy ≥ 3 million ESALs	≥ 2.5 inches (63 mm)	≥ 1.5 inch (37.5 mm)	≥ 1.5 inch (37.5 mm)	Lot-by-Lot
		< 1.5 inch (37.5 mm)	< 1.5 inch (37.5 mm)	Rollerpass
	< 2.5 inches (63 mm)	> 1.5 inch (37.5 mm)	> 1.5 inch (37.5 mm)	Lot-by-Lot
		≤ 1.5 inch (37.5 mm)	≤ 1.5 inch (37.5 mm)	Rollerpass
Medium < 3 million ESALs	≥ 3.0 inches (75 mm)	> 1.5 inch (37.5 mm)	> 1.5 inch (37.5 mm)	Lot-by-Lot
		≤ 1.5 inch (37.5 mm)	≤ 1.5 inch (37.5 mm)	Rollerpass
	< 3.0 inches (75 mm)	All lifts	All lifts	Rollerpass

Note 1 Any lift that is placed at a thickness of less than two times the nominal maximum aggregate size, as specified in either Table 401.4.2A or Table 401.4.2B, shall be compacted using the rollerpass method.

Note 2 Any asphalt that has been specified with a higher than standard grade PG Binder (i.e. PG 70-22, PG 76-22, etc.) shall be compacted using the Lot by Lot method in accordance with Section 10.0 of MP 401.05.20.

Table 401.7.3B
Other Compaction Situations

Procedure	Construction Situation	Compaction Method
Shoulders	New Construction	Lot-by-Lot
	Overlay Projects	Rollerpass
Shoulders With Rolled-In Rumble Strips	Surface Course Only	See Section 401.7.3.2
Trench Paving	All	Rollerpass or Satisfaction of the Engineer
Pavement Widening	All	Rollerpass or Satisfaction of the Engineer
Pavement Repairs	All	Rollerpass or Satisfaction of the Engineer

401.7.3.1-LOT-By-LOT Testing: Randomly located nuclear density tests will be performed in accordance with the LOT-By-LOT test procedure described in MP 401.05.20. The pavement shall be divided into LOTS not exceeding 1000 feet (300 meters) of paving lane. A randomly located density test shall be conducted in each LOT. The density shall be within the range of 92 to 96% of the maximum density of the approved mix design or the maximum density established under Section 401.6.2, Job Mix Formula Verification. If the density is outside the range, an additional five tests shall be conducted for the LOT and the average of these five tests used to judge acceptance of the LOT in accordance with Table 401.13.3.

401.7.3.2-Shoulders With Rolled-In Rumble Strips: On both new construction and overlay projects, the compaction requirement for the surface course of the shoulder shall be in accordance with the rollerpass procedure described in MP 401.05.20. However, the number of roller passes may be reduced in the area of the rolled-in rumble strip to allow for the proper placement of the rumble strip.

401.7.4-Thickness: When a uniform thickness of three inches (75 mm) or more is specified, excluding resurfacing, cores shall be taken to verify the thickness of the compacted pavement.

Cores will be taken by the Division at random locations. The sampling frequency shall be approximately five cores per 2,000 feet (600 meters) of two-lane construction, except that the sampling frequency shall normally be limited to a minimum of five and a maximum of 50 cores per project. The Division may elect to waive coring for short projects of less than 1,000 feet (300 meters) in length or for projects where a paving mat of uniform thickness cannot be expected (for example: tapered paving

mats or pavement widening projects). The Division may also elect to take additional cores when needed to resolve problems related to pavement thickness.

The thickness shall be considered acceptable if one or both of the following criteria are met:

(a) The average thickness equals or exceeds the specified thickness.
(b) The average thickness is less than the specified thickness, but the difference is not statistically significant at the 95% confidence level. (Standard one tail "t" test at 0.05 significance).

The calculated 't' value shall be less than or equal to the standard 't' value at the 95% confidence level. The method for calculating Criteria 'B', shall be as follows:

$t \leq t_{95}$ Where:

t_{95} = value from standard "t" table for 95% confidence level.

$$t = \frac{x_s - \bar{x}}{s}\sqrt{n-1}$$

x_s = specified thickness

$\bar{x}$ = average thickness

n = number of samples

$$s = \sqrt{\frac{\sum x_2 - \frac{(\sum x)_2}{n}}{n-1}}$$

x = individual core thickness

If the average thickness is less than specified and is determined to be significant as determined by criteria 'B', the Division shall decide on a course of action as described in Section 401.13.4.

401.8-WEATHER RESTRICTIONS:

Bituminous asphalt shall only be placed when the surface is dry and when weather conditions are such that proper handling, finishing, and compaction can be accomplished. In no case however, shall asphalt be placed when the surface temperature is below the minimum established in Table 401.8.

TABLE 401.8	
Course Thickness	**Minimum Surface Temperature**
3 inches (75 mm) and over	35 °F (2 °C) **Note -1**
1.5 to 2.9 inches (38 to 74	40 °F (4 °C)
Less than 1.5 inches (38 mm)	50 °F (10 °C)

Note 1 In lieu of 35 °F (2 °C), a minimum air temperature of 40 °F (4 °C) shall be used when paving directly on an aggregate base, subbase, or subgrade

In addition to the above surface temperature requirements, no wearing courses shall be placed when the air temperature is less than 40° F (4° C).

401.8.1-Cold Weather Paving: When the air temperature falls below 50° F (10° C) or the surface temperature falls below 60° F (15° C) the provisions for cold weather paving shall apply.

Paving shall be performed so that the transverse joints in adjacent lanes shall be no more than 50 feet (15 meters) apart at the end of each day's paving operations.

The surface temperature shall be taken a minimum of once every hour and shall be taken in all shaded areas. The temperature requirements as listed in Table 401.8 shall apply.

It shall be the Contractor's responsibility to monitor the declining surface temperature to insure that material delivery from the plant be terminated so as to allow that all material can be placed prior to the surface temperature falling below the surface temperatures listed in Table 401.8.

The temperature of the delivered material and the mat temperature at the time final density is obtained shall be taken for every truck load. These temperatures shall be in accordance with Section 401.10.3 for delivered material and 401.10.4 for the mat temperature at the time final density is obtained.

401.9-EQUIPMENT:

401.9.1-Plants: All plants in West Virginia producing asphalt for the Division shall provide documented evidence of compliance with current requirements of the West Virginia Air Pollution Control Commission.

All plants which are not in West Virginia but producing asphalt for the West Virginia Division of Highways shall provide documented evidence of compliance with current requirements of the laws and regulations of the State in which they are producing, applicable to air pollution. All plants shall meet the general requirements set forth in AASHTO M156 unless it can be demonstrated to the satisfaction of the Engineer that a consistent quality mix can be produced with modifications to any of these requirements.

401.9.2-Dust Collector: An efficient dust collecting system shall be provided to prevent the loss of fine material. The material collected may be returned to the mixture at a uniform rate or discarded.

401.9.3-Truck Scales: Truck scales shall be provided at each Plant, except that truck scales are not required at properly calibrated automatic batching plant facilities which are equipped with digital printout equipment, and which load the trucks directly from the mixer or the weigh hopper in a surge or storage bin.

A person designated as a weigher shall be provided by the producer. The weigher shall certify that the weight of the asphalt, as determined either by the truck scales or from the digital printout of the batch weights, is correct.

Each truck shall be weighed empty prior to each load, except at automatic batch plants approved to operate without truck scales.

All truck scales shall be mounted on solid foundations which will insure them remaining plumb and level.

Approval and sealing of scales shall be conducted at the frequency determined by the West Virginia Division of Labor, Bureau of Weights and Measures, and when the plant is moved, or upon the request of the Engineer. The Engineer shall be notified of any scale malfunctions when material is being furnished to Division of Highways projects. The Division may, at its option, accept inspection and sealing by out-of-state agencies when the mixing plant is located outside West Virginia.

A digital recorder shall be required on all truck scales. The digital recorder shall produce a printed record of the gross, tare and net weights, and the time, date, truck identification, and project number. Provision shall be made for constant zero compensation and further provision shall be made so that the scales may not be manually manipulated during the printing process. The system shall be interlocked so as to allow printing only when the scale has come to rest. In case of breakdown of the automatic equipment, the Engineer may permit manual operation for a reasonable time, normally not to exceed 48 hours, while the equipment is being repaired.

The scales shall be of sufficient size and capacity to weigh the loaded trucks that are used for delivery of asphalt from the plant.

401.9.4-Test Weights: As part of its standard equipment, each plant which proportions aggregate by weight shall provide a minimum of ten 50-pound (22.68 kg) test weights for the purpose of maintaining the continued accuracy of its weighing equipment.

Plants which proportion asphalt material by weight shall furnish, in addition to the above, one five pound (2.268 kg) test weight.

401.9.5-Surge and Storage Bins: During the normal daily operation of the plant, asphalt may be stored in a surge or storage bin for a maximum of 12 hours, provided the bin has received prior evaluation and acceptance through the District plant inspection. The resulting temperature of the material at time

of placement and compaction shall be sufficient to comply with 401.10.3 and 401.10.4

Longer silo storage times, up to 24 hours, may be permitted for dense graded asphalt if the storage silo is insulated and/or heated to assure that the proper mix temperature is maintained. The gates at the bottom of the storage silo shall be adequately heated and sealed when the asphalt is held for the extended period of time. An inert gas system may be used to purge the silo of oxygen to prevent oxidation of the asphalt. The asphalt delivered from the storage silo shall meet all of the specification requirements.

When asphalt is stored for the extended time period, it shall not be used until the temperature has been checked and the asphalt has been visually inspected for hardening of the mix and stripping of the asphalt from the aggregate. Approval of the extended storage time may be revoked if it is determined through inspection and/or testing that the extended storage is having a detrimental effect on the asphalt.

Loading of trucks through the storage bin will only be permitted when a minimum 25-ton (23-Mg) buffer of material is being maintained or an amount as recommended by the bin manufacturer, means shall be provided for loading the trucks directly from the mixer when the storage bin is not in operation.

401.9.6-Inspection of Equipment and Plant Operations: The Engineer shall have access to the plant to assure the adequacy of the equipment in use, to inspect the conditions and operation of the plant, to verify weights, to verify the proportion and character of materials, and to determine if specified temperatures are being maintained in the preparation of the mixture.

401.9.7-Trucks for Transporting Mixture: The inside surfaces of trucks shall be thinly coated with a soapy water or a mixture with not more than ten percent lubricating oil. The use of diesel fuel, kerosene, or similar solvent-based products which can dissolve the asphalt film from the aggregate particles will not be permitted. Any commercial release agent which can be certified as harmless to the mix may be used; however, the Division reserves the right to restrict any release agent that is shown to cause problems during placement of the mix. In the case of mixtures composed of PG Binders which contain polymer modification, truck surfaces should be coated with a release agent recommended by the binder supplier. All excess coating material shall be removed from the truck bed prior to loading the asphalt.

All truck beds shall be insulated with approved material. No trucks shall be used which cause segregation of the materials, which show large oil leaks, or which cause undue delays in delivery of material. All trucks shall be provided with a waterproof cover and a hole in the body for the purpose of conveniently checking the temperature of the load. Covers shall be suspended slightly above the mixture, shall extend over the sides of the truck, and shall be securely fastened to eliminate air infiltration and to prevent water from coming in contact with the mixture.

401.9.8-Laboratory: A testing facility or laboratory, as described below, shall be provided within reasonable proximity of the asphalt plant. Plant operations must be visible from within the laboratory.

The laboratory shall be of sufficient size to hold all laboratory test equipment and supplies with adequate floor space to allow the technicians to test samples in an efficient manner. The laboratory shall be furnished and maintained with adequate ventilation, heat, light, water, sink and drainage, electrical or gas outlets, or both, work table, shelves, and supply cabinets.

The laboratory shall be supplied with the equipment and materials listed below and these shall be maintained to meet the applicable requirements of AASHTO or ASTM:

i. Hot plate, gas or electric.
ii. Large ovens (as needed for heating and drying samples), gas or electric.
iii. Unit weight container, ½ cubic foot (0.014 cubic meter). Required for slag only.
iv. Balances of sufficient capacity and accuracy for conducting specified tests and plant calibration.
v. Thermometers: dial type, liquid-in-glass, and digital as required for conducting standard test procedures and monitoring mix temperatures. Digital thermometers shall be equipped with an appropriate sturdy probe that can be pushed into a sample of hot asphalt to check the temperature of the mix.
vi. Standard Gilson shaker or equivalent, with screens.
vii. Ro-Tap shaker or equivalent, with 8 and/or 12 inch (200 and/or 300 mm) diameter screens.
viii. Sample splitters for fine and coarse aggregates.
ix. Miscellaneous items (including sample splitting trowels, scoops, square point shovel, aggregate sample pans, heat resistant gloves, measuring rules, brushes, flashlight, timing devices, and glassware as needed).
x. Expendable supplies necessary for performance of tests.
xi Equipment for determining the maximum specific gravity of asphalt mixtures as specified in AASHTO T209.
xii. Equipment for determining the in-place density of asphalt mixtures meeting the requirements of MP 401.05.20.
xiii. Non-contact infrared thermometer accurate to ± 2° F (± 1° C).
xiv. Equipment for determining the bulk specific gravity of HMA using saturated surface dry specimens complying with AASHTO T166.
xv. Marshall equipment necessary to comply with AASHTO T245 and ASTM D5581, including a calibrated automatic testing apparatus having recording capabilities and compaction hammers. (Marshall designs only)
xvi. Asphalt content ignition oven with built-in scale and printer meeting the requirements of AASHTO T308, Test Method A. (Optional for Marshall designs – Mandatory for Superpave designs)

xvii. Calibrated Gyratory compactor meeting requirement of AASHTO T312 with computer (including software for data acquisition and test calculations) and primer. Compactor must be calibrated to the internal angle in accordance with AASHTO TP71 with annual verification (Superpave designs only).

401.9.9-Asphalt Paving Equipment: Asphalt paving equipment shall be self-contained and of sufficient size, power and stability to receive, distribute and strike-off the asphalt mixture at rates and widths commensurate with the typical sections and other details shown on the plans. The paver shall be provided with an activated screed or strike-off assembly equipped to be heated. Approval of the paver by the Engineer will be based on the demonstrated capability of the equipment to place the mixture to the required cross-section, profile and alignment in an acceptable, finished condition ready for compaction.

The paver shall be equipped with means of preventing the segregation of the coarse aggregate particles when moving the mixture from the paver hopper to the paver augers. It shall also be capable of pushing a sufficient amount of the mixture under the auger gearbox to prevent streaking or tearing of the mat. Some paver models may require the installation of a manufacturer retrofit kit or equipment modification to accomplish this.

Specialized equipment or hand methods approved by the Engineer may be employed to spread the asphalt mixture where the use of standard full scale paver is impractical due to the size or irregularity of the area to be paved.

Pavers shall be equipped with mechanical or automatic grade and slope controls. The use of automatic grade and slope controls with a traveling straight edge shall be required only when specified on the Plans or in the Proposal. Both the grade and slope controls shall be in working order at all times. In the event of failure of the automatic controls, the Contractor will be permitted to finish the day's work using manual controls but will not be allowed to resume work the following day until the grade and slope controls are in proper working order.

401.9.10-Compaction Equipment: Compaction may be performed by self-propelled steel-wheeled, pneumatic-tired and/or vibratory rollers. Hand-held rollers or vibrating plates may be used in small inaccessible areas if approved by the Engineer. Prior to use on any project, the roller shall be inspected to see that it is in good mechanical condition. The total weight, weight per inch of width (steel-wheeled), and average ground contact pressure (pneumatic-tired) shall be documented.

401.10-PAVING OPERATIONS:

401.10.1-Cleaning and Sweeping: Immediately prior to the arrival of the paving mixture, the existing base or surface shall be thoroughly cleaned by the use of tools and equipment as may be required to remove all mud, dirt, dust,

and other caked or loose material foreign to the type of treatment or surface being placed. The cleaning shall be done to a minimum width of one foot on each side beyond the width of the surface being placed.

401.10.2-Patching and Leveling and Scratch Courses:

401.10.2.1-Patching and Leveling: A tack coat shall be applied to the existing pavement prior to placing patching and leveling.

Patching and leveling shall be placed at various locations throughout the project to remove irregularities in the existing pavement such as dips, or to raise the outside edge of the existing pavement to provide a uniform template prior to placing a base or wearing course. Patching and leveling shall not be placed as a continuous layer or course over the full width and length of the project.

Compaction of patching and leveling shall be performed with three-wheel (steel) or pneumatic-tire rollers.

401.10.2.2-Scratch Course: A tack coat shall be applied to the existing pavement prior to placing a scratch course.

The scratch course shall be placed to the limits designated on the plans. Scratch course shall be placed with a paving machine. The paving machine screed shall be set to drag on the high areas of the existing pavement, only depositing material in ruts and other depressions.

The wearing course, or at least one lift of base course, should be placed over the scratch course prior to maintaining traffic in the lane where the scratch course has been placed. All repairs to a scratch course due to traffic damage shall be at the contractor's expense.

Compaction of a scratch course shall be performed with a three-wheel (steel) or pneumatic-tire roller.

401.10.3-Spreading and Finishing: Before spreading any material, the contact surfaces of curbs, gutters, manholes, and of adjacent Portland cement concrete pavement edges shall be painted or sealed with asphalt material. Exact edge of pavement, except on concrete, shall be established by a string or chalk line for a distance of not less than 500 feet ahead of the spreading operation.

For mixes produced with neat (non-modified) asphalts (which may include PG 70-22, PG 64-22, PG 64-28, and PG 58-28) the temperature of the mixture at the time of placement shall be within the temperature requirements of the JMF. The JMF temperature range shall be within the master temperature range of 250° and 338° F (121° and 170° C) unless otherwise specified by the asphalt supplier. The mix temperature shall be monitored by inserting a dial type thermometer into the mix through the hole in the truck bed.

The temperature of the completed mix, when measured at the plant, shall be within the tolerance as established by the JMF. The first load which demonstrates temperatures outside of that range shall be accepted, provided

that the temperature is still within the master temperature range. No additional loads of material shall be run out until necessary steps are taken to reestablish the temperature of the mix within the plant tolerance. When measured at the project site, the temperature of the mix shall be within the tolerance established by the JMF. The first truck load of material which demonstrates temperatures outside of that range or any trucks in transit at that time shall be accepted provided temperatures are within the master temperature range. Any truckload of material which exceeds the master temperature range may be rejected by the Engineer. However, the plant shall immediately be notified that no additional loads of material are to be dispatched until necessary action is taken to reestablish temperature within JMF specification limits.

When the surface temperature falls to within 10° F (6° C) of the weather restrictions of Table 401.8, the mix temperature may be increased up to a maximum of 338° F (170° C) unless otherwise specified by the asphalt supplier. The temperature of each truckload of material shall be monitored for compliance. Any truckload of material which exceeds this maximum temperature may be rejected by the Engineer.

Mixes produced with asphalts that contain modifiers for high or low temperature performance enhancement shall meet the temperature requirements recommended by the asphalt supplier, which will be referenced on the JMF.

401.10.4-Rolling Procedure: Shoulders, ramps, and similar areas shall be compacted in the same method as the mainline.

During rolling, roller wheels shall be kept moist with only enough water to avoid picking up material. Fuel oil on roller wheels or pneumatic tires is not allowed. Rollers shall move at a slow but uniform speed with the drive roll or wheels nearest the paver.

If rolling causes material displacement, the affected area shall be loosened at once with lutes or rakes and restored to its original grade with loose material before being re-rolled. Heavy equipment, including rollers, should not be permitted to stand on the finished surface before it has thoroughly cooled or set.

Mat temperature shall be measured using a non-contact infrared thermometer. The required density shall be obtained prior to the mat temperature reaching 175° F (80° C). The Contractor shall be allowed to lower this temperature to 165° F (74° C) if they can demonstrate during the first day of placement of each lift on each project that additional densification can be achieved without causing any pavement distress.

401.10.5-Joints: The longitudinal joint in any layer shall offset that in the layer immediately below by approximately six inches; however, the joint in the top layer shall be at the centerline of the pavement if the roadway comprises two lanes of the width, or at lane lines if the roadway is more than

two lanes in width. The transverse joint in any layer shall offset that in the layer immediately below by approximately six feet.

All transverse joints between existing and new pavement shall be "heeled-in" to the existing surface at the beginning and at the end of the project and at all other locations where the new pavement terminates against an existing pavement. Transverse joints between one day's production and the next shall be carefully constructed and shall be formed by cutting back into the existing section to expose the full depth of the course. All joints shall be squared up to the full vertical depth of the course to be placed, and a tack coat of asphalt material shall be applied. Joints adjacent to curbs, gutters, or adjoining pavement shall be formed by transporting back sufficient hot material to fill any space left uncovered by the paver.

The longitudinal joint between adjacent mats shall be set up to a sufficient height to receive the full compactive effort from the rollers and shall be tacked prior to placing adjacent material.

Transverse joints shall be checked for smoothness with a ten foot straight edge provided by the Contractor. All surface irregularities shall be corrected prior to proceeding with paving operations.

401.11-PROTECTION OF PAVEMENT AND TRAFFIC CONTROL:

The Contractor shall be responsible for the protection of asphalt surfaces from damage by their equipment and personnel. When the construction of asphalt surfaces is undertaken on projects under public traffic and the road surface is 16 feet wide or greater and the ADT is 400 or greater, the Contractor shall place no passing signs, Interim pavement markings, and Temporary pavement markings to delineate the edge line, centerline, and/or lane line of the roadway as required herein and in the project plans.

Interim markings are described as markings applied to freshly resurfaced roadways between lifts and after placement of the final lift prior to opening the portion of the roadway being resurfaced to traffic. These markings are intended to provide the minimum amount of delineation required for safe navigation of the roadway, and are to be succeeded by. Temporary markings within a three (3) to fourteen (14) day period, based on the type of roadway and AADT, as specified herein.

Temporary markings are described as markings, typically short-lived in nature, which supplant Interim markings and are to be succeeded by Permanent markings within a sixty (60) day time period.

Permanent markings are described as the final pavement marking application within a project. These markings generally supplant Temporary markings. There shall be a minimum calendar day time period, as defined in Section 663, provided between the placement of Temporary and Permanent pavement markings, depending on the seasonal time of placement .

The Contractor shall be responsible for maintaining both signs and Temporary pavement markings until such time as the Permanent markings are placed, or thirty calendar days after completion of the final course, whichever is

less. No separate payment will be made for maintenance of these items but shall be included in the applicable pay items for initial installation.

Interim pavement markings shall be Type VIIA Interim Pavement Markings applied as described in Section 663.5.6 and shall meet the requirements of Material Section 715.40.3. Temporary pavement markings shall be as described in Section 636.8 and shall meet the requirements of the applicable Materials Section. Permanent markings shall be as described in Section 663.5.2 and shall meet the requirements of the applicable Materials Section. All Interim, Temporary, and Permanent Pavement Markings shall be in conformance with the Manual on Uniform Traffic Control Devices (MUTCD).

All Interim pavement markings shall be installed by the end of the work day by placing the markings as the paving operation progresses within 1000 feet (300 meters) of the paver. Removal of Interim pavement markings shall not be required between lifts or after placement of the final markings. Payment of Interim pavement markings shall be incidental to the 401 Items.

401.11.1-Interim Traffic Control for Two-Lane, Two-Way Roadways: Prior to any work which will cover the centerline, the Contractor shall install 24-inch x 30-inch "DO NOT PASS" (R4-1) signs on permanent posts at the beginning of each no passing zone throughout the length of the project. These signs shall be placed at the beginning of each no passing zone and shall be repeated every 2,500 feet as required. Payment shall be made under the "Traffic Control Devices" item.

To delineate the centerline of the roadway, the Contractor shall install yellow Interim Pavement Markings measuring 4 inches x 4 inches along the centerline of the roadway on 20 foot centers.

401.11.1.1-Temporary Pavement Markings for two-way, two-lane roadways

401.11.1.1.1-AADT equal to or > 3,000: The Interim Pavement Markings described in 401.11.1 shall be permitted only for a period of up to three (3) calendar days after completion of the final course. Within this time, the Contractor shall install a full compliance Temporary centerline and full compliance Temporary edgelines in conformance with Section 636. Payment for Temporary pavement markings shall be made under the "Temporary Pavement Marking Paint" pay item.

401.11.1.1.2-AADT < 3,000: The Interim Pavement Markings described in 401.11.1 shall be permitted only for a period of up to fourteen (14) calendar days after completion of the final course. Within this time, the Contractor shall install a full compliance Temporary centerline and full compliance Temporary edgelines in conformance with Section 636. Payment for Temporary pavement markings shall be made under the "Temporary Pavement Marking Paint" pay item.

401.11.2-Interim Traffic Control for One-Way Multilane Roadways: On all one-way multilane roadways, the Contractor shall install white Interim Pavement Markings measuring 4 inches x 48 inches along the lane line. Interim Pavement Markings shall be placed on 40-foot centers.

401.11.2.1-Temporary Pavement Markings: After paving is first completed in the left lane, and prior to the left lane being opened to traffic, the Contractor shall install a full compliance Temporary yellow edge line. Prior to the remaining lanes being opened to traffic, the Contractor shall install a full compliance Temporary white lane lines and white edge line. These markings shall be in conformance with Section 636. Payment for Temporary pavement markings shall be made under the "Temporary Pavement Marking Paint" pay item.

401.11.3-Interim Traffic Control for Two-Way Three-Lane Roadways: Prior to any work which will cover the centerline and/or lane lines, the Contractor shall install 24-inch x 30-inch "DO NOT PASS" (R4-1) signs on permanent posts at the beginning of each no-passing zone throughout the length of the project as required. "DO NOT PASS" signs in both directions will be required for Center Left Turn Lanes.

These signs shall be placed at the beginning of each no-passing zone and shall be repeated every 2500 feet as required. Payment shall be made under the "Traffic Control Devices" item.

The Contractor shall install Interim Pavement Markings measuring 4 inches x 48 inches. Where truck-climbing lanes exist, the centerline shall be marked with two parallel yellow lines separated by a four-inch space placed on 40-foot centers. Lane lines shall be marked with white lines placed on 40-foot centers. Where center left-turn lanes exist, the center lane shall be marked with two parallel yellow lines separated by a four-inch space, and placed on 40-foot centers on both sides of the center lane.

401.11.3.1-Temporary Pavement Markings: The Interim Pavement Markings described in Section 401.11.3 shall be permitted only for a period of up to three calendar days after completion of the final course. Within this time, the Contractor shall install full compliance centerline, lane line, and edgeline Temporary pavement markings in conformance with Section 636. Payment for Temporary pavement markings shall be made under the "Temporary Pavement Marking Paint" pay item.

401.11.4-Interim Traffic Control for Two-Way Four-Lane and Five-Lane Roadways: On all two-way four-lane and five-lane highways, the Contractor shall install Interim Pavement Markings measuring 4 inch x 48 inch along the lane line and centerline where required. Centerlines shall be marked with two parallel yellow lines separated by a four inch space placed on 40 foot centers. On five-lane roadways these markings shall be placed on

both sides of the center left turn lane. Lane lines shall be marked with white lines placed at 40 foot centers.

401.11.4.1-Temporary Pavement Markings: The Interim Pavement Markings described in Section 401.11.4 shall be permitted only for a period of up to three calendar days after completion of the final course. Within this time the Contractor shall install full compliance Temporary lane line, centerline, and edge line pavement markings in conformance with

Section 636. Payment for Temporary pavement markings shall be made under the "Temporary Pavement Marking Paint" pay item.

401.11.5-Seasonal Temporary Markings: If it becomes necessary to open the roadway to traffic prior to the completion of paving operations for longer than 14 calendar days, whether on the base or final course, the Contractor shall install full compliance Temporary pavement markings in conformance with Section 636. Payment for Temporary pavement markings shall be made under the "Temporary Pavement Marking Paint" pay item.

401.12-METHOD OF MEASUREMENT:

Asphalt concrete will be measured by the ton (Mg), or square yard (square meter). For projects paid by the ton, the quantity will be determined by the Contractor from the total weigh slips for each vehicle load weighed upon an approved standard scale or from digital printout slips from an automatic batching plant, and certified by the Contractor as correct. For projects paid by the square yard, the quantity will be determined by the Plan Quantity as provided for in the proposal unless otherwise directed by the Engineer.

Any patching or leveling mixture placed on a subbase or base course constructed in the same Contract with the asphalt items shall be at the expense of the Contractor. No additional compensation will be allowed for the material or any work incidental to its placement.

401.13-BASIS OF PAYMENT:

The quantities determine as provided above, will be paid for at the contract unit price for the items listed below, which prices and payment shall be full compensation for furnishing all the materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, field laboratory, supplies, and incidentals necessary to complete the work.

The conditioning, cleaning, and sweeping of the existing base or underlying surface shall be considered as part of the construction of the appropriate items listed in 401.14, and no additional compensation will be allowed for "Cleaning and Sweeping".

There will be no additional compensation for tack coat material used for minor (spot) areas to be patched and leveled; the cost of this tack coat material will be included in the unit bid price for the "patching and leveling" Item.

There will be no additional compensation for Interim Pavement Markings.

401.13.1-When a LOT of Superpave asphalt material is found not in compliance with the tolerance requirements of MP 401.02.29, it shall be subject to a price adjustment in accordance with the criteria established in this MP.

401.13.2 – When a LOT of asphalt pavement is represented by a smoothness value larger than that shown in Tables 401.7.2E or 401.7.2M, the unit price of the LOT (surface course only) shall be determined as follows:

ENGLISH VERSION:

Reduced Unit Price	=	Unit Bid Price X [(127.86 – As)/100]
Where A	=	0.429 when specified smoothness is 65 in/mi
Where A	=	0.341 when specified smoothness is 81 in/mi
Where s	=	Smoothness value measured as per 401.7.2

METRIC VERSION:

Reduced Unit Price	=	Unit Bid Price X [(127 – As)/100]
Where A	=	0.0274 when specified smoothness is 1 000mm/km
Where A	=	0.0218 when specified smoothness is 1 250 mm/km
Where s	=	smoothness value measured as per 401.7.2

When the measured smoothness value exceeds the specified value by 50% or more, the LOT so measured shall be corrected, at the Contractor's expense, to comply with Tables 401.7.2E or Table 401.7.2M.

401.13.3- When a LOT of asphalt pavement does not meet the density requirements of 401.7.3, the Price shall be adjusted as follows:

Formula-1: Projects requiring only mat density testing :

Lot Price Adjustment (Mat only) = (unit price) X (Lot quantity) X (mat density price adjustment % from Table 401.13.3A)

TABLE 401.13.3A ADJUSTMENT OF CONTRACT PRICE FOR PAVEMENT DENSITY NOT WITHIN TOLERANCE OF DENSITY	
Percent of Density	**Percent of Contract Price to be Paid**
Greater than 96 %	Note 2
95% to 96%	102
92% to 94% 92 % to 94 %	100
91%	98
90%	96
89%	92
88%	88
Less than 88%	Note 2

Note 1 Mat density slightly above 96% is normally only a problem if it leads to asphalt flushing on the surface of the mat or rutting due to an unstable mix. The Division will make a special evaluation of the material and determine the appropriate action

Note 2 When the density is less than 92%, the mat will be more susceptible to accelerated deterioration and a decrease in the expected service life of the pavement. For price adjustments on mat densities less than 88%, the percent of Contract Bid Price will be decreased by 10% per percentage of mat density less than 88%, unless a Special evaluation performed by the Division determines a more appropriate action.

401.13.4-When a LOT of asphalt pavement is determined to be statistically non-conforming in accordance with criteria 'B' of Section 401.7.4, the Division will review the plans and project records to determine if there is an acceptable explanation for this deficiency. If it is determined that a deficiency does exist, one of the following adjustments may be used. If the deficiency is less than ¾ inch (19 mm), the Division may choose to accept the material at a price equal to the bid price times the ratio of the average thickness divided by the specified thickness. If the deficiency is ¾ inch (19 mm) or greater, the Division may require that an additional lift of material [specified to the nearest ¼ inch (6 mm) of the deficiency] be placed at the Contractor's expense. Retesting of the overlay will be at the expense of the Contractor in accordance with MP 109.00.20.

401.14-PAY ITEMS:

Item Number	Description	Unit
401001-*	"design method" ASPHALT BASE COURSE, "aggregate type", TYPE "mix type"**	Ton (Mg)
401002-*	"design method" ASPHALT WEARING COURSE, "aggregate type", TYPE "mix type"**	Ton (Mg)
401003-*	"design method" ASPHALT PATCHING AND LEVELING COURSE, "aggregate type**	Ton (Mg)
401007-*	"design method" SCRATCH COURSE, "aggregate type" , TYPE 'mixed type"**	Ton (Mg)

* "design method" shall be either Marshall or Superpave
* "aggregate type" shall be either stone and gravel or slag
* "mix type" from Table 401.4.2A or 401.4.2B
* Sequence Number
** Type Of Aggregate

SECTION 402

HOT-MIX ASPHALT BASE, WEARING, AND PATCHING AND LEVELING COURSES

DELETE HEADING AND CONTENTS AND REPLACE WITH THE FOLLOWING

SECTION 402
BITUMINOUS ASPHALT SKID RESISTANT PAVEMENT

402.1-DESCRIPTION:

This work shall consist of constructing a Hot-Mix Asphalt (HMA) and Warm-Mix (WMA) Skid Resistant Wearing Coarse or a Superpave (HMA or WMA) Skid Resistant Wearing Coarse in accordance with the requirements of the Section 401 Asphalt Specification with the following exceptions and additions:

402.2-MATERIALS:

The coarse aggregate shall consist of gravel, slag, or other acceptable polish resistant aggregate, or combinations thereof, meeting the requirement of Subsections 703.1 through 703.3, except as amended in this subsection.

When stone or gravel is specified in the contract, the coarse aggregate shall consist of gravel or other acceptable polish resistant aggregate, or combination thereof meeting the requirements of 703.1 through 703.3, except as amended in this subsection. When slag is specified in the contract, the coarse aggregate shall be slag which meets the requirements of 703.3, except as amended in this subsection.

Acceptable dolomite may be used alone or as a part of a coarse aggregate blend on roadways with a projected ESAL value of less than 3,000,000. On roadways with a projected ESAL value of 3,000,000 or greater, acceptable dolomite may be used only as a part of the coarse aggregate blend and shall not exceed 50% of that blend.

The total of shale (determined by MP 703.00.27), coal and other lightweight deleterious material (determined by ASTM C123) and friable particles (determined by MP 703.01.20) shall not exceed three percent.

402.2.1-Marshall Mix Designs: For Marshall mix designs, the coarse aggregate or blends thereof shall have a minimum of 80 percent two-face fracture, and, except for those carbonate rocks which may be designated as acceptable polish resistant aggregate, the portion obtained on the No. 4 (4.75 mm) sieve shall contain no more than 15 percent carbonate particles.

The total thin and elongated pieces, when tested as per MP 703.00.25, shall not exceed five percent.

402.2.2-Superpave Mix Designs: For Superpave mix designs, the coarse aggregate or blends thereof shall have a minimum angularity requirement as specified in MP 401.02.28, Table 401.02.28C and, except for those carbonate rocks which may be designated as acceptable polish resistant aggregate, the portion obtained on the No. 4 (4.75 mm) sieve shall contain no more than 15 percent carbonate particles.

Flat and elongated particles shall be tested in accordance with ASTM D4791 and the procedure modification referenced in AASHTO MP2. The total flat and elongated particles, measured at a 5:1 ratio, shall not exceed ten percent by weight for all pavements where the estimated traffic level is greater than or equal to 0.3 million ESALs.

402.3-FINE AGGREGATE:

402.3.1-Marshall Mix Designs: Fine aggregate shall meet the requirements of 702.3.

402.3.2-Superpave Mix Designs: Fine aggregate shall meet the requirements of 702.3 along with the addition of the fine aggregate angularity and sand equivalent requirements noted in MP 401.02.28, Table 401.02.28C.

402.4-MIXING:

The skid resistant paving mix shall be type designated on the plans.

402.5-PAY ITEMS:

Method of measurement and basis of payment will be in accordance with the applicable sections of Section 401.

ITEM	DESCRIPTION	UNIT
402001-*	Marshall Asphalt Skid Resistant Pavement, “aggregate type”, TYPE “mix type”	TN (MG)
402001-*	Superpave Asphalt Skid Resistant Pavement, “aggregate type”, TYPE “mix type”	TN (MG)

* “design method” shall be either Marshall or Superpave
* “aggregate type” shall be either stone and gravel or slag
* “mix type” from Table 401.4.2A or 401.4.2B
* Sequence number

SECTION 408
TACK COAT

408.9-JOINTS:

DELETE THE CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

Longitudinal joints shall be treated using an application rate that will thoroughly coat the vertical face without excessive runoff
.

DIVISION 500
RIGID PAVEMENT

SECTION 501
UNBONDED CONCRETE OVERLAY

DELETE THE TITLE OF THE SECTION AND RENAME AS THE FOLLOWING:

SECTION 501
PORTLAND CEMENT CONCRETE PAVEMENT

501.1-DESCRIPTION:

DELETE THE FIRST PARAGRAPH OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

This work shall consist of a pavement or an unbonded overlay pavement composed of portland cement concrete, with or without reinforcement as shown on the Plans, constructed on a prepared subgrade, base course, or existing pavement in accordance with these Specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

501.4-TESTING:

501.4.4.-Testing for Opening Pavement to Traffic:

INSERT THE FOLLOWING AFTER THE FIRST PARAGRAPH AS PARAGRAPH TWO:

In lieu of the cylinders outlined in the previous paragraph, the Contractor may use the Maturity Method for the estimation of concrete strength, as outlined in MP 601.04.21, for determining when the pavement may be opened to traffic.

501.4.5-Compressive Strength Tests for Acceptance:

ADD THE FOLLOWING PARAGRAPH AT THE END OF THE SUBSECTION:

Compressive strength of concrete overlays less than 8 inches (200 mm) in thickness shall be determined in accordance with Section 601.4.4, with one set of test specimens representing a maximum of 500 yd^3 (380 m^3) of concrete.

501.6-PREPARATION OF GRADE, SETTING FORMS, AND CONDITIONING OF SUBGRADE OR BASE:

ADD THE FOLLOWING SUBSECTION:

501.6.3.1-Conditioning of Surfaces Receiving an Unbonded Concrete Overlay: If required, the bond breaker/leveling course for unbonded concrete overlays shall be constructed as shown on the Plans.

Construct any specified hot-mix asphalt base, bond breaker, or patching and leveling course in accordance with Section 401. Remove all loose materials from the existing pavement prior to placing the asphalt.

If required on the Plans, mill the surface before concrete placement in accordance with Section 415. After milling, tight blade the surface to remove ridges and loose material. Prior to placement of the overlay, the milled surface shall be swept clean. The Engineer shall be notified if milling operations expose underlying concrete pavement. All areas where the underlying concrete pavement is exposed shall be repaired, regardless of size. The Contractor shall first determine, in the presence of the Engineer, if the remaining asphalt surrounding the area of exposed concrete is sound. This asphalt shall be considered sound if it cannot be easily removed by prying it loose with a shovel. If it can be easily removed in such a manner, the Contractor shall continue to remove all such unsound asphalt until sound asphalt is encountered. If the asphalt surrounding the exposed concrete area is less than 2 inches (50 mm) thick, greater than 50 square feet (4.6 square meters) or are wider than 6 feet (1.8 meters) in the transverse direction, spray exposed concrete with tack coat meeting the requirements of Section 408 and cover with engineering fabric meeting the requirements of Section 715.11.8. If the asphalt surrounding the exposed concrete area is 2 inches (50 mm) or more in thickness, repair the exposed concrete area with an asphalt patch of the same thickness as the surrounding asphalt with either a Base-II or 19 mm mix in accordance with Section 401.

501.9-PLACING CONCRETE:

ADD THE FOLLOWING PARAGRAPHS TO THE END OF THE SUBSECTION:

When placing an unbonded concrete overlay, place the concrete when the base temperature is below 115° F (46° C). Reduce the temperature by spraying a fine water fog on the base. Ensure water does not pond in front of the plastic concrete. The application of white curing compound or a lime slurry shall be permitted as temperature control measures when waterproof bases are encountered. Concrete shall not be placed if frost exists in the base or if the base temperature is below 35° F (2° C).

When placing unbonded concrete overlays, concrete should be placed on the grade to the nominal thickness shown on the Plans. Any deviations for profile adjustments, and/or cross section adjustments, should be above the nominal thickness. When adjustments are necessary for grade or yield improvement, the thickness shall not, in any case, be less than the minimum thickness shown on the Plans.

501.11-JOINTS:

DELETE THE ENTIRE SECTION AND ADD THE FOLLOWING:

Joints shall be constructed of the type and dimensions and at the locations shown on the approved Joint Layout Plan(s). The Contractor shall submit for approval a Joint Layout Plan for all intersections on the project in general accordance with the following: "Street Jointing Criteria: Ten Rules Of Practice" as suggested by the Portland Cement Association (PCA), Skokie, Illinois; the American Concrete Pavement Association's Intersection Joint Layout Guidelines; the West Virginia Division Of Highways' Standard Specifications, dated 2010 and the latest issue of any subsequent Supplemental Specifications; the West Virginia Division Of Highways' "Standard Details Book Volume 1 – Drainage, Guardrail, Pavement, Fence, and Markers" hereinafter referred to as "Standard Details Volume 1"; or as directed by the Engineer.

The "Street Jointing Criteria: Ten Rules of Practice" suggested by the PCA are paraphrased and revised for the West Virginia Division of Highways' needs as follows:

i. Joints are used in concrete pavement to aid construction and to minimize random cracking. Avoid odd-shaped areas of pavement.

ii. Space longitudinal joints not to exceed 12.0 ft. (3.8 m). The contractor shall decide on the type of longitudinal joint as shown on Standard Detail Sheet PVT1 of "Standard Details Volume 1" needed depending on the type of construction. Type D joints will be used for full-width construction. Type D joins with a projecting tie bar for the following lane/shoulder pour are acceptable. Type E joints without the key are acceptable for lane-at-a-time construction. Type F joints are not acceptable at any location on the project.

iii. Space transverse joints at regular intervals of 15.0 ft. (4.6 m) or less.

iv. Thinner slabs tend to crack at closer intervals than do thicker slabs. Long narrow slabs tend to crack more than square ones.

v. All contraction and expansion joints must be continuous through any Combination Concrete Curb and Gutter or Integral Concrete Curb (Standard Sheet PVT6, Sheet 1 of 2 of Standard Details Volume 1). See Standard Specification Section 610.3.4.

vi. Longitudinal construction joints should be butt-type joints with tiebars (Types D or E joints based on construction method) as shown on Standard Detail Sheet PVT1 of Standard Details Volume 1. The purpose of these tiebars is to hold adjacent slabs in vertical alignment. The normal backfill behind any integral curb or curb and gutter constrains the slabs and holds them together. With separate curb and gutter built on fill, use Type E Joints as shown on Standard Detail Sheet PVT1 of Standard Details Volume 1.

vii. Offsets at radius points should be at least 2.0 ft. (0.60 m) in width. Angles of less than 60º shall be avoided.

viii. Make minor adjustments in joint locations to meet all structures projecting through, into or against the pavement. Minor adjustments should not make any joint spacing greater than that specified in ii. and iii. in this list.

ix. (Deleted)

x. Manhole and inlet frames, as well as any other metal structure projecting through, into or against the pavement shall be isolated in accordance with 501.11.6.

The Contractor shall submit a Joint Layout Plan for each intersection on the Project to the Engineer for approval a minimum of 10 working days before ordering materials. No work on or ordering of materials for the intersections shall be performed until the Engineer has approved the Joint Layout Plan(s). These Submittals are not required to be signed and sealed by a Registered Professional Engineer.

501.11.1-Longitudinal Joints: Deformed steel tie bars (Type D joint) or tie bolt assemblies (Type E joint) shall be placed perpendicular to the longitudinal joints. They shall be placed by suitable mechanical equipment or rigidly secured by suitable supports to prevent displacement. Tie bars shall be epoxy coated and free of grease, oils, dirt, paint or other foreign materials, and shall not be enclosed in tubes or sleeves.

All longitudinal joints shall be sawed normal to the surface of the pavement with a suitable concrete saw. Construction of longitudinal joints shall be in accordance with the appropriate requirements, as follows:

i. When the longitudinal joint separates adjacent pavement lanes or slabs that are poured at the same time (full-width construction: Type D joint), sawing of longitudinal joints shall be performed between 4 and 24 hours after the pavement is placed and before any equipment and vehicles are allowed on the pavement. The saw cut shall be to a minimum depth of one-third of the plan depth of pavement; the width shall be 1/8 in. (3 mm), with a tolerance of plus or minus 1/16 in. (2 mm).

ii. When the longitudinal joint separates adjacent pavement lanes or slabs that are poured separately (lane-at-a-time construction: Type

D or E joint), the longitudinal joint shall be sawed. The saw cut shall be to a depth of 1 in. (25 mm), plus ¼ in. (6 mm); the width shall be 1/8 in. (3 mm) plus or minus 1/16 in. (2 mm).

501.11.2-Transverse Expansion Joints (Type B or Type C joint): The expansion joint filler shall be one piece, continuous from form to form, shaped to the subgrade and to the cross section of concrete. The filler shall be depressed ½ in. (13 mm) below the surface of the pavement.

The expansion joint filler shall be held in a vertical position. Finished joints shall not deviate more than ¼ in. (6 mm) in the horizontal alignment from a straight line at right angles to the centerline of the pavement. No plugs of concrete will be permitted anywhere within the expansion space.

501.11.3-Transverse Contraction Joints: Transverse contraction (Type A) joints shall consist of planes of weakness created by sawing or forming grooves, normal to the grade, in the surface of the pavement as shown on the approved Joint Layout Plan(s). These contraction joint grooves shall be centered, within 1 in. (25 mm) of the mid-length of the dowels, over the coated dowel bars specified.

Unless otherwise specified or authorized, all transverse contraction joint grooves shall be constructed as described, resulting in the dimensions detailed on the approved Joint Layout Plan(s) and at the spacing and locations shown on the Plans.

As soon as feasible after placing the concrete, the contraction joints shall be sawed to the dimensions shown on the approved Joint Layout Plan(s). Sawing of joints shall commence as soon as the concrete has hardened sufficiently to permit sawing without excess raveling, usually 4 to 24 hours. All joints shall be sawed before uncontrolled shrinkage cracking takes place, but no later than 24 hours after placement of concrete. If necessary, sawing operations shall be continuous, through day and night, regardless of weather conditions. In general, all joints should be sawed in sequence. The sawing of any joint shall be omitted if cracking occurs at or near the joint location prior to the time of sawing. Sawing of a joint shall be discontinued when a crack develops ahead of the saw. If extreme conditions exist which make it impractical to prevent erratic cracking by early sawing, the contraction joints shall be formed in the plastic concrete.

All joint repair work shall be done at the Contractor's expense and to the satisfaction of the Engineer.

When formed joints are permitted, they shall be effected by an approved mechanically operated device to the dimensions specified and while the concrete is still in the plastic state.

Random cracking at transverse contraction joints, as described in 501.11.7, shall be sealed with silicone sealant.

501.11.4-Transverse Construction Joints: Transverse construction joints shall be installed when there is an interruption of more than 30 minutes

in the concreting operations. No construction joint shall be installed within 10 ft. (3 meters) of an expansion or contraction joint. If sufficient concrete has not been placed to form a slab at least 10 ft. (3 meters) long, the excess concrete back to the last proceeding joint shall be removed.

Construction joints shall be constructed in a manner similar to transverse contraction joints utilizing a Type A joint. The groove shall have the same dimensions as for transverse contraction joints.

501.11.5-Coated Dowel Bars: Coated dowel bars (load transfer reinforcement) shall be used across all transverse Type A joints as shown on the approved Joint Layout Plan(s). Dowels shall be located at mid-depth of the pavement with a tolerance of placement within plus or minus 1 in. (25 mm) of the lateral and vertical positions shown on the approved Joint Layout Plan(s). Dowels shall be aligned parallel to the centerline and surface of the pavement with a tolerance for such alignments within plus or minus 0.6 inches (15 mm) per dowel.

Dowels shall be held in position in the pavement by means of metal supports that remain in the pavement, except as noted. The combination of dowel bars and all the various components of the metal supports at a joint is commonly referred to as the dowel bar assembly or load transfer unit. Welding of dowels to the supports, to achieve a fixed end condition, shall be performed in accordance with the details shown on the approved Joint Layout Plan(s). For dowel assemblies at contraction and construction joints, welding of dowels to any member of the supports will not be permitted within the middle one-third of the dowel's length. The longitudinal misalignment of one end of a dowel assembly with respect to the other end in achieving a perpendicular alignment with the centerline of the pavement (longitudinal side shift) shall not exceed 2 inches (50 mm) when 18 inch (450 mm) long dowel bars are used. Acceptance of a type of dowel assembly by the Division in no way relieves the Contractor of their responsibility for furnishing, as part of the assembly, coated dowel bars that meet the requirements of 709.15, nor does it relieve the Contractor of the Contractor's responsibility for placing and maintaining the assembly in its proper position and alignment during paving operations.

The mechanical implanting method of placing dowel bars is permitted if the Contractor can show, by the method outlined below or other approved methods, that the dowel bars can be placed within the required tolerance with no adverse effects to the finished concrete pavement. Prior to, or on the first day of the paving operation, the Contractor shall use non-destructive testing methods, such as the MIT Scan-2 technique, approved by the Engineer, to confirm dowel placement and alignment.

Dowel bars shall be placed to within plus or minus 1 inch (25 mm) of the depth shown on the plans, and parallel to the traffic lane centerline and top of roadway surface within a tolerance of 0.6 inches (15 mm) per 18 inches (450 mm) of dowel bar length.

Suspend paving operations if dowels are installed improperly and dowel alignment does not meet the specified tolerances. Paving operations shall not be resumed until the Contractor demonstrates to the Engineer that the problem has been corrected.

For coated dowel bar types that require a bond breaker, the bond breaking material, prequalified for use with that particular type coating, shall be carefully applied over the entire length of the bar just prior to placement of concrete unless an approved bondbreaker lubricant has been applied in the shop.

The free end of expansion joint dowels utilized in a Type B joint shall be provided with a close fitting metal cap or sleeve equipped with a stop to prevent closing during paving operations. A clearance of 1 in. (25 mm) shall be maintained between the closed end of the cap and the end of the dowel to accommodate future movement of the concrete slab.

501.11.6-Expansion Joints Around Structures: Expansion joints shall be formed by placing pre-molded expansion joint material about all structures and features projecting through, into or against the pavement. Unless otherwise indicated, such joints shall be ½ in. (13 mm) in width.

501.11.7-Random Cracks: Random cracks falling within 3 inches (75 mm) of the center of the transverse contraction joint's dowel bars shall be sawed for the full width, widening and deepening the crack to the dimensions of sawing for transverse contraction joints.

If any random or uncontrolled crack occurs outside 3 inches (75 mm) from a doweled joint, the entire pavement within the lane where such crack occurs shall be removed for the entire 15ft panel between joints.. The dowel assembly or bars, as the case may be, shall be replaced with a new dowel assembly with drilling. The new joint over the dowel assembly shall be initially formed by the use of a removable insert or by sawing. The tie bars shall be replaced with a Modified Type E joint. The above described work shall be done at no additional cost to the Division.

501.11.9-Transverse Joints in Concrete Shoulders: Dowel bars are not required in paved shoulders except where turning traffic may use the shoulders as a lane.

501.14-CURING:

501.14.4-White Pigmented Impervious Membrane:

ADD THE FOLLOWING PARAGRAPH AFTER THE SECOND PARAGRAPH:

For unbonded concrete overlays, the curing compound application rates noted below shall be doubled.

501.16-SEALING JOINTS:

Cleaning and sealing of all joints is not required unless shown in the Plans.

501.16.1-Silicone Sealant:

DELETE THE FIFTH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

Immediately following placement of the sealant and before a skin forms, the sealant shall be tooled to force it against the joint faces and to provide a slightly concave surface with a depth of approximately ¼ inch (6 mm) (at the center of the joint) below the pavement surface.

501.22-METHOD OF MEASUREMENT:

ADD THE FOLLOWING PARAGRAPHS AFTER THE FIRST PARAGRAPH:

When Item 501009-* is specified in the project plans, the quantity of concrete overlay placement to be paid for will be the number of square yards (meters) complete in place and accepted. The width for measurement will be the width of the pavement or overlay shown on the typical cross section of the Plans and additional widening where called for or as otherwise directed in writing by the Engineer. The length will be measured on the surface along the centerline of each roadway and each roadway ramp.

When Item 501011-* is specified in the project plans the quantity of concrete used in concrete overlays to be paid for will be the number of cubic yards (meters) in place and accepted. The Engineer will measure the volume of concrete used in concrete overlays using the Contractor's certified batch tickets or other approved documentation.

501.23-BASIS OF PAYMENT:

501.23.1-General:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

501.23.1-General: The quantities, determined as provided above, will be paid for at the contract unit prices less adjustments referred to below, which shall constitute full compensation for furnishing and preparing of all materials, including reinforcing steel, transverse and longitudinal joints, expansion joint filler, elastomeric joint seals, silicone sealant, epoxy mortar for joint repair work, polyethylene tape, rope or rod joint back-up material, lubricant-adhesive for elastomeric seals, and dowels or load transfer devices

as are required in the Plans; construction of any bond breaker/leveling course, milling existing surface; placing, finishing and curing concrete; and all labor, equipment, tools, field laboratory, supplies and incidentals necessary to complete the work.

501.24-PAY ITEMS:

ADD THE FOLLOWING PAY ITEMS:

ITEM	DESCRIPTION	UNIT
501009-*	"Thickness" UNBONDED PORTLAND CEMENT CONCRETE OVERLAY	Square Yard (Meter)
501011-*	UNBONDED PORTLAND CEMENT CONCRETE OVERLAY	Cubic Yard (Meter)

* Sequence number

SECTION 503
SEALING CRACKS IN CONCRETE PAVEMENT

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

503.1-DESCRIPTION:

This work shall consist of the cleaning and sealing of cracks in concrete pavement in the manner and subject to the conditions and regulation prescribed.

503.2-MATERIALS:

The sealant shall be in accordance with section 708.3.

The joint back-up material shall be in accordance with section 708.4.2, shall meet the requirements of the Sealant Manufacturer, and shall be appropriate for outdoor applications.

503.3-CONSTRUCTION METHODS:

Old filler and foreign material in the cracks shall be removed. The cracks shall then be sealed as prescribed. Other means and/or methods recommended by the Sealant Manufacturer and approved by the Engineer may be used.

503.4-PREPARATION OF MATERIAL BEFORE USE:

Before charging the compound into the melting unit, the unit shall be free from all foreign material. If the type of heater to be used requires that the sealing material as shipped, be cut into smaller pieces before melting, the method used is subject to approval by the Engineer.

The heating kettle used for melting sealing materials shall be of the indirect heating or double boiler type, using oil as the heat transfer medium. It shall have a thermostatically controlled heat source, a built-in automatic agitator,

and thermometers installed to indicate both the temperature of the melted sealing material and that of the oil bath. Other methods of indirect heating approved by the Engineer may be used. A positive means of controlling the temperature of the heat transfer medium at all points in the system shall be incorporated in the heater. Sealing material shall be uniformly heated until the pouring temperature recommended by the Sealant Manufacturer is reached. Should the maximum recommended pouring temperature be exceeded, the material will be rejected. The material shall be poured as soon as possible after the pouring temperature is reached. Only sufficient material for the day's operation shall be heated each day. Other means and/or methods recommended by the Sealant Manufacturer and approved by the Engineer may be used.

503.5-PREPARATION OF JOINTS FOR SEALING:

Cracks should be widened with a crack saw to a minimum width of ½" (16 mm) and to a depth necessary to provide a 1:1 width to depth ratio including room for the backer rod. The cracks shall be thoroughly cleaned of all loose scale, dirt, dust, other foreign matter, old sealant and loosely stuck particles of mortar and aggregate, so that dry, sound, and clean surfaces result. The use of any tool which results in damage to the pavement is prohibited. Just prior to the actual sealing operation, the crack shall be thoroughly blown out with an air jet having sufficient volume and pressure to remove any loose material left by the cleaning operation. After the final cleaning, the back-up material shall be inserted into the crack in accordance with the Manufacturer's recommendations to provide the correct shape factor for the sealant.

503.6-EQUIPMENT FOR APPLYING SEALER:

The equipment used for the placing of sealing material in the cracks may consist of conventional hand pouring pots, individual mechanical pouring kettles mounted on wheels with a pouring shoe, or heating units from which material may be discharged into the joint through the use of flexible lines and suitable shoes. Any heat, which it may be necessary to apply to sealing material after it leaves the main heating unit, shall be applied by indirect and controlled methods as specified in 503.4. No direct heat will be permitted on the pouring unit in order to meet field controls set forth below. Any method of placing sealing material, which results in compliance with the following requirements, will be satisfactory.

503.7-PLACEMENT REQUIREMENTS:

After insertion of the back-up material and prior to becoming contaminated, the crack shall be sealed in accordance with the Sealant Manufacturer's recommendations. At the time of sealing, the crack faces shall be dry and dust free. The sealant shall be introduced into the crack in a continuous uniform operation to properly fill and seal the crack from the bottom upward in order to avoid trapping any air bubbles. The crack shall be sealed to within 1/8 to ¼ inch (3 to 6 mm) below the pavement surface. Traffic shall not be allowed on the sealed joint for the minimum time recommended by the Sealant Manufacturer after placement, unless otherwise approved by the Engineer.

Sealant shall never be applied to frozen, dirty, wet, or damp concrete or during inclement weather conditions. Sealant shall not be placed in the cracks unless the temperature of the pavement is 40° F (4° C) or higher unless approved by the Engineer.

503.8-METHOD OF MEASUREMENT:

The quantity of work done will be measured in linear feet (meters) of "Sealing Cracks", when the item below is included in the contract.

503.9-BASIS OF PAYMENT:

The quantity of work, as described above, will be paid for at the contract unit price bid for the item below, which price and payment shall be full compensation for furnishing all the materials and doing all the work prescribed in an acceptable manner, including all the labor, tools, equipment, supplies, and incidental items necessary to complete the work.

503.10-PAY ITEM:

ITEM	DESCRIPTION	UNIT
503001-*	Sealing Cracks in Concrete Pavement	Linear Foot (Meter)

* Sequence number

SECTION 506
CONCRETE PAVEMENT REPAIR

DELETE ENTIRE SECTION AND REPLACE WITH THE FOLLOWING:

506.1-DESCRIPTION:

This work consists of the removal and replacement of deteriorated concrete pavement and patches, and replacing subbase material where required, at locations as shown on plans or as specified by the Engineer.

The following is a description of each patch type:

i. Jointed Concrete Pavement Patch, Type I:
Patching shall consist of full depth, full lane width concrete pavement repairs equal to or greater than 6 feet (1.8 meters) in length. Type I patches shall constructed in accordance with the Concrete Repair Details in the plans.

ii. Jointed Concrete Pavement Patch, Type II:
Patching shall consist of partial depth concrete pavement repairs that extend a minimum of 2 inches (50mm) and no deeper than one-half the

slab thickness at cracks or no more than one-third the slab thickness at doweled joints. Type II patches shall be constructed in accordance with the Concrete Repair Details in the plans.

iii. Jointed Concrete Pavement Patch, Type III:
Patching shall consist of a repair along the edge of a transverse crack or joint that extends from the bottom of a partial depth repair (Type II) to potentially the full depth of the slab, and isolated within 12" of either the longitudinal joint or pavement edge. Type III patches shall be constructed in accordance with the Concrete Repair Details in the plans.

506.2-MATERIALS:

Materials shall meet the requirements of section 501 or 601, and as follows:

MATERIAL	SECTION OR SUBSECTION
Subbase	307
Portland Cement Concrete	501 or 601
Epoxy-Coated Dowel Bars	709.15
Tie Bars and Hook Bolts	709.1
Joint Sealer	708.3, 708.4
Accelerating Admixtures	707.13
Curing Materials	707.6-707.10

An approved epoxy grout shall be used to firmly anchor dowel bars in 30 minutes.

Cement meeting the requirements of ASTM C150, Type III may be used in the concrete mixes for concrete pavement repair.

506.3-PROPORTIONING:

Portland cement concrete for patching concrete pavement shall meet the requirements of Section 501 or Class B concrete as specified in Section 601, except that it shall be shown by compressive strength tests that the concrete mix shall attain 2,000 psi (13.8 Mpa) prior to the time at which the pavement will be opened to traffic, and an AASHTO number 8 coarse aggregate for use in Type II repairs with a depth of 3 inches (75mm) or less.

Type III repairs may be placed simultaneously with Type II repairs. When constructed in this manner, the same concrete mix shall be used in both repair types.

Prior to the start of work, the Contractor shall submit the mix proportions and recent compressive strength test data for the specified age at which the concrete is to be opened to traffic.

506.4-TESTING:

All testing shall be in accordance with section 501. The Contractor shall fabricate a minimum of nine compressive strength cylinders for each 24 hour period of operation. Six of these nine field cured cylinders shall be field cured in a temperature and moisture condition as close as possible to that of the concrete in the repair area. When the average strength of three of these cylinders, representing the concrete placed, indicate that the concrete has attained the required strength for opening to traffic, that concrete may be put into service. These cylinders shall represent concrete produced from the batch from which they were fabricated and, if applicable, concrete from previous batches also. These cylinders will not represent any concrete which was placed after the time that they were fabricated. Three of the nine cylinders shall receive standard curing and shall be tested at 28days to verify that the required strength at that age has been achieved.

In lieu of six field cured cylinders required above, the Contractor may use the Maturity Method for the Estimation of concrete strength, as outlined in MP 601.04.21 for determining when the pavement may be opened to traffic.

506.5-EQUIPMENT AND TOOLS:

Equipment and tools shall be in accordance with section 501 unless noted otherwise. Saw cutting equipment shall be capable of sawing neat vertical faces along the patch boundaries. The use of a carbide-toothed wheel saw shall not be permitted for sawing the patch boundaries. A carbide-tipped wheel saw may be used for additional saw cuts provided that a minimum 3-inch (75 mm) clearance from the sawed boundary is maintained.

506.6-CONSTRUCTION METHODS:

506.6.1-Removal of Existing Pavement: Designated defective pavement shall be removed full depth, and undisturbed portions of the existing pavement adjacent to the area to be patched shall be left with straight vertical sides.

The existing pavement to be removed shall be sawed full depth along the transverse and longitudinal boundaries, including the lane and shoulder/lane joints as shown on the plans or as directed by the Engineer. Additional saw cuts inside the patch boundaries will be permitted to facilitate the concrete removal operation.

Concrete sawn full depth to be removed shall be lifted out by means of chains, lift-pins, or other approved devices. The breaking of concrete in-place shall not be permitted. During the removal operations, utmost care shall be exercised to minimize disturbance and damage to the base material, and the adjacent pavement and shoulder.

506.6.2-Conditioning Existing Subbase: Prior to placing concrete in the repair area, any subbase material that is disturbed below the desired level of cleanout shall be removed and the patch area compacted to the satisfaction of the Engineer. Unsuitable subbase material, concrete, reinforcing steel, and any other debris shall become property of the Contractor and shall be legally disposed. The Contractor shall replace the removed subbase material with concrete integral to pavement replacement up to a maximum 1-inch (25 mm) depth. In the event that soft areas are encountered in the subbase or subgrade, or if more than 1-inch (25 mm) of subbase material is removed, replacement of subbase and subgrade shall be in accordance with section 307, testing shall be waived. When subbase or subgrade material is replaced, it shall be brought to grade and compacted to the satisfaction of the Engineer.

506.6.3-Placing Concrete: Unless behind permanent closures or unless otherwise approved by the Engineer, all excavated areas shall be patched the same day that they are excavated. The excavated area shall be thoroughly cleaned of loose material and debris and moistened prior to the placement of concrete.

Existing pavements shall not be removed if such removal will result in concrete being placed when the ambient air temperature is below 32° F, unless approved by the Engineer. Concrete for partial depth repairs shall not be placed when the ambient temperature is below 40° F. The concrete temperature at the time of placement shall not be less than 70° F and not more than 95° F, unless approved by the Engineer.

Concrete shall be deposited in the excavated area, and the free fall shall not be more than 3 feet (1 m). If the concrete does not fall into its final position in the patch, it shall be moved by means of shovels; raking is prohibited. The concrete shall be worked with tampers, spades, or other tools to completely fill the patch area. Maximum effort will be used to ensure that the area beneath the existing concrete pavement is completely filled. Internal vibration shall be used.

Following the placing of the concrete, the surface will be struck off to a finished grade and floated to a smooth finish. Finishing of the plastic concrete shall conform to the requirements of Section 501.12 of the Specifications, except that the final concrete surface shall be textured similar to that of the adjoining pavement.

506.6.4-Straightedge Checking and Surface Correction: During finishing operations, deviations in adjacent lanes which are also to be repaired shall not be transferred to the new construction. The Contractor shall furnish and use straightedges to check the surface tolerance. For patches 10 feet (3 m) or more in length, a 10 foot (3 m) straightedge shall be used. Shorter straightedges shall be used for patches less than 10 feet (3 m) in length.

The minimum length straightedge shall be 6 feet (1.8 m). Section 501.12.6 shall govern except that the shorter straightedges shall be used for shorter patches.

506.6.5-Curing: Immediately after straight edging and texturing, the concrete shall be cured in accordance with Section 501.14. Where early opening to traffic is required, insulation mats or blankets may be used over the repairs during curing in order to accelerate strength gain.

506.6.6-Sealing Joints: When patching two lanes simultaneously, the longitudinal joint shall be reestablished by sawing. Joint sealing shall be done in accordance with Section 510.

506.6.7-Repair of Adjacent Shoulders: Within 24 hours after completion of a patch area, any adjacent shoulders damaged during pavement repair operations shall be reconstructed in accordance with the requirements of the applicable section of the specifications to match the finished shoulder grade and to the satisfaction of the Engineer. In the event traffic is to be permitted on the patch area prior to reconstruction of the shoulder, the Contractor shall first make such temporary repair to the shoulder as is necessary to avoid any hazardous condition.

506.6.8-Specific Construction Methods: Construction methods specific to each repair type are noted in the following sections.

506.6.8.1-Type I Repairs: Where the existing joint dowel assembly is to be removed, the existing concrete shall be saw cut full depth and removed a minimum of 1 foot (300 mm) on either side of existing transverse joints. Minimum length of removal shall be 6 feet (1.8 m) in accordance with that shown in the WVDOH Concrete Repair Details.

Oversawing into the adjacent slabs or shoulder shall be kept to the minimum amount necessary to ensure that full depth cuts in the corners have been achieved. All oversawing shall be cleaned and filled with an approved epoxy material.

Any areas damaged during concrete sawing and removal operations shall be repaired to the satisfaction of the Engineer by extending the patch boundary or repairing spalls at the Contractor's expense. Spalls greater than ¼ inch (6 mm) wide and 2 inches (50 mm) long and more than ½ inch (13 mm) deep below the pavement surface shall be repaired using an approved epoxy mortar. The patch boundary shall be extended by re-sawing the limits of the patch beyond the spalled area when spalls greater than 1 inch (25 mm) wide and 12 inches (300 mm) long and more than ½ inch (13 mm) deep below the pavement surface are created by the pavement removal operation.

A bond breaking material, approved by the Engineer, shall be placed at the longitudinal joint for Type I patches as shown in WVDOH Concrete Repair Details. Acceptable bond-breaking materials include white pigmented curing compound, roofing felt, and tar paper.

Where dowels are required, holes slightly larger than the diameter of the dowels shall be drilled 9 inches (225 mm) into the face of the existing slab starting 6 - 12 inches (150 – 300 mm) from either edge and then on 12 inch (300 mm) centers. The number of dowels per joint shall be as shown in the WVDOH Concrete Repair Details. The holes shall be located at a depth as shown in the WVDOH Concrete Repair Details. The dowels shall be carefully aligned (within ¼ inch (6 mm)) with the direction of the pavement and parallel to the plane of the surface. An approved quick setting, non-shrinking mortar or an approved high viscosity epoxy shall be used to anchor the dowels in the holes. The holes shall be completely filled around the dowels so as to minimize vertical movement of the dowels and ensure that the dowels are permanently fastened to the existing concrete. The epoxy or grout is to be put into the hole in sufficient quantity so that when the bar is inserted, the material completely fills the annular space around the dowel. The holes shall be filled from the back to the front with epoxy or grout prior to insertion of the dowel. Dipping of the dowels into epoxy or grout prior to insertion into the holes is not permitted. A grout retention ring shall be used as shown in the WVDOH Concrete Repair Details.

The surface edges of all patches shall be tooled, formed and/or sawed, and cleaned to result in a properly dimensioned reservoir for sealant. All transverse and longitudinal joints at pavement repair locations shall be sealed in accordance with manufacturer's recommendations unless otherwise approved by the Engineer.

506.6.8.2-Type II Repairs: Full lane-width partial depth repairs at transverse joints and cracks and at longitudinal joints 12 feet or more in length shall be a minimum of 18 inches (450 mm) wide, with the vertical face of the repair being no less than 6 inches (150 mm) from the crack or the joint. Partial depth repairs shall be sawed a minimum depth of 2 inches (50 mm) around the perimeter of the patch area to provide a vertical face at the edges unless removal is to be performed with milling operations. Acceptable milling operations shall provide neat vertical faces and be approved by the Engineer. Concrete within the patching area shall be broken out with a pneumatic hammer not heavier than a 35-pound class or by other methods approved by the Engineer. Edge spalls greater than ¼ inch (6 mm) wide and 2 inches (50 mm) long and more than ½ inch (50 mm) deep below the pavement surface shall be repaired using an approved epoxy mortar. The patch boundary shall be extended by re-sawing the limits of the patch beyond the spalled area when spalls greater than 1 inch (25 mm) wide and 12 inches (300 mm) long and more than ½ inch (13 mm) deep below the pavement surface are created by the pavement removal operation.

The area of failure shall be removed by equipment that will not damage the adjacent sound pavement. The exposed faces of the concrete shall be free of loose particles, oil, dust, and other contaminants before placement of patch material. Immediately prior to placement of the concrete patch, all exposed

concrete faces within the patched area shall be cleaned by sandblasting, then airblasting, then coated with an approved epoxy bonding compound per the manufacturer's recommendations. All residues shall be removed just prior to placement of the concrete bonding agent.

Any crack or joint within the limits of, or adjacent to, the partial depth repair shall be re-established by forming with an acceptable material in order to follow the crack or joint alignment. The method and material used to re-establish the crack or joint shall be approved by the Engineer. However, at joint repairs, sawcutting through the full-depth of the repair area may be used to fully re-establish the joint being repaired. Additionally, the Contractor shall saw and seal existing joints and cracks, involving partial depth repairs, in accordance with Section 510.

506.6.8.3-Type III Repairs: "Turned Down Edge" repairs at transverse joints and cracks shall extend no more than 12 inches (300 mm) into the slab from the edge of pavement whether at the outside or along an interior longitudinal joint. Concrete within the patching area shall be broken out with a pneumatic hammer not heavier than a 35-pound class or by other methods approved by the Engineer. The area of failure shall be removed by equipment that will not damage the adjacent sound pavement.

Number 4 tie bars, 10 inches (250 mm) in length, shall be inserted into the exposed vertical faces within the repair area. One bar shall be placed per one-foot (300 mm) of exposed face, or fraction thereof, on each side of the transverse crack or joint. The bar(s) shall be inserted at mid-depth of the slab, allowing for five inches (125 mm) of length to extend into the area to be repaired. The hole(s) for placement of the tie bar(s) into the exposed vertical face of the slab shall be slightly larger than the diameter of the bar and shall be drilled at an angle in order to allow for drill clearance. Additionally, a minimum clearance of one inch shall be maintained around the hole for placement of concrete. The holes shall be filled from the back to the front with epoxy or grout prior to insertion of the bar. Dipping of the bars into epoxy or grout prior to insertion into the hole is not permitted. The bar should be bent prior to insertion into the grouted hole such that the exposed portion of the bar within the area being repaired shall be parallel with the pavement surface. No bars shall be placed in a manner that would interfere with free movement of the joint or crack being repaired and re-established.

The exposed faces of the concrete shall be free of loose particles, oil, dust, and other contaminants before placement of patch material. Immediately prior to placement of the concrete patch, all exposed concrete faces within the patched area shall be cleaned by sandblasting, then airblasting, then coated with an approved epoxy bonding compound per the manufacturer's recommendations. All residues shall be removed just prior to placement of the concrete bonding agent.

Any crack or joint within the limits of, or adjacent to, the repair shall be re-established by forming with an acceptable material in order to follow the crack or joint alignment. However, at joint repairs, sawcutting through the full-depth of the repair area may be used to fully re-establish the joint being repaired. The method and material used to re-establish the crack or joint shall be approved by the Engineer. Additionally, the Contractor shall saw and seal existing joints and cracks, involving partial depth repairs, in accordance with Section 510.

506.7-RIDE ACCEPTANCE:

As soon as the concrete has hardened sufficiently, the pavement surface shall be tested with a 10 foot (3 m) straightedge. The straightedge shall be placed in successive positions parallel to the road centerline, matching existing wheel paths. Areas showing deviations (either high or low) of more than ¼ inch (6 mm) in 10 feet (3 m) shall be marked and corrected down with approved grinding equipment to an elevation where the surface deviations will not be more than ¼ inch in 10 feet (3 m). All joint sealing operations shall be performed after any grinding operations.

In the event that the deviation cannot be corrected to ¼ inch (6 mm) or less (either high or low) in 10 feet (3 m), the areas shall be removed and replaced at the discretion of the Engineer and at the Contractor's expense. All areas or sections so removed shall not be less than 6 feet (1.8 m) in length or less than full width of the traffic lane involved. Any remaining portion of the slab adjacent to the joints that is less than 6 feet (1.8 m) in length shall also be removed and replaced. Where concrete repairs are made that are to be overlayed, the smoothness criteria is waived for the concrete repair.

506.8-METHOD OF MEASUREMENT:

The quantity of concrete pavement repair to be paid for will be the number of square yards (meters) complete in place and accepted for all Type I and Type II repairs.

For Type III repairs, each location complete in place and accepted will be paid for.

506.9-BASIS OF PAYMENT:

The quantity of concrete pavement repair, determined as provided above, will be paid for at the contract unit price and shall constitute full compensation for the furnishing, hauling, and placing of all materials, saw cutting pavement to the required depth, the removal and disposal of old concrete, preparing of sublayer, furnishing and installing steel dowels, furnishing and installing reinforcing steel as specified, furnishing, placing, finishing, and curing the concrete, cleaning and sealing joints, patch area protection, and for all other materials, labor, tools, equipment, and incidentals necessary to complete the item.

506.10-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
506001-003	CONCRETE PAVEMENT REPAIR, TYPE I, "Thickness"	Square Yard (Meter)
506001-004	CONCRETE PAVEMENT REPAIR, TYPE II	Square Yard (Meter)
506001-005	CONCRETE PAVEMENT REPAIR, TYPE III	Each
506003-*	REPLACE EXISTING AGGREGATE BASE COURSE	Ton-(Megagram)

*Sequence number

**Supplemental description shall be thickness in inches.

SECTION 509

RE-SAWING AND SEALING LONGITUDINAL CONCRETE PAVEMENT JOINTS

DELETE THE ENTIRE SECTION.

SECTION 510
RE-SEALING TRANSVERSE CONCRETE PAVEMENT JOINTS

RETITLE THE SECTION AND REPLACE THE ENTIRE CONTENTS WITH THE FOLLOWING:

SECTION 510
RE-SEALING CONCRETE PAVEMENT JOINTS

RETITLE THE SECTION AND REPLACE THE ENTIRE CONTENTS WITH THE FOLLOWING:

510.1-DESCRIPTION:

This work includes all labor, equipment, and material required to remove existing sealers, clean the joint, and seal the joint with a sealant meeting the requirements of section 510.2. The location of the joints to be sealed shall be as shown in the plans or as directed by the Engineer.

510.2-MATERIALS:

The joint sealant shall be in accordance with either section 708.3 or 708.4.

The joint back-up material shall be in accordance with section 708.4.2, shall meet the requirements of the Sealant Manufacturer, and shall be appropriate for outdoor applications.

510.3-CONSTRUCTION METHODS:

510.3.1-Joint Preparation:

All spalls along the joint which are directed by the Engineer to be repaired, shall be repaired as specified in section 506 for partial depth repair. The spalls shall be repaired prior to resealing the joint. Existing joint sealer or sealant shall be removed from the joint groove as designated by the Engineer.

Where re-sealing in an area of previously installed sealant, a fresh sawcut shall be made to provide a clean face for the new sealant to bond. The new sawcut shall provide a joint groove of adequate width and depth to provide a width to depth ratio (shape factor), including joint back-up material, of 1:1 for hot-poured sealant and 2:1 for silicone sealant. Any damage done to newly placed sealant by re-sawing operations shall be repaired to the satisfaction of the Engineer. The longitudinal joints shall be sawed prior to resealing the intersecting transverse joints.

Immediately following the final sawing operation, both vertical faces of the joint shall be completely free of dirt and dust; leaving a clean dry, newly exposed concrete surface. Joints shall be cleaned by sandblasting each vertical face with the nozzle held at an angle to the joint face and within 1 or 2 inches (25 to 50 mm) of the pavement. Sandblasting shall be done to a depth at which the sealant and backer rod are to be installed.

Just prior to installing the back-up material, the joints shall be blown out with compressed air at a pressure of at least 90 psi (620 kPa) to remove all dust, loose particles, and debris. Air compressors used for this purpose shall be equipped with traps capable of removing moisture and oil from the compressed air. A joint shall not be sealed until it is thoroughly clean and dry.

After the final cleaning, the back-up material shall be inserted into the joint groove in accordance with the Manufacturer's recommendations to provide the correct shape factor for the sealant being used.

510.3.2-Joint Sealing:

After insertion of the back-up material and prior to becoming contaminated, the joint groove shall be sealed in accordance with the Sealant Manufacturer's recommendations. At the time of sealing, the joint groove faces shall be dry and dust free. The sealant shall be pumped into the joint groove in a continuous uniform operation to properly fill and seal the joint groove from the bottom upward in order to avoid trapping any air bubbles. Tooling of the sealant, in order to force the sealant against the joint faces and provide a slightly concave surface with a depth of approximately ¼ in. (6 mm) (at the center of the joint) below the pavement surface, is required unless otherwise directed by the sealant manufacturer. When not tooled, the joint groove shall be sealed flush to within 1/8 to ¼ inch (3 to 6 mm) below the pavement surface. Traffic shall not be allowed on the sealed joint for the minimum time recommended by the Sealant Manufacturer after tooling or placement, unless otherwise approved by the Engineer.

Sealant shall never be applied to frozen, dirty, wet, or damp concrete or during inclement weather conditions. Sealant shall not be placed in the joints unless the temperature of the pavement is 40° F (4° C) or higher unless approved by the Engineer.

510.4-METHOD OF MEASUREMENT:

The quantity of re-sealing concrete pavement joints to be paid for will be the number of linear foot (meters) complete in place and accepted.

510.5-BASIS OF PAYMENT:

Re-sealing concrete pavement joints will be paid for at the contract unit price per linear foot (meter). Payment shall be full compensation for all labor, equipment, material, and incidentals required to remove all existing sealers or sealants, clean the joint groove, install the back-up material, and seal the joint with sealant.

510.6-PAY ITEM:

ITEM	DESCRIPTION	UNIT
510001-*	Re-Sealing Transverse Concrete Pavement Joints	Linear Foot (Meter)
510002-*	Re-Sealing Longitudinal Concrete Pavement Joints	Linear Foot (Meter)

* Sequence number

SECTION 514
ROLLER COMPACTED CONCRETE

DELETE THE CONTENTS AND SUBSTITUTE THE FOLLOWING.

514.1-DESCRIPTION:

Roller Compacted Concrete (RCC) consists of aggregate, Portland cement and possibly other supplementary cementitious materials (fly ash, slag), and water. RCC is proportioned, mixed, placed, compacted, and cured in accordance with these specifications. Ensure that the RCC conforms to the lines, grades, thickness, and typical cross section shown in the plans or otherwise established by the WVDOH. When used as base course, it shall be constructed as shown in the plans.

514.2-MATERIALS:

Materials shall meet the requirements specified in the following Sections or Subsections of Division 700:

MATERIAL	SECTION OR SUBSECTION
Portland Cement	701.1, 701.3
Fine Aggregate [Note 1]	702.1
Coarse Aggregate	703.1-4
Pozzolanic Additives	707.4
Water	715.7
Water Reducing and Retarding Admixtures	707.2
Curing Materials	707.6-707.10

Note 1 The use of limestone as fine aggregate will not be permitted

Shipping and storage of Cement and Pozzolanic Additives: Cement and pozzolanic additives shall be shipped and stored as outlined in Section 501.2.

514.2.1-Material Requirements:

Aggregates: Use no aggregate where the plasticity index of the aggregate exceeds 5. Aggregates may be a blend of fine and coarse aggregates. Use well-graded aggregate without gradation gaps and conforming to the following gradation:

Sieve Size	% Passing by Weight
1 inch	100
¾ inch	95-100
½ inch	70-90
3/8 inch	60-85
#4	40-60
#16	20-40
#100	3-15
#200	0-8

Prior to the start of each day's production, the Contractor shall perform a gradation test on the material to be used that day in order to verify that the aggregate gradation meets the above requirements. If the results of this test show that the aggregate gradation does not meet the above requirements, the Contractor shall immediately notify the Engineer and shall not begin production that day unless approved to do so by the Engineer. The Contractor shall then take immediate action to correct any gradation not meeting the above requirements, regardless of whether or not production is allowed. All gradation test results shall be submitted to the Engineer within 72 (seventy-two) hours.

514.3-PROPORTIONING:

514.3.1-RCC Mix Design Requirements:

At least 45 days prior to the start of construction, the Contractor shall submit to the Engineer for approval the proportion of materials to be used which will result in a workable RCC mix. No more than 25%, by mass, of the cementitious material content of the RCC mix shall be pozzolanic materials. The Engineer will review these proportions within 14 (fourteen) Calendar Days.

Laboratory density tests, in accordance with AASHTO T180 (Method D), shall be performed during development of the mix design in order to determine the maximum laboratory density and optimum moisture content for the RCC mix. The material proportions used to achieve the maximum laboratory density and the optimum moisture content shall be the material proportions used in the approved mix design and during construction. Compressive strength tests, as outlined in Section 514.3.2 shall be conducted on at least two separate batches of RCC developed from these material proportions. The mix design results shall be reported on the attachments for MP 711.03.23. The maximum laboratory density and optimum moisture content shall be reported and included on the mix design submittal also.

514.3.2-Design Compressive Strength: A mix design shall be used which demonstrates a minimum compressive strength of 4500 psi within 28 days. Compressive strength specimens shall be prepared in accordance with ASTM C1435 and tested in accordance with AASHTO T22. At least three sets of three cylinders shall be produced, with one set being tested at 3 days, one set being tested at 7 days, and the other at 28 days. The compressive strength at a particular age shall be determined as the average of the three specimens. If one individual result is much lower or much higher than the other two due to defects in the specimen as outlined in section 601.4.4, that value shall be discarded.

514.3.3-Design Moisture Content: A test for moisture content, in accordance with ASTM C566, shall be performed on each of the RCC batches produced in Section 514.3.1, from which compressive strength specimens were fabricated. The average moisture content shall be considered the target evaporable moisture content of the RCC mix, and shall be used for quality control purposes as outlined in Section 514.4.2.1.

514.3.4-Test Section: If the mix design appears satisfactory to the Engineer, the Contractor shall prepare and test a trial batch mixture and representative test section at least 100 ft. (30 m) in length and 10 ft (3 m) in width to verify that the design criteria for strength and density are met. The criteria for strength and lift thickness shall be verified by the Contractor by taking three cores at random locations and testing them in accordance with AASHTO T24. The minimum required compressive strength for each of these

cores is 3,500 psi (24 Mpa), measured at an age no later than 28 days, or within 10 percent of either the 3 or 7-day mix design strength, as determined in Section 514.3.2. Density testing, as outlined in Section

514.4.2.3 shall be performed on this Test Section also. The minimum required density for this testing is 98 percent of the maximum laboratory density.

Perform batch mixture preparation and testing in the presence of representatives of the Engineer. Construction, using RCC, shall not begin until an approved mix design has been obtained.

The Test Section shall be located in a location approved by the Engineer. If permitted by the Engineer, it is acceptable to place and leave the Test Section in place as part of the completed pavement if it meets all of the above required testing and acceptance criteria. If the Test Section is placed in an area which is to be paved with RCC, and it does not meet all of the above acceptance criteria, it shall be removed at the Contractor's expense.

514.4-TESTING:

514.4.1-Test Methods:

Standard Practice for Molding Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Hammer	ASTM C1435
Compressive Strength of Cylindrical Concrete Specimens	AASHTO T22
Making and Curing of Concrete Specimens	AASHTO T23
Obtaining and Testing Drilled Core Specimens	AASHTO T24
Measuring Length of Drilled Concrete Cores	AASHTO T148
Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying	ASTM C566
Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 inches) Drop	AASHTO T180

514.4.2-Contractor's Quality Control:

514.4.2.1-RCC Moisture Content: The Contractor shall perform moisture content tests in accordance with ASTM C566 on the initial batch of RCC produced each day and then once again if the ambient temperature reaches 85 °F (30 °C) or greater, as recorded in the vicinity of the concrete production facility.

514.4.2.2-Testing for Opening Pavement to Traffic: A minimum of three sets of compressive strength specimens shall be made for each day's paving operation. These compressive strength specimens shall be fabricated in accordance with ASTM C1435, and under the direct observation of the Engineer. A set of specimens consists of three cylinders. Field cure the specimens in accordance with AASHTO T23.

Test one cylinder from each set of these cylinders for compressive strength in accordance with AASHTO T22 at each of the following ages under the direct observation of the Engineer: 3 days, 5 days, and 7 days. The compressive strength of each set of cylinders shall be the average of the three specimens except that if one specimen shows evidence of improper sampling, molding, or testing, it shall be discarded and the remaining two strengths averaged. Should more than one specimen representing a given test show definite defects due to improper sampling, molding, or testing, the entire test shall be discarded.

The Contractor's personnel who fabricate the compressive strength specimens shall provide evidence, prior to the start of construction and to the satisfaction of the Engineer, that they are proficient in the specified test methods.

RCC pavement at an age of 3, 5, or 7 days may be put into service if the average compressive strength test result of the set of cylinders at the corresponding age is at least 3,000 psi (21 Mpa).

The results of the 3 and 7 day quality control compressive strength tests shall also be compared to the compressive strength results obtained in Section 514.3.2. If the compressive strength of these quality control specimens is less than 90% of the compressive strength results obtained in Section 514.3.2, the Contractor shall investigate the potential causes of the low strengths and report to the Engineer within 24 hours. If the compressive strength of these quality control specimens is less than 80% of the compressive strength results obtained in Section 514.3.2, and the compressive strength is also less than 3,500 psi immediately stop production and notify the Engineer. Do not resume production until the cause of the discrepancy has been determined to the satisfaction of the Engineer.

If the average strength of any of these sets of quality control cylinders, representing a single day's production, is equal to or greater than 4,000 psi (28 Mpa), then the Contractor is not required to test any of the remaining quality control cylinders representing that day's production.

514.4.2.3-Density Testing: Field density tests for quality control shall be performed by the contractor as soon as possible, but no later than 30 minutes after the completion of the rolling. The in-place density and moisture content shall be determined using a properly maintained nuclear moisture-density gauge in accordance with the applicable provisions of MP 717.04.21. All testing shall be performed in direct transmission mode. Only wet density is used for evaluation.

The testing shall be performed at a frequency not to exceed one test for every 1,000 yd^2 placed. The required minimum density is 98 percent of the maximum laboratory density obtained according to AASHTO T 180 (Method D), as determined in Section 514.3.1. The gauge will be calibrated for moisture content at the beginning of the work and at any time during the work. Any lot of RCC which was properly placed and

compacted, but not meeting the density requirements based on the initial testing, can be further evaluated by obtaining five additional randomly located density tests within the lot in question. If the average of these five additional tests meets the required minimum density, the lot shall be considered acceptable.

If the lot has been determined to not meet the specified minimum density requirements, it may be cored and tested by the Division in addition to any coring performed for acceptance as per Section 514.4.3.1. If the tested area achieves 3,500 psi (24 Mpa), it will be paid at the full unit price. If the tested area indicates strength less than 3500 psi but greater than 3150 psi, payment will be made as set forth in Table 514.4.2.3.

TABLE 514.4.2.3

Compressive Strength (psi)	Price Reduction (percent of unit bid price)
3300-3499	5
3150-3299	15

If the cores indicate strengths less than 3150 psi at 28 days or longer, the Engineer will evaluate the results and may reject the affected area and require removal and replacement or elect to pay at a reduced rate.

514.4.3-Acceptance Testing:

514.4.3.1-Compressive Strength Tests for Acceptance: The compressive strength for acceptance of RCC will be determined by testing cores. The RCC shall be at least 28 days old before the cores are obtained. One 4-inch (100 mm) diameter core shall be obtained, by the Division, for every 1,500 yd^2 (1,250 m^2) or fraction thereof of RCC placed and represent that area for acceptance purposes. These cores shall be tested by the Division for compressive strength. The minimum required compressive strength of these cores is 3,500 psi (24 Mpa).

The Contractor shall repair the core holes using concrete meeting the requirements of Section 501 and shall rod and neatly strike off the repair material.

Areas of RCC represented by any cores not meeting the minimum compressive strength requirements shall be handled in accordance with Section 105.12. Such areas that are allowed to remain in place shall be paid for at a reduced unit bid price as outlined in Section 601.15.2, with the Design Strength being 3,500 psi (24 Mpa).

Additionally, as outlined in Section 514.4.2.3, cores may also need to be obtained to determine the compressive strength of any areas which are found to not meet the specified density requirements. It should be noted that lot sizes for density testing (1,000 yd^2) and compressive strength acceptance testing (1,500 yd^2) are different, and will overlap throughout the project.

However, only one price adjustment shall be applied to any area not meeting the specification requirements. If any lot, or portion of a lot, is determined to have compressive strengths below 3,500 psi (24 Mpa) as outlined in Section 514.4.2.3 and is also found to be deficient in strength as outlined in Section 514.4.3.1, the price adjustment to be applied to that lot, or portion of that lot, shall be the greater of either the price adjustments calculated accordingly.

514.4.3.2-Thickness Tests for Acceptance: The cores obtained in Section 514.4.3.1 shall be measured for thickness, in accordance with AASHTO T148, prior to being tested for compressive strength.

If the thickness of any core is found to be less than the specified design thickness, then an evaluation of the area represented by that core shall be performed by the Engineer in accordance with Section 105.12. If the Engineer allows that area of deficient thickness to remain in place, then that area shall be paid for at a reduced unit bid price as outlined in Table 514.4.3.2.

TABLE 514.4.3.2

Average Value of Pavement Thickness as Represented by Acceptance Core	Unit Price As Percent of Contract Unit Price
0.1 to 1.0% Less than Specified Thickness	98.0%
1.1 to 2.0 % Less than Specified Thickness	96.0%
2.1 to 3.0% Less than Specified Thickness	94.0%
3.1 to 4.0% Less than Specified Thickness	92.2%
4.1 to 5.0% Less than Specified Thickness	90.3%
5.1 to 6.0% Less than Specified Thickness	88.4%
6.1 to 7.0% Less than Specified Thickness	86.5%
More than 7.0% Less than Specified Thickness, with a maximum of 0.70 inches (18 mm) Less than Specified Thickness	Remove and Replace

514.4-EQUIPMENT AND TOOLS:

Construct roller compacted concrete with any combination of equipment that will produce a completed pavement meeting the requirements for mixing, transporting, placing, compacting, finishing, and curing as provided in this specification.

514.4.1-Field Laboratory: RCC shall be supplied by a plant which has been certified by the Division as meeting all requirements of the governing Specifications and as having the facilities necessary to ascertain and control the quality of the product in accordance therewith. A testing facility or laboratory, meeting the requirements of Section 501.5.1 shall be provided by the Contractor.

514.4.2-Mixing Plant:

514.4.2.1-General: Unless approved measures are taken to delay the setting time of the RCC, the mixing plant shall be located within a thirty-minute haul time from the point of RCC placement. Use only plants capable of producing an RCC pavement mixture in the proportions defined by the final approved mix design and within the specified tolerances. The capacity of the plant must be sufficient to produce a uniform mixture at a rate compatible with the placement equipment. The estimated production rate of the Plant shall be noted in the Contractor's Quality Control plan. If the plant is unable to produce material at a rate adequate to prevent unnecessary cold joints and frequent paver stoppages, the Engineer may halt production until such time that a plant of appropriate capacity is used. The plant shall be inspected and approved by WVDOH District Materials Personnel prior to production of material under these specifications.

514.4.2.2-Pugmill Plant: Use only pugmill plants of the central plant type with a twin-shaft pugmill mixer, capable of batch or continuous mixing, equipped with synchronized metering devices and feeders to maintain the correct proportions of aggregate, cement, pozzolan, and water. These plants shall meet the requirements of AASHTO M156. Other pugmill plant requirements are as follows:

514.4.2.2.1-Aggregate Storage: If previously blended aggregate is furnished, storage may be in a stockpile from which it is fed directly to a conveyor feeding the mixer. If aggregate is furnished in two size groups, follow proper stockpiling techniques in accordance with section 501.7 to ensure aggregate separation.

514.4.2.2.2-Aggregate Feed Rate: Use aggregate bins with a feed rate controlled by a variable speed belt, or an operable gate calibrated to accurately deliver any specified quantity of material. If two aggregate size stockpile sources are used, the feed rate from each bin must be readily adjustable to change aggregate proportions, when required. Feed rate controls must maintain the established proportions of aggregate from each stockpile bin when the combined aggregate delivery is increased or decreased.

514.4.2.2.3-Plant Scales: Plant scales, if utilized, for any weigh box or hopper must comply with Section 601.5.2.3.

514.4.2.2.4-Cement and Pozzolan Material Storage: Supply separate and independent storage silos for Portland cement and pozzolan. At plants with two or more silos in which different types of cement or cementitious materials are stored, ensure that each silo has a sign at each

fill inlet to reduce the potential for loading errors. Make the sign from a durable material, with minimum two-inch high by ¼-inch wide letters that are raised, indented, or cut. Ensure that the sign clearly identifies the material that is in the silo and may be easily read even when completely coated with dust.

514.4.2.2.5-Portland Cement and Pozzolan: If using Portland cement and pozzolan (such as fly ash or slag), employ blending equipment acceptable to the WVDOH and demonstrate, with a testing plan, the ability to successfully produce a uniform blended material meeting the mix design requirements. Perform testing on at least a daily basis to ensure both uniformity and proper quantities.

514.4.2.2.6-Cement and Pozzolan Feed Unit: Provide a satisfactory means of dispensing Portland cement and pozzolan, volumetrically or by weight, to ensure a uniform and accurate quantity of cementitious material enters the mixer.

514.4.2.2.7-Water Control Unit: Use a water control unit capable of measuring the required amount of water for the approved mix by weight or volume. Ensure that the unit is equipped with an accurate metering device. Vary the amount of water to be used only with the approval of the Engineer.

514.4.2.2.8-Gob Hopper: For continuous operating pugmills, provide a gob hopper attached to the end of the final discharge belt to temporarily hold the RCC discharge in order to allow the plant to operate continuously.

514.4.2.3-Rotary Drum Mixer: Shall meet the requirements of Section 501.5.3 and shall provide a rotary drum batch mixer capable of producing a homogeneous mixture, uniform in color, and having all coarse aggregate coated with mortar. Equip the mixer with batching equipment to meet the following requirements:

514.4.2.3.1-Weighing Equipment: Measure the amounts of cement, pozzolan, and aggregate entering into each batch of RCC by direct weighing equipment. Use only weighing equipment that is readily adjustable in order to compensate for the moisture content of the aggregate or to change the proportionate batch weights. Include a visible dial or equally suitable device that will accurately register the scale load from zero to full capacity. The cement and pozzolan may be weighed separately or cumulatively in the same hopper on the same scale, provided the cement is weighed first.

514.4.2.3.2-Weigh Hoppers: Use only bulk cement and pozzolan weigh hoppers that are equipped with vibrators to operate automatically and continuously while weighing hoppers are being dumped. Ensure that the weigh hopper has sufficient capacity to hold not less than 10 percent in excess of the cementitious material required for one batch.

514.4.2.3.3-Water Metering: Measure the amount of water entering each batch of RCC by weight or volume. Use only equipment capable of measuring the water to within a tolerance of plus or minus one percent and equipped with an accurate gauge or dial measuring device. Vary the amount of water to be used only with the approval of the Engineer. During batching, admit water to the mixer only through the water measuring device and then only at the time of charging.

514.4.2.3.4-Mixing Time: Use only drum mixers equipped with an accurate clock or timing device, capable of being locked, for visibly indicating the time of mixing after all the materials, including the water, are in the mixer.

514.4.2.3.5-Recharging: Discharge all material in the drum before recharging. Ensure that the volume of mixed material per batch does not exceed the manufacturer's rated capacity of the mixer.

514.4.3-Paver: Place RCC with a high-density asphalt-type paver subject to approval by the Engineer. Use only pavers equipped with compacting devices capable of producing an RCC pavement with a minimum of 90 percent of the maximum density in accordance with AASHTO T 180, Method D prior to any additional compaction. Ensure that the paver is of suitable weight and stability to spread and finish the RCC material, without segregation, to the required thickness, smoothness, surface texture, cross-section, and grade.

514.4.4-Compactors: Use self-propelled steel drum vibratory rollers having a minimum static weight of 10 tons (9.1 Mg) for primary compaction. For final compaction, use either a steel drum roller, operated in a static mode, or a rubber-tired roller of equal or greater weight. Only use walk-behind vibratory rollers or plate tampers for compacting areas inaccessible to large rollers.

514.4.5-Haul Trucks: Use trucks for hauling the RCC material from the plant to the paver with covers available to protect the material from inclement weather and excessive evaporation. To ensure adequate and continuous supply of RCC material to the paver, have a sufficient number of trucks. If the number of trucks is inadequate to prevent frequent starts and stops of the paver, cease production until additional trucks are obtained.

514.4.6-Water Trucks: Keep at least one water truck, or other similar equipment, on-site and available for use throughout the paving and curing process. Equip such equipment with a spreader pipe containing fog spray nozzles capable of evenly applying a fine spray of water to the surface of the RCC without damaging the final surface.

514.4.7-Inspection of Equipment: Before start-up, the Contractor's equipment will be carefully inspected. Should any of the equipment fail to operate properly, cease work until the deficiencies are corrected.

514.4.8-Access for Inspection and Calibration: Provide the Engineer or WVDOH District Materials Inspector access at all times for any plant, equipment, or machinery to be used in order to check calibration, scales, controls, or operating adjustments.

514.5-PREPARATION OF GRADE AND CONDITIONING OF SUBGRADE OR BASE:

Before the RCC processing begins, prepare the subgrade in accordance with Section 228 of the WVDOH Standard Specifications.

514.6-HANDLING, MEASURING, AND BATCHING MATERIALS:

Handling, measuring, and batching of materials shall be in accordance with Section 501.7, except that volumetric batching shall not be permitted.

514.7-MIXING RCC:

514.7.1-Mixing Process: Use the same mixture for the entire project unless otherwise stated in the project documents. If, during production, the source of Portland cement, pozzolan, or aggregates is changed, then suspend production and submit a new mix design to the Engineer for approval. Do not exceed the manufacturer's rated capacity for dry concrete mixtures in the mixing chamber. Keep the sides of the mixer and mixer blades free of hardened RCC or other buildups. Routinely check mixer blades for wear and replace if wear is sufficient to cause inadequate mixing.

514.7.2-Mixing Time: Use a mixing time adequate to ensure a thorough and complete mixing of all materials. Do not allow the mixing time, after all materials including water are in the mixer, to be less than 1½ minutes for one cubic yard (0.76 cubic meter) and 20 seconds for each additional cubic yard (0.76 cubic meter).

514.7.3-Plant Calibration: Prior to commencement of RCC production, carry out a complete and comprehensive calibration of the plant in accordance with Section 501.5.2. Provide all scales, containers, and other items necessary to complete the calibration. After completion of the initial calibration,

calibrate the plant periodically as directed by the Engineer. Plants listed on WVDOH approved list at the time of RCC production are exempt from this requirement, although the WVDOH reserves the right to require additional calibration if variation in mixture quantities are suspected.

514.7.4-Daily Reports: Supply daily plant records of production and quantities of materials used that day to the Engineer. These records may be used as a check on plant calibration.

514.7.5-Transportation: Transport the RCC pavement material from the plant to the areas to be paved in dump trucks equipped with retractable protective covers for protection from rain or excessive evaporation. Ensure that the trucks are dumped clean with no buildup or hanging of RCC material in the corners. Have the dump trucks deposit the RCC material directly into the hopper of the paver or into a secondary material distribution system that deposits the material into the paver hopper. Dump truck delivery must be timed and scheduled so that RCC material is spread and compacted within the specified time limits.

514.8-PLACING RCC:

514.8.1-Subbase Condition: Prior to RCC placement, ensure that the surface of the subbase is clean and free of foreign material, ponded water, and frost. Ensure that the subbase is uniformly moist at the time of RCC placement. If sprinkling of water is required to remoisten certain areas, ensure that the method of sprinkling will not form mud or pools of freestanding water. Correct soft or yielding subbase areas prior to placement of RCC as specified in Section 6.1 above.

514.8.2-Adverse Weather Conditions:

514.8.2.1-Cold Weather Precautions: Employ cold weather precautions as detailed in Section 601.9.1 of the Standard Specifications.

Stop placement operations when the air temperature falls below 40°F (4.5°C) and is declining. Start operations only if the air temperature rises above 35°F (1.7°C) and is elevating.

If the air temperature is expected to fall below 40°F (4.5°C) at some time during construction, and if the Contractor plans to place RCC during that time, the Contractor shall advise the Division of his plans for cold weather curing and protecting the RCC. The Division may, at any time, require the Contractor to provide additional protection to cause the provisions of this specification to be met.

514.8.2.2-Hot Weather Precautions*:* Employ hot weather precautions as detailed in Section 601.9.2 of the Standard Specification. During periods of hot weather or windy conditions, take special

precautions to minimize moisture loss due to evaporation. Cooling of aggregate stockpiles by shading or the use of a fine mist may be required. Protective covers may be required on dump trucks. Keep the surface of the newly placed RCC pavement continuously moist.

The Engineer may decrease the allowable time, specified in Section 514.9.1, between mixing and the completion of compaction when the ambient temperature exceeds 90°F (32°C) or during windy conditions.
In no event shall RCC be placed when its temperature at any time after the completion of mixing exceeds 90°F (32°C).

514.8.2.3-Rain Limitations: Conduct no placement of RCC pavement during rain conditions sufficient to be detrimental to the finished product. Placement may continue during light rain or mists provided the surface of the RCC pavement is not eroded or damaged in any way. Use dump truck covers during these periods. The WVDOH may terminate paving at any time when, in the WVDOH judgment, the rain is detrimental to the finished product.

514.8.3-Paver Requirements: Place all RCC with an approved paver as specified in Section 514.5.3, and also meeting the requirements of this Section.

514.8.3.1-Filling the Paver: Do not allow the quantity of RCC material in the paver to approach empty between loads. Maintain the material above the auger at all times during paving.

514.8.3.2-Stopping the Paver: Ensure that the paver proceeds in a steady, continuous operation with minimal starts and stops, except to begin a new lane. Maximum paver speed during laydown is 10 feet (3 m) per minute. Higher paver speeds may be allowed at the discretion of the WVDOH if the higher speeds may be obtained without distress to the final product or cause additional starts and stops.

514.8.3.3-Surface Condition: Ensure that the surface of the RCC pavement is smooth, uniform, and continuous without excessive tears, ridges, or aggregate segregation once it leaves the paver.

514.8.4-Inaccessible Areas: Pave all areas inaccessible to either roller or paver with cast-in-place concrete meeting the requirements of Section 501.

514.8.5-Adjacent Lane Pavement: Place adjacent paving lanes within 60 minutes. If more than 60 minutes elapses between placement of adjacent lanes, the vertical joint must be considered a cold joint and prepared in accordance with Section 514.10. At the discretion of the Engineer, this time may be increased or decreased depending on ambient conditions of

temperature, wind, and humidity. Multiple pavers may be used in tandem to reduce the occurrence of cold joints.

514.8.6-Hand Spreading: Broadcasting or fanning the RCC material across areas being compacted is not permissible. Such additions of materials may only be done immediately behind the paver and before any compaction has taken place. Any segregated coarse aggregate shall be removed from the surface before rolling.

514.8.7-Segregation: If segregation occurs in the RCC during paving operations, placement shall cease until the cause is determined and corrected to the satisfaction of the Engineer. If the segregation is judged by the Engineer to be severe, remove and replace the segregated area at no additional cost to the Department.

514.9-COMPACTION:

514.9.1-Time to Compaction Start: Ensure that compaction begins with the placement process and is completed within 60 minutes of the start of the mixing at the plant. The time may be increased or decreased at the discretion of the WVDOH depending on ambient conditions of temperature and humidity. Do not permit delays in rolling unless approved by the Engineer. Plan operations and supply sufficient equipment to ensure that these criteria are met.

514.9.2-Rolling: Determine the sequence and number of passes by vibratory and non-vibratory rollers to obtain the specified density and surface finish. Only operate rollers in the vibratory mode while in motion. Rubber-tire rollers may be used for final compaction. Use additional rollers if specific density requirements are not obtained or if placing operations get ahead of the rolling operations.

514.9.3-Rolling Longitudinal and Transverse Joints: Do not operate the roller within 2 feet of the edge of a freshly placed lane until the adjacent lane is placed. Then, roll both edges of the two lanes together within the allowable time. If a cold joint is planned, then roll the complete lane and follow cold joint procedures as specified in Section 514.10.

514.9.4-Inaccessible Areas: Compact areas inaccessible to large rollers using walk-behind rollers or hand tampers. Cast-in-place, meeting the requirements of Section 501, may be used in these areas as a replacement for RCC.

514.10-JOINTS:

514.10.1-Fresh Vertical Joints: A joint is considered a fresh joint when an adjacent RCC lane is placed within 60 minutes of placing the previous lane or as specified by the Engineer based on ambient conditions. Fresh joints do not require special treatment.

514.10.2-Cold Vertical Joints: Any planned or unplanned construction joints that do not qualify as fresh joints are considered cold joints. Prior to placing fresh RCC mixture against a compacted cold vertical joint, thoroughly clean the cold joint of loose or foreign material. Wet the vertical joint face and maintain it in a moist condition immediately prior to placement of the adjacent lane.

514.10.2.1-Sawing Cold Vertical Joints: For uncompacted surfaces or slopes more than 15 degrees from the vertical, cut the joint vertically for the full depth. Within 2 hours of final compaction, the edge of a cold joint may be cut with approved mechanical equipment. For edges cut after 2 hours, sawcut to the full depth of the pavement. Demonstrate any modification or substitution of the sawcutting procedure to the WVDOH for approval prior to use. In no case allow cutting of the edge to cause raveling or tearing of the surface. Moisten the cut edge immediately prior to placement of the adjacent lane.

514.10.3-RCC Pavement Joints at Structures: Line structures such as manholes, valves, or concrete curb and gutter with joint filler as defined in Section 708 of the Standard Specifications.

514.10.4-Control Joints: Construct transverse contraction joints in the RCC pavement by sawing. At the option of the Contractor, soft-cut or green-cut saws may be utilized as soon as possible behind the rolling operation and set to manufacturer's recommendations. Conventional cut saws must be used as soon as the sawing operation will not result in raveling or other damage to the RCC pavement, but not more than 18 hours after RCC placement. Cut all joints to 1/4 the depth of the RCC pavement to a single saw blade width. Joints should be spaced at intervals not to exceed 24 times the nominal pavement thickness unless otherwise indicated on the Plans or directed by the WVDOH. (For example, for an 8-inch RCC pavement, cut joints at 16-foot intervals.).

In areas where RCC is placed adjacent to existing concrete pavement, such as in shoulder areas, the Contractor shall adjust the joint spacing to align with the joints in the existing adjacent concrete pavement. In these areas, in order to work out a joint spacing which aligns with the joints in the existing pavement, the joints in the RCC may be spaced at intervals up to 24 times the nominal RCC pavement thickness, plus 10 percent of that distance. (For example, for an 8-inch RCC pavement, cut joints at a maximum spacing of 17.6-foot intervals).

514.11-FINISHING:

Ensure that the finished surface of the RCC pavement, when tested with a 10-foot straightedge or crown surface template, does not vary from the straightedge or template by more than 1/4 inch at any one point and shall be within 5/8 inch of the specified finished grade. When surface irregularities are outside these tolerances, or other smoothness requirements specified in the plans, diamond-grind the surface to meet the tolerance at no additional cost to the WVDOH.

514.12-CURING:

Immediately after final rolling and compaction testing, keep the surface of the RCC pavement continuously moist until an approved curing compound, a suitable prime coat, or a layer of asphalt concrete is applied or for 72 hours after placement, whichever comes first.

Until the RCC has achieved the required strength for opening to traffic, the surface temperature of the RCC shall not be allowed to fall below freezing. The Contractor shall be responsible for the quality of the RCC placed and cured during cold weather. Any RCC injured by frost action shall be removed and replaced at the Contractor's expense.

514.13.1-Water Cure: Apply water cure by water trucks equipped with fog spray nozzles, soaking hoses, sprinkling system, or other means such that a uniform moist condition on the surface of the RCC is ensured. Apply this moisture in a manner that will not erode or damage the surface of the finished RCC pavement.

514.13.2-Curing Compound: Do not use curing compounds when the RCC material is to be promptly covered with asphalt. Apply curing compound as indicated in Section 707.9 of the Standard Specifications, except that the minimum rate of curing compound application is 11 square yards per gallon (2.5 m^2/L) unless a higher rate is specified by the curing compound manufacturer.

514.13-OPENING TO TRAFFFIC:

Protect the RCC from vehicular traffic during the curing period. Do not place vehicular traffic, except for curing equipment or sawcutting equipment, on the RCC pavement until the RCC material achieves a minimum compressive strength of 3,000 psi (21 Mpa) as demonstrated in Section 514.4.2.2.

514.14-MAINTENANCE:

Maintain the RCC pavement in good condition until all work is completed and accepted. Perform such maintenance at no additional cost to the Engineer.

514.15-METHOD OF MEASUREMENT:

The quantity of RCC placement to be paid for will be the number of square yards (meters) complete in place and accepted. The width for measurement will be the width of the pavement or overlay shown on the typical cross section of the Plans and additional widening where called for or as otherwise directed in writing by the Engineer. The length will be measured on the surface along the centerline of the roadway or roadway ramp. Construction of control joints will not be measured separately and no direct payment will be made for this work.

514.16-BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract unit prices less adjustments referred to below and shall constitute full compensation for furnishing and preparing of all materials, equipment, tools, labor, and incidentals necessary to satisfactorily complete the work.

514.16.1-Thickness: Any sampling units found to be deficient in thickness, and which are allowed to remain in place by the Engineer, shall be paid for at a reduced Contract Unit Bid Price as outlined in Table 514.4.3.2. No compensation will be allowed for the materials or labor involved in the removal of defective material.

514.16.2-Strength: Determination of RCC strength shall be in accordance with Section 514.4.3.1. Any sampling units found to be deficient in strength, and which are allowed to remain in place by the Engineer, shall be paid for at a reduced Contract Unit Bid Price as outlined in Section 514.4.3.1. No compensation will be allowed for the materials or labor involved in the removal of defective material.

514.16.3-Density: Determination of RCC density shall be in accordance with Section 514.4.2.3. Any sampling units found to be deficient in density, shall be handled in accordance with Sections 514.4.2.3 and 514.4.3.1.

514.17-PAY ITEM:

ITEM	DESCRIPTION	UNIT
514001-*	"Thickness" ROLLER COMPACTED CONCRETE	Square Yard (Meter)

* Sequence number

DIVISION 600
INCIDENTAL CONSTRUCTION

SECTION 601
STRUCTURAL CONCRETE

601.1-DESCRIPTION:

ADD THE FOLLOWING SUBSECTION AFTER THE NINTH PARAGRAPH:

Class DC concrete shall be used in drilled caisson foundations.

DELETE THE LAST PARAGRAPH AND SUBSTITUTE THE FOLLOWING.

A hydration control stabilizing admixture may be used at the Contractor's option provided that the conditions in section 601.7 are met.

601.2-MATERIALS:

ADD THE FOLLOWING TO THE TABLE:

MATERIAL	SECTION OR SUBSECTION
Hydration Control Stabilizing Admixtures	707.15
Specific Performance Admixtures	707.17
****Joint Filler (Substructure)	708.1.2
*****Joint Filler (Superstructure)	708.1.1

**** Joint filler for vertical joints in the substructure shall be in accordance with Section 708.1.2.

***** Preformed joint filler for vertical joints in the superstructure shall be sponge rubber in accordance with Section 708.1.1.

601.3-PROPORTIONING:

ADD THE FOLLOWING PARAGRAPH AT THE END OF THE SUB-SECTION (AFTER THE FOURTH PARAGRAPH):

For establishment of mixture proportions, as an alternative to the curing methods for rapid chloride permeability testing outlined in the previous paragraph, specimens may be moist cured for 7 days in accordance with ASTM C 192, then cured for 21 days in lime-saturated water at 100.0 ± 3.5 °F (38.0 ± 2.0 °C), then tested at an age of 28 days. This method of curing shall be noted as the accelerated RCPT curing method.

601.3.1-Mix Design Requirements:

ADD THE FOLLOWING AS THE SECOND PARAGRAPH IN THE SUB-SECTION:

Approved Hydration Control Stabilizing Admixtures, as defined in Section 707.15, which are designed to stop the hydration of cement in a concrete mix, enabling an extension to the allowable discharge time from a truck mixer as outlined in Section 601.7, may be added to an existing approved concrete mix design in accordance with the procedures outlined in MP 711.03.23.

ADD THE FOLLOWING LINES TO TABLES 601.3.1A {ENGLISH} AND {METRIC}:

TABLE 601.3.1A
{ENGLISH}

Class of concrete	Design 28 Day Compressive Strength	Target Cement Factor	Maximum Water Content	Standard Size of Coarse Aggregate***	Entrained Air
	Pounds per square inch	lbs./c.y. *	lb. of water / lb. of cement **	Number	Percent
DC	4500	705	0.44	7, 78, or 8	6

TABLE 601.3.1A
{METRIC}

Class of concrete	Design 28 Day Compressive Strength	Target Cement Factor	Maximum Water Content	Standard Size of Coarse Aggregate***	Entrained Air
	Mpa	Kg/m^3 *	L of water / Kg of cement **	Number	Percent
DC	31	418	0.44	7, 78, or 8	6

*** A number 67 coarse aggregate may be used in Class DC concrete, provided the Engineer approves the use of that size aggregate for the specific project on which it is to be used. That approval will depend on the minimum spacing of the reinforcing steel in the drilled caisson.

ADD THE FOLLOWING LINES TO TABLE 601.3.1B

TABLE 601.3.1B		
MATERIAL	**CLASS OF CONCRETE**	**QUANTITY**
Fly Ash	DC	0.72 ft^3 (0.020 m^3)
Ground Granulated Furnace Slag	DC	1.79 ft^3 (0.051 m^3)

601.3.2.3-Yield:

DELETE THE THIRD PARAGRAPH IN THE SECTION AND REPLACE WITH THE FOLLOWING:

During the progress of the work, the actual yield shall be verified at the frequency noted in MP 601.03.50; and, if the yield, based on a single unit weight determination, should differ from the theoretical yield by more than plus or minus two percent, two additional unit weight determinations shall be made, and the average of the three determinations shall be considered the unit weight of the concrete. The actual yield shall be determined from that average unit weight, and the design mix shall be adjusted as required to correct the actual yield to correspond to the theoretical yield.

601.3.2.4-Total Solids Ā:

ADD THE FOLLOWING PARAGRAPH AFTER THE FIFTH PARAGRAPH IN THE SUBSECTION AS PARAGRAPH SIX:

When the small quantity work condition applies, the Ā required after 50 cubic yards (37.5 cubic meters) of concrete production shall be performed on the day that the 50 cubic yard quantity is achieved. All concrete produced on that day (the day that the 50 cubic yard quantity is achieved) shall be represented by the previous Ā. The Ā conducted on the day that the 50 cubic yard quantity is achieved shall represent the next 50 cubic yards of concrete produced, beginning with the concrete produced on the next day of production.

ADD THE FOLLOWING AT THE END OF THE SUBSECTION AS PARAGRAPHS EIGHT AND NINE:

When, in a concrete mix, gradations tests show that the percentage of material which passes the No. 200 (75 µm) sieve, exceeds the amount permitted in Sections 702.1.2 and 703.4, and provided the Engineer permits the material to remain in place and the Contractor elects to leave the material in place, then a penalty shall be applied in the manner outlined in the following paragraph.

It shall be determined which material (coarse aggregate, fine aggregate, or both) caused the total material finer than the No. 200 (75 µm) sieve to exceed the specification limits as determined in Sections 702.1.2 and 703.4. The mass of the material(s) in the concrete mix ($M_{ca,}$ $M_{fa,}$ or both, as defined in MP 601.03.51), which caused the total material finer than the No. 200 (75 µm) sieve to exceed the specification limits shall be divided by M_t (as defined in MP 601.03.51). The resulting number shall be multiplied by the unit price of the concrete, as billed by the Concrete Supplier and by the quantity of non-specification concrete placed. That value shall be the penalty applied for the use of the material which did not meet the specification requirements.

601.4-TESTING:

601.4.1-Sampling and Testing Methods:

DELETE THE LAST TWO PARAGRAPHS FROM THE SECTION:

ADD THE FOLLOWING LINE AT THE END OF THE TABLE:

Rapid Chloride Permeability Test	AASHTO T 277

601.4.2-Contractor's Quality Control:

INSERT THE FOLLOWING PARAGRAPH AT THE END OF THE SECTION:

The Contractor shall provide a copy of the quality control test results to the Supplier of the concrete which was tested within 48 hours of the completion of the test.

601.4.5-Tests for permeability acceptance:

DELETE THE HEADING AND THE FIRST SENTENCE OF THE FIRST PARAGRAPH AND REPLACE WITH THE FOLLOWING:

601.4.5-Tests for permeability acceptance of Class H concrete: The Contractor shall be required to compare the compressive strength test results obtained in Section 601.4.4, for Class H concrete, to the compressive strength of the approved test mix per Section 601.3.

DELETE THE FIRST SENTENCE OF THE SECOND PARAGRAPH AND REPLACE WITH THE FOLLOWING:

The Contractor shall also be required to fabricate six rapid chloride permeability test specimens in accordance with AASHTO T277 every time that a set of compressive strength specimens for Class H concrete is fabricated.

601.7-MIXING

DELETE THE FOURTH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

When placing concrete at remote locations, due to excessive haul time to the site of work from the closest approved batch plant, and when discharge of the concrete within the time limits specified in the previous paragraph is not possible, or in other circumstances when approved by the Engineer, a concrete mix that includes a hydration control stabilizing admixture may be used to extend the allowable concrete discharge time. The subject concrete mix containing this admixture must be approved in accordance with section 601.3.1, and the hydration control stabilizing admixture must be approved in accordance with section 707.15. When conditions are such that a hydration control stabilizing admixture is used, the allowable time between the introduction of the cement to the aggregates and discharge of the concrete shall be increased to three hours. The limit of 300 maximum revolutions (pertaining to truck mixers or agitators) specified in AASHTO M 157 may be waived when hydration control stabilizing admixtures are used, provided that no additional water is added prior to discharge of the concrete. A single batch of concrete containing a hydration control stabilizing admixture may not be discharged on more than one project.

601.8-FORMS:

601.8.1-General:

ADD THE FOLLOWING TO THE SUBSECTION AS PARAGRAPH THREE:

Deck slab overhang forms shall be supported from the bottom flange of fascia girders or stringers. The Contractor shall submit forming plans and supporting calculations for the overhang to the Engineer for approval prior to erecting the formwork.

601.8.7-Removal of Forms and Construction of Superimposed Elements:

ADD THE FOLLOWING AS THE LAST PARAGRAPH OF THE SUBSECTION:

In lieu of field cured cylinders for the determination of compressive strength required for from removal and construction of superimposed elements, the Contractor may use the Maturity Method for the estimation of concrete strength as outlined in MP 601.04.21.

601.8.9-Stay-In-Place Fabricated Metal Forms for Concrete Bridge Decks:

601.8.9.4-Placement of Concrete:

ADD THE FOLLOWING AS PARAGRAPH THREE:

Prior to placement of concrete, the Contractor shall submit to the Engineer for approval Concrete Volume to Stay In Place Form Adjustment Factor (SIP_{adj}). The SIP_{adj} shall be the equivalent ratio of the concrete volume in the form flutes to Square Yard of Stay-In-Place Form Area.

601.10-PLACING CONCRETE:

601.10.1.1-Pre-Pour Meeting:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

601.10.1.1-Pre-Pour Meeting: On projects for which the concrete is being used in bridge construction, the Contractor shall schedule a meeting prior to the start of the concrete work. The Engineer, Construction Manager, Prime Contractor, Concrete Contractor, Concrete Finisher, Concrete Supplier, and the Individual or Agency that will perform the quality control testing of the concrete shall attend. Topics of discussion shall include concrete mixture proportions, batching, transporting, handling, placing, finishing, curing, and on-site quality control testing requirements.

601.10.1.2-Concrete Placement Limitations:

DELETE THE FIRST SENTENCE AND REPLACE WITH THE FOLLOWING:

Immediately prior to, and during, placement of Class H concrete, if the evaporation rate exceeds 0.10 lb./sq. ft. per hour (0.5 kg/sq. m per hour) (see Figure 1), the Contractor shall make provisions (i.e. wind breaks, fogging, etc.) to reduce the rate prior to placing concrete.

601.10.1.4-Concrete Placement at Night

RE-NUMBER THE SECTION 601.10.1.4 TO SECTION 601.10.1.3. THE REVISED SECTION HEADING SHALL READ AS FOLLOWS:

601.10.1.3-Concrete Placement at Night:

601.11-FINISHING CONCRETE SURFACES:

EDIT AND RE-NUMBER THE SECTION AS FOLLOWS:

601.11.4-Finishing Concrete Bridge Decks: Any addition of water to the surface of the concrete to assist in the finishing operations will not be permitted. When conditions are such that unusually rapid drying is occurring, an atomized mist may be used to prevent the rapid evaporation of water from the concrete surface during the final finishing.

601.11.4.1-Class K Bridge Decks: After striking off, consolidating, and floating have been completed, both while the concrete is still plastic, the surface shall be checked for trueness with a straightedge. The Contractor shall furnish an accurate scraping type straightedge with a minimum length of 10 feet (3.048 meters) and swung from a handle at least 3 feet (1 meter) longer than one-half the width of the slab.

The straightedge shall be held in successive positions parallel to the road centerline and in contact with the roadway surface and operated from side to side until the surface is within the permissible tolerance provided. Advance along the roadway shall be in successive stages of not more than one-half of the length of the straightedge. Any depressions found shall be immediately filled with freshly mixed concrete, struck-off, consolidated, and refloated. High areas shall be cut down and refloated. The straightedge testing and reflecting shall continue until the surface is found to be free from observable departures from the straightedge and the slab has the required grade and contour.

Upon completion of the above operations, the surface shall be smoothed with a lute or smoothing float, 4 to 6 feet (1.2 to 1.8 meters) in length, after which the surfaces shall be tested with an accurate straightedge. This checking straightedge shall be 10 feet (3.048) meters long and shall be held in a position parallel to the centerline of the roadway. The advance of this straightedge along the slab shall be in successive stages of not more than one-half of its length. When tested with this straightedge, the finished surface shall be free from observable departures from the straightedge.

Upon completion of the above operations, the surface of the concrete shall be given a groove finish while the concrete is still plastic. The tool used shall produce a groove that is approximately 3/32 inch (2 mm) wide. The depth of this groove shall be 1/8 inch (3 mm) to 3/16 inch (5 mm) and spaced approximately ½ inch (13 mm) center to center. The grooves shall be formed in a direction that is transverse to the centerline of the roadway or parallel to the skew. On any one bridge the direction of the grooves shall be consistent. Adjacent strokes to establish the texture shall abut one another without appreciable overlap. Texturing shall be performed when

the concrete surface is of such plasticity as to prevent excessive raveling (concrete too dry) or to prevent mortar from flowing back into the grooves (concrete too wet). All texturing shall be accomplished with a single pass of the tool. To facilitate drainage, the 12 inches (300 mm) immediately adjacent to the curbline shall be left untextured.

Instead of forming the grooves into the plastic concrete by tining, as specified in the previous paragraph, the Contractor may sawcut the grooves into the hardened concrete bridge deck as specified in Section 601.11.4.4. All sawcutting shall be performed before any sealing operations required in Section 601.13.1. No additional payment will be made for constructing this type of bridge deck surface.

601.11.4.2-Class H Bridge Decks: The surface of the Class H concrete shall be uniformly smooth, dense and even. The surface shall then be given a suitable texture with an approved burlap drag.

The Contractor shall texture in a transverse or longitudinal direction. Once begun, the direction of texturing shall not change. All texturing shall be performed prior to the beginning of curing operations. Only one pass of the drag over the finished area will be permitted. Texturing shall be in strict accordance with the time requirements of 601.12.4 for applying wet burlap.

If texturing is done in the transverse direction, the Contractor shall texture by hand methods as soon as practicable after finishing machine passage, without any additional finishing operations between the machine passage and texturing operations.

If texturing is done in the longitudinal direction, the burlap drag shall be a seamless strip and shall be attached to the work bridge such that the surface of the concrete is textured as soon as practicable after finishing machine passage, without any additional finishing operations between the machine passage and texturing operations. Small areas, inaccessible to the attached drag, may be textured by hand methods.

The finishing movement and resulting progress of the burlap drag shall be done in a manner so as to prevent ridges or gouges from forming in the concrete surface. The drag shall be weighted and the contact area changed as required to produce a texture acceptable to the Engineer. The drag shall be cleaned as required; to remove all hardened concrete particles and shall be replaced after each day's operation.

Texture resulting from the drag shall stop within one foot (305 mm) of curbs or parapets.

Any hand finishing operations shall be kept to a minimum for Class H bridge decks.

601.11.4.3-Straightedge Testing of Hardened Bridge Decks: When finishing has been completed and the concrete has hardened sufficiently, the surface shall be given a further test for trueness with a rolling straightedge. Areas showing high spots of more than 1/8 inch (3 mm)

shall be marked by the Engineer and, only when directed by the Engineer, such areas shall be ground with an approved grinding tool, utilizing carborundum stones or industrial diamond wheels; grinding shall be done to an elevation where the area or spot will not show a surface deviation in excess of 1/8 inch (3 mm) when tested with the 10 feet (3.048 meter) rolling straightedge, except that the maximum depth of grinding shall not exceed ¼ inch (6 mm). The ground areas shall be treated as directed by the Engineer. Where the initial deviation from the straightedge is ½ inch (13 mm) or more, the Contractor will be required to remove and replace the complete pour in which the areas not meeting the required tolerance are located.

After grinding, all areas either high or low, not meeting the requirements of 1/8 inch (3 mm) tolerance will be measured and disposition of these areas will be as set forth in 601.15.2.

ADD THE FOLLOWING SUBSECTION:

601.11.4.4-Class H Concrete Finished Deck Grooving: After completion of water curing the concrete and after corrective grinding, but before opening the bridge to traffic, saw longitudinal or transverse grooves in accordance with the following applicable subsection.

601.11.4.4.1-Transverse Grooving: After corrective grinding and before opening to traffic, grooves shall be cut into the concrete using a mechanical saw. These grooves shall be 0.10 inch (3 mm) wide and 0.25 inch (6 mm) deep. Groove spacing shall be 1.5 inches (38 mm) center to center. No later than one week prior to grooving operations, the Contractor shall provide the Engineer with two accurate, easily readable gauges with which to verify groove dimensions. Groove depth and spacing tolerances are limited to ±1/16 inch (±2 mm). Groove width tolerances are +0.02 (+0.5 mm) inch and -0.0 inch (-0 mm). The grooves shall be cut in a direction that is transverse to the centerline of the roadway or parallel to the skew. On any one bridge the direction of the grooves shall be consistent. Grooves shall be cut continuously across the deck to within one foot (305 mm) of gutter lines or drainage structures. Grooves shall also be continuous across the full width of the deck surface including construction joints. Grooves shall terminate within 1 inch (25 mm) of any exposed metal component or elastomeric concrete of an expansion joint. When the deck is skewed and the contractor is using gang blades to saw the grooves, the maximum distance (measured perpendicular to the centerline of the expansion joint) from the last groove termination in the pass to the expansion joint shall be 1 foot - 8 inches (508 mm). Radial grooving shall be performed in increments limited to 12 feet (3.7 m) of bridge length.

601.11.4.4.2-Longitudinal Grooving: Use diamond blades mounted on a multi-blade arbor on self-propelled machines that were built for

grooving of concrete surfaces. The groove machines shall have depth control devices that detect variations in the pavement surface and adjust the cutting head height to maintain the specified depth of the groove. The grooving machines shall have devices to control alignment. Do not use flailing or impact type grooving equipment. More than one size grooving machine may be required in order to saw the grooves as specified.

Provide an experienced technician to supervise the location, alignment, layout, dimension, and grooving of the surface.

Saw grooves parallel to the bridge centerline in a continuous pattern across the surface. Begin and end sawing 9 to 12 inches (220 to 300 mm) from any device in place in a bridge deck, such as scuppers or expansion joints. Stop sawing a minimum of 2 inches (50 mm) to a maximum of 24 inches (600 mm) from skewed expansion joints. Maintain a clearance of a minimum of 2 inches (50 mm) and a maximum of 4 inches (100 mm) from the grooves to longitudinal joints in the deck. Maintain a minimum clearance of 9 inches (220 mm) to a maximum of 30 inches (750 mm) clearance between the grooves and the curb or parapet toe. However, at no point shall un-grooved portions of deck extend beyond edge line and into the temporary or permanent travelled lanes. Saw grooves in a uniform pattern spaced at 3/4 inch minus 1/4 inch or plus 0 inches (19 mm minus 6 mm or plus 0 mm). Saw grooves 0.15 inches (4 mm) deep and 0.10 inches (3 mm) wide. Groove tolerances for depth are +0.0625 inches (2 mm) and minus 0 inches (0 mm). Groove tolerances for width are +0.02 inches (0.5 mm) and minus 0 inches (0 mm).

For staged, or phased bridge deck work, saw the grooves parallel to the final, permanent bridge centerline. If the different stages or phases of the bridge deck work occur within one construction season, any stage opened to traffic shall receive an interim coarse broom finish during placement, then saw the longitudinal grooves after the final stage. The interim broom finish will not be allowed as a surface texture when opened to traffic over a winter season. Saw longitudinal grooves in the deck prior to opening to traffic for a winter season.

For bridge decks that widen from one end to the other, saw the longitudinal grooves parallel to the centerline of the roadway. On the side of the bridge that widens, saw the longitudinal grooves to follow the edge line. Saw longitudinal grooves in the gore areas, avoiding the overlapping of grooves.

At the beginning of each work shift, furnish a full complement of grooving blades with each saw that are capable of cutting grooves of the specified width, depth, and spacing.

If during the work, a single grooving blade on a machine becomes incapable of cutting a groove, continue work for the remainder of the work shift. The Contractor is not required to cut the groove omitted because of the failed blade. Should two or more grooving blades on a machine become incapable of cutting grooves, cease operating the machine until it is repaired.

Continuously remove all slurry and remaining residue from the grooving operation and leave the deck surface in a clean condition. Prevent residue from grooving operations from flowing across shoulders or across lanes occupied by public traffic or from flowing into gutters or other drainage facilities. Remove solid residue before the residue is blown by passing traffic or by wind.

Provide water as necessary to saw grooves according to this subsection.

601.12-CURING AND PROTECTING CONCRETE:

601.12.1-Curing Under Normal Conditions:

ADD THE FOLLOWING AFTER THE FIFTH SENTENCE OF THE SECOND PARAGRAPH:

The contractor shall not be permitted to add additional cement to the target cement factor in the approved mix design in order to obtain high-early strength and/or reduce curing time.

601.12.3-Protection of Finished Surfaces:

ADD THE FOLLOWING TO THE END OF THE FIRST PARAGRAPH:

Water runoff from concrete curing operations shall be deflected away from the steel girders and shall not drain onto the substructure concrete after contacting the weathering steel.

601.12.4-Curing Class H Concrete

DELETE THE SECOND PARAGRAPH AND REPLACE WITH THE FOLLOWING:

The concrete surface shall be completely covered with clean, wet burlap. The burlap shall be thoroughly saturated over its entire area, but shall be drained of excess water before application. Burlap shall be lapped a minimum of one foot (305 mm) and shall lay flat. Failure to apply wet burlap within 30 minutes after discharge of the concrete from the truck and within 10 minutes of the completion of finishing operations shall be cause for rejection of the work as determined by the Engineer. Care shall be exercised to ensure that the burlap is well drained. Burlap shall be continuously wet for a period of seven days by means of automatic intermittent sprinkling or a continuous wetting system.

ADD THE FOLLOWING TO THE SECTION:

601.12.5-Protecting Concrete Decks: Construction equipment with an axle load greater than 20,000 lbs (20 kips) shall not be permitted on bridge deck. Construction equipment or loads that are not required to complete the slab, parapets, railing overlay, or other appurtenances shall not be allowed on the bridge deck.

601.13-PROTECTIVE SURFACE TREATMENT:

601.13.1-Linseed Oil

DELETE THE SUB-SECTION AND RENAME AND REPLACE WITH THE FOLLOWING:

601.13.1-Silane Treatment for Bridge Superstructure: After the concrete has achieved a minimum of 80% of the design strength, a silane protective treatment as specified shall be applied to the entire top surface of bridge decks, approach slabs when they are included in the Contract, concrete bridge medians, top and curb face of bridge sidewalks, and the inside faces of parapets. When approach slabs are specified to be overlayed with asphalt, the silane treatment is not required.

The application of this silane protective surface treatment is not required for elements constructed from Class H concrete.

The surface to receive the treatment shall be dry for at least 48 hours before treatment and shall be free from sand, surface dust and dirt, oil, grease, chemical films, and other contaminants prior to application of the silane. Immediately before application, the entire surface shall be air blown to remove any loose dust. The surface, air, and material temperatures shall be between 40 and 100° F during application, and temperatures above 40° F, without precipitation, must be forecast for the twelve hours following application. Any coating damaged by rain or moisture shall be corrected by an additional application.

The surface treatment shall consist of one of the silane sealers listed on the Division's Approved Product List of Concrete Sealers.

The surface treatment, including application rate, shall be applied in accordance with the requirements listed above and the Manufacturer's recommendations.

Metal hand rails shall be protected from spray by shielding or masking.

The Contractor shall prohibit all pedestrian and vehicular traffic on the structure during the drying period of the protective coating.

601.13.1.1-Silane Treatment for Bridge Substructure: Before placing any steel superstructure members on the concrete substructure units, the Contractor shall coat all exposed areas of the abutment, tops, sides, and all faces of pier caps and pier stems to the ground or water line elevation with an approved silane based concrete sealer except for projects where concrete

protective or other coatings are specified. Preparation of surfaces, application rates, and methods shall be as recommended by the silane manufacturer.

Upon completion of all superstructure concrete curing operations, the Contractor shall remove all stains from substructure units using proprietary chemical stain removers and/or mild acid etching. Abrasive blast cleaning shall be used to supplement the other cleaning methods to completely remove all stains if the stained areas are severe or extensive. All cleaning methods shall be subject to approval of the Engineer.

Re-coat all areas where stains were removed, regardless of the cleaning method used, with an approved silane based concrete sealer as specified above.

601.13.3-Concrete Protective Coating:

ADD THE FOLLOWING TO THE SECTION:

This section shall apply only when the pay item for concrete protective coating is included in the plans.

601.13.3.1-Concrete Surface Preparation:

DELETE THE FIRST PARAGRAPH AND REPLACE WITH THE FOLLOWING:

After the Engineer has inspected and accepted the concrete surfaces of bridges and median barriers as having a satisfactory ordinary surface finish, clean the concrete surfaces specified hereinafter of all dust, rust, foreign matter, and form oil, and apply a Department approved protective coating finish. Coat the following surfaces, including all beveled edges:

601.14-METHOD OF MEASUREMENT:

DELETE THE FIRST PARAGRAPH AND REPLACE WITH THE FOLLOWING:

The quantity of work done for Classes A, B, C, D, H, K, and M concrete will be measured in cubic yards (meters), complete in place and accepted as determined by the dimensions on the Plans or Contract Documents, subject to adjustments provided for in Sections 104.2 and 109.2.

DELETE PARAGRAPH TWO AND REPLACE WITH THE FOLLOWING:

The quantity of work done for Class H and Class K concrete will be measured in cubic yards (meters), complete in place and accepted, as measured from one end of the bridge to the other, fascia to fascia, and from the top of the forms to the finished elevation of the proposed deck surface. The volume of

concrete required to fill the flutes of stay-in-place forms shall be calculated by taking the Contractor's approved SIP_{adj} factor and multiplying by the square yardage of SIP area minus beam widths, expansion dam widths, etc. as applicable.

601.15-BASIS OF PAYMENT:

601.15.1-General:

DELETE PARAGRAPH ONE AND REPLACE WITH THE FOLLOWING:

The quantities, determined as provided above, will be paid for at the contract unit prices bid or at the adjusted percent of contract price as specified for the items listed below, which prices and payments shall be full compensation for furnishing all the materials and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, joint filler, field laboratory, supplies and incidentals necessary to complete the work.

601.16-PAY ITEMS

DELETE THE FOLLOWING ITEMS FROM THE TABLE:

ITEM NUMBER	DESCRIPTION	UNIT
6010025-001	Modified Concrete, Class	CY
6010026-001	Modified Architectural Concrete, Class	CY

ADD THE FOLLOWING ITEMS TO THE TABLE:

ITEM NUMBER	DESCRIPTION	UNIT
601002-002	Class B Concrete, Mass	CY
601025-002	Modified Concrete, Class A	CY
601025-003	Modified Concrete, Class B	CY
601025-004	Modified Concrete, Class B Mass	CY
601025-005	Modified Concrete, Class C	CY
601025-006	Modified Concrete, Class D	CY
601025-007	Modified Concrete, Class H	CY
601025-008	Modified Concrete, Class K	CY
601026-002	Modified Architectural Concrete, Class B	CY
601026-003	Modified Architectural Concrete, Class H	CY
601026-004	Modified Architectural Concrete, Class K	CY

SECTION 602
REINFORCING STEEL

602.6-PLACING AND FASTENING:

602.6.1-General:

INSERT THE FOLLOWING AS PARAGRAPH TWO:

The clear distance between the reinforcing steel and the face of the concrete unless otherwise shown in the plans shall be:

Top of deck slab:	2.5”
Bottom of deck slab:	1.0”
Bottom of footings	3.0”
All other locations	2.0”

602.7-BAR SPLICES:

602.7.1-Lapping:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

602.7.1-Lapping: All reinforcement shall be furnished in full lengths as indicated on the Plans. No splicing of bars, except where shown on the Plans, will be permitted without the written approval of the Engineer. Lapped splices shall be well distributed or located at points of low tensile stress. The bars shall be rigidly clamped or wired at all splices in a manner approved by the Engineer. Minimum lengths of lap splices unless otherwise noted shall be:

#4 Bar	1’-9”
#5 Bar	2’-2”
#6 Bar	2’-9”
#7 Bar	3’-9”
#8 Bar	4’-11”
#9 Bar	6’-2”
#10 Bar	7’-10”
#11 Bar	9’-7”

For epoxy coated bars, the minimum lap splice length shall be increased by 50 percent at locations where concrete cover is less than 3 bar diameters and 20 percent at all other locations.

SECTION 603
PRESTRESSED CONCRETE MEMBERS

603.6.5-Strength of Concrete:

ADD THE FOLLOWING PARAGRAPH AT THE END OF THE SUB-SECTION:

Whenever the compressive strength of a member at 28-days is less than the 28-day design compressive strength value, the subject member may still be accepted without a price adjustment if the compressive strength at any time prior to shipment (up to a maximum of 56-days from the date of fabrication) exceeds the 28-day design compressive strength value. The Division shall not be responsible for any project delays incurred due to the delayed strength attainment, and time extensions under Section 108 of the Specifications are not applicable to this scenario.

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

603.14.2.1 – Price Adjustments:

Members found not in compliance with the requirements of 603.6.5 for compressive strength, but for which the evaluation indicates may still be used, will be paid for at a reduced price in accordance with the following formulas, depending on who purchased the members:

FORMULA 1: Use the following price reduction formula when the members are used in a project constructed by a Contractor:

Price Reduction = $\left(\frac{f_c^{'} - \bar{X}}{0.5 f_c^{'}} \right)$ x 40% of the Contract Unit Bid Price

FORMULA 2: Use the following price reduction formula when the beams are used in a project constructed by the Division:

Price Reduction = $\left(\frac{f_c^{'} - \bar{X}}{0.5 f_c^{'}} \right)$ x IC

Where:

$f_c^{'}$ = 28-Day Design Compressive Strength, psi (Mpa)

$\bar{X}$ = Average 28-day Compressive Strength as determined in 603.6.5

$IC_{(Formula\ 2\ only)}$ = The invoiced cost of the member itself, as billed to the Division by the Fabricator. This cost shall not include other items associated with the member such as guardrail, bearing pads, etc.

603.15-PAY ITEMS

DELETE THE FOLLOWING ITEMS FROM THE TABLE:

ITEM	DESCRIPTION	UNIT
603027-*	Precast Reinforced Concrete Three-Sided Structure	Linear Feet (Meter)
603028-*	Precast Reinforced Concrete Wingwall	Linear Feet (Meter)
603029-*	Precast Reinforced Concrete Headwall	Square Feet (Meter)

SECTION 606
UNDERDRAINS

606.2-MATERIALS:

ADD THE FOLLOWING TO THE TABLE:

MATERIAL	SUBSECTION	TYPE OR GRADATION
Corrugated Polyethylene Underdrain	714.19	
Perforated Plastic Semicircular Pipe	714.20	
Miscellaneous Concrete	715.12	

SECTION 607
GUARDRAIL

607.2-MATERIALS:

ADD THE FOLLOWING TO THE TABLE:

MATERIAL	SUBSECTION	TYPE OR GRADATION
Miscellaneous Concrete	715.12	

SECTION 610
PLAIN CONCRETE CURBING, INTEGRAL CONCRETE CURBING, AND COMBINATION CONCRETE CURB AND GUTTER

610.3.4-Sections:

DELETE THE THIRD SENTENCE OF PARAGRAPH ONE AND REPLACE WITH THE FOLLOWING:

Sections shall be separated by joints 1/8 in. (3mm) wide except at expansion joints.

SECTION 614
PILING WALLS

614.8-METHOD OF MEASUREMENT

DELETE THE CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

The quantity of piles will be measured in linear feet (meters) of piles installed and accepted for the wall.

The quantity of lagging will be measured in square feet (meters) installed and accepted as measured by the total area of wall as measured through all wall elements, without deductions for gaps between lagging, piles, etc.

SECTION 615
STEEL STRUCTURES

615.3-MATERIALS:

615.3.2-High-Strength Fasteners:

DELETE PARAGRAPH ONE AND REPLACE WITH THE FOLLOWING:

Bolts, nuts, and washers shall conform to Section 709.24 and shall be mechanically galvanized in accordance with ASTM B695. Hot-dip galvanizing or coating with a zinc rich primer may be used only when specified by the Contract documents.

INSERT THE FOLLOWING SUBSECTION:

615.3.2.1-Weathering Steel Bridges: High strength fasteners shall meet Section 709.24 and shall be Type 3 (weathering steel), per ASTM A325. High strength fasteners used in regions of the structure that require painting shall be Type 1 or 3, per ASTM A325, and mechanically galvanized in accordance with ASTM B695.

615.3.7-Coating of Anchor Bolts, Nuts and Washers:

DELETE PARAGRAPH ONE AND REPLACE WITH THE FOLLOWING:

All anchor bolts, nuts and washers shall be hot dip galvanized in accordance with AASHTO M232 after fabrication.

615.4-FABRICATION:

REPLACE THE FOLLOWING SUBSECTION:

615.4.2-Storage of Materials: Steel members must not be gouged, scratched, dented, or allowed to rub against other members that would result in damage to the steel member or coating. Members shall be handled using softeners and slings instead of chokers and chains.

Store members in the fabrication shop and on the project site in such a manner as to be kept free and clean of all foreign substances such as grease, oil, mortar and concrete splatter , chalk and crayon marks, paint, and dirt. All storage must be above ground and sloped to allow free drainage of melted snow, rainwater, and dew. If the members are stored for periods longer than three months, the members must be placed on metal supports. For a period of storage up to three months, members may be placed on clean, untreated wood timbers. Do not allow treated lumber or treated timber to contact steel members.

Store plate girders and rolled beams with the web in the upright position. The members may be stacked on metal or wood supports provided, as noted above; individual members must be kept separate. Under no circumstances shall members be nested together or bundled.

615.5-ASSEMBLY:

615.5.7-Welding:

INSERT THE FOLLOWING AS PARAGRAPHS TWO AND THREE:

No field welding is permitted unless shown on the plans or approved by the Engineer.

Exercise caution while making field or shop welds while an elastomeric bearing pad is in contact with the steel. In no case shall the elastomer or elastomer band be exposed to instantaneous temperatures greater than 400 degrees F. Any damage to the elastomeric bearing due to welding will be cause for rejection. The temperature shall be monitored by heat crayons furnished by the Contractor.

615.6-ERECTION:

INSERT THE FOLLOWING SECTION:

615.6.9-Final Cleaning Of Weathering Steel Bridges: Upon completion of all concrete curing operations, the contractor shall clean all steel surfaces to remove all grease, oil, concrete residue, dirt, and other foreign substances to the satisfaction of the Engineer.

Cleaning may be by high pressure water, powered or hand wire brushing, or by Brush off Blast Cleaning according to SSPC-SP 7. Cleaning shall be followed by a clean water rinse to remove all residues of detergents and cleaners if they were used. All grease and oil shall be removed prior to the clean water rinse by solvent cleaning.

Do not use acids to remove stains.

Areas of the shop applied paint system which are damaged during erection and high strength bolted connection areas that were only prime painted shall be properly cleaned and painted according to Section 688 of the Standard Specification, PAINTING STEEL STRUCTURES, and to the satisfaction of the Engineer.

After completion of all tightening operation, mechanical galvanized fasteners shall be solvent cleaned and field painted as specified for the structural steel.

For integral or semi-integral abutment structures, the crevice/interface between the embedded steel and the concrete shall be suitably chamfered to provide for placement of a sealant. Sealant material shall meet the requirements of ASTM C920, Type S, Grade NS, Class 25, Uses NT and M. Sealant shall be suitable for bonding between concrete and the top coat of the specified paint system. Acid-cure sealants shall not be permitted.

SECTION 620
THREE-SIDED REINFORCED CONCRETE BRIDGE/CULVERT

620.2-GENERAL:

DELETE THE FIRST TWO PARAGRAPHS IN THE SECTION:

SECTION 625
DRILLED CAISSON FOUNDATIONS

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

625.4.1-Concrete: Concrete for the drilled caissons shall be Class DC and shall conform to the requirements of Section 601 of the Standard Specifications.

The design 28-day compressive strength shall not be less than 4500 psi (31 Mpa) unless shown otherwise in the Plans. The Contractor shall prepare a mix design in accordance with MP 711.023.23 to attain this strength. Slump for dry placement will be 7 inches (175 mm) plus-or-minus 1 inch (25 mm). Unless otherwise specified in the Plans, the cement shall be Type I.

For placement of caisson concrete by tremie or pumping, the cement factor shall be increased by 94 lbs. (43 kg) from the original design cement factor, the slump shall be 8 inches (200 mm) plus-or-minus 1 inch (25 mm) and shall maintain a slump in excess of 4 inches (100 mm) throughout the concrete placement.

SECTION 626
RETAINING WALL SYSTEMS

DELETE THE SECOND PARAGRAPH AND REPLACE WITH THE FOLLOWING:

626.5-MATERIALS:

626.5.1.1.2.3-Sealers shall be silane and/or siloxane based and specifically formulated for use on porous surfaces such as concrete block.

Sealers shall be tested in accordance with ASTM E514 on a block wall, and shall provide a minimum of 90% reduction in leakage.

Three dry-cast concrete block specimens shall be treated with the sealer and tested for absorption in accordance with ASTM C140. The sealer shall provide a minimum of 90% reduction in water absorption when tested in this manner.

626.5.3.1-Test Requirements:

REVISE THE TABLE REFERENCED IN PARAGRAPH ONE TO SAY THE FOLLOWING:

Sieve Size	Percent Passing
4 inches (100mm)	100
No. 40 (425 µm)	0-60
No. 200 (75 µm)	0 - 15

REVISE NOTE (**) OF BULLET D., TO SAY THE FOLLOWING:

** May be adjusted if geosynthetic material is used for soil reinforcements or attachment devices see shop drawings and section 626.5.1.1.6.

SECTION 633
CONCRETE GUTTER, INVERT PIPE GUTTER, OR DUMPED ROCK GUTTER

633.2-MATERIALS:

ADD THE FOLLOWING TO THE TABLE

MATERIALS	SUBSECTION
CEMENT FOR GROUT	701.1 or 701.3
SAND FOR GROUT	702.1.1 through 702.1.5 and 702.2 or 702.6

633.6-DUMPED ROCK GUTTER:

ADD THE FOLLOWING TO THE SECTION:

633.6.1-Grout for Dumped Rock Gutter: Grout for Dump Rock Gutter shall be defined as per Section 633.2 with interstices filled with spalls and grouted cement grout. The grout filler shall be composed of a mixture of one part Portland Cement and three parts sand, mixed with water to produce a workable consistency. The amount of water shall be that designated by the Engineer. The stone shall be thoroughly wet immediately before grout is applied. As soon as the grout is deposited on the surface, it shall be thoroughly worked into the joints. The stones shall then be brushed so that their top surfaces are exposed.

Grouted Dump Rock Gutter shall be cured in accordance with any of the methods specified in 501.15, with a blanket of earth kept wet for 72 hours, or by sprinkling with a fine spray of water every two hours during the day-light hours for a period of three days.

633.7-METHOD OF MEASUREMENT

ADD THE FOLLOWING AS PARAGRAPH FOUR:

The quantity of work done for "Grouted Dump Rock Gutter" will be measured in cubic yards (meters), complete in place and accepted as determined by the dimensions as shown on the Plans or established by the Engineer. No excess thickness will be measured for pay quantity and no separate payment will be made for the cement grout.

633.9-PAY ITEMS:

ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
633004-001	GROUTED DUMP ROCK GUTTER	CUBIC YARDS (METERS)

SECTION 636
MAINTAINING TRAFFIC

636.5-TEMPORARY STRUCTURES:

DELETE THE CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

Temporary structures shall be constructed and maintained as shown on the Plans or as called for in the Proposal. The use of used material is acceptable; Such material shall be inspected visually and accepted by the Engineer prior to its use. The design and plans for the temporary structure shall be in accordance to Section 105.2.

ADD THE FOLLOWING SUBSECTION:

636.12-TEMPORARY IMPACT ATTENUATING DEVICE:

This device shall be a "stationary crash cushion" as described within Section F.82 of the manual "*Manual On Temporary Traffic Control For Streets And Highways, 2006 Edition*".

The device utilized shall be a model listed on the WVDOH Approved Products Listing (APL) for Safety Devices specifically noted as being approved for temporary work zone use. Specific device selection in regards to manufacturer and model shall be at the Contractor's discretion; however, unless the characteristics of the obstacle to be shielded dictate otherwise, the device utilized shall be a non-tapered, non-gating device. If it is not possible, based on the width of the obstacle to be shielded, to utilize a non-tapered, non-gating device, the Contractor shall utilize an approved Sand Barrel system.

Notes included on the APL characterize non-gating devices by their National Cooperative Highway Research Program Report 350 (NCHRP-350) crash testing approval level (Test Level 2 or Test Level 3). The Test Level certification required for each particular device to be qualified at shall be based on the normal (non work zone) posted speed limit in effect at the location of the device. A Test Level 2 or Test Level 3 device shall be utilized if the normal posted speed limit is 40 MPH or less. Otherwise, a Test Level 3 device shall be required. Sand Barrel arrays shall be designed for an impact speed 5 MPH greater than the normal posted speed limit.

All Temporary Impact Attenuating Devices shall be installed and maintained fully in accordance with the specifications and recommendations of the device manufacturer. This shall include, but shall not be limited to, characteristics of the roadway profile along the approach to the nose of the device and along the adjacent (traffic) side of the device, changes in the roadway grade within the length of the device, side slope and changes in the side slope at the location of the device, anchoring (base to be anchored to as well as the anchoring system), backup, attachment to the obstacle being shielded, transitioning to the obstacle being shielded, winterization, delineation, repair, and cleaning. If the

installation requires deviations from the specifications and recommendations of the device manufacturer, the Contractor shall obtain written approval from the device manufacturer and shall produce this written approval for review upon request.

Impacted devices shall be maintained and returned to full impact capacity in a timely manner. Beginning 12 hours from the time and date upon which the Contractor is given documented notice of damage to an Impact Attenuating Device requiring repairs, the Contractor shall be subject to a penalty of $1,000 per Calendar Day (24 hrs.), or fraction thereof, until the necessary repairs are completed. This penalty shall not be temporarily suspended for any reason and shall apply regardless of the cause of the damage to the device.

All labor, equipment, and materials required for the repair of impact attenuating devices shall be incidental to Bid Item 636060.

636.14-TEMPORARY CONCRETE BARRIER:

DELETE THIS ENTIRE SECTION AND TITLE AND REPLACE WITH THE FOLLOWING:

636.14-TEMPORARY BARRIER:

Furnish, install, maintain, remove and dispose of temporary barrier in accordance with this specification and the contract plans.

636.14.1-Materials: Temporary Barrier shall meet the requirements of NCHRP Report 350 and/or MASH-08 for the different test levels as shown in Table 3.1 "Test Matrix for Longitudinal Barriers" in NCHRP Report 350. Specific types of temporary barrier will not be used unless crash tested and approved by the Engineer. Historical performance will help determine use of a product. Poor performance may be grounds for non-acceptance.

Based on past performance, existing temporary concrete barrier with pin and eye connections are considered acceptable up to and including test level TL-3, until January 1, 2016

Temporary Barriers shall have adequate drainage slots to allow runoff to pass through.

Temporary Barrier shall have 8" x 12" Type B-1 Delineators (white or yellow as appropriate) facing traffic at 40 foot centers.

636.14.2-Installation: This barrier type shall conform to the details on the Plans, set as directed on the Plans, with the barrier sections securely connected together by satisfactory fastening devices to provide a more stable structure against impact.

A Temporary Barrier Installation Plan shall be approved according to Section 105.2.1.2 "Contractor Approval Method". It shall have information adequate to ensure it meets the installation conditions below and shall include barrier type, barrier connection type, NCHRP test approval and data, individual segment length, anchorage details, end treatments, and transition details.

The temporary barrier shall be placed to match test conditions as determined by the Engineer. These conditions may include, but not be limited to, anchorages, total length of barrier, individual segment length and connection details. Only one type of temporary barrier shall be used for any one continuous run of barrier in a project. To clarify, the entire length of temporary barrier shall not be intermixed in regard to type of barrier, connection type, or individual barrier length unless that configuration has been tested.

Anchorage spacing and installation, if required, shall be per manufacturer subject to shop drawing review and approval and meet or exceed test conditions. Shop drawing information shall include details for anchor removal and patching and /or repair of pavement or bridge deck.

Where temporary barrier adjoins guardrail barrier, regardless if one is temporary and the other is permanent (newly constructed or previously in existence) or if both are temporary, they must be connected with a Temporary Guardrail Connector conforming to 636.16.2.

Where temporary barrier adjoins bridge parapet or other essentially non-yielding barrier or obstacle, they must be joined in a manner to maintain barrier continuity and prevent vehicle snagging during impact. If they cannot be joined in this manner, a connection device must be used to assure barrier continuity and to prevent vehicle snagging during impact.

When the temporary barriers are no longer needed, they will become the property of the Contractor, unless otherwise noted on the Plans.

J-J Hook connections shall be tensioned by pulling the barrier segments apart to make this type connection "tight".

Vehicles, materials or any other equipment shall not be stored in the Temporary Barrier buffer area. Unless required as a part of the contract, vehicles and equipment shall not work in the Temporary Barrier buffer area and if required, shall be limited to that time that it is necessary to be in that area.

636.15-REMOVING AND RESETTING TEMPORARY CONCRETE BARRIERS:

DELETE THIS ENTIRE SECTION AND REPLACE WITH THE FOLLOWING:

636.15-REMOVING AND RESETTING TEMPORARY BARRIERS:

Temporary barriers that are to be relocated within a project shall be salvaged and reinstalled as specified in 636.14 and set as indicated on the Plans.

636.23-METHOD OF MEASUREMENT:

636.23.4-Temporary Structures:

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

"Temporary Structures for Maintaining Traffic", as detailed on the Plans or called for by the Engineer, shall be on a lump sum basis for completing, maintaining and removal of the work. Earthwork required for erection or removal of the structure, not measured and paid for by a specific item, shall not be measured or paid for and shall be incidental to Item 636005-*, Temporary Structure For Maintaining Traffic.

636.23.17-TEMPORARY CONCRETE BARRIER:

DELETE THE HEADING CONTENTS. REPLACE WITH THE FOLLOWING:

636.23.17-Temporary Barrier: The quantity of "Temporary Barrier" shall be the linear feet (meters) of barrier actually placed. Payment shall include terminal connecting devices, delineators, anchoring, maintaining, dismantling, removal and disposal of the barrier and devices when no further use is required.

636.23.18-Removing and Resetting Temporary Concrete Barrier:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

636.23.18-Removing and Resetting Temporary Barrier: The quantity of "Removing and Resetting Temporary Barrier" shall be the linear feet (meters) of barrier reused in a different location. Payment shall include temporary storage if necessary, re-erecting, maintaining, dismantling, removal and disposal of the barrier.

ADD THE FOLLOWING SUBSECTION:

636.23.27-Temporary Impact Attenuating Device: One unit of "Temporary Impact Attenuating Device" shall be paid at the time of initial installation of a device, as described in Section 636.12, at each unique location within the project. However, over the life of the project the Contractor shall not be paid for a quantity of this item exceeding the maximum number of individual devices required to be in place on the project at a specific time. Each installation beyond this quantity shall be paid for using the "Remove And Reset Attenuator Device" item.

ADD THE FOLLOWING SUBSECTION:

636.23.28-Remove and Reset Attenuator Device: This item shall be measured and paid for in accordance with the provisions of Section 636.23.27.

636.25-PAY ITEMS:

ADD THE FOLLOWING ITEMS TO THE TABLE:

Item Number	Description	Unit
636017-*	Temporary Barrier, TL-1, **	Linear Foot (LF) Meter (M)
636017-*	Temporary Barrier, TL-2, **	Linear Foot (LF) Meter (M)
636017-*	Temporary Barrier, TL-3, **	Linear Foot (LF) Meter (M)
636017-*	Temporary Barrier, TL-4, **	Linear Foot (LF) Meter (M)
636017-*	Temporary Barrier, TL-5, **	Linear Foot (LF) Meter (M)
636018-*	Remove and Reset Temporary Barrier	Linear Foot (LF) Meter (M)
636060-*	Temporary Impact Attenuating Device	EACH
636060-*	Remove and Reset Attenuator Device	EACH

* Sequence number

** Deflection range (see below)
Example: "636017 Temporary Barrier TL-3, IV "

DEFLECTION RANGES:

Supplemental Description	Deflection Criteria
I	Minimal Deflection < 6 in.
II	Low Deflection < 24 in.
III	Medium Deflection < 60 in.
IV	High Deflection < 96 in.

Deflection values are based on NCHRP testing for corresponding level and is permanent deflection measured at the bottom of the barrier.

SECTION 638
PROJECT MARKERS, RIGHT-OF-WAY MARKERS, AND SURVEY MARKERS

DELETE THE HEADING AND REPLACE WITH THE FOLLOWING:

SECTION 638
PROJECT MARKERS, RIGHT-OF-WAY MARKERS,
SURVEY MARKERS, AND OUTLET MARKERS

638.1-DESCRIPTION:

DELETE THE FIRST PARAGRPAH AND REPLACE WITH THE FOLLOWING:

This work shall consist of furnishing, and placing or installing at the points designated on the Plans, in the Contractor's Proposal or by the Engineer, metal (signpost) project markers, right-of-way markers, concrete survey markers, and outlet markers in accordance with these Specifications and in reasonably close conformity to the lines, grades, dimensions, locations, and sections shown on the Plans, in the Contractor's Proposal or established by the Engineer.

638.2-MATERIALS:

ADD THE FOLLOWING AS THE THIRD PARAGRAPH:

The materials for Outlet Marker Signs, such as for the sign panels, their supports, and for the legend and background, are to be of a type and method of fabrication that will be consistent with the conditions and estimated period of use. Signs shall have black letters for the legend on a white background. Reflective sheeting will be permitted, but not required.

DELETE SECTIONS: 638.6, 638.7, AND 638.8 AND REPLACE WITH THE FOLLOWING:

638.6-OUTLET MARKERS:

638.6.1-General: Outlet Markers Signs shall be furnished by the Contractor and placed during the mobilization of the project. The Outlet Marker Sign shall be in accordance with Figure 638.6.1 below. . The Outlet Marker Signs shall become the property of the Division and remain in place upon completion of the project unless otherwise directed by the Engineer. No shop drawings shall be required.

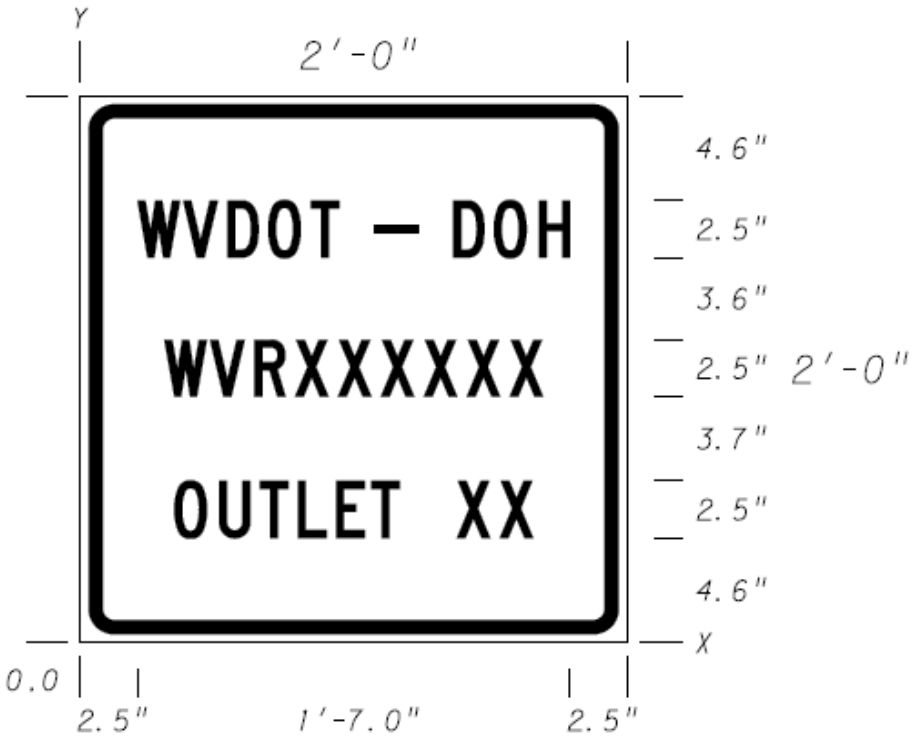

Figure 638.6.1: Outlet Marker

638.6.2-Location And Content: The Outlet Marker Signs for projects shall be placed at each discharge point as indicated in the Special Provision for NPDES PERMITS contained within the Contractor's Proposal and conform to the example as shown on the attached drawing.

The following information shall be placed on the Outlet Marker Signs:

1. WVDOT-DOH
2. NPDES Registration Number
3. Outlet Number

638.6.3-Installation: Mounting, transverse location, and similar features for Outlet Marker Signs shall be consistent with practices used for the installation in 636.9 on wooden or steel U-channel supports to comply with small sign support safety practices. The sign shall be mounted as directed by the Engineer.

638.7-METHOD OF MEASUREMENT:

The quantity of work done will be the actual number of "Project Markers", "Right-of-Way Markers", "Survey Markers" or "Outlet Markers", complete in place and accepted.

638.8-BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract unit prices bid for the items listed below, which prices and payments shall be full compensation for excavating, backfilling, disposing of surplus material, furnishing all the material and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

638.9-PAY ITEMS:

ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
638004-*	OUTLET MARKER	EACH

*****Sequence number

SECTION 640
FIELD OFFICE AND STORAGE BUILDING

640.4-FIELD OFFICE

640.4.1-General:

DELETE PARAGRAPH TWO OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

The office shall be provided with an approved type of heating and cooling equipment that will maintain a comfortable seasonable temperature throughout the project life. It shall be furnished with satisfactory electric lighting and lighting service. A minimum of two duplex convenience outlets shall be provided in each room. The building shall be provided with neat, sanitary, enclosed toilet with exhaust fan accommodations for the exclusive use of the Engineer, and such facilities shall meet the requirements of the State Department of Health or other authorities having jurisdiction. It shall be stocked with lavatory and sanitary supplies at all times during the period of the contract. Additionally the Contractor shall provide, maintain, and pay for internet access via service such as Cable, DSL, Satellite or other system along with a wireless router for the field office. The wireless router and internet specifications such as minimum upload and download speeds can be located at the following WVDOH website:

http://www.transportation.wv.gov/highways/contractadmin/specifications/640.11fieldoffice/Pages/default.aspx

SECTION 642
TEMPORARY POLLUTION CONTROL

642.6-TEMPORARY PIPE, CONTOUR DITCHES, BERMS, SLOPE DRAINS, DITCH CHECKS, SILT FENCE AND PREMANUFACTURED DITCH CHECKS:

DELETE AND REPLACE WITH THE FOLLOWING HEADING:

642.6-TEMPORARY PIPE, CONTOUR DITCHES, BERMS, SLOPE DRAINS, DITCH CHECKS, SILT FENCE, PREMANUFACTURED DITCH CHECKS AND SUPER SILT FENCE:

ADD THE FOLLOWING SUBSECTION:

642.6.8-Super Silt Fence: Fence shall be in accordance with the latest specifications for Section 608: Right-of-Way Fence. The details shall be as shown in the latest version of the standards detail book: Standard Detail F4 (Sheet 1 of 2) except as noted below:

Once sedimentation has reached half of the Super Silt Fence height, all accumulated sediment shall be removed and disposed of as directed by the Engineer.

The Contractor shall inspect all super silt fences after each rainfall event of at least 0.5 inches or greater. Any deficiencies or damage shall be repaired by the Contractor. If the Super Silt Fence is damaged or inadvertently moved during the sedimentation removal process, the contractor shall immediately replace and/or repair any Super Silt Fence after the damage occurs. The Contractor shall be responsible for all details, devices, accessories and special construction necessary to properly furnish, install, adjust and place in continuous satisfactory service and complete the work in an acceptable manner.

642.7-METHOD OF MEASUREMENT:

ADD THE FOLLOWING TO THE SUBSECTION AS THE LAST PARAGRAPH:

Super Silt Fence will be measured by the linear foot complete and in place.

642.8-BASIS OF PAYMENT

DELETE PARAGRAPH ONE AND REPLACE WITH THE FOLLOWING:

Except where provided for elsewhere in these specifications, the quantities determined as provided above, will be paid at the contract unit prices bid for the items listed below, which prices and payment shall be full compensation for furnishing all materials and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work, including necessary maintenance, and removal where applicable.

642.9-PAY ITEMS:

ADD THE FOLLOWING ITEM TO THE SECTION:

ITEM NUMBER	DESCRIPTION	UNIT
642015-001	Super Silt Fence	LF (Meter)

SECTION 657
ROADSIDE SIGN SUPPORTS

657.2-MATERIALS:

ADD THE FOLLOWING SECTION.

657.2.5-U-channel Breakaway Mounting Device: When specified to be used in the project plans, this device shall be used in order to enable either 2# per foot or 3# per foot flanged "U-channel" to be installed into an anchor, which shall be imbedded in an existing asphalt or concrete surface. The device shall be designed as described in Materials Section 709.51.

657.4.2-Setting Posts:

REPLACE THE FORTH PARAGRAPH WITH THE FOLLOWING.

When posts are to be located in existing concrete such as dividers or islands, the concrete shall be carefully opened by drilling or other suitable methods. The post shall then be placed to the required depth of embedment and backfilled with base course material to a point approximately 2 inches (50 mm) from the top of a liquid, rubberized asphalt compound in accordance with 708.3. Alternatively, if specified to be used in the project plans on either existing concrete or asphalt surfaces, the supports shall be installed using U-channel Breakaway Mounting Device shall be installed as specified by the device manufacturer.

ADD THE FOLLOWING SECTION.

657.5.12-U-Channel Breakaway Mounting Device: Any U-channel Breakaway Mounting Devices specified to be installed in the project plans shall be paid incidental to either bid item 657008-001-2.00 LB CHANNEL

POST, or bid item 657010-001-3.00 LB CHANNEL POST, as applicable. This shall include all labor, materials, equipment, or other incidental expenses associated with the installation of the devices.

SECTION 660
TRAFFIC SIGNALS

660.2-MATERIALS:

ADD THE FOLLOWING TO THE TABLE:

MATERIALS	SUBSECTION
Priority Control System Emitter	715.42.7.4
Priority Control System Detector	715.42.7.4

ADD THE FOLLOWING.

660.9-LOOP TRAFFIC DETECTORS:

The Contractor shall be responsible for replacement of damaged loops and lead-in cable to the existing splice box or otherwise designated junction box.

The Contractor shall be responsible for replacing all damaged traffic signal loops within the construction limits within fourteen (14) calendar days of when damage occurs.

Standard (6 foot x 6 foot) detector loops shall consist of three (3) turns of stranded #14 AWG copper wire, with Quadrupole presence loops consisting of two (2) turns of stranded #14 AWG copper wire meeting IMSA conductor specifications. All detector loops shall conform to WVDOH Standard Specifications 715.42.2 and 715.42.13.

660.10-SIGNAL HEADS:

ADD THE FOLLOWING SUB-SECTION:

660.10.1 LIGHT EMITTING DIODE SIGNAL MODULES (L.E.D.)

1. When specified, L.E.D. traffic signal modules shall be used for replacement of either eight or twelve inch heads operating at 120 Vac. Total power consumption at each section shall not consume more than 22 watts.

2. L.E.D. traffic signal modules shall be designed for new or existing signal lamps which shall not require special tools for installation. Retrofit replacement L.E.D. signal modules shall fit into existing traffic signal housings built to VTCSH (Vehicle Traffic Control Signal Heads) standard without modification to the housing.

3. Installation of a retrofit replacement L.E.D. signal module into an existing signal housing shall only require the removal of the existing optical unit components, i.e., lens, lamp module, gaskets, and reflector; shall be weather tight and fit securely in the housing; and shall connect directly to existing electrical wiring.

4. The L.E.D. signal module shall be a single, self-contained device. The power supply must be designed to fit and mount inside the traffic signal module.

5. The assembly and manufacturing process for the L.E.D. signal assembly shall be designed to assure all internal L.E.D. and electronic components are adequately supported to withstand mechanical shock as per MIL-STD-883.

6. The L.E.D. signal module shall be rated for use in the ambient operating temperature range of -40C to +74C degrees.

7. The L.E.D. signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991, for Type 4 enclosures to protect all internal L.E.D. electronic, and electrical components.

8. The L.E.D. single module lens shall be UV stabilized.

9. Each module shall comprise a smooth surface convex UV stabilized polycarbonate outer shell. A mechanical alignment and assembly mechanism shall ensure that each L.E.D. shall be maximized by an internal beam controlling optical faceted lens designed and patented to meet the 44 points measurement of the VTCSH standard.

10. The multiple L.E.D. light source should be the latest technology available on the market. Materials shall meet all applicable ASTM specifications.

11. The measured chromaticity coordinates of L.E.D. signal modules shall conform to the chromaticity requirements of Section 8.04 and Figure 1 of the VTCSH standard.

12. All wiring and terminal blocks shall meet the requirements of Section 13.02 of the VTCSH standard. Two secured, color coded, 36 inch long 600V, 20 AWG minimum, jacketed wires, conforming to the NEC, rated for service at +105C, are to be provided for electrical connection.

13. The module shall operate on a 60 Hz AC line voltage ranging from 80 volts rms to 135 volts rms with less than 10% light intensity variation. Nominal rated voltage for all measurements shall be 120+/- volts rms. The circuitry shall prevent flickering over this voltage range.

14. The individual L.E.D. light sources shall be wired so that a catastrophic failure of one L.E.D. light source will result in the loss of not more than 20 percent of the signal module light output.

15. The L.E.D. lamp shall contain a disconnect that will show an open switch to the conflict monitor when less than 80% of the L.E.D. in the unit are operational.

16. The L.E.D. signal module shall be operationally compatible with NEMA TS-1 or later.

17. The power supply must permit the regulation of the current supplied to the L.E.D.s to maintain a constant current.

18. The L.E.D. signal and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

19. The L.E.D. signal module shall provide a power factor of 0.90 or greater at 25C degrees and at the nominal operating voltage.

20. Total harmonic distortion, current and voltage, induced into an ac power line by a signal module shall not exceed 20 percent, over the operating voltage range specified in Section 14 and within the ambient temperature range specified in Section 4.

21. The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.6.NEMA Standard TS-2, 1992.

22. The L.E.D. signal module shall operate from a 60+/-3 Hz ac line over a voltage range from 80 Vac to 135 Vac, drawing a minimum of 100 mA rms over the entire voltage range. Load switches shall be compatible with NEMA TS-1 or later.

23. All L.E.D. signal modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, in an ambient temperature of 60C degrees.

24. Manufacturers shall provide a Certificate of Compliance to this specification for each shipment of L.E.D. signal modules to an end user. Each L.E.D. signal module shall be identified with a serial number.

25. Warranties shall include the replacement or repair of an L.E.D. signal module that fails to function as intended due to workmanship or material defects within the first 60 months from the date of delivery. Also, replacement or repair of L.E.D. signal modules that exhibit luminous intensity of less than the minimum values specified in Table 1 of ITE August, 1997, draft specification within the first 36 months from the date of delivery.

ADD THE FOLLOWING.

660.15-JUNCTION BOXES:

The Contractor shall be responsible for reconstruction and/or replacement of all damaged junction boxes. Damage junction boxes shall be defined as any junction box more than two (2) inches below grade, or is covered by the area roadway surface.

The adjustment of the junction box shall include the complete excavation and shall conform to WVDOH Standards Specifications, Section 660.8 and 660.15. All conduit, cable and attached appurtenances shall be incidental to this junction box.

The adjustment of the junction box shall be as per detail and shall conform to WVDOH Standards and Specifications Section 660.8 and 660.15.

660.19-METHOD OF MEASUREMENT

ADD THE FOLLOWING SUBSECTIONS TO THE SECTION:

660.19.10-Priority Control System Emitter: Bid includes the furnishing, installation (mounting of EO on vehicle/structure), and testing of a P.C.S. emitter and measured per unit complete and in-place. This item shall include driver's training which will consist of one (1) hour of system management to the receiving agency, per intersection, by a qualified representative as designated by the P.C.S. manufacturer.

660.19.11-Priority Control System Detector: Bid includes the furnishing, installation and testing (1) P.C.S. detector, the mounting of this unit, all necessary wiring, card rack and interface unit, confirmation light and all other materials to operate the P.C.S. intersection system. This item shall be measured complete and in-place by intersection.

660.21-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
660005-*	ADJUST JUNCTION BOX, BOX NUMBER "number"	Each
660007-*	MISCELLANEOUS SIGNAL LOOP NUMBER "number"	Lump Sum
660010-010	PRIORITY CONTROL SYSTEM EMITTER, "code"	Each
660010-010	PRIORITY CONTROL SYSTEM DETECTOR, "OE"	Each

* Sequence Number

SECTION 661
TRAFFIC SIGNS AND DELINEATORS

661.3.7.1-Flat Sheet:

DELETE ENTIRE SUB-SECTION AND REPLACE WITH THE FOLLOWING:

Flat sheet signs shall be fabricated of a single piece of sheet material without joints. The height or width of the sign shall be within plus or minus 5/8 inch (3 mm) tolerance of the dimensions indicated on the Plans. Corner radii shall be within plus or minus 1/16 inch (1.6 mm) tolerance of the dimensions shown on the Plans.

Panels shall have dimensions and corner radii in accordance with the Standard Details and shall be punched only with the holes necessary for proper mounting. Signs shall be free of buckles, warp, dents, and burrs prior to the application of reflective sheeting or other background material. Dimples or indentations shall not be noticeable from a distance of 10 feet (3 m) normal to the sign.

661.17-PAY ITEMS:

DELETE THE FOLLOWING FROM THE TABLE:

ITEM NUMBER	DESCRIPTION	UNIT
661001-002	0.100 IN FLAT SHEET SIGN	SF

SECTION 662
ROADWAY LIGHTING

662.11-LIGHTING SUPPORTS:

ADD THE FOLLOWING SENTENCE TO PARAGRAPH ONE AS SENTENCE TWO:

All anchor bolts shall be installed, tightened and tested in accordance with sections 658.5.1, 658.5.3, and 658.5.4.

ADD THE FOLLOWING.

662.14-TESTING:

The Contractor shall inspect and certify to the replacement of all damaged traffic signal loop conductors and to the proper functioning of the traffic signal, and that the junction boxes within the project limits comply with section 660.15. The inspection shall be performed before project completion and after all the work has been completed in the area of the traffic signal system and related components.

The Electrical Inspection shall be paid as item 662015-*, Electrical Test, per Lump Sum.

SECTION 664
TRAFFIC SAFETY DEVICES

664.2-MATERIALS:

REPLACE THIS SECTION WITH THE FOLLOWING:

664.2-MATERIALS: Materials shall conform to the requirements of the following subsections of Division 700**.**

MATERIALS	SUBSECTION
Sand Barrel Impact Attenuating Device (Type V)	715.41.1
Crash Cushion Terminal Impact Attenuating Device (Type VI)	715.41.2
Truck Mounted Attenuating Devices (Type VII)	715.41.3
Quad Guard Terminal Device (Type VIII)	715.41.4
Reuseable Energy Absorbing Crash Terminal Device (Type I)	715.41.5
Trinity Attenuating Crash Cushion (Type II)	715.41.6
SCI Impact Attenuating Device (Type III)	715.41.7
TAU-II Impact Attenuating Device (Type IX)	715.41.8

Unless otherwise specified in the project plans, the appropriate model Type II, III, VIII, or IX device listed on the Division's APL may be utilized for any installation for which Bid Item Number 664001-016 is to be used for payment.

664.3-CONSTRUCTION METHODS:

664.3.1-Attenuating Devices:

664.3.1.1-Crash Cushion, Quad Guard Terminal Devices, Reusable Energy Absorbing Crash Terminal, and Trinity Attenuating Crash Cushion Devices:

MODIFY THE SECTION TITLE AS FOLLOWS:

664.3.1.1-Crash Cushion, Quad Guard Terminal Devices, Reusable Energy Absorbing Crash Terminal, Trinity Attenuating Crash Cushion, SCI Impact Attenuating, and TAU-II Impact Attenuating Devices:

ADD THE FOLLOWING TO THE SECTION:

664.3.2-Rumble Strips: This work consists of furnishing a machine capable of cutting or milling rumble strips on the centerline or edge of roadways in accordance with the details and notes on the plans and as directed by the Engineer.

The Contractor shall pre-mark the location of the center of each cut, and the beginning and ending points of the sections, prior to the installation of the Rumble Strips. The Engineer shall review and approve the locations.

Rumble Strips shall not be installed on bridge decks, loop detector saw-cut locations, structures, approach slabs or in other areas identified by the Engineer.

The method and equipment for constructing ground-in indentations shall be selected by the Contractor and shall meet the requirements of 664.3.2.1.

Rumble Strips shall be constructed within two (2) inches of the required alignment.

Indentations shall not vary from the dimensions shown on the plans by more than 0.10 inch in depth and five percent (5%) in width.

Finished Rumble Strips not meeting the specified tolerances shall be brought within tolerance by either abrasive grinding, or removal and replacement. The corrective method will be selected by the Engineer. Ground surface areas shall be neat and uniform in appearance. The corrective work shall be at the Contractor's expense.

All removed material shall become the property of the Contractor and disposed of in conformance with provisions in Section 415, "Removing Existing Pavement Surface" of the Standard Specifications or as approved by the Engineer.

664.3.2.1-Rumble Strip Equipment: The machine shall consist of a rotary type cutting head with a maximum outside diameter of 12 (twelve) inches (305mm). The cutting tool shall have the cutting head(s) arranged in such a pattern as to provide a relatively smooth cut per milled section without tearing or snagging and be equipped with guides to provide uniformity and consistency in alignment of each cut with respect to the roadway. The strips shall be cut in accordance with the dimensions as detailed on the Plans, and materials resulting from cutting the pavement shall be disposed of and the slots shall be properly cleaned.

664.4-METHOD OF MEASUREMENT:

ADD THE FOLLOWING TO THE SECTION:

664.4.2-Rumble Strips: This work shall be measured for payment by the actual linear feet of rumble strips placed and accepted, without regard to the width of the strip. This distance shall be measured longitudinally along the centerline of pavement with deductions for bridge decks, drainage structures, raised pavement markers, loop detector saw-cut locations, and any other sections where Rumble Strips were not installed.

664.5-BASIS OF PAYMENT

ADD THE FOLLOWING PARAGRAPH TO THE SECTION:

The Contract unit price per foot for Rumble Strips will be paid for the pay items listed in Section 664.6. The price shall include furnishing all equipment, tools, labor, and work incidental thereto and also disposal of any waste material resulting from this operation.

664.6-PAY ITEMS

ADD THE FOLLOWING TO THE TABLE:

ITEM NUMBER	DESCRIPTION	UNIT
664002-001	Edge Line Rumble Strip, Asphalt Pavement	LF (Meter)
664002-002	Edge Line Rumble Strip, Concrete Pavement	LF (Meter)
664003-001	Centerline Rumble Strip, Asphalt Pavement	LF (Meter)
664003-002	Centerline Rumble Strip, Concrete Pavement	LF (Meter)
664004-001	Rumble Strip, ADAB	LF (Meter)

SECTION 679
OVERLAYING OF PORTLAND CEMENT CONCRETE BRIDGE DECKS

679.2.2-Specialized Concrete Mix Design and Testing:

INSERT THE FOLLOWING PARAGRAPH AFTER THE FOURTH PARAGRAPH IN THE SUB-SECTION:

For establishment of mixture proportions, as an alternative to the curing methods for rapid chloride permeability testing outlined in the previous paragraph, microsilica concrete specimens may be moist cured for 7 days in accordance with ASTM C 192, then cured for 21 days in lime-saturated water at 100.0 ± 3.5 °F (38.0 ± 2.0 °C), then tested at an age of 28 days. For establishment of mixture proportions, as an alternative to the curing methods for rapid chloride permeability testing outlined in the previous paragraph, latex modified concrete specimens may be moist cured for 2 days in accordance with ASTM C 192, then cured for 26 days in air at 100.0 ± 3.5 °F (38.0 ± 2.0 °C) and a minimum of 50% relative humidity, then tested at an age of 28 days. These methods of curing shall be noted as the accelerated RCPT curing methods.

ADD THE FOLLOWING AT THE END OF THE TENTH PARAGRAPH IN THE SECTION (THIRD PARAGRAPH IN THE SUB-SECTION ON CONTRACTOR'S QUALITY CONTROL):

If the 28-day compressive strength of the in-place concrete, obtained from specimens made as outlined in the previous paragraph, is less than or equal to eighty percent of the compressive strength of the approved test mix, these rapid chloride permeability test specimens shall be tested, as outlined in the following two paragraphs. Otherwise, testing of these specimens is not required.

ADD THE FOLLOWING PARAGRAPH AT THE END OF THE SUB-SECTION:

Gradation testing shall be performed in accordance with Section 601.3.2.4.

679.2.2.1-Latex Modified Concrete:

DELETE THE THIRD ROW OF TABLE 679.2.2.1 AND REPLACE WITH THE FOLLOWING:

Water/Cement Ratio (c)	0.40 by weight, maximum

DELETE THE FIRST TWO SENTENCES OF NOTE (a) AND REPLACE WITH THE FOLLOWING:

* **Note (a)** When required, as outlined in the Contractor's Quality Control Section of Section 679.2.2, rapid chloride permeability tests shall be performed and the results tabulated and submitted to the Engineer. Chloride permeability of the in-place concrete shall be considered acceptable if the 28-day compressive strengths obtained in Section 679.2.2 are greater than eighty percent of the 28-day compressive strength of the approved test mix.

DELETE NOTE (d). RE-LETTER NOTES (e) AND (f) to (d) AND (e) RESPECTIVELY.

679.2.2.2-Microsilica Concrete:

DELETE THE FIRST TWO SENTENCES OF NOTE (a) AND REPLACE WITH THE FOLLOWING:

* **Note (a)** When required, as outlined in the Contractor's Quality Control Section of Section 679.2.2, rapid chloride permeability tests shall be performed and the results tabulated and submitted to the Engineer. Chloride permeability of the in-place concrete shall be considered acceptable if the 28-day compressive strengths obtained in Section 679.2.2 are greater than eighty percent of the 28-day compressive strength of the approved test mix.

679.2.2.4-Test Slab Requirements:

DELETE THE SECOND SENTENCE IN THE SECTION AND REPLACE WITH THE FOLLOWING:

The trial shall simulate transportation and job site conditions, utilizing proposed material and methods of placing, finishing, and curing, including the application of bonding grout when required.

679.3-CONSTRUCTION METHODS:

679.3.1.1-Removal of Existing Deck Surface Phase I:

DELETE PARAGRAPH THREE AND REPLACE WITH THE FOLLOWING:

When full depth removal of material is necessary, the forming shall be incidental to the cost of the concrete deck overlay.

679.3.1.2-Removal of Existing Deck Surface Phase II:

DELETE PARAGRAPH THREE FROM THE SUBSECTION.

INSERT THE FOLLOWING SUBSECTION INTO THE SECTION:

679.3.1.2.1-Full Depth Removal Of Material: When full depth removal of material is necessary it shall be handled in accordance with section 679.6.2.3.

679.3.1.4-Disposal:

ADD THE FOLLOWING TO THE END OF THE SUB-SECTION

In addition to the requirements mentioned above, to temporarily discharge wastewater from activities associated with hydroblasting demolition of concrete on a bridge deck. The wastewater shall be treated prior to discharging to natural drainage.

The authorization being granted herein is contingent upon strict adherence to the following conditions.

1. The Contractor shall provide via email to the West Virginia Department of Environmental Protection (DEP)-with carbon copies to the WVDOH personnel as listed in the plan notes, the following information for review:

2. Project Name, Project Number, County, Route number, layman's description of location, Contractor's Name, description of work, description of discharge, a list of Best Management Practices to be used to protect water quality, and estimated start & stop dates of discharging activity.

The Contractor will allow the DEP seven (7) days to review the submitted information and respond.

a) All materials and equipment required to perform the work shall be on site prior to the initiation of the work activities.

b) The Contractor shall immediately implement the necessary procedures needed to mitigate any adverse impacts resultant to the temporary discharge occurrence.

c) Collected solids shall be disposed of in a manner consistent with any, and all, appropriate laws and regulations.

d) The work activities and temporary discharge shall be managed in a manner that will provide for the maximum alleviation of impact to, and maximum protection of, aquatic life and human health.

e) The Contractor shall notify the applicable DEP's Environmental Enforcement's District field office, 24 hours prior to the initiation of any procedures. This will afford the DEP with an opportunity to have personnel available to observe the activities.

f) The Contractor shall, further, notify the Emergency Response Spill Alert System at 1-800-642-3074 in the event of an accidental discharge that did not go through the appropriate devices.

679.3.7.5.1-Curing Latex Modified Concrete:

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

A layer of 4-mil (0.1 mm) thick white polyethylene film shall be placed over the burlap as soon as possible. The overlay shall then be wet cured for 48 curing hours. Care shall be exercised to ensure the burlap remains saturated for the 48-hour cure period. Plastic coated fiber blankets may be substituted for the polyethylene film, but shall not replace the initial wet burlap. The film (or fiber blankets) shall be anchored along all edges and internally to prevent the loss of moisture and from being displaced. After the wet cure, the polyethylene film and burlap shall be removed and the concrete shall be air-cured for 48 hours.

679.3.7.5.2-Curing Microsilica Concrete:

DELETE THE SECOND SENTENCE IN THE SECTION AND REPLACE WITH THE FOLLOWING:

Burlap shall be continuously wet for a period of 168 curing hours by means of automatic intermittent sprinkling or a continuous wetting system.

679.6-METHOD OF MEASUREMENT:

679.6.2.2:

DELETE PARAGRAPH TWO FROM THE SUBSECTION.

INSERT THE FOLLOWING SUBSECTION INTO THE SECTION:

679.6.2.3-Full Depth Removal: It is reasonably expected that full depth removal of material will be encountered on the project at various locations.

The Contractor will be required to fully repair such locations accounting for up to and including 2% (two percent) of the deck area for the individual bridge deck being overlaid at no additional cost to the Division.

As determined by the Engineer, when full depth repairs exceed 2% of the each bridge deck area being overlaid, the Contractor shall be paid $200 per square yard (SY) for each square yard (or fraction thereof) in excess of the 2% described above.

For clarity, the phrase “each bridge deck being overlaid” is not a cumulative Project total bridge area, but instead refers to a single bridge’s total deck surface area. It is likely a project will contain multiple bridges to be overlaid. Expansion dam area locations shall not be included in the bridge deck surface area measured.

DIVISION 700
MATERIALS DETAILS

SECTION 701
HYDRAULIC CEMENT

DELETE THE SUB-SECTION AND REPLACE WITH THE FOLLOWING:

701.3-BLENDED HYDRAULIC CEMENTS:

Blended hydraulic cement shall conform to the requirements of ASTM C595 for Portland blast-furnace slag cement, Type IS, or Portland-pozzolan cement, Type IP, or Portland-limestone cement, Type IL.

SECTION 707
CONCRETE ADMIXTURES, CURING AND COATING MATERIALS

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

707.9-LIQUID MEMBRANE-FORMING COMPOUNDS FOR CURING CONCRETE:

Curing compounds shall conform to the requirements of ASTM C309, Type 2, Class A.

DELETE THE SUB-SECTION AND REPLACE WITH THE FOLLOWING:

707.15-HYDRATION CONTROL STABILIZING ADMIXTURES FOR CONCRETE:

707.15.1-Acceptance Requirements for Approval of Hydration Control Stabilizing Admixtures: Hydration control stabilizing admixtures for concrete shall conform to the requirements of AASHTO M 194, Type B or D.

707.15.2-Performance Requirements for Concrete Hydration Control Stabilizing Admixtures:

707.15.2.1-The effects of using hydration control stabilizing admixtures may vary widely with different types of cement, cement from different mills, aggregate proportions, aggregates from different sources and of different gradation, and changes in water-cement ratio. Therefore, no hydration control stabilizing admixture shall be used until the concrete of the specified class, designed in accordance with these Specifications and made with the

ingredients proposed for use by the Contractor, including hydration control stabilizing admixtures as specified or permitted under this Specification, is shown to meet the requirements of AASHTO M 194 for water reduction and compressive strength increases at ages 3, 7, and 28 days.

Upon completion of mixing of this trial batch, air content and slump tests in accordance with section 601.4.1 shall be performed on the plastic concrete containing the hydration control stabilizing admixture. A test to establish the initial and final times of setting of the concrete mix shall also be performed in accordance with ASTM C403. The air content and slump tests shall then be repeated at 45-minute intervals until a period of 3-hours after the completion of mixing has elapsed.

The value obtained by any of the air content tests during the 3-hour period shall not vary from the value obtained by the initial air content test by more than 2.5 percentage points.

The value obtained by any of the slump tests during the 3-hour period shall not vary from the value obtained by the initial slump test by more than 1.75 inches (445 mm).

707.15.2.2-The mix shall contain the quantity of admixture recommended by the manufacturer at the prevailing temperature.

707.15.3-Certification of Hydration Control Stabilizing Admixtures: When a Contractor proposes to use an approved hydration control stabilizing admixture, the procedure set forth in 707.2.4 shall apply.

707.15.4-Additional Test Requirements for Hydration Control Stabilizing Admixtures (Optional): Either prior to or at any time during construction, the Engineer may require the selected admixture to be tested further to determine its effect on the strength of the concrete. When so tested, the hydration control stabilizing admixture shall meet the requirements specified in 707.15.2.

ADD THE FOLLOWING TO THE SECTION:

707.17-SPECIFIC PERFORMANCE ADMIXTURES FOR CONCRETE:

707.17.1-Acceptance Requirements for Approval of Specific Performance Admixtures: Specific performance admixtures for concrete shall conform to the requirements of AASHTO M 194, Type S.

707.17.2-Performance Requirements for Concrete Accelerators:

707.17.2.1-The effects of using specific performance admixtures may vary widely with different types of cement, cement from different mills, aggregate proportions, aggregates from different sources and of different gradation, and changes in water-cement ratio. Therefore, no specific performance admixture shall be used until the concrete of the specified class, designed in accordance

with these Specifications and made with the ingredients proposed for use by the Contractor, including Type S admixtures as specified or permitted under this Specification, is shown to meet the requirements of AASHTO M 194 for compressive strength at ages 3, 7, and 28 days.

707.17.2.2-The mix shall contain the quantity of admixture recommended by the manufacturer at the prevailing temperature.

707.17.3-Certification of Specific Performance Admixtures: When a Contractor proposes to use an approved specific performance admixture, the procedure set forth in 707.2.4 shall apply.

707.17.4-Additional Test Requirements for Accelerating Admixtures (Optional): Either prior to or at any time during construction, the Engineer may require the selected admixture to be tested further to determine its effect on the strength of the concrete. When so tested, the accelerator shall meet the requirements specified in 707.17.2.

SECTION 708
JOINT MATERIALS

708.2-PREFORMED ELASTOMERIC JOINT SEALS; LUBRICANT-ADHESIVES:

708.2.2-Joint Seals for Bridges:

ADD THE FOLLOWING AFTER THE FIRST PARAGRAPH AS PARAGRAPH TWO:

The strip seal gland shall be delivered to the jobsite in lengths suitable for continuous one piece installation for each individual expansion joint. Field splicing of a strip seal gland is not permitted. Special conditions such as doglegs, tees, and crosses shall be shop fabricated in a mold under heat and pressure.

SECTION 709
METALS

ADD THE FOLLOWING SECTION.

709.51-U-CHANNEL BREAKAWAY MOUNTING DEVICES:

709.51.1-General Description and Requirements: The device shall be NCHRP-350 approved up to Test Level III for use with 2# per foot and 3# per foot-u-channel supports on installations with up to three (3) supports in a seven (7) foot lateral width. The device shall be designed to withstand cyclic

loading (allowing for bending beyond 12%), yet break away safely on impact. The device shall be designed to not fail due to wind loading prior to failure of the sign support.

709.51.2-General Design and Functionality: The objective of the device shall be to ensure a signpost with release from an anchor upon impact from a motor vehicle. The device shall include a driven subgrade anchor, a receiver for the channel support, and a breakaway coupling connecting the receiver to the anchor,

Vehicle damage shall be minimized, as shall the risk to pedestrians after the post has been impacted. As a minimum, the device shall incorporate the following features:

1. The breakaway coupler shall be designed to shear or yield at any angle of incidence (360) degrees), with a constant amount of force, irrespective of vehicle velocity.

2. The breakaway coupler shall function effectively and independent of the sequence in which the fasteners are tightened. The sole function of the fasteners shall be to secure the sign post to the receiver and the coupler to the subgrade anchor. The receiver for the sign support shall be integral to the upper end of the coupler, eliminating the need for connection hardware.
3. Upon impact, no shards of metal shall be left above the top of the subgrade anchor, which shall be designed to be driven to grade. The anchor shall be automatically plugged to prevent any foreign matter or debris from entering, and to ensure protection from a pedestrian trip or fall accident.
4. No special tools such as torque wrenches or the like shall be required for effective installation or replacement of the receiver and breakaway coupler.
5. The receiver and breakaway coupler design shall enable the sign installer to fully reattach a signpost to the anchor within a five-minute period after a knock down.
6. When damaged by a direct wheel impact or vehicle under carriage, the design of the breakaway coupler shall facilitate reuse of the anchor.

709.51.3-Individual Component Features:

709.51.3.1-Breakaway Coupler: The breakaway coupler shall incorporate a hollow biconical or other similarly shaped shear section facilitating reliable true 360 degree functionality and enabling the post and receiver to separate cleanly from the anchor. To prevent trip or fall hazards, the coupler shall break cleanly and reliably at grade without leaving any sharp pieces of metal above grade. The coupler material shall provide for a

minimum bending (elongation) of 12% prior to fracture. Upon impact the anchor shall remain undamaged with the inside of the anchor plugged by the remaining portion of the coupler. The bottom end of the coupler shall attach to the anchor by slidably fitting inside with the breakaway portion of the coupler being slightly above the anchor. The coupler shall incorporate a locking feature which applies equal and opposite force directly to a minimum of two opposing side walls of the anchor through the tightening of one externally accessible fastener prior to or after installation of the sign support.

709.51.3.2-Anchor: The breakaway coupler shall attach to a square 2½ " x 2½" (min.) heavy duty anchor. The length of the anchor shall be 8" min. for concrete applications and 12" min. for asphalt applications. The anchor shall incorporate a tab completely around the top end such that the tab will sit flush on the road surface when completely driven, and will aid to seal the pre-driven hole from moisture and debris.

The anchor may be designed to allow a square 2"x2" ¼ " wall (min.), 80 KSI min. yield strength seamless extension to slide into the end in order to meet the 12" length requirement in asphalt. The anchor a minimum of 4". The anchor shall use a taper lock feature which is designed to ensure the joining of the anchor and the extension.

The anchor shall incorporate an inside plug or barrier, below the designed elevation of the bottom of the coupler after being inserted, to prevent moisture or soil from the bottom of the anchor to come into contact with the coupler.

709.51.3.3-Receiver: The receiver for the sign support shall be cast, and shall facilitate a snug male (sign support) to female (receiver) connection. The support shall be securely fastened to the receiver through the use of a maximum of two fasteners.

709.51.4-Component Materials and Coatings: The coupler and receiver components of the device shall be manufactured using material meeting the requirements of ASTM A536 (65-45-12 min). These components shall be coating with an exterior grade (UV protected) powder coating.

The subgrade anchor shall be manufactured from steel meeting the requirements of ASTM C1018. The entire anchor shall be covered with a rust inhibiting exterior grade epoxy coating.

SECTION 710
WOOD MATERIALS

710.1-STRUCTURAL MATERIALS:

Timber, lumber, piles, posts, and blocks shall meet the requirements of AASHTO M168 and AASHTO M133. Preservation and Treatment plants shall meet the requirements of the Book of Standards of the American Wood Protection

Association (AWPA). All preservatives and treated wood products shall comply with US EPA regulations.

710.2-SPECIES AND GRADE:

710.2.1-Structural softwood shall meet the requirements of the Southern Pine Inspection Bureau (SPIB) grading rules. All wood for structural use shall be visually or mechanically graded for the requirements shown on the Plans or specified in the contract.

710.2.2-Structural hardwood shall meet the requirements of AASHTO M168 or the Northeastern Lumber Manufacturers Association (NeLMA) structural grades. The grade and species required shall be as shown on the Plans or specified in the contract.

710.2.3-Hardwood used for bridge decking shall meet the Standards of the National Hardwood Lumber Association (NHLA) for sound square edge, be rough sawn and sized by being processed through a hit or miss surfacer.

710.2.4-All graded material may either carry the appropriate grade stamp, or be inspected by an independent inspection agency approved by the Division.

710.3-PRESERVATIVE TREATMENT:

All wood products and preservative treatments used for highway and commercial use shall meet the requirements of AWPA Standard U1 and AASHTO M133.

The quantity of preservative shall be as required above, unless modified by the Plans or purchase order.

710.4-TREATMENT PLANTS:

Material treated with preservative may be purchased from certified or noncertified plants. Both types of plants shall adhere to the quality control procedures of AWPA M2.

710.4.1-Certified Plants: The Division's procedure for plant certification is defined in MP 710.01.40.

710.4.2-Noncertified Plants: Material purchased from noncertified plants will be tested on a lot by lot basis. The inspection shall be performed by a Division approved inspection agency. The cost of the inspection will be paid by the supplier. Shipments from noncertified plants shall be documented as described in MP 710.01.40.

710.5-WOOD POSTS:

Wood posts shall meet the requirements of AASHTO M168 and AASHTO M133 except round posts may be used for guardrail.

710.5.1-Round posts for guardrail shall meet the requirements of Section 5 "Material Requirements" of ANSI 05.1. Round posts for guardrail shall be from the major or minor species of Southern Pine.

710.5.2-Rectangular posts for guardrail shall be No. 1 major or minor species of Southern Pine as defined in Section 400 of the SPIB grading rules.

710.5.3-Dimensions of all guardrail posts except as noted on the Plans shall be as follows:

Round Guardrail Posts

Diameter:	7" ±¼" (177 mm ±6 mm) throughout the length except as noted on Plans.
Length:	6' ±½" (1 828 mm ±13 mm)

Rectangular Guardrail Posts

Size:	6" ±¼" X 8"±¼" (152 mm ±6 mm by 203 mm ±6 mm) throughout the length except as noted on Plans
Length:	6' ±½" (1 828 mm ±13 mm)

710.5.4-Dimensions of wood posts for fence and signs shall be as shown on the Plans.

710.6-PLYWOOD:

710.6.1-Plywood shall meet the requirements of Product Standard PS-1 of U.S. Department of Commerce. All plywood shall be identified with the mark of a qualified inspection and testing agency. The identification shall include:

710.6.1.1-Species group classification, or class number, or span rating, depending on grade.

710.6.1.2-Either interior or exterior.

710.6.1.3-Grade name or grade of face and back veneers.

710.6.1.4-The symbol PS-1 signifying conformance with the standard.

710.6.2-Exterior plywood shall be bonded with exterior glue and the veneers used in manufacture cannot be less than grade C as defined in PS-1.

710.7-COMMON LUMBER:

710.7.1-Common lumber is untreated and suitable for general construction and utility purposes. Common lumber is from 2 inches (50 mm) to, but not including, 5 inches (125 mm) thick and is 2 inches (50 mm) or more in width. Common lumber shall be grade 2 or better, unless otherwise specified in the plans, when graded by the Board of Review of the American Lumber Standards Committee.

710.8-SERVICE AND LIGHTING POLES:

710.8.1: Wood Service or lighting poles shall be ANSI Class 5, or larger, or as called for on the contract plans. Lighting poles shall be southern yellow pine and service poles shall be either southern yellow pine or Douglas fir. The poles shall be pressure-treated) to meet the requirements of AWPA U1 (Commodities Specification D: Poles).

SECTION 714
CONCRETE, CLAY, FIBER AND PLASTIC PIPE

714.23-PRECAST REINFORCED CONCRETE BOX CULVERTS:

ADD THE FOLLOWING AT THE END OF THE SECTION:

All box culverts shall be cured in accordance with section 601.12 except that curing may be discontinued once 70% of the design strength is achieved.

SECTION 715
MISCELLANEOUS MATERIALS

715.6-HYDRATED LIME:

DELETE THE CONTENTS OF THE SECTION AND REPLACE WITH THE FOLLOWING:

715.6.1-General Use: The material shall conform to the requirements of ASTM C206.

715.6.2-Soil Stabilization or Pavement Preservation Purposes: The material used in for soil stabilization purposes or pavement preservation purposes shall conform to the requirements of ASTM C977.

715.8-WATERPROOFING FABRIC:

DELETE THE ENTIRE CONTENTS AND REPLACE THE FOLLOWING.

The material shall conform to the requirements of ASTM D173.

ADD THE FOLLOWING SECTION(S) TO THE SECTION:

715.10-PREFABRICATED DRAINAGE SYSTEMS:

715.10.1-Prefabricated Pavement Edge Drain:

715.10.1.1-General: Prefabricated pavement edge drain shall be a flexible rectangular hollow mat consisting of a supporting polymeric drainage core encased in an engineering fabric envelope and having sufficient flexibility to withstand installation bending and handling without damage.

715.10.1.2-Core: The drainage core shall be constructed from a polymeric material, have a minimum thickness of ¾ inch (19 mm) and a minimum compressive strength of 3,000 pounds per square foot (145 kPa) with a maximum deflection of 20 percent determined by ASTM D 1621, except the sample size may be increased to a maximum of 12 in. by 12 in. (300 mm by 300 mm) The edge drain shall permit inflow on both sides of the drain and produce a minimum flow rate of 10 gal/minute/ft (123 liters/minute/meter) of width as determined by ASTM D 4716. Flow rates shall be based on a hydraulic gradient of 0.1 and a confining pressure of 10 psi (69 kPa) using a closed-cell foam rubber layer on both sides. The height of the edge drain shall be as shown on the Plans.

715.10.1.3-Fabric: The fabric shall be suitable for subsurface drainage applications and shall meet the requirements of 715.11 except the minimum tensile strength shall be 90 lbs. (400 N). The fabric shall be bonded to or stretched tightly over the core support contact points.

715.10.1.4-Fittings: All fittings shall be in accordance with the manufacturer's published specifications.

715.10.1.5-Outlet Pipe: The outlet pipe shall be a smooth inner wall unperforated pipe meeting the requirements of 714.19 (AASHTO M252, Type S only) or 714.22

715.10.1.6-Acceptance: All components of the edge drain shall be approved before use. The Contractor shall furnish certified test data with the material supplied for each project. Tests for all required properties shall be performed in accordance with the procedures specified. Compliance of this data with the requirements specified will be the basis of acceptance.

715.11-ENGINEERING FABRIC:

715.11.1-General: Engineering fabric shall meet the applicable requirements of AASHTO M 288.

715.11.2-Acceptance: All engineering fabric shall be approved before use. When using a fabric not on the Division's approved list, the Contractor shall furnish certified test data with each shipment of fabric. Compliance of this data with the requirements of the specific application will be the basis of acceptance.

The test results submitted shall be derived from testing samples representing the fabric contained in each shipment. Tests for all required properties shall be performed in accordance with the procedures specified. Each roll shipped shall be identified so as to show its relationship to the test data submitted.

715.11.3-Maintenance and Repairs: Any fabric damaged or displaced shall be replaced or repaired at the Contractor's expense. Any fabric, other than that used for silt fence, not covered within 14 days after installation shall be removed and replaced at no expense to the Division. Minor tears or ruptures in the fabric may be repaired by sewing or by placing another piece of fabric over the damaged area so that the overlap is at least 2 feet (600 mm) in each direction or as directed by the Engineer.

715.11.4-Engineering Fabric For Subsurface Drainage: Engineering fabric for subsurface drainage shall meet the applicable requirements of AASHTO M 288, Section 7, Class 2. Additionally, the permittivity shall be a minimum of 0.2 sec^{-1} and the apparent opening size shall be no larger than No. 60 (250μm) sieve.

715.11.5-Engineering Fabric For Sediment Control (Silt Fence): Engineering fabric for sediment control shall meet the applicable requirements of AASHTO M 288, Section 8.

715.11.6-Engineering Fabric For Erosion Control: Engineering fabric for erosion control shall meet the applicable requirements of AASHTO M 288, Section 7, Class 1.

715.11.7-Engineering Fabric For Paving: Engineering fabric for paving shall meet the applicable requirements of AASHTO M 288, Section 9.

715.11.8-Engineering Fabric For Separation: Engineering fabric for separation shall meet the applicable requirements of AASHTO M 288, Section 7, Class 2.

715.11.9-Engineering Fabric For Stabilization: Engineering fabric for stabilization shall meet the applicable requirements of AASHTO M 288, Section 7, Class 1.

715.11.10-Engineering Fabric for Pumped Sediment and Erosion Control (Dewatering Device): Each standard Dewatering Device shall have a fill spout large enough to accommodate a 4 inch (100 mm) discharge hose with attached straps to secure the hose and prevent pumped water from escaping without being filtered. The device must be able to accommodate a minimum flow rate of 1000 gal per minute (4 546 liters per minute) for the application for which it is to be used and a minimum size of 100 square feet (9 square meters).

The Dewatering Device shall be a nonwoven bag, which is sewn with a double needle stitching using a high strength thread.

The Dewatering Device seams shall have an average wide width strength per ASTM D 4884 of 100 LB/IN (1.15 kg/meter).

The geotextile fabric shall be nonwoven fabric with the following properties:

PROPERTIES	TEST METHOD	ENGLISH	METRIC
Grab Tensile	ASTM D-4632	250 Lbs.	113 kg
Puncture	ASTM D-4833	165 Lbs.	75 kg
Flow Rate	ASTM D-4491	70 Gal/ Min/ Square Foot	25 liters/ Min/ Square meter
Permittivity	ASTM D-4491	1.3 Sec.-1	1.3 Sec.-1
Mullen Burst	ASTM D-3786	550 LBS. / square inch	3.79 MPa
UV Resistant	ASTM D-4355	70 %	70 %
AOS % Retained	ASTM D-4751	100 %	100 %

* All properties are minimum average roll value.

715.12-CONCRETE FOR MISCELLANEOUS USES:

Concrete specified in this Section is intended for such uses a cast-in-place footers for right-of-way fence and footers for guardrail breakaway cable terminals and special trailing end terminals. The concrete may be mixed with or without air entrainment at the option of the Contractor. Batching and mixing may be by hand, by portable mixer, or by a commercial plant. At the time of placement, the concrete shall be of a workable consistency which can be consolidated satisfactorily by spading or vibrating. Indications of initial set in the concrete to such an extent as to adversely affect the workability of the concrete during

placement shall be cause for rejection. The concrete shall be in accordance with one of the following:

i. Concrete produced for other construction items under an approved mix design.
ii. Concrete produced from premixed ingredients sold commercially in acceptable sacks, such as "Sacrete", or "Quickrete", "Handicrete or approved equal. Premixed commercial preparations shall be mixed in accordance with the manufacturer's instructions.
iii. Concrete produced from separate components proportioned by volume in the ratio of one part Portland cement to two parts sand to three parts coarse aggregate. Sand and coarse aggregate shall be visually inspected for deleterious substances, and such matter shall be removed prior to mixing.

715.14-ELASTOMERIC BEARING PADS:

DELETE THE ENTIRE CONTENTS AND REPLACE THE FOLLOWING.

715.14-ELASTOMERIC BEARING PADS:

Bearing pads shall meet the requirements of the AASHTO Standard Specifications for Highway Bridges, except for sampling frequency.

715.14.1-Sampling Frequency For Elastomeric Bearing Pads: The sampling rate shall be one bearing pad per lot, per nominal dimensional size. (A change in nominal dimensional size is any change in the designed length, width or height of the bearing pad.)

715.40-PAVEMENT MARKING MATERIAL:

715.40.6-Raised Marker:

DELETE THIS SECTION AND REPLACE WITH THE FOLLOWING:

715.40.6-Raised Pavement Markers (RPM's): RPM's include Type P-2 markers, Type R-4 markers, and Temporary markers.

715.40.6.1-Type P-2 Markers: This specification covers Type P-2 markers, a type of plowable, retroreflective, RPM for lane marking and delineation.

All references to ASTM specification D 4383 herein shall be taken as referencing the D 4383 – 05 version of this specification.

715.40.6.1.1-Casting Requirements: The metal castings of Type P-2 markers shall meet the following requirements:

a) When tested in accordance with the methods and procedures specified in ASTM D4383, the castings shall meet the Compressive Strength performance requirements of ASTM D4383.
b) When tested in accordance with the methods and procedures specified in ASTM D4383, the "ramps" of the castings shall meet the Hardness performance requirements of ASTM D4383.
c) The installed height of the casting shall not exceed 0.25 in. (6.4 mm) above the road surface.
d) The casting shall be manufactured of material specified in ASTM D4383, and shall be hardened to the level specified in ASTM D4383. The castings shall be capable of demonstrating that this hardness level has been achieved when tested in accordance with the methods and procedures specified in ASTM D4383.
e) The plow blade deflecting ramps of the casting shall be angled not more than six (6) degrees to the surface of the road.
f) The ramps of the castings shall be designed such that there shall be no vertical surfaces above the road level that can be contacted by the plow blade moving in the normal travel direction.
g) In new condition, the surfaces of the casting shall be free of scale, dirt, rust, oil, grease, or any other contaminant which may reduce its bond to the adhesive with which the casting is installed or with which the lens is mounted.
h) The casting shall be designed to be partially recessed below the pavement surface to withstand plow impact. It shall have means for indexing the pavement surface, such as tabs.
i) Castings with center rails shall not be allowed.
j) Castings shall have fully completed testing on the American Association of State and Highway Transportation Officials - National Transportation Product Evaluation Program (AASHTO-NTPEP) test deck in a location having a similar climate to West Virginia. Upon review, the performance of the castings on the test deck shall meet or exceed the historical performance of other industry standard castings approved by the WVDOH. This determination shall be made solely by the WVDOH.
k) Castings shall have been tested by an independent testing facility to the applicable ASTM D4383 specification requirements referenced herein. The castings shall have been sampled as specified in ASTM D4383 and shall meet the applicable

specification requirements, as demonstrated by test results certified and made available by the testing facility. The applicable ASTM D4383 specification requirements referenced herein shall be considered to be parts a), b), and d) of this Section.

715.40.6.1.2-Lens Requirements: The retroreflective lenses of Type P-2 markers shall meet the following requirements:

a) The coefficient of luminous intensity (RI) of the lenses in new condition shall be not less than the values specified in ASTM D4383 when measured in accordance with the procedures and methods specified in ASTM D4383. Coefficient of luminous intensity shall be defined as the ratio of the luminous intensity (I) of the retroreflector in the direction of observation to the illuminance (E) at the retroreflector on a plane perpendicular to the direction of the incident light, expressed in candelas per lux (cd/lx).
b) After abrading the lenses in accordance with the procedures and methods specified in ASTM D4383, the coefficient of luminous intensity of the lenses at zero (0) degrees entrance angle shall be not less than the values specified in ASTM D4383 when measured in accordance with the procedures and methods specified in ASTM D4383. This requirement shall not apply to red faces of lenses.
c) When illuminated in accordance with ASTM D4383, the color of the lenses shall meet the color requirements of ASTM D4383 when measured in accordance with the procedures and methods specified in ASTM D4383.
d) When impacted in accordance with the methods and procedures specified in ASTM D4383, the lenses shall meet the Lens Impact Strength performance requirements of ASTM D4383.
e) When subjected to temperature cycling in accordance with the methods and procedures specified in ASTM D4383, the lenses shall meet the Temperature Cycling performance requirements of ASTM D4383.
f) The lens shall be comprised of materials with adequate chemical, water, and UV resistance for the intended use.
g) The lens width shall be approximately four (4) in. (102 mm).
h) The angle between the face of the lens and the base shall be no greater than forty-five (45) degrees.

i) The base of the marker shall be flat within 0.05 in. (1.3 mm). If the bottom of the marker is configurated, the outermost faces of the configurations shall not deviate more than 0.05 in. (1.3 mm) from a flat surface.

j) The lens shell, or body, shall be a solid polymer with no fill material. The retroreflective face(s) of the lens shall not be required to be integral with the shell.

k) The retroreflective face(s) of the lens shall be subdivided into multiple "cells" which shall allow undamaged cells to continue to perform unaffected when one or more cells are damaged.

l) The retroreflective technologies incorporated into the retroreflective face(s) of the lens shall be designed such that the lens will provide retroreflectivity when wet.

m) Lenses shall have fully completed testing on the American Association of State and Highway Transportation Officials - National Transportation Product Evaluation Program (AASHTO-NTPEP) test deck in a location having s similar climate to West Virginia. Upon review, the performance of the lenses on the test deck shall meet or exceed the historical performance of other industry standard lenses approved by the WVDOH. This determination shall be made solely by the WVDOH.

n) Lenses shall have been tested by an independent testing facility to the applicable ASTM D4383 specification requirements referenced herein. The lenses shall have been sampled as specified in ASTM D4383 and shall meet the applicable specification requirements, as demonstrated by test results published and certified by the testing facility. The applicable ASTM D4383 specification requirements referenced herein shall be considered to be parts a), b), c), d), and e) of this Section.

715.40.6.1.3-Adhesive Requirements: Epoxy adhesive shall be used for applying Type P-2 markers to the pavement surface. The specific adhesive used shall be an adhesive recommended by the P-2 marker manufacturer and meeting the requirements of ASTM D4383.

The adhesive used for adhering the Type P-2 marker lenses in the castings shall be an adhesive recommended by the P-2 marker manufacturer.

715.40.6.1.4-Product Submission and Approval: Type P-2 marker castings and/or lenses to be considered for inclusion on the WVDOH Approved Products List (APL) shall be submitted to the Materials Division following the current procedures specified by the Materials

Division. The manufacturer may contact the Traffic Engineering Division for verification. The manufacturer should include all relevant documentation and information with this form, including but not limited to Product Data Sheets, Product Flyers, Manufacturer Product Specifications, Product Bulletins, Engineering Drawings, AASHTO-NTPEP test results, and the independent testing facility test results described herein.

In addition to the above, the WVDOH may also require that the casting and/or lens product(s) submitted for evaluation be field tested in one or more locations in West Virginia in order to validate the acceptable performance of the product(s). This field testing shall typically be a minimum of six months to one year in duration including a full winter season. Specific details related to this testing, such as locations and quantities, shall be determined by the WVDOH.

All submitted information will be forwarded to the WVDOH Traffic Engineering Division, which will in turn contact and work directly with the manufacturer during the evaluation process. The Traffic Engineering Division will evaluate all submitted literature and documentation for compliance with the specified requirements as well as satisfactory performance on the AASHTO-NTPEP test deck. The Traffic Engineering Division may also arrange for the manufacturer to furnish test samples and arrange for the product to be installed for field testing as previously described. After the evaluation is complete, the Traffic Engineering Division will inform the Materials Division in writing of the outcome of its evaluation.

715.40.6.2-Type R-4 Markers: This specification covers Type R-4 markers, a type of nonplowable, retroreflective RPM for nighttime lane marking and delineation. Note, due to the fact that snow plowing operations are necessary throughout the state of West Virginia, Type R-4 markers are not placed such that they will be subjected to direct plowing; rather, the RPM's are installed in limited locations in conjunction with surface mounted tubular markers in order to be shielded from plowing. All references to ASTM specification D 4280 herein shall be taken as referencing the D 4280 – 08 version of this specification.

Type R-4 markers shall meet the following requirements:

a) When tested in accordance with the methods and procedures specified in ASTM D4280, the markers shall meet the Flexural Strength performance requirements of ASTM D4280.
b) When tested in accordance with the methods and procedures specified in ASTM D4280, the markers shall meet the Compressive Strength performance requirements of ASTM D4280.
c) The markers shall be comprised of materials with adequate chemical, water, and UV resistance for the intended use.

d) The color of the marker shell shall match the color of the lens of the marker that is not red.
e) The marker height shall not exceed 0.80 in. (20.3 mm).
f) The marker width shall not exceed 5.1 in. (130 mm).
g) The base of the marker shall be substantially free from gloss or substances that may reduce its bond to adhesive.
h) The base of the marker shall be flat within 0.05 in. (1.3 mm). If the bottom of the marker is configurated, the protruding faces of the configurations shall not deviate more than 0.05 in. (1.3 mm) from a plane.
i) The coefficient of luminous intensity (RI) of the marker lenses in new condition shall be not less than the values specified in ASTM D4280 when measured in accordance with the procedures and methods specified in ASTM D4280. Coefficient of luminous intensity shall be defined as the ratio of the luminous intensity (I) of the retroreflector in the direction of observation to the illuminance (E) at the retroreflector on a plane perpendicular to the direction of the incident light, expressed in candelas per lux (cd/lx).
j) After abrading the marker lenses in accordance with the procedures and methods specified in ASTM D4280, the coefficient of luminous intensity of the lenses at zero (0) degree entrance angle shall be not less than the values specified in ASTM D4280 when measured in accordance with the procedures and methods specified in ASTM D4280. This requirement shall not apply to red faces of lenses.
k) When illuminated in accordance with ASTM D4280, the color of the marker lenses shall meet the color requirements of ASTM D4280 when measured in accordance with the procedures and methods specified in ASTM D4280.
l) When impacted in accordance with the methods and procedures specified in ASTM D4280, the marker lenses shall meet the Lens Impact Strength performance requirements of ASTM D4280.
m) When subjected to temperature cycling in accordance with the methods and procedures specified in ASTM D4280, the marker lenses shall meet the Temperature Cycling performance requirements of ASTM D4280.
n) The retroreflective face(s) of the lens shall be subdivided into multiple “cells” which shall allow undamaged cells to continue to perform unaffected when one or more cells are damaged.

o) The retroreflective technologies incorporated into the retroreflective face(s) of the lens shall be designed such that the lens will provide retroreflectivity when wet.
p) The angle between the face of the marker lens and the base shall be no greater than forty-five (45) degrees.
q) The markers shall have fully completed testing on the American Association of State and Highway Transportation Officials -National Transportation Product Evaluation Program (AASHTO-NTPEP) test deck. Upon review, the performance of the markers on the test deck shall meet or exceed the historical performance of other industry standard Type R-4 markers approved by the WVDOH. This determination shall be made solely by the WVDOH.
r) The markers shall have been tested by an independent testing facility to the applicable ASTM D4280 specification requirements referenced herein. The markers shall have been sampled as specified in ASTM D4280 and shall meet the applicable specification requirements, as demonstrated by test results certified and made available by the testing facility. The applicable ASTM D4280 specification requirements referenced herein shall be considered to be parts a), b), i), j), k), l), and m) of this Section.

715.40.6.2.1-Adhesive Requirements: Standard set epoxy adhesive, rapid set epoxy adhesive, or bituminous adhesive may be used for applying Type R-4 markers to the pavement surface. The specific adhesive used shall be an adhesive recommended by the R-4 marker manufacturer and meeting the requirements of ASTM D4280 for one of the adhesive types described above.

715.40.6.2.2-Product Submission and Approval: Type R-4 markers to be considered for inclusion on the WVDOH Approved Products List (APL) shall be submitted to the Materials Division following the current procedures specified by the Materials Division. The manufacturer may contact the Traffic Engineering Division for verification. The manufacturer should include all relevant documentation and information with this form, including but not limited to Product Data Sheets, Product Flyers, Manufacturer Product Specifications, Product Bulletins, Engineering Drawings, AASHTO-NTPEP test results, and the independent testing facility test results described herein.

In addition to the above, the WVDOH may also require that the markers submitted for evaluation be field tested in one or more locations in West Virginia in order to validate the acceptable performance of the product(s). This field testing shall typically be a minimum of six months to one year in duration including a full winter season. Specific details

related to this testing, such as locations and quantities, shall be determined by the WVDOH.

All submitted information will be forwarded to the WVDOH Traffic Engineering Division, which will in turn contact and work directly with the manufacturer during the evaluation process. The Traffic Engineering Division will evaluate all submitted literature and documentation for compliance with the specified requirements as well as satisfactory performance on the AASHTO-NTPEP test deck. The Traffic Engineering Division may also arrange for the manufacturer to furnish test samples and arrange for the product to be installed for field testing as previously described. After the evaluation is complete, the Traffic Engineering Division will inform the Materials Division in writing of the outcome of its evaluation.

715.40.6.3-Temporary Markers: Temporary markers shall meet the same requirements as permanent Type R-4 markers, as described in Section 715.40.6.2, with the exception of requirements q) and r).

The adhesive used to apply the markers shall meet the requirements of Section 715.40.6.2.1 or, in lieu of adhesives of this type, the Contractor may utilize markers supplied by the manufacturer with a "peel and stick" pressure sensitive adhesive pad pre-applied to the marker, provided that the surface upon which the marker is to be placed is within the manufacturer's recommendations for markers incorporating a pre-applied adhesive pad. Markers supplied for temporary application to newly placed asphalt final wearing course surfaces or newly placed concrete surfaces shall be placed using a pre-applied pressure sensitive adhesive pad.

Temporary markers are not required to be submitted for review, approval, and placement on an Approved Products List (APL). No APL shall be maintained for temporary markers. When requested, the Contractor shall submit to the project Engineer a letter of certification from the marker manufacturer certifying that the markers supplied meet the current WVDOH Standard Specifications.

715.41-TRAFFIC SAFETY DEVICES:

715.41.4-Quad Guard Impact Attenuating Device (Type VIII):

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE THE FOLLOWING.

The unit shall consist of crushable cartridges surrounded by a framework of steel Quad-beam guardrail which can telescope rearward during head-on impacts. The quad Guard System shall have a center monorail which will resist lateral movement during side angle impacts. The nose shall consist of a formed plastic or metal nose wrap.

715.41.7-Acceptance:

DELETE THIS SECTION AND REPLACE WITH THE FOLLOWING:

715.41.7-SCI Impact Attenuating Device (Type III):

715.41.7.1-Description: The unit shall consist of a flat galvanized steel base plate, to be attached to the support surface with chemical anchor bolts, with welded galvanized steel reinforcing support gussets and two welded galvanized steel channel beams running the length of the unit.

The internal area of the unit shall be supported laterally by a framework consisting of a welded up galvanized steel box shaped "sled" at the front of the unit, followed by successive welded galvanized steel support diaphragms to which the left and right sides of the unit are to be connected. The sled and diaphragms shall be locked into and held in position laterally by, and shall be capable of sliding longitudinally along, the channel beams included as part of the base.

Each side of the unit shall provide a surface to capture and redirect impacting vehicles by using successive galvanized steel 10 ga. quad beam side panels, overlapped from the rear to the front of the unit, with the beginning of the front side panels attached to the front sled, and the underlying panels at each overlap to be attached to an internal support diaphragm.

The kinetic energy dissipating system employed by the unit for front impacts shall consist of a round, non-rotating, steel sheave assembly at the front of the unit with the ability to slide longitudinally along the unit; two round, non-rotating, steel sheave assemblies at the rear of the unit connected by an energy dissipating hydraulic piston; and a galvanized steel cable interconnecting the sheaves. During front end impacts, the entire device shall telescope rearward. Energy shall be dissipated variably, dependent on the vehicle momentum, by the hydraulic piston as it is compressed by the two rear sheave assemblies as tension is induced in the cable.

For protection of the components, the unit shall be designed such that the tops of the sheave assemblies and piston sit below the top level of the base plate channel beams. In addition, the unit shall be designed such that when fully collapsed, all of the sheave assemblies and piston shall remain behind the front sled.

The total outside to outside width of the unit along its' entire length shall be approximately 36". The length of the unit from the front to rear of the support base shall be approximately 21-1/2 feet.

715.41.7.2-Performance: When installed in accordance with the manufacturer's recommendations, the device shall be acknowledged by the Federal Highway Administration (FHWA) to meet the structural adequacy, occupant risk, and vehicle trajectory criteria set forth in National Cooperative Highway Research Program Report 350 (NCHRP-350) for redirective, non-gating crash cushions. The device shall be acknowledged as meeting these criteria for all NCHRP-350 required impact tests, demonstrated by performance of the tests, unless specific tests are not required to be performed based on the results of other tests as acknowledged by the FHWA.

In regards to impact capacity, the device shall be available in two different basic versions; one designed to meet the requirements of NCHRP-350 Test Level 2 and one designed to meet the requirements of NCHRP-350 Test Level 3, with each to be clearly acknowledged by the FHWA as meeting the NCHRP-350 requirements at the applicable Test level.

INSERT THE FOLLOWING SECTION:

715.41.8-TAU-II Impact Attenuating Device (Type IX):

715.41.8.1-Description: The device shall accommodate a wide range of hazard widths up to 8-1/2 ft (2.6 m) in six (6) inch (150 mm) increments. The device shall be available in various impact speed capacities, achievable by different combinations of number of bays and placement of the two different types of energy absorbing cartridges described herein within the bays. The device shall utilize non-proprietary transition components and hardware for transitioning to a wide range of proprietary and non-proprietary barrier systems. The system shall be made up of independent collapsible bays that are guided and supported by high strength galvanized steel cables. The system's energy dissipating capacity shall be achieved using energy absorbing cartridges. All length/width configurations shall be constructible using the same basic parts.

The foundation system shall consist of two cables, a back support, and front cable anchors of various designs for different specific site conditions. The back support and cable anchors shall be manufactured using ASTM A36 steel and shall be galvanized per ASTM A123. The fasteners for these components shall be Class 5.8 (Grade 2) or greater and shall be galvanized per ASTM 153. All washers shall be hardened. The cables shall be one (1) inch (25 mm) in diameter, minimum, and shall be galvanized per ASTM A603.

Bays shall be separated by Front Supports, Middle Supports, and Bulkheads of various widths as required. The Supports, Bulkheads, and cable guides shall incorporate modular bolted on cable guides for the steel cables. The Supports and Bulkheads shall be manufactured using ASTM A36 steel and shall be galvanized per ASTM A123. The fasteners for these components shall be Class 5.8 (Grade 2) or greater and shall be galvanized per ASTM 153. All washers shall be hardened.

Each bay shall be enclosed on each side by steel thrie-beam shaped Sliding Panels. The panels shall be bolted to the Supports and Bulkheads using sliding bolts. End Panels shall be used at the rear end of the device. The End Panels shall be attached to the back support and the last bay's Sliding Panel through Pipe Panel Mounts which provide mounting points for transition components. The Pipe Panel Mounts shall be bolted to the Back Support. Sliding and End Panels shall be fabricated from steel conforming to AASHTO M180 Class B. Sliding Bolts shall be cast from ASTM 1045 HT steel and shall be galvanized per ASTM A123. Pipe Panel Mounts shall be fabricated from steel conforming to ASTM A513, Type 5. The fasteners for

these components shall be Class 5.8 (Grade 2) or greater and shall be galvanized per ASTM 153. All washers shall be hardened.

The system shall incorporate a nose piece and flexible front support legs mounted to the front support. The front support legs shall be manufactured from either synthetic or natural rubber or polyurethane. The nose piece shall be fabricated from polyurethane. The fasteners for these components shall be Class 5.8 (Grade 2) or greater and shall be galvanized per ASTM 153. All washers shall be hardened.

The system shall utilize two types of energy absorbing cartridges. The cartridges shall be cylindrical shaped and shall measure approximately 30-1/2 in (775 mm) in length and 25 in (635 mm) in diameter. Each cartridge shall weight approximately 35 lb (16 kg). The cartridges shall be manufactured using a specially formulated High Density Cross-linked polyethylene.

The device shall be attached to a foundation. Foundation and attachment specifications and details shall be provided by the manufacturer. The anchor design shall achieve a pull out strength of 25,000 lb (12,000 kg) and shear strength of 19,000 lb (8,500 kg).

715.41.8.2-Performance: When installed in accordance with the manufacturer's recommendations, the device shall be acknowledged by the Federal Highway Administration (FHWA) to meet the structural adequacy, occupant risk, and vehicle trajectory criteria set forth in National Cooperative Highway Research Program Report 350 (NCHRP-350) for redirective, non-gating crash cushions. The device shall be acknowledged as meeting these criteria for all NCHRP-350 required impact tests, demonstrated by performance of the tests, unless specific tests are not required to be performed based on the results of other tests as acknowledged by the FHWA.

In regards to impact capacity, the device shall be available in two different basic versions; one designed to meet the requirements of NCHRP-350 Test Level 2 and one designed to meet the requirements of NCHRP-350 Test Level 3, with each to be clearly acknowledged by the FHWA as meeting the NCHRP-350 requirements at the applicable Test level.

INSERT THE FOLLOWING SECTION:

715.41.9-Acceptance: Acceptance shall be based upon review and approval of the certified crash test data by the Division. Materials Control, Soils, and Testing Division shall develop an approved list of Traffic Safety Devices.

715.42-TRAFFIC SIGNAL MATERIALS AND EQUIPMENT

715.42.7.4-Preemption:

ADD THE FOLLOWING SUBSECTIONS TO THE SECTION:

715.42.7.4.1-Implementation: When included in the plans, the priority control system shall provide advance signal control per intersection approach.

The systems consist of an emitter, detector, confirmation light and a card rack mounted signal interface unit.

Priority control shall be measured as a complete unit in place per intersection or control location. This item shall consist of a complete electrical mechanism and all intrinsic items necessary for controlling preemptive functions at each intersection.

When accepted as complete, the quantities determined and as provided below will be paid for at the contract unit price compensation for furnishing all materials and doing all work prescribed in a workmanlike manner and for furnishing all labor, equipment, tools and incidentals to complete the necessary work per intersection.

The emitter shall be mounted on the priority vehicle and transmit a shaped, optical pattern of infrared light to a detector at the prioritized intersection approach. The interface unit will then input a call to the controller for a pre-programmed preemption routine. The transmit/receive distance for each intersection approach must be user programmable and will be the responsibility of the Division of Highways to determine and set. A means of adjustment for the transmit/receive distance per approach must be provided with the system. See I/S phasing and estimate of quantities.

715.42.7.4.1.1-Optical Emitter: The Optical Emitter (OE) must be a single pulsed infrared light source capable of delivering sufficient optical energy to activate compatible O.C.S. detectors up to 2500 feet. Emissions must be precisely timed pulses of high intensity light. The O.E. must be available in 10HZ and 14HZ (+/- 1 HZ) modules for use as low and high priority vehicles.

The range of activation of preemption at signalized intersections must be a function of the P.C.S. hardware.

715.42.7.4.1.2-Detector: The Detector unit must be responsive to the optical emitter at a distance of up to 2500 feet. The unit must be totally compatible with all features of the emitter and be capable of priority distinction without the addition of special detectors. The Detector shall have a minimum reception angle of 35 degrees.

715.42.7.4.1.3-Card Rack Mounted Interface Unit: Each interface card must provide a two (2) to four (4) channels per card for a total of (8) eight pre-empt outputs for use by the local traffic signal controller.

715.42.7.4.1.4-Control Equipment: Preemption control must be applicable to NEMA TS1 standards.

715.42.7.4.1.5-System Requirements: Preemption control equipment must be compatible and completely interchangeable with existing preemption systems (as it relates to these special revisions and the WVDOH APL). All P.C.S. equipment for this system must be on the WVDOH Approved Products List (APL). Fixed card racks with integral power supplies and capacities to accommodate required P.C.S. features must be in the controller cabinet with priority control.

715.42.7.4.1.6-Warranty: all electronic components except the optical emitter strobe and confirmation light, shall be warranted for a minimum of three (3) years.

715.42.7.4.1.7-Codes and Basis of Payment: When accepted as complete, the quantities determined as provided above will be paid for at the contract unit price bid for the items listed below which the prices and payment shall be full compensation for furnishing all materials and doing all work prescribed in a workmanlike manner and for furnishing all labor, equipment, tools and incidentals necessary to complete the work.

Unit bid prices shall be submitted as indicated on the plans per code unit.

(OE) – OPTICAL EMITTER
(D1) – DETECTOR – one detector per intersection
(D2) – DETECTOR – two detector per intersection
(D3) – DETECTOR – three detector per intersection
(D4) – DETECTOR – four detector per intersection