

20260901 – September Specifications Committee Meeting

September Specifications Committee Meeting Agenda

Meeting Date

Tuesday, September 1, 2026 10:00 AM

Meeting Location: 190 Dry Branch Drive, Conference Room, MCS&T Division, Charleston, WV

Also meeting virtually via Google Meet. E-mail distribution message includes instructions.

Approved Supplemental Specification changes from last Committee meeting (07/07/26)

- **Section 651-Furnishing and Placing Soil:** This is an entire section rewrite and updates the requirements for seeding and mulching.
- **Section 652-Seeding and Mulching:** This is an entire section rewrite and updates the requirements for seeding and mulching.
- **715.25-715.32:** This revision updates the requirements for seeding and mulching.
- **106.1.1-Definitions and 106.1.5-State and/or Federal Use of Manufactured Products:** The revision adds the definition of Fifty-Five Percent (55%) requirement and reflects changes to 23 CFR 635.410. All manufactured products and final assembly shall occur in America. Manufactured products shall meet the 55% Requirements.
- **506.2-Materials:** This revision allows calcium sulfoaluminate (CSA) cement, specified in Section 701.5 of the Supplemental Specification to be used for concrete repairs in Section 506.
- **601.1-Description, 601.3-Proportioning, 601.3.1.1.1.3-Level of Prevention and 601.16-Pay Items:** The revision adds new “Class P” of Concrete, which is another option for patching concrete.
- **615.5.6.3-Installation:** The revision removes references to impact and air-supplied tools and clarifies that bolt tightening wrenches shall have sufficient capacity to achieve tightening in approximately ten (10) seconds.
- **Section 619-Membrane Waterproofing:** The revision is a complete section rewrite to reflect current waterproofing practices, covering materials, installation, and protection.
- **705.7-Waterproofing Materials:** Revised to match these changes in Section 619 and remove outdated requirements.
- **642.6.5-Silt Fence:** This revision improves silt fence performance and consistency by updating height, embedment, installation, and alignment requirements, including guidance for multiple rows. It also adds ASTM D6461 material standards, defines Standard and High Performance fence types, and updates related tables and pay items.
- **Section 697–Safety Inspection of In-Service Bridges During Construction:** The revision updates the names associated with NBI inspections and shortens the report submission timeframe to better align with our Consultant Inspection Contracts. A current special provision incorporated into supplemental specifications.
- **701.1-Portland Cement.** The revision adds Type III cement for items in Section 603, 506, and precast concrete applications when specified.
- **709.1.3-Galvanized Coated Bars for Concrete Reinforcement:** The revision adds inspection requirements for galvanized reinforcing steel and requirements if ASTM A767 is used as the method of galvanizing.

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- **709.24.4.3-Direct Tension Indicators (DTIs):** The revision provides an additional method for tightening bolted connections and establishing that DTIs, when used to indicate bolt tension, must conform to ASTM F959.

Approved Special Provisions (SP) from last Committee meeting (07/07/26)

- **SP 106.1.4-Use of Domestic Construction Materials (De Minimis Standard):** The revision adds language to Subsection 106.1.4 incorporating the FHWA Build America, Buy America (BABA) De Minimis standard.
- **SP 106-Build America Buy America:** The revision adds the definition of Fifty-Five Percent (55%) requirement and reflects changes to 23 CFR 635.410. All manufactured products and Final Assembly shall occur in America. Manufactured products shall meet the 55% Requirements. This SP will need to be included in proposals for projects authorized by the federal government on or after October 1, 2026.

Items Removed from the Agenda:

- **SP 636-Temporary Pavement Markings-Orange**

Old Business Items

<u>401</u>	401.7.4-Thickness & 401.13.4-	3rd time to Committee. Discussed in May, July, and September. Specification change to 401-Asphalt Base, Wearing, and Patching and Leveling Courses, 401.7.4-Thickness and 401.13.4. The revision allows using MIT Scanning (nondestructive testing) to verify asphalt pavement thickness. It also includes revisions to the acceptance and payment methods. The item has been updated since the last meeting, the changes include: • Added language preventing additional lifts prior to thickness testing. • Increased testing frequency to 1 test per 800 ft. • Require Contractor to core and refill cores when necessary. • Added 0.08" or 2mm tolerance. K. Welch Item is up for a vote.
<u>679</u>	Section 679 Overlaying of Portland Cement Concrete Bridge Decks.	3rd time to Committee. Discussed in May, July, and September. Specification change to various subsections of Section 679 Overlaying of Portland Cement Concrete Bridge Decks. The revisions incorporates very early strength latex modified concrete from the current Special Provision into the specification. • 679.1-Description,

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	A. Thaxton	• 679.2-Materials, • 679.3.1-Removal of Existing Deck Surface, • 679.3.1.1-Removal of Existing Deck Surface Phase I, • 679.3.1.2-Removal of Existing Deck Surface Phase II, • 679.3.1.4-Disposal • 679.3.3-Preparation of Surface, • 679.3.5-Placement Preconditions, • 679.3.6-Placing, Finishing and Curing Slab Reconstruction Concrete, • 679.3.6.2-Removal of Slab Reconstruction Concrete Surface, • 679.3.7.1-General, • 679.3.7.5.3-Curing Very Early Strength Latex Modified Concrete, • 679.4.3.4-Loading Limitations during Curing, • 679.4.9-Defective or Damaged Concrete, • 679.6.3.1-Blast Cleaning This item has been updated since the last meeting pending another follow-up meeting based on Industry comments.
<u>SP 103</u>	SP 103-Alternate Design and Alternative Bidding (ADAB) K. Welch	2nd time to Committee. Discussed in July and September. The proposed revision is in response to several Design Directive (DD) updates that reference the WVDOH Life-Cycle Cost Analysis (LCCA) Report and require corresponding changes to SP 103. The changes update the ADAB provisions to incorporate references to DD-648, clarify the relationship between the ADAB process and the LCCA methodology, and identifies the LCCA Report as the source of the Life-Cycle Cost Factor calculations used in the bid evaluation process. Revisions since the last meeting include adding the word “to” back into the sentence in subsection 103.2.2.1. Item is up for a vote.

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<u>401</u> <u>&</u> <u>410</u>	401.4.2-Job Mix Formula & 410.4.2-Job Mix Formula	2nd time to Committee. Discussed in July and September. Specification change to Section 401-Asphalt Base, Wearing, and Patching and Leveling Courses, and Section 410-Asphalt Base and Wearing Courses Percent With Limits (PWL). The following subsections were revised: • Section 401: 401.4.2-Job Mix Formula • Section 410: 410.4.2-Job Mix Formula The changes add requirements for a 19 mm surface course, including a minimum requirement of 47% passing the No. 4 sieve for both Tables 401.4.2B and 410.4.2B. As a result, new subsections 401.4.2.2 and 410.4.2.2 have been added to support these requirements. The revision also removes the 37.5 mm mix from Tables 401.4.2B and 410.4.2B, as it is no longer utilized. To facilitate use on projects a new item number will be created and is shown for illustrative purposes only. No revisions since the last meeting. Items are up for a vote.
<u>406</u>	406.2-Materials	2nd time to Committee. Discussed in July and September. Specification change to Section 406, 406.2-Materials. Updates the reference from AASHTO MP 41 to AASHTO M 354. Both specifications are titled "Standard Specification for High Friction Surface Treatment for Asphalt and Concrete Pavements Using Calcined Bauxite." This change updates the referenced standard but does not alter the intent or requirements of the specification. No revisions since the last meeting. Item is up for a vote.
<u>410</u>	410.7.1.4-Thickness & 410.7.1.5-Bond Strength	2nd time to Committee. Discussed in July and September. Specification change to Section 410, subsections 410.7.1.4-Thickness and 410.7.1.5-Bond Strength. The revision updates MP references.

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	S. Boggs	No revisions since the last meeting. Item is up for a vote.
<u>420</u>	420.4.6-Surface Preparation & 420.4.9-Weather and Seasonal Limitations K. Welch	2nd time to Committee. Discussed in July and September. Specification Change Section 420, subsections 420.4.6-Surface Preparation and 420.4.9-Weather and Seasonal Limitations. The following updates were made: • 420.4.6-Surface Preparation: Revision adds “standing water” as an additional condition that must be removed from the surface prior to placement. • 420.4.9-Weather and Seasonal Limitations: Revision increases the minimum placement temperature from 45°F to 50°F. Revisions since the last meeting include clarifying in subsection 420.4.6 that the tack requirement applies to diluted emulsion. Item is up for a vote.
<u>601</u>	601.3.1-Mix Design Requirements A. Thaxton	2nd time to Committee. Discussed in July and September. Specification change to 601, subsection 601.3.1-Mix Design Requirements. This revision removes Class K and Class S concrete from the Surface Air Meter (SAM) requirements in Section 601.3. Class K is no longer used for bridge deck applications, the original intended use of SAM testing, and corresponding Surface Resistivity requirements were never added for this concrete class. Class S was inadvertently included in the specification before the related provision was fully implemented and used on projects. Revisions since the last meeting included removing the unit “psi” from “0.20 psi,” as “0.20” was intended to be unitless. Item is up for a vote.

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<u>601</u>	601.3.2.4 & 601.3.2.4.1 A. Thaxton	2nd time to Committee. Discussed in July and September. Specification update to Section 601-Structural Concrete, subsection 601.3.2.4-Total Solids $\bar{A}$ and 601.3.2.4.1-Optimized Aggregate Gradation. The update revises the frequencies for gradation and Total Solids $\bar{A}$ based upon an industry proposal and internal discussion with Districts. No revisions since the last meeting. Item is up for a vote.
<u>601</u>	601.4.4-Compressive Strength Test for Acceptance I. Shaffer	2nd time to Committee. Discussed in July and September. Specification update to Section 601-Structural Concrete, subsection 601.4.4-Compressive Strength Tests for Acceptance. The revision removes references for the 6" X 12" test cylinders and MP 711.03.23. No revisions since the last meeting. Item is up for a vote.
<u>SP 601</u>	SP 601-Class H Lightweight Concrete A. Thaxton	2nd time to Committee. Discussed in July and September. Special Provision to Section 601.3 removes the RCP test requirement to comply with the 2026 Supplemental Specifications, which include Surface Resistivity requirements. Revisions since the last meeting include updating the third paragraph of subsection 601.3 for Class H Lightweight Concrete and adds revised subsection 601.4.5 to the Special Provision. Both updates to the Special Provision adds surface resistivity requirements.
<u>603</u>	603.6.2.1-Class S-P Concrete Mix Design Testing	2nd time to Committee. Discussed in July and September. Specification change to Section 603, subsection 603.6.2.1-Class S-P Concrete Mix Design Testing. The revision updates Table 603.6.2.1C and removes the 6" X 12" cylinder size option for the Compressive Strength Test. No revisions since the last meeting.

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	J. Reese	Item is up for a vote.
<u>662</u>	662.11-Lighting Supports S. Boggs	2nd time to Committee. Discussed in July and September. Specification change to Section 662-Lighting, subsection 662.11-Lighting Supports. The revision updates the reference for anchor bolt installation, tightening, and testing requirements to reflect the current requirements contained in Section 658.5.6. Minor editorial revisions are also included to improve readability and clarify the requirements for lighting support alignment and placement. Revisions since the last meeting include removing the letter “s” off of “subsections”. Item is up for a vote.
<u>688</u>	688.5.3-Small Quantity Field Painting Exemption K. Trent	2nd time to Committee. Discussed in July and September. Specification Change to Section 688-Field Painting of Metal Structures, subsection 688.5.3-Small Quantity Field Painting Exemption. The revision adds a subsection allowing exemption from SSPC QP-1 and SSPC QP-2 certification requirements for small quantity field painting. Subsequent subsections are renumbered accordingly. No revisions since the last meeting.

New Business Items

SECTION	TITLE	DESCRIPTION
<u>108</u>	Section 108-Prosecution and Progress S. Smith	1st time to Committee. Comprehensive rewrite of Section 108 to incorporate changes from the Section 108 working group. Revisions primarily address the Construction Schedule requirements and Field Office Overhead provisions.
<u>206</u> <u>&</u> <u>626</u>	206.2-Reference Documents 206.3.1-General: &	1st time to Committee. Specification change to Section 206-Base Course Reinforcement Geogrid, subsections 206.2-Reference Documents 206.3.1-General and Section 626-Retaining Wall Systems, subsection 626.5.1.1.6-Geosynthetics Soil Reinforcing or Attachment Devices.

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	626.5.1.1.6-Geosynthetics Soil Reinforcing or Attachment Devices: L. Ford	The revisions remove the title and contents of Subsection 206.2 – Reference Documents, leaving Subsection 206.2 blank. Additionally, Subsections 206.3.1 and 626.5.1.1.6 are revised to add requirements that the material be evaluated by AASHTO Product Evaluation and Audit Solutions.
<u>SP 471</u>	SP 471-Longitudinal Joint Stabilizer V. Allison	1st time to Committee. This item proposes combining the existing Special Provisions 471 and 708.11 into a single LJS Special Provision. The original SP 471 and accompanying SP 708.11 were approved by the Spec Committee and FHWA in 2013. This update combines the existing requirements into one provision, cleans up the formatting, and adds a conventional LJS pay item. There are no significant changes proposed to the existing LJS requirements.
<u>501</u>	501.19-Tolerance in Pavement Thickness & 501.23-Basis of Payment. K. Welch	1st time to Committee. Specification change to 501-Portland Cement Concrete Pavement: 501.19-Tolerance in Pavement Thickness and 501.23-Basis of Payment. The revision simplifies the current procedure used to verify concrete pavement thickness. It includes revisions to the testing frequency, request and payment methods.
<u>506</u>	506.2-Materials L. Ford	1st time to Committee. Specification change to Section 506-Concrete Pavement Repair, subsection 506.2-Materials. The revision adds AASHTO product and evaluation requirements for epoxy material.
<u>601</u>	601.3-Proportioning A. Thaxton	1st time to Committee. Specification change to 601-Structural Concrete, subsection 601.3-Proportioning. The revision clarifies the curing method for Surface Resistivity is to be the accelerated curing method defined in AASHTO T358.
<u>601</u>	601.4.5-Tests for Surface Resistivity Acceptance of Class H Concrete	1st time to Committee.

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	A. Thaxton	Specification change to 601-Structural Concrete, subsection 601.4.5-Tests for Surface Resistivity Acceptance of Class H Concrete. The revision clarifies the curing method for Surface Resistivity is to be the accelerated curing method defined in AASHTO T358.
<u>626</u>	Section 626-Retaining Wall Systems J. Reese	1st time to Committee. Section 626 was revised at the request of the Geotechnical Design Unit to clarify that Gravity Walls are a type of retaining wall. The subsections were also updated to include changes relevant to Gravity Walls. Additionally, at the request of the Aggregate Section, the pH test method was changed from AASHTO T 289 to ASTM G51 following discussions at the AASHTO Comp Conference.
<u>679</u>	679.2.2-Specialized Concrete Mix Design and Testing A. Thaxton	1st time to Committee. Specification change to Section 679-Overlaying of Portland Cement Concrete Bridge Decks, subsection 679.2.2-Specialized Concrete Mix Design and Testing. The revision incorporates curing requirements for surface resistivity.
<u>715</u>	715.14.1-Approval for Bearing Pads With Shims J. Gum	1st time to Committee. Specification change to Section 715-Miscellaneous Materials, subsection 715.14.1- Approval for Bearing Pads With Shims. The revision deletes and replaces the current subsection to reference MP 715.14.01.
<u>601</u>	SP 601-Class S Concrete A. Thaxton	1st time to Committee. The revised Special Provision updates the surface resistivity specimen curing conditions and updates Table 601.4.1.6 for price adjustments to match the current specification. Additionally, the acceptance requirements was lowered to 30 kΩ-cm to match Class H concrete, but maintains 40 kΩ-cm for mix design approval.

New items and updates for the November 5, 2026 meeting are due by October 9, 2026.

Comments

Comments are requested for Specification Changes and Project Specific Special Provisions as they help in the decision-making process. Please send comments by Friday prior to the meeting.

Please Send Comments to: Kristy.J.Huffman@wv.gov.

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The **2026 Supplemental Specifications and order forms** are available on the MCS&T webpage:

<https://transportation.wv.gov/highways/mcst/Pages/specifications.aspx>

- Note: Physical copies of the 2026 Supplemental Specifications are available at no cost to DOH and State personnel. Industry members may purchase copies using the order form available at the link above.

If you are the '**Champion**' of any Specification Changes and/or Project Specific Special Provisions currently in the Specification Committee, it is your responsibility to edit/update/revise your items in a timely manner per Specification Committee Guidelines.

NOTE: Failure to submit updates may result in removal of item and/or delays.

File Format Structure and Progression of items through Specifications Committee

The purpose of the protocol below is to provide guidance on the file structure of Proposed Specifications & Project Specific Provisions as they progress through Specifications Committee. This procedure would facilitate a means of tracking changes from meeting to meeting as the agenda & provisions are posted publicly online on the Spec Committee website.

NEW BUSINESS ITEMS:

New items should be set up & submitted in the following format along with a brief overview of the item or reason for the change:

1. **Specification Changes** – Show as redline copy (see note)
2. **Project Specific Special Provisions (SP)** – Will be shown in all black.
3. **Updates to approved SP** – Shown as redline copy.

NOTE: Redline copy is a form of editing which indicates removal or addition of text. You can redline a Microsoft Word document by using the built-in "Track Changes" feature.

OLD BUSINESS ITEMS:

Updated provisions that were discussed at the last committee meeting should be set up in the following format:

- Redline copy from prior meeting would not be shown.
- Redline copy of new changes/updates (from previous meeting)

PROGRESSION OF ITEMS THRU COMMITTEE AND APPROVAL:

Depending on how important the project and/or comments/discussion of item at previous meeting, then several things can happen in no particular order.

- Few comments/discussion/minor changes...will recommend approval of item at next meeting.
- A lot of comments/discussion...will not recommend approval at next meeting; item will be updated and reviewed again at the next meeting.
- SPs in committee may be used in advertised project. Hope to work to address comments & finish approving at subsequent meeting.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 401
ASPHALT BASE, WEARING, AND PATCHING AND LEVELING
COURSES

401.7-VERIFICATION TESTING

401.7.4-Thickness:

DELETE SUBSECTION 401.7.4 AND REPLACE WITH THE FOLLOWING:

When a uniform thickness of three (3) inches or more is specified, excluding resurfacing, ~~cores shall be taken to verify~~ the thickness of the compacted pavement shall be verified by taking cores, in accordance with MP 401.04.22, or by using non-destructive measurements, in accordance with MP 700.10.01. Non-destructive testing is required on the base layers of all projects meeting criteria for Percent Within Limits, in accordance with Section 410, unless non-destructive testing is determined to be unfeasible by the Engineer.

~~Cores will be taken by the Division at random locations. The sampling frequency shall be approximately five cores per 2,000 feet 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 ~~coreing thickness testing~~ for short projects of less than 1,0500 feet 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 individual thickness measurement shall be considered acceptable if it equals or exceeds the specified thickness. If the measurement is not acceptable, utilize subsection 401.13.4 to determine the required price adjustments or corrective actions. Subsequent asphalt layers shall not be placed prior to completion of thickness testing.

~~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.~~

ADD THE FOLLOWING THREE SUBSECTIONS (401.7.4.1, 401.7.4.2, AND 401.7.4.3):

401.7.4.1-Testing Frequency: Thickness measurements will be taken by the Division at random locations at a frequency of approximately one (1) measurement per 4,0800 feet per paving width. The individual thickness measurement shall represent the entire 4, 0800 foot section.

401.7.4.2-Coring: The Contractor is responsible for coring, which shall be witnessed by the Division. When coring, the Contractor shall refill all core holes at no additional cost to the Division.

401.7.4.3-Non-Destructive Testing: When testing with non-destructive methods, at least two (2) weeks prior to paving, the Engineer will request the applicable reflector discs via the form found in the MCS&T Toolbox.

~~Within reasonable notice, Additionally Tthe Engineer will submit a pavement testing request to MCS&T via the form found in the MCS&T Toolbox. Testing will be completed no later than twenty (20) calendar days after receiving the pavement testing request.~~

~~If the accuracy of a result from the non-destructive method is questioned by the Engineer, then a core shall be taken from the location at which the non-destructive measurement was taken. If a difference of more than 1/4 inch between the two measurements exists, the core measurement shall be used for acceptance purposes, instead of the non-destructive method measurement.~~

401.13-BASIS OF PAYMENT:

401.13.4-

DELETE SUBSECTION 401.13.4 AND REPLACE WITH THE FOLLOWING:

The individual thickness measurement will be considered acceptable if it equals or exceeds the specified thickness. When an Lot of asphalt pavement individual thickness measurement 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, deficient, one of the following adjustments may will be used.:

1. If the deficiency is less than or equal to 3/4 inch, the quantity of pavement represented by this thickness will be paid for by a direct calculation as defined as follows: the Division may choose to accept the material at a price equal to the bid price, ~~rootimes the ratio of the average thickness divided by the specified thickness.~~

$$\text{Price Adjustment (\%)} = \frac{\text{Measured Thickness} + 0.08"}{\text{Specified Thickness}} \times 100$$

This value is then applied to the unit price for asphalt per 800 feet.

2. If the deficiency is greater than 3/4 inch ~~or greater~~, the Division may require that an additional lift of material [specified to the nearest 1/4 inch 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.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 679
OVERLAYING OF PORTLAND CEMENT CONCRETE BRIDGE DECKS

679.1-DESCRIPTION

DELETE THE ENTIRE CONTENTS OF SUBSECTION 679.1 REPLACE WITH THE FOLLOWING:

The work shall consist of furnishing and placing a specialized concrete overlay to a designated grade line. Unless otherwise indicated on the plans, the Contractor may place any one of the specialized overlays allowed by the terms of this specification. Only one type of overlay will be allowed on any one structure. A specialized concrete overlay will not be considered an acceptable method for deck retrofit for any bridge deck where the original slab thickness is less than 6.5 inch.

679.1.1-Other Work: The following work, as required by the contract plans, may also be performed under the terms of this section:

- a) Clean the bridge deck
- b) Bridge deck repair
- c) Clean exposed reinforcing steel
- d) Support and tie reinforcing steel
- e) Place slab reconstruction concrete
- f) Abutment backwalls and approach slabs repair (same as bridge deck or as shown in the plans.)
- g) Milling and hHydrodemolition of existing deck surface

679.1.2-Definitions:

679.1.2.1-Specialized Concrete Overlay: ~~Two~~ Three (3) types of specialized concrete overlay are permitted as follows:

- 1) **Latex Modified Concrete:** A Portland cement concrete to which an approved styrene butadiene latex admixture has been added.
- 2) **Silica Fume Concrete:** A Portland cement concrete to which an approved silica fume admixture has been added.
- 3) **Very Early Strength Latex Modified Concrete:** A latex modified concrete that has been specifically designed using Very Rapid Hardening (VRH) cement per ASTM -C1600 in accordance with Subsection 701.5 to achieve a minimum 2,500 psi

compressive strength unless otherwise specified in the Contract plans prior to opening of traffic. Mix designs will be approved on project specific basis based on the time frame of opening of traffic as specified in the plans.

679.1.2.2-Slab Reconstruction Concrete: Slab reconstruction concrete is that concrete placed completely around exposed reinforcing bars.

679.1.2.3-Curing Hour: A curing hour is any hour, beginning with the hour of placement, during which the temperature of the concrete surface remains at, or above, 50° F as measured by a recording thermometer.

679.1.2.4-Curing Temperature: This is the air temperature at the concrete surface, or the air temperature between the concrete surface and its protective covering.

679.2-MATERIALS

DELETE THE ENTIRE CONTENTS OF SUBSECTION 679.2 EXCEPT FOR 679.2.2 AND 679.2.2.5, AND REPLACE WITH THE FOLLOWING:

679.2.1-General: Materials used in the manufacture of specialized concrete overlays shall meet the requirements specified in Ssubsection 601.2 of the Specifications and as required herein.

679.2.1.1-Fine Aggregate: Fine aggregate shall be silica sand meeting the requirements of Ssubsections 702.1.2 through 702.1.5 and 702.6 of the Specifications.

679.2.1.2-Coarse Aggregate: Coarse aggregate shall be AASHTO Size No. 8 crushed stone or gravel conforming to Section 703 of the Specifications.

679.2.1.3-Latex Admixture: Formulated latex modifier shall meet the requirements of Ssubsection 707.5 of the Specifications.

679.2.1.4-Silica Fume Admixture: Silica fume admixture shall meet the requirements of Ssubsection 707.4.3.

679.2.1.5-Very Rapid Hardening Hydraulic Cement: Very Rapid Hardening Cement (VRH) meeting subsection 701.5 requirements shall be used in very early strength latex modified concrete overlays.

679.2.1.6-Set-Retarding Admixture: An admixture, such as liquid citric acid, may be used as a set-retarding admixture in very early strength latex modified concrete overlays if a written compatibility statement with the recommended dosage rate is provided, and it is included in the mix design proportions upon approval.

679.2.1.~~7~~5-Bonding Grout: Bonding Grout shall not be used on Reconstruction Projects. On New Construction Projects Bonding Grout shall consist of the actual modified

concrete used with coarse aggregates removed. The consistency of the slurry shall be such that it can be applied to the prepared concrete surfaces with a stiff bristle broom in a thin, even coating that will not run or puddle. The bonding grout shall be applied using a stiff broom and worked into all areas of the slab. The rate of applying this coating shall be controlled so that the brushed material does not become dry before it is covered with additional material.

679.2.1.86-Class K Concrete: Class K Concrete shall meet the requirements of Section 601 of the Specifications except that coarse aggregate shall meet the requirements of subsection 679.2.1.2. Class K concrete shall attain a minimum compressive strength of 4,000 psi prior to an overlay placement.

679.2.1.97-Curing Materials:

Burlap: This shall meet the requirements of subsection 707.7 of the Specifications.

Quilted Covers: These shall be clean and free of defects, providing a water retention blanket over the concrete. Acceptance will be based on visual inspection.

Polyethylene Curing Covers: These shall meet the requirements of subsection 707.6 of the Specifications.

Plastic Coated Fiber Blankets: These shall be clean and free of defects, providing a water retention blanket over the concrete. Acceptance will be based on visual inspection.

679.2.1.108-Replacement Bars: Reinforcing bars shall be Grade 60 and shall meet the material requirements of Section 602 of the Specifications. Replacement bars shall be spliced to existing bars using either minimum 30-bar diameter lap splices or approved mechanical connectors.

679.2.1.11-Fibers: Fibers shall meet the requirements of subsection of 715.3.

679.2.2-Specialized Concrete Mix Design and Testing:

679.2.2.1-Latex Modified Concrete or Very Early Strength Latex Modified Concrete: The following test criteria must be met for all latex modified concrete pours placed at the structure. This testing shall be performed by the Contractor or his designated representative and certified results provided to the Engineer prior to final acceptance of the project.

Table 679.2.2.1

Surface Resistivity ^(a)	Minimum 30 kΩ-cm @ 35 days (per AASHTO T 358)
Compressive Strength ^{(b)(c)}	<u>Minimum</u> 4,000 psi
Water/Cement Ratio ^(de)	0.40 by weight, maximum
Portland Cement Content	658 lb/cu. yd., minimum
Latex Admixture Content ^(ed)	24.5 gal/cu. yd., minimum
Air Content ^(fe)	6.5% maximum (Per AASHTO T 152)
Slump	4.0 inches ± 2.0 inches

Note (a) The surface resistivity tests shall be performed and the results tabulated and submitted to

Table 679.2.2.1

	the Engineer. If the surface resistivity value is less than n the minimum value noted in Table 679.2.2.1, then the concrete represented by this surface resistivity value may be removed and replaced by the Contractor. If the Contractor elects to leave the material in place, the Engineer shall evaluate it as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the use intended shall be removed and replaced by the Contractor. When the Engineer's evaluation indicates that the work may satisfactorily remain in place, the subject material shall be paid for at a reduced unit price based on Table 679.2.2.5.
Note (b)	The minimum 28-day compressive strength shall be 4,000 psi. Overlay concrete with a compressive strength of less than this acceptance level may be removed and replaced at the contractor's expense. If the Contractor elects to leave the material in place, the Engineer shall evaluate it as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the use intended shall be removed and replaced by the Contractor. When the Engineer's evaluation indicates that the work may satisfactorily remain in place, the subject material shall be paid for at a reduced unit price based on subsection 601.15.2 in addition to any penalty assessed from Table 679.2.2.
Note (c)	<u>For very early strength latex modified concrete overlays shall achieve a minimum compressive strength of 2,500 psi prior to opening unless otherwise specified in the Contract plans. three (3) or six (6)</u>
Note (de)	The amount of added water shall be adjusted to provide slump at or below the prescribed limit. The water portion of all admixtures shall be included as part of the water/cement ratio.
Note (ed)	Latex sampling shall be in accordance with <u>subsection 707.5</u> .
Note (fe)	The initial mix design shall be based on an expected air content range of 3% to 6%. The mixture proportions shall be determined using actual conditions for fineness modulus and bulk specific gravities (saturated surface dry for aggregates).

679.2.2.2-Silica Fume Concrete: The following test criteria must be met for all silica fume concrete pours placed at the structure. This testing shall be performed by the Contractor or their designated representative and certified results provided to the Engineer prior to final acceptance of the project.

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Surface Resistivity (a)	Minimum 30 kΩ-cm @ 28 days (per AASHTO T 358)
Compressive Strength ^(b)	<u>Minimum</u> 4,000 psi
Water/(Cementitious Materials) Ratio ^(c)	0.37 by weight, maximum
Portland Cement Content ^(d)	680 lb/cu.yd., minimum
Silica Fume Content ^(e) (Dry Weight)	50 lb./cu. yd., minimum
Air Content	7.0% (plus or minus 1.5%) (Per AASHTO T 152)
Slump	6.5 inches ± 1.5 inches
High Range Water Reducer (Superplasticizers) ^(f)	As needed for workability, slump and water/cementitious ratios

Note (a) The surface resistivity tests shall be performed and the results tabulated and submitted to the Engineer. If the surface resistivity value is less than the minimum value noted in Table 679.2.2.2, then the concrete represented by this surface resistivity value may be removed and replaced by the Contractor. If the Contractor elects to leave the material in place, the Engineer shall evaluate it as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the use intended shall be removed and replaced by the Contractor.

Table 679.2.2.2

	When the Engineer's evaluation indicates that the work may satisfactorily remain in place, the subject material shall be paid for at a reduced unit price based on Table 679.2.2.5.
Note (b)	The minimum 28-day compressive strength shall be 4,000 psi. Overlay concrete with a compressive strength of less than this acceptance level may be removed and replaced at the contractor's expense. If the Contractor elects to leave the material in place, the Engineer shall evaluate it as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the use intended shall be removed and replaced by the Contractor. When the Engineer's evaluation indicates that the work may satisfactorily remain in place, the subject material shall be paid for at a reduced unit price based on <u>subsection 601.15.2</u> in addition to any penalty assessed from Table 679.2.2.
Note (c)	The amount of added water shall be adjusted to provide slump at or below the prescribed limit. The water portion of all admixtures shall be included as part of the water/cement ratio.
Note (d)	An equal volume of fly ash may be substituted for cement to a maximum of 1 ¼ bags per cubic yard. An equal volume of slag cement may be substituted for cement to a maximum of <u>three (3)</u> bags per cubic yard. When fly ash or slag cement are used, equivalent volumes of fly ash or slag cement shall be considered as cement for purposes of determining the proportioning ratios.
Note (e)	Silica fume sampling shall be in accordance with <u>subsection 707.4.3</u> .
Note (f)	A high range water-reducing admixture is required to improve workability. No more than two <u>(2)</u> additions of the admixture shall be made, and the total quantity shall not exceed the manufacturer's maximum dosage rate. Each time high range water reducer is added, the concrete shall be mixed an additional minimum of 30 revolutions. The total number of revolutions shall not exceed 300.

679.2.2.3-Pre-Pour Meeting: The Contractor shall schedule a meeting prior to the start of the concrete work. The Engineer, Construction Manager, Prime Contractor, Concrete Contractor, Concrete Finisher, the Concrete Supplier and the Individual or Agency that will perform the quality control testing of the concrete shall attend. Topics of discussion shall include specialized concrete mixture proportions, batching, transporting, handling, placing, finishing and curing.

679.2.2.4-Test Slab Requirements: After obtaining the Engineer's approval of mixture proportions and at least one (1) week before any slab reconstruction concreting or overlay is to be placed, the Contractor shall make one (1) or more trial batches of the specialized concrete of the size to be hauled or mixed at the site. 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.

The test slab shall be constructed the same as the actual work (depth, reinforcing steel, etc.) and shall be at least one (1) lane width wide and of a length to allow the use of the contractor's entire paving train from placement to finishing. The test slab location shall be as shown in the plans or as approved by the Engineer. The prime intent is to familiarize the concrete finishing crew with the handling, finishing and curing characteristics of the concrete. Batching, placement and texturing shall be in strict accordance with this specification. Additional reference test slabs may be constructed as necessary to provide an acceptable standard of reference. This standard of reference shall serve throughout the project construction period as the basis of acceptance of the actual as-built work. This Item may be deleted at the discretion of the Engineer, however it is recommended for very early strength latex modified concrete deck overlays.

679.2.3-Equipment: All equipment proposed for use shall have the Engineer's approval prior to its usage.

679.2.3.1-Cutting Equipment: Shall consist of a cold planer or a high pressure water jet (hydrodemolishing) system per the following requirements.

679.2.3.1.1-Cold Planer Equipment: The cold planer shall be capable of accurately establishing profiles along each edge of the machine, maintain depths of cut and cross slopes. It must be capable of maintaining a specific profile grade and prevent damage outside of milling plain.

679.2.3.1.2-Hydrodemolishing Equipment: The hydrodemolishing system shall be self-propelled, completely programmable, designed for high production concrete removal, and utilizes a high-pressure water jet stream capable of attaining pressures in the range of 14,000 to 20,000 PSI and removing all unsound, or otherwise designated, concrete to the depth specified. The pressure used for this work shall be a minimum of 14,000 PSI and a maximum of 20,000 PSI. Ultra high-pressure machines shall not be permitted. Water usage per minute shall be a minimum of 55 gallons (55 GPM minimum). Hydrodemolishers shall be capable of removing concrete from around and below the steel reinforcement. Lances shall be of a type intended to remove rather than scarify concrete. Individuals certified by the equipment manufacturers shall operate the removal equipment.

All removal equipment shall be capable of operating at a noise level of less than 90 decibels at a distance of fifty (50) feet from the noise source. The Contractor shall monitor noise levels throughout the project to ~~insure~~ensure compliance, if required by the Engineer. No separate or additional payment will be made for monitoring -noise levels.

Potable or filtered water may be used. Filtered water shall have all visible solids and oils removed that could prevent a proper bonding with the remaining concrete. When filtered water is used, the Contractor shall wash the bridge deck with potable water in water blasting equipment as soon as all the concrete debris has been cleaned up. This water blasting shall be in addition to any other water blasting that may be required.

The Contractor shall shield his operations to prevent injury or damage from flying or falling debris. The Contractor shall provide a method for handling expected and unexpected blow-through of the deck. This method shall provide for the containment of runoff water and debris, and the protection of the area under the bridge deck. The Contractor shall be responsible for any injury or damage caused by his operations.

679.2.3.1.2.1-Hydrodemolishing Equipment Demonstration: Two (2) trial areas will be designated by the Engineer to allow the Contractor to demonstrate that the equipment, personnel, and methods of operation can meet the requirements of this specification. The demonstration shall follow any ~~rote-milling~~milling by cold planer permitted by this specification. No separate or additional payment will be made for this demonstration.

The first trial area will consist of approximately 30 square feet of sound concrete. The hydrodemolisher shall be calibrated to remove sound concrete to the depth specified in the contract documents without damaging the underlying sound concrete. After removing the

sound concrete in the first trial area, the hydrodemolisher shall be moved to the second trial area. This area will consist of deteriorated or defective concrete. This trial will determine whether this unsound concrete will be completely removed with the above calibration.

If the equipment is deemed inadequate for use, the Contractor shall obtain another hydrodemolisher for a subsequent demonstration. When satisfactory results are obtained, production removal may proceed. No adjustment in the completion date of the project will be considered due to delays in obtaining suitable equipment.

If concrete is not being adequately removed during production work, recalibration of the equipment will be required.

679.2.3.2-Blast Cleaning Equipment: Blast cleaning equipment shall be capable of removing rust from reinforcing bars, laitance, and small chips of partially loosened concrete. Certain qualities of rust are not necessary to be removed (refer to Subsection 679.3.3).

679.2.3.3-Proportioning and Mixing Equipment: Unless fibers are used, handling, measuring, and batching of materials shall conform to the requirements specified in 501.7. Mix fibers as recommended by the manufacturer such that the addition of the fibers does not create balling. Notify the Engineer in writing of the dedicated personnel for this task, the procedure for distributing fibers into the concrete mixture, and the mixing method. Any of the following fiber addition methods are acceptable on all jobs except for mobile mixers:

- i. Open bag and distribute fibers on aggregate belt at ready-mix concrete plant.
- ii. Open bag, break apart any fiber clumps, and introduce fibers into ready-mix concrete truck in a well-distributed manner (i.e., “chicken feed”).

A minimum of 70 revolutions at mixing speed after all the fibers are added is required for proper mixing and dispersion of fibers in trucks. Allowing bags of fiber to dissolve in the ready-mix concrete trucks will not be allowed. Fibers shall never be the first material added in any mixing process. When using a mobile mixer unit, fibers should be mixed as recommended by the mobile mixer manufacturer and fiber manufacturer such that the addition of the fibers does not create balling and distributes the proper dosage of fibers into the concrete matrix. Notify the Engineer in writing of the dedicated personnel for this task, the procedure for distributing fibers into the concrete mixture, and the mixing method. The Engineer may require a trial batch to be placed by the mobile mixer unit before any concrete placement can occur.

Proportioning and Mixing Equipment shall consist of the following:

679.2.3.3.1-Latex Modified Concrete or Very Early Strength Latex Modified Concrete: Self-contained, continuous mixing and proportioning mobile units shall be used. A minimum of two (2) units shall be supplied. The requirements of subsections 679.2.3.4 and 679.2.3.5 shall apply.

679.2.3.3.2-Silica Fume Concrete: An approved concrete batch plant, mobile mixer or truck mixer shall supply all concrete. The requirements of Section 601 of the Specifications shall apply, except as modified herein.

When silica fume densified powder is used, the densified powder shall be weighed using an approved cement scale or supplied in bags, the weight of each bag shall be clearly

marked on the bag. The densified powder shall be last in the weighing sequence and the tolerance for each material draw weight shall be based upon the total weight of cement plus densified powder. Batching tolerance for the cement plus densified powder shall be 1%.

679.2.3.4-Mobile Mixer Units: Each unit shall be self-propelled and shall be capable of carrying sufficient unmixed material to produce on site, no less than six (6) cubic yards of specialized concrete.

Volumetric mixers shall conform to the requirements of AASHTO M 241, except as otherwise specified.

The Engineer will inspect each unit. A unit not functioning in a manner the Engineer considers acceptable shall be repaired. If repair is impractical, the unit shall be replaced. All costs associated with delays attributable to mobile mixer replacement shall be borne by the Contractor. No extension of time, for the purpose of replacing unacceptable mixers, will be granted. Conditions which will automatically designate an unit-unacceptable unit are: hydrated cement deposits; broken, bent, loose or scalloped mixing paddles; mixing paddles worn 20% in any dimension; mixing paddles heavily caked with mortar; and admixture or water delivery system out of tolerance.

Proportioning devices shall deliver the materials within the following tolerances:

Coarse Aggregate	±2%
Fine Aggregate	±2%
Cement + fly ash	0% to +4%
Water	±1%
Cement + microsilica powder	1%
Fibers	1%
Latex Admixture	1%
Other Admixtures	3%

The unit shall be capable of positive measurement of cement being introduced into the mix.

There shall be positive control of the flow of water into the mixing chamber. Water flow shall be indicated by a flowmeter and readily adjustable to provide for minor variations in aggregate moisture. The system shall be equipped with a bypass valve, or hose, for determining proportioning accurately. Also, there shall be a positive control of the flow of admixture into the mixing chamber. The admixture discharge pipe shall be readily accessible for determining proportioning accuracy.

The units shall be capable of being calibrated to automatically proportion and blend all components of indicated composition on a continuous or intermittent basis as required by the finishing operation, and shall discharge mixed material through a conventional chute directly in front of the finishing machine.

A sufficient number of self-propelled mixers shall be available at the job site to ensure ~~insure~~ that not more than 30 minutes shall elapse between the placement of batches.

679.2.3.5-Mobile Mixer Unit Testing: The units shall be calibrated by the Contractor to accurately proportion the approved mix design prior to placing the mix. The Engineer may require recalibration of any mixer as deemed necessary. Yield tests shall be performed by the

Contractor for each mixer for each day's operation and when there appears to be a change in the mix. Certification of the calibration ~~shall be performed per MP 679.02.99. by an approved testing authority will be accepted as evidence of this accuracy if the yield is shown to be true within a tolerance of 1.0% according to the following test:~~

With the cement yard set on zero (0) and all controls set for the approved design mix, activate the mixer and discharge mixed material into a 0.25 cubic yard container one (1) yard square by nine (9) inches tall. When the container is level-struck full, making provision for settling the material into all corners, the cement yard shall show the discharge for a 0.25 cubic yard pour within the tolerance specified (refer to 679.2.3.4). No calibration shall be performed while it is raining.

679.2.3.6-Placing and Finishing Equipment: This shall include adequate hand tools for the placement of plastic concrete and for working down to approximately the correct level for the auger strike-off. A self-propelled finishing machine will be required to place and finish all concrete, except in areas inaccessible to the machine.

The finishing machine shall be capable of forward and reverse motion under positive control. Provisions shall be made for raising the screeds to clear the screeded surface, if traveling in reverse.

The machine shall be capable of placing full width, in one operation, the pours shown in the plans. The finishing machine shall be equipped with a vibrating device to consolidate the concrete, a power driven strike-off auger, a power driven finishing roller, and a pan float. The vibrating device shall vibrate at a frequency between 50 Hz and 115 Hz. A sufficient number of suitable portable lightweight or wheeled work bridges shall be required and used behind the finishing operation for touch-up work, surface texturing and curing cover placement.

Approved manual type screeds, metal plates equipped with electric vibrators, or hand held vibrators shall be used to consolidate and finish small inaccessible areas and slab reconstruction concrete.

Supporting rails shall be required. Rails may be two (2) inch by two (2) inch perforated steel bar stock, two (2) inch pipe rail, or approved equal. They shall exhibit no bends or kinks. Rail supports shall be fully adjustable (not shimmed) to obtain the correct profile. Rail supports are subject to the requirements of 679.3.7.2.

When placing concrete adjacent to a previously completed pour, the side of the finishing machine adjacent to the completed pour shall be equipped to travel on the completed lane on rail supports only.

The placing and finishing equipment shall be designed so that the elapsed time between depositing concrete and final finishing shall not exceed 10 minutes.

When using fibers for Portland cement concrete, in order to provide consolidation and bury surface fibers, open slab surfaces should be struck off with a vibrating screed or laser screed. Magnesium floats in the form of a bullfloat, channel radius float, or highway straightedge should be used to establish a surface and close tears or open areas. The use of wood floats is not permitted.

679.2.3.7-Recording Thermometer: The Contractor shall supply a continuous recording thermometer capable of recording temperatures in the 30 - 150 F range. It shall likewise provide a recording capability over a 24-hour continuous period, minimum. The Contractor shall provide any ancillary equipment, supplies and labor necessary for calibration of this

equipment.

679.2.3.8-Compressors Or Water Flushing Equipment: Equipment used for surface preparation shall be of such size and capacity to thoroughly remove all foreign material from the surface being prepared.

679.2.3.9-Saw Cutting Equipment: Only multi-bladed saw cutting equipment, using circular saw blades, will be permitted for final deck finish operations. The Engineer may allow the use of single blade circular saw equipment only where such equipment is necessary to complete the work as required.

679.2.3.10-Fogging Equipment: Fogging equipment shall be available for use in accordance with these specifications. The fogging nozzles shall produce an atomized mist. Fogging nozzles shall incorporate compressed air to create the mist. Hand held or hand operated equipment shall be permitted when the Contractor has demonstrated that his operator has been trained in its use.

679.3-CONSTRUCTION METHODS

DELETE THE CONTENTS OF SUBSECTIONS 679.3.1, 679.3.1.1, AND 679.3.1.2
REPLACE WITH THE FOLLOWING:

679.3.1-Removal of Existing Deck Surface: All asphaltic patches or bituminous overlays shall be removed by hydrodemolishing, ~~roto-milling~~ milling by cold planer, or other approved methods. All debris from patch or overlay removal shall be legally disposed. Unless otherwise directed by the engineer, prior to concrete deck removal operations, the Contractor shall sound the deck using chain drags.

679.3.1.1-Removal of Existing Deck Surface Phase I: The Contractor shall determine the depth to the top mat of reinforcing steel using methods acceptable to the Engineer. The existing deck shall be removed so as to expose the topmost components of rebar in the upper mat of reinforcement. Full exposure of the upper mat of reinforcement is not required.

For decks greater than 7.0 inch thick, the deteriorated concrete may be removed by cold planer to 1.0 inch above the rebar followed by hydro-demolition, or any means acceptable to the Engineer; however, for Very Early Strength Latex Modified overlays the existing depth of removal may vary and shall be specified in the plans.

It is recommended that milling be done in shallow 0.25 inch deep passes to avoid damage to underlying reinforcement, and to prevent damage to any sound deck that will remain in place. Conventional concrete removal, such as milling by cold planer and the use of pavement breakers shall not be utilized for slabs less than 7.0 inch thick. For slabs, 6.5 to 7.0 inch thick, special consideration must be given to methods of removal of the deteriorated concrete, such as hydro-demolition, so that damage of the remaining slab is minimized.

~~The deck removal shall be accomplished by roto-milling, hydrodemolishing, or any means acceptable to the Engineer. Damage to the existing mat will be repaired at no~~

additional cost to the Division; and the Contractor may be assessed a penalty of \$1,200.00 per bar by the Engineer for any disturbed reinforcing steel during the demolition process. Any bar replacement shall be spliced per the minimum lap length specified in subsection 602.7.1 of the Specification.

After removal of the deck is complete as described above, the Contractor shall sound the deck using chain drags and delineate remaining areas of delaminated and unsound concrete for removal subject to the approval of the Engineer. Aerosol spray paint for delineating shall be provided by the Contractor. Edges around these concrete removal areas shall be vertical or slightly undercut. Upon completion of removal, the Contractor shall provide a hydrodemolished surface on which to install the new concrete Overlay.

When full depth removal of material is necessary, the forming shall be performed in accordance with ~~s~~Subsections 104.3 and 109.4 of the Specifications.

679.3.1.2-Removal of Existing Deck Surface Phase II: Unless waived by the Engineer; such as when the deck is overlayed within 24 hours; immediately prior to placement of new concrete overlay, the Contractor shall sound the deck using chain drags and delineate any additional areas that may have become delaminated or unsound. Edges around these concrete removal areas shall be vertical or slightly undercut. These areas shall be removed prior to placement of the new concrete overlay. Upon completion of the removal process, the Contractor shall provide a hydrodemolished surface on which to install the new concrete Overlay.

The Division is not responsible for delays caused by the concrete removal described here in 679.3.1.2.

When full depth removal of material is necessary, the forming shall be performed in accordance with ~~s~~Subsections 104.3 and 109.4 of the Specifications.

679.3.1.4-Disposal:

UPDATE THE FORMATTING AND CONTENTS OF THE FIFTH PARAGRAPH WITH THE FOLLOWING:

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 ~~& and~~ stop dates of the discharging activity.

679.3.3-Preparation of Surface:

DELETE THE CONTENTS OF SUBSECTION 679.3.3 AND REPLACE WITH THE FOLLOWING:

Blast cleaning shall be performed to thoroughly clean all horizontal and vertical receiving

surfaces. Surfaces, which will be in contact with the specialized concrete overlay, shall have laitance and partially loosened chips of concrete removed by blast cleaning, which shall produce a bright, clean appearance. The edge of previously placed pours shall be similarly treated to promote bond.

All reinforcing steel, or other steel, which is to be in contact with the new concrete, shall be cleaned of all grease, dirt, concrete mortar and injurious rust. Injurious rust is defined as all scale, loose rust deposits, or all rust not firmly bonded to steel. Rust and concrete deposits, which in the Engineer's opinion cannot be removed by blast cleaning, will be considered firmly bonded and may remain. Any portion of a reinforcing bar judged by the Engineer to have any more than 50% section loss shall be replaced at no additional cost to the Division. A light coating of orange colored rust that forms on the reinforcing steel after blast cleaning is not considered detrimental to bond and may remain unless the time limit that follows is exceeded, or if ordered to be removed by the Engineer.

All debris from the blast cleaning operation shall be removed. After removal, the exposed reinforcing steel shall be supported and tied. Rustproof chairs shall be provided. If a continuous length of six (6) feet or more of reinforcing bar is exposed, the Engineer may require supports and positive tie-downs at a maximum spacing of four (4) feet. Positive tie-downs shall consist of anchors drilled into the structural slab and connected to the reinforcing bars. Replacement bars shall be spliced to existing bars using either minimum 30 bar diameter lap splices, approved mechanical connectors, or a welded splice as directed by the Engineer. Welded splices, if approved, shall be in accordance with ANSI/AWS Structural Welding Code - Reinforcing Steel D1.4. The Engineer shall be allowed sufficient time to inspect the work after the supporting and tying of the reinforcing steel has been completed.

Blast cleaning operations may be commenced in an area after necessary concrete removal, per ~~S~~subsection 679.3.1 or ~~S~~subsection 679.3.2, as applicable, has been completed. If more than 48 hours elapse from the termination of any blast cleaning operation to slab wetting, blast cleaning shall be repeated per the Engineers direction regardless of the apparent condition of the receiving surfaces.

679.3.5-Placement Preconditions:

DELETE THE CONTENTS OF SUBSECTION 679.3.5 AND REPLACE WITH THE FOLLOWING:

Slab reconstruction concrete, or overlay concrete, shall be placed only after all of the following preconditions are satisfied:

The Contractor has submitted to the Engineer, in writing, the proposed sequence of operations, equipment, number of personnel, and category of personnel to be used during the concrete placement.

- a) All concrete removal operations in the placement area are complete and approved.
- b) Deck drains have been cleaned of all debris and plugged.
- c) Blast cleaning has been completed on an area large enough to require one working day for concrete overlay placement. In no case shall this be less than one span long.
- d) Any additional blast cleaning, if required, has been completed and approved on an area large enough to require one working day for concrete overlay placement. In no case shall this be less than one span long.

- e) Slab temperature and wetting requirements are met.

679.3.6-Placing, Finishing and Curing Slab Reconstruction Concrete:

DELETE THE CONTENTS OF SUBSECTION 679.3.6 AND REPLACE WITH THE FOLLOWING:

Slab reconstruction concrete shall be placed separately from overlay concrete except when both of the following conditions are, in the opinion of the Engineer, present:

- a) Areas of exposed reinforcing steel do not exceed 5% of the total slab area ready to be overlaid.
- b) Individual areas of exposed reinforcing shall not exceed 25 square feet in area.

When these two (2) conditions are present, slab reconstruction concrete may be placed integrally with overlay concrete.

The Contractor has the following choices of concrete placed as slab reconstruction concrete:

Overlay Type	Slab Reconstruction Concrete
Latex Modified	Latex Modified or Class K
<u>Very Early Strength Latex Modified</u>	<u>Very Early Strength Latex Modified or Class K</u>
Silica Fume	Silica Fume or Class K

Slab reconstruction concrete placed integrally with overlay shall match the Specialized Concrete Overlay.

The horizontal and vertical surfaces on which the slab reconstruction concrete is being placed shall be in a saturated surface dry condition immediately prior to placing any concrete.

When Class K Concrete is used as reconstruction concrete, a self-contained mobile mixer meeting the requirements of 679.2.3.4 may be used to provide the concrete.

After blast cleaning is completed, the Contractor shall place slab reconstruction concrete in the locations where reinforcing bars have been exposed. The concrete shall be consolidated by internal vibration in accordance with ~~S~~subsection 601.10.3 of the Specifications. It shall be finished to the level of the surrounding concrete, or to the middle of the reinforcing steel, whichever is higher. The surface of the new concrete shall be intentionally roughened to a raked finish. Placement of slab reconstruction concrete in accordance with this subsection shall not relieve the Contractor of the requirements to provide the minimum required thickness of overlay material.

679.3.6.2-Removal of Slab Reconstruction Concrete Surface:

DELETE THE CONTENTS OF SUBSECTION 679.3.6.2 AND REPLACE WITH THE FOLLOWING:

The slab reconstruction concrete surface shall be blast cleaned per the requirements of ~~S~~subsection 679.3.3 prior to the placement of the overlay.

679.3.7-Placing and Finishing Specialized Concrete Overlay:

679.3.7.1-General:

DELETE THE CONTENTS OF SUBSECTION 679.3.7.1 AND REPLACE WITH THE FOLLOWING:

The following requirements shall apply for specialized concrete overlay placements:

- a) The overlay thickness shall be determined in accordance with ~~S~~subsection 679.3. The Contractor shall restore the concrete overlay in a uniform manner to match existing grade unless otherwise directed by the Engineer. Under no circumstance, the overlay thickness shall not be less than 1 ¼ inches.
- b) The prepared surface of the structural slab shall be protected from contamination by any source and shall be in a saturated surface dry condition immediately prior to concrete placement.
- c) Concrete may be mixed at the point of deposition.
- d) When placing Specialized Concrete Overlays on a newly placed deck, the deck concrete shall be a minimum of 28 days old. The sidewalks, parapets, or curbs shall be a minimum of seven (7) days old.
- e) ~~When using VRH cement in latex modified overlays the Contractor shall submit copies of the manufacturer's recommendations for the placement and curing of the overlay to the Engineer for review prior to starting construction.~~

REVISE THE FOLLOWING SUBSECTION:

679.3.7.5-Curing:

DELETE THE CONTENTS OF SUBSECTION 679.3.7.1 AND REPLACE WITH THE FOLLOWING:

~~—It is the nature of specialized concrete overlay material to quickly form a plastic film at the surface upon drying. This film is to be protected from drying and cracking by prompt covering with wet burlap. The temperature of the water for the wet burlap shall not exceed the maximum ambient temperature of the last 24 hours by more than 5°F. Regardless of the type of concrete placed, the use of membrane curing compounds will not be allowed. Floor drains shall be immediately unplugged to permit the deck to drain.~~

~~—The overlay 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 (1) foot 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 by means of automatic intermittent sprinkling or a continuous wetting system~~

Curing shall begin immediately following the finishing and texturing operations of specialized concrete overlays. It is the nature of specialized concrete overlay material to quickly form a plastic film at the surface upon drying. This film is to be protected from drying and cracking by prompt covering with wet burlap. The use of membrane curing compounds will not be allowed. Floor drains shall be immediately unplugged to permit the deck to drain.

The overlay 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 at a minimum of 1 foot, and shall lay flat.

The contractor shall maintain a tight construction sequence such that the maximum longitudinal distance between the finishing machine and the placement of the pre-soaked wet burlap does not exceed 15 feet at any time. Under no circumstances shall the initial application of wet burlap be delayed more than 15 minutes from the time the concrete is discharged and screeded. In the event of a placement delay exceeding 10 minutes, all exposed latex-modified concrete surfaces and bulkheads shall be temporarily protected with wet burlaps followed by white opaque polyethylene sheeting.

Failure to apply wet burlap within 15 minutes after discharge of the concrete from the truck and within 5 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, and burlap shall remain until initial set. The surface shall be continuously wet until opening to traffic strength is obtained by means of automatic intermittent sprinkling or a continuous wetting system

ADD THE FOLLOWING SUBSECTION:

679.3.7.5.3-Curing Very Early Strength Latex Modified Concrete: The overlay shall be wet cured for minimum of three (3) curing hours and until the opening to traffic strength is achieved with wet burlaps followed by a layer of white opaque polyethylene sheeting on top. White opaque plastic-coated fiber blankets may be substituted for the polyethylene sheeting but shall not replace the initial wet burlap. Care shall be exercised to ensure these approved moisture retaining covers remain in place during the entire cure period. They shall be anchored along all edges and internally to prevent loss of moisture and displacement.

679.4-CONSTRUCTION LIMITATIONS AND REQUIREMENTS

679.4.3-Vehicular and Equipment Restrictions:

679.4.3.4-Loading Limitations during Curing:

DELETE THE CONTENTS OF SUBSECTION 679.4.3.4 AND REPLACE WITH THE FOLLOWING:

No construction load shall be permitted on new concrete until the specified curing period(s) has been completed. No structural slab concrete removal work shall be performed on structural slab areas adjoining new concrete during the time the new concrete is curing and until the overlay concrete has attained a compressive strength of at least 4,000 psi as outlined below.

No newly placed concrete shall be opened to traffic until the overlay concrete has attained a compressive strength of at least 4,000 psi, with the exception that very early strength latex modified concrete deck overlays may be opened to traffic once it has attained a compressive strength of at least 2,500 psi unless otherwise specified in the plans. This strength shall be determined by an average of three compressive strength specimens which have been cured in

conditions as similar as possible to the concrete which they represent.

679.4.9-Defective or Damaged Concrete:

DELETE THE CONTENTS OF SUBSECTION 679.4.9 AND REPLACE WITH THE FOLLOWING:

After the overlay has been cured, the Contractor in the presence of the Engineer shall sound the deck in order to detect delaminated areas. All defective or damaged concrete, as determined by the Engineer, shall be repaired or replaced at no additional cost to the Division. Defects shall include but not be limited to delaminations, cracking, tearing, damage or other imperfections. The Contractor shall propose repair methods for approval by the Engineer. All concrete requiring removal and replacement, as determined by the Engineer, shall be removed by sawcutting the perimeter to a depth of $\frac{3}{4}$ inch $\pm$ $\frac{1}{8}$ inch. Damaged concrete shall then be chipped out to the level of the original prepared surface. The chipped face shall not undercut the sawcut and shall have a slope of approximately 45°. Chipping hammers shall use only chisel bits. The prepared surface shall be blast cleaned prior to reapplying the overlay concrete.

679.6-METHOD OF MEASUREMENT

679.6.3-Newly Installed Deck Surface:

679.6.3.1-Blast Cleaning:

DELETE THE CONTENTS OF SUBSECTION 679.6.3.1 AND REPLACE WITH THE FOLLOWING:

During New Construction projects only where no removal of existing surface is required, bBlast cleaning of the deck surface as described in subsection 679.3.3, shall be paid at the unit bid price for 679001 Concrete Deck Overlay. Measurement shall be in square yard at one half ($\frac{1}{2}$) the actual field measured area to be bBlast cleaned.

679.8-PAY ITEMS

ADD THE FOLLOWING ITEM TO THE TABLE:

ITEM	DESCRIPTION	UNIT
<u>679003-*</u>	<u>Very Early Strength Latex Modified Concrete Deck Overlay</u>	<u>Square Yard</u>

* Sequence number

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 103

AWARD AND EXECUTION OF CONTRACT

103.3-AWARD OF CONTRACT:

ADD THE FOLLOWING SUBSECTION:

103.3.2-Consideration and Award: The Contractor is advised that, due to the aspects involved in the bid analysis of this project, the results displayed by the electronic bidding system are unofficial for the purpose of determining the apparent lowest qualified responsible bidder. The official results will be determined manually by the Division based on the following criteria.

103.3.2.1-Alternate Design and Alternative Bidding (ADAB): The ADAB process is used ~~by other state highway agencies across the country~~ to equate alternative pavement systems for contract bidding purposes. The ADAB process is officially authorized under applicable Federal Highway Administration regulations and guidance documents. Alternate bidding for pavement systems is accomplished by developing two or more equivalent pavement designs and allowing competing construction contractors to determine which pavement system (as defined in Special Provision for Section 695) is the most economical based on market conditions at the time of the letting. This process promotes added competition to the bidding process, which results in cost-effective usage of highway construction funds.

The ADAB process (as defined in Design Directive 648) considers future pavement preservation, roadway rehabilitation, and traffic control associated with that rehabilitation. The process utilizes life-cycle cost analysis (LCCA) concepts (as defined in Design Directive 647) to model the cost of pavement section alternatives over a selected analysis period. This LCCA evaluation produces a cost factor that represents the value added of building a longer-lasting, lower-maintenance pavement structure.

The Life-Cycle Cost Factors~~s~~ for this project are as follows:

Pavement Type	Life-Cycle Cost Factor (cost per lane mile)
Asphalt w/ preservation	
Concrete w/ preservation	
Note – The Life-Cycle Cost Factor are calculated in accordance with Design Directive 648. <u>calculations are detailed in the WVDOT LCCA Report.</u>	

The total number of lane miles for this project is below:

Total Lane Miles =	
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103.3.2.2-Adjusted Contract Bid: Each bidder’s total bid received via the electronic bidding system shall be adjusted for life cycle costs of the corresponding pavement system. Each bidder’s Adjusted Contract Bid will be determined by multiplying the number of lane miles by the Life-Cycle Cost Factor and adding this to the total bid received.

$(\text{Total Lane Miles} \times \text{Life-Cycle Cost Factor}) + \text{Total Bid Received} = \text{Adjusted Contract Bid}$

103.3.2.3-Low Bid Evaluation: The adjusted contract bid for each bidder will be evaluated by the division, and the lowest adjusted contract bid will determine the apparent low bidder for the contract.

The total bid received via the electronic bidding system shall be the contract value upon award of the project.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

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

401.4-COMPOSITION OF MIXTURES:

401.4.2-Job Mix Formula:

DELETE TABLE 401.4.2B AND REPLACE WITH THE FOLLOWING:

TABLE 401.4.2B
Design Aggregate Gradation Requirements for Superpave Mix Designs

Type of Mix	37.5	25	19 ^{Note 1} (Patch & Level)	<u>19</u> <u>Surface</u> <u>(Wearing)</u>	12.5	9.5 (Scratch)	4.75 (Scratch)
Standard Sieve Size	Nominal Maximum Size						
	37.5 mm (1 1/2 inch)	25 mm (1 inch)	19 mm (3/4 inch)	<u>19 mm</u> <u>(3/4 inch)</u>	12.5 mm (1/2 inch)	9.5 mm (3/8 inch)	4.75 (No. 4)
50 mm (2")	100	—	—	<u>—</u>	—	—	—
37.5 mm (1 1/2")	90-100	100	—	<u>—</u>	—	—	—
25 mm (1")	90 max	90-100	100	<u>100</u>	—	—	—
19 mm (3/4")	—	90 max	90-100	<u>90-100</u>	100	—	—
12.5 mm (1/2")	—	—	90 max	<u>90 max</u>	90-100	100	100
9.5 mm (3/8")	—	—	—	<u>—</u>	90 max	90-100	95-100
4.75 mm (No.4)	—	—	—	<u>47 min</u>	—	90 max	90-100
2.36 mm (No.8)	15-41	19-45	23- 49	<u>23-49</u>	28-58	32-67	
1.18 mm (No.16)	—	—	—	<u>—</u>	—	—	30-60
600 µm (No.30)	—	—	—	<u>—</u>	—	—	—
300 µm (No. 50)	—	—	—	<u>—</u>	—	—	—
75 µm (No.200)	0-6	1-7	2-8	<u>2-8</u>	2-10	2-10	6-12

TABLE 401.4.2B
Design Aggregate Gradation Requirements for Superpave Mix Designs

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.
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ADD THE FOLLOWING SUBSECTION:

401.4.2.2 – 19 mm Surface Mix (Superpave): When a 19 mm Superpave mix is specified for use as a surface (wearing) course, it shall conform to the gradation requirements for “19 Surface (Wearing)” in Table 401.4.2B.
This mixture shall be designed as a fine-graded mix and shall include a minimum of 47 percent passing the 4.75 mm (No. 4) sieve. This requirement is not applicable to standard 19 mm mixes specified for base, patching and leveling, or other non-surface applications.
The 19 mm Surface mix shall be considered a distinct mix type for purposes of design, acceptance, and payment.

401.14-PAY ITEMS:

For informational purposes only: The item numbers listed below will be added to AASHTOWare for the Superpave Asphalt Surface Course 19 mm mix. These item numbers will not be included in the spec book.

For Example:

- 401002-052 — SUPERPAVE ASPHALT WEARING CRSE, SG, TY 19 TN

The item numbers would coorlate to the following in the Pay Item Table:

ITEM	DESCRIPTION	UNIT
401002-*	“design method” Asphalt Wearing Course, “aggregate type”, Type “mix type”	Ton

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 410
ASPHALT BASE AND WEARING COURSES,
PERCENT WITH LIMITS (PWL)

410.4-COMPOSITION OF MIXTURES:

410.4.2-Job Mix Formula:

DELETE TABLE 410.4.2B AND REPLACE WITH THE FOLLOWING:

TABLE 410.4.2B
Design Aggregate Gradation Requirements for Superpave Mix Designs

Type of Mix	37.5	25	19 ^{Note 1} (Patch & Level)	<u>19</u> <u>Surface</u> <u>(Wearing)</u>	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)	<u>19 mm</u> <u>(3/4 inch)</u>	12.5 mm (1/2 inch)	9.5 mm (3/8 inch)	4.75 (No. 4)
50 mm (2")	100	—	—	<u>—</u>	—	—	—
37.5 mm (1½")	90-100	100	—	<u>—</u>	—	—	—
25 mm (1")	90 max	90-100	100	<u>100</u>	—	—	—
19 mm (¾")	—	90 max	90-100	<u>90-100</u>	100	—	—
12.5 mm (½")	—	—	90 max	<u>90 max</u>	90-100	100	100
9.5 mm (⅜")	—	—	—	<u>—</u>	90 max	90-100	95-100
4.75 mm (No.4)	—	—	—	<u>47 min</u>	—	90 max	90-100
2.36 mm (No.8)	15-41	19-45	23- 49	<u>23-49</u>	28-58	32-67	
1.18 mm (No.16)	—	—	—	<u>—</u>	—	—	30-60
600 µm (No.30)	—	—	—	<u>—</u>	—	—	—
300 µm (No. 50)	—	—	—	<u>—</u>	—	—	—
75 µm (No.200)	0-6	1-7	2-8	<u>2-8</u>	2-10	2-10	6-12

TABLE 410.4.2B
Design Aggregate Gradation Requirements for Superpave Mix Designs

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.
--------	--

ADD THE FOLLOWING SUBSECTION:

410.4.2.2 – 19 mm Surface Mix (Superpave): When a 19 mm Superpave mix is specified for use as a surface (wearing) course, it shall conform to the gradation requirements for “19 Surface (Wearing)” in Table 410.4.2B.
This mixture shall be designed as a fine-graded mix and shall include a minimum of 47 percent passing the 4.75 mm (No. 4) sieve. This requirement is not applicable to standard 19 mm mixes specified for base, patching and leveling, or other non-surface applications.
The 19 mm Surface mix shall be considered a distinct mix type for purposes of design, acceptance, and payment.

410.14-PAY ITEMS:

For informational purposes only: The item numbers listed below will be added to AASHTOWare for the Superpave Asphalt Surface Course 19 mm mix. These item numbers will not be included in the spec book.

For Example:

- 410002-052 — SUPERPAVE ASPHALT WEAR CRSE, TY 19 SY

The item numbers would coorlate to the following in the Pay Item Table:

ITEM	DESCRIPTION	UNIT
410002-*	“design method” Asphalt Wear Course, Type “mix type”	Square Yard

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 406

HIGH FRICTION SURFACE TREATMENT

406.2-MATERIALS:

DELETE THE CONTENTS OF SUBSECTION 406.2 AND REPLACE WITH THE FOLLOWING:

The binder and aggregate shall meet the requirements of AASHTO ~~MP-41~~ M 354.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 410

**ASPHALT BASE AND WEARING COURSES,
PERCENT WITH LIMITS (PWL)**

410.7-ACCEPTANCE TESTING:

410.7.1-Acceptance Testing of Asphalt:

410.7.1.4-Thickness:

DELETE THE CONTENTS OF THE SECOND PARAGRAPH IN SUBSECTION 410.7.1.4 AND REPLACE WITH THE FOLLOWING:

Cores obtained for mat density and bond strength will both be measured for thickness as per MP ~~410.07.22~~ 401.07.22 Measurement for Thickness of Asphalt Pavement Using Drilled Cores, prior to those subsequent analyses. The core measurements which represent the thickness of the sampling units shall be analyzed to determine the average value of the pavement thickness. Pavement Thickness (T) shall include all of the pavement layers as specified excluding any patch and level course and scratch courses. This value will be used to determine the degree of compliance with the provisions and to develop certain factors to be used in the derivation of equitable deductions as set forth in Section 410.13.5, in the event the provisions of this Specification are not met.

410.7.1.5-Bond Strength:

DELETE THE CONTENTS OF THE FOURTH PARAGRAPH IN SUBSECTION 410.7.1.5 AND REPLACE WITH THE FOLLOWING:

Core Bond strength shall meet a minimum of 50 psi when tested in accordance with MP ~~410.07.23~~ 401.07.23 Guide to Determining Interface Bond Shear Strength.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 420

SINGLE / MULTIPLE COURSE MICRO SURFACING

420.4-CONSTRUCTION:

420.4.6-Surface Preparation:

DELETE THE CONTENTS OF SUBSECTION 420.4.6 AND REPLACE WITH THE FOLLOWING:

Remove all plastic pavement markings using an abrasion method. Remove markings just before the surfacing operation. Work and payment for removal of pavement markings shall follow Subsection 636.7 of the Specifications.

Micro Surfacing shall not be placed on top of patches, crack seal, Base Repairs, Edge Repairs, or any other asphalt pavement repairs for at least thirty (30) calendar days. Work and payment for these items shall follow their appropriate sections.

Thoroughly clean the existing surface of all loose materials, vegetation, dirt, dust, mud, standing water and other objectionable materials at the time of placing the mixture. Remove animal remains and thoroughly wash the surface before placing the mixture.

The project plans will dictate whether to remove or temporarily cover existing RPMs prior to placement of micro surfacing; payment for removal or covering shall be incidental. When removal is required, the Contractor shall remove RPMs with minimal damage to the pavement surface. Payment for new RPMs shall be in accordance with Section 663.

Protect drainage structures, monument boxes, water shut-offs, etc., during application of tack coat and mixture.

Apply tack coat according to sSection 408, except for the following:- Mix tack coat with one part emulsion to three parts water. Use the same emulsion as used in the production mixture. Apply the tack coat uniformly, at an application rate of 0.05-0.12 gallons of diluted emulsion per square yard and without excessive run off. Allow the tack coat to cure before placement of mixture.

Establish 1,000-foot intervals for the entire project, before placing the mixture. Clearly identify and maintain these intervals until project completion.

420.4.9-Weather and Seasonal Limitations:

DELETE THE CONTENTS OF SUBSECTION 420.4.9 AND REPLACE WITH THE FOLLOWING:

1. Place the mixture when the ambient air and pavement temperatures are at least ~~45~~50 °F ~~and rising during the entire placement.~~
2. Do not place mixture ~~in~~ if rain or inclement weather is imminent or when temperatures are forecast to be below 32 °F within twenty-four (24) hours of completion of the work.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 601
STRUCTURAL CONCRETE**

601.3-PROPORTIONING:

601.3.1-Mix Design Requirements:

DELETE THE FIRST PARAGRAPH AND REPLACE WITH THE FOLLOWING:

Prior to the start of construction, the Contractor shall design and submit to the Engineer for approval the proportion of materials, including admixtures, to be used which will result in a workable concrete having the applicable properties enumerated below, including those of Table 601.3.1A. In addition, Class H, ~~K and S~~ mix designs shall have a Sequential Air Meter (SAM) number of less than or equal to 0.20~~psi~~ for establishment of the mixture proportions in accordance with AASHTO T 395 for mix design approval.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 601
STRUCTURAL CONCRETE**601.3-PROPORTIONING:****601.3.2-Field Tolerances and Adjustments:****601.3.2.4-Total Solids $\bar{A}$:**

DELETE THE CONTENTS OF SUBSECTIONS 601.3.2.4 AND REPLACE WITH THE FOLLOWING:

The combined grading of the coarse aggregate, fine aggregate, and cement used in the structural concrete shall conform to the design mix $\bar{A}$ plus or minus the tolerance specified in the following table for the coarse aggregate size used.

This subsection will not apply for mix designs with optimized aggregate gradation. Subsection 601.3.2.4.1 shall be used in lieu of subsection 601.3.2.4.

TABLE 601.3.2.4-Total Solids $\bar{A}$

Coarse Aggregate Size Number	Design Mix $\bar{A}$ Tolerance
3 or 4	± 0.35
57 or 67	± 0.25
7, 78 or 8	± 0.15

$\bar{A}$ is the value obtained by grading of the total solids (coarse aggregate, fine aggregate, and cement). ~~The $\bar{A}$ shall be determined by the Contractor (in accordance with MP 601.03.51) at least once for every 50 cubic yards of concrete that are produced from the same mix design. The Contractor shall conduct a minimum of one gradation test per aggregate type for every 100 cubic yards of concrete produced per plant, and use those results to establish the total solids $\bar{A}$ for each mix design in accordance with MP 601.03.51.~~ However, not more than one $\bar{A}$ test (for each mix design) shall be required per calendar day as long as not more than 400 cubic yards of concrete are produced in a single day from the same mix design. In situations when more than 400 cubic yards of concrete are produced in a single day from the same mix design, two (2) $\bar{A}$ tests shall be required (one in the AM and one in the PM) for that mix design.

During any calendar week (Sunday through Saturday) in which concrete is being produced, a minimum of one (1) $\bar{A}$ test shall be required (for each mix design from which concrete is being produced). This $\bar{A}$ test shall be conducted on the first day of production of that calendar week. For days on which concrete is being produced, but no $\bar{A}$ test is required, laboratory number 1392885 shall be used for $\bar{A}$ test documentation purposes.

Should the moving average of any five (5) consecutive grading tests of the total solids have an $\bar{A}$ outside the specified mix design tolerance limits, production shall be discontinued until appropriate corrections are made. Corrections shall be made either in the proportions of the concrete (the mix design), the gradation of the aggregates, or the storage and loading of the aggregate, as the Contractor may elect.

When the small quantity work condition applies, the $\bar{A}$ required after ~~50~~100 cubic yards of concrete production shall be performed on the day that the ~~50~~100 cubic yard quantity is achieved. All concrete produced on that day (the day that the ~~50~~100 cubic yard quantity is achieved) shall be represented by the previous $\bar{A}$. The $\bar{A}$ conducted on the day that the ~~50~~100 cubic yard quantity is achieved shall represent the next ~~50~~100 cubic yards of concrete produced, beginning with the concrete produced on the next day of production.

When, in a concrete mix, gradations tests show that the percentage of material which passes the No. 200 (75 μ m) sieve, exceeds the amount permitted in ~~subs~~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 μ m) sieve to exceed the specification limits as determined in ~~subs~~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 μ m) 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.

601.3.2.4.1-Optimized Aggregate Gradation:

DELETE THE CONTENTS OF SUBSECTIONS 601.3.2.4.1 AND REPLACE WITH THE FOLLOWING:

The optimized aggregate gradation is performed by mechanical analysis on all of the coarse and fine aggregates used in any mix design. The combined percent retained from all aggregate gradation shall conform Table ~~-~~601.3.2.4.1A. The combined percent retained from all aggregate gradations in Table ~~-~~601.3.2.4.1A is based on the Tarantula Curve for optimized aggregate gradation. The contractor shall determine optimized aggregate gradation in accordance with MP 601.03.53.

Table 601.3.2.4.1A

Sieve Size	Combined % Retained
1½ in	0%
1 in	≤ 16%
¾ in	≤ 20%
½ in	4 - 20%
⅜ in	4 - 20%
No. 4	4 - 20%
No. 8	≤ 12%
No. 16	≤ 12%
No. 30	4 - 20%
No. 50	4 - 20%
No. 100	≤ 10%
No. 200	≤ 2%
Coarse Sand % Retained (No.8 to No. 30 Sieve)	> 15%
Fine Sand % Retained (No. 30 to No. 200 Sieve)	24% - 34%

The combined aggregate gradation test shall be performed by the contractor (in accordance with MP 601.03.53) at least once for every ~~50~~100 cubic yards of concrete that are produced from the same mix design. The working range on each sieve from cumulative combined percent retained from aggregate gradation shall be in accordance with Table ~~601.3.2.4.1B~~. However, not more than one (1) combined aggregate gradation test (for each mix design) shall be required per calendar day as long as not more than 400 cubic yards of concrete are produced in a single day from the same mix design. In situations when more than 400 cubic yards of concrete are produced in a single day from the same mix design, two (2) combined aggregate gradation tests shall be required (one (1) in the AM and one (1) in the PM) for that mix design.

Table 601.3.2.4.1B

Sieve Size	Allowable variation from Combined % Retained in Design Mix ^{Note 1}
1 in	± 10% of the % retained on this sieve in the Design Mix
¾ in	± 10% of the % retained on this sieve in the Design Mix
½ in	± 10% of the % retained on this sieve in the Design Mix
⅜ in	± 10% of the % retained on this sieve in the Design Mix
No. 4	± 5% of the % retained on this sieve in the Design Mix
No. 8	± 5% of the % retained on this sieve in the Design Mix
No. 16	± 4% of the % retained on this sieve in the Design Mix
No. 30	± 4% of the % retained on this sieve in the Design Mix
No. 50	± 4% of the % retained on this sieve in the Design Mix
No. 100	± 3% of the % retained on this sieve in the Design Mix
No. 200	± 2% of the % retained on this sieve in the Design Mix

Table 601.3.2.4.1B

Sieve Size	Allowable variation from Combined % Retained in Design Mix ^{Note 1}
Note 1	The maximum and minimum allowable % retained on each sieve size noted in Table 601.3.2.4.1A shall not be exceeded during production. For example, if the 1/2" sieve has a combined % retained of 15% in design mix, then the allowable % retained on 1/2" sieved during production would be 5% to 20%.

During any calendar week (Sunday through Saturday) in which concrete is being produced, a minimum of one (1) combined aggregate gradation test shall be required (for each mix design from which concrete is being produced). This combined aggregate gradation test shall be conducted on the first day of production of that calendar week.

Should the moving average of any five (5) consecutive combined aggregate gradation tests have a working range outside of the limits sets forth on Table 601.3.2.4.1B, for any of the sieve sizes listed, production shall be discontinued until appropriate corrections are made. Corrections shall be made either in the aggregate proportions in the concrete mix (the mix design), the gradation of the aggregates, or the storage and loading of the aggregate, as the Contractor may elect.

When the small quantity work condition applies, the combined aggregate gradation test required after ~~50-100~~ cubic yards of concrete production shall be performed on the day that the ~~50-100~~ cubic yard quantity is achieved. All concrete produced on that day (the day that the ~~50-100~~ cubic yard quantity is achieved) shall be represented by the previous combined aggregate gradation test. The combined aggregate gradation test conducted on the day that the ~~50-100~~ cubic yard quantity is achieved shall represent the next ~~50-100~~ cubic yards of concrete produced, beginning with the concrete produced on the next day of production.

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 ~~sub~~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 ~~sub~~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 601.03.53), 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 601.03.53). 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.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 601 STRUCTURAL CONCRETE

601.4-TESTING

601.4.4-Compressive Strength Tests for Acceptance:

DELETE THE CONTENTS OF THE FIRST PARAGRAPH OF 601.4.4 AND REPLACE WITH THE FOLLOWING:

A strength test shall consist of three (3) 4" x 8" test specimens. ~~Either 6" x 12" cylinders or 4" x 8" cylinders are permitted, provided the requirements of MP 711.03.23 are met. The size of the cylinders which the Contractor intends to use on each project shall and the size shall~~ be listed in the Contractor's Quality Control Plan. The test shall be the average of the three (3) specimens, except that if one (1) specimen shows manifest evidence of improper sampling, molding, or testing, it shall be discarded and the remaining two (2) strengths averaged. Should more than one (1) specimen representing a given test show definite defects due to improper sampling, molding, or testing, the entire test shall be discarded.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 601
STRUCTURAL CONCRETE

601.1–DESCRIPTION:

ADD THE FOLLOWING PARAGRAPH AFTER CLASS DC CONCRETE:

Class H Lightweight concrete shall be used for bridge decks and other bridge elements when designated in the Plans.

601.3–PROPORTIONING:

DELETE CONTENTS OF THE THIRD PARAGRAPH OF SUBSECTION 601.3 AND REPLACE WITH THE FOLLOWING:

Design mixture testing for Class H Lightweight Concrete shall be in accordance with MP 711.03.23 and shall include air content, slump, compressive strength, and surface resistivity test. For establishment of mixture proportions, surface resistivity tests shall be conducted on representative samples prepared and tested in accordance with AASHTO T 358. The specimens shall be moist cured in accordance with the accelerated moist-curing method defined in AASHTO T358 then tested at an age of 28 days, and the result shall be equal to or greater than 20 kΩ-cm. The cost of all test mix requirements shall be considered incidental to the cost of Class H Lightweight Concrete.

ADD THE FOLLOWING TO THE END OF THE SUBSECTION:

Class H Lightweight Concrete shall have an oven-dry density of 115 ± 5 lb/ft³ when tested in accordance with ASTM C567. ~~The average result of the rapid chloride permeability tests performed on both batches in the mix design shall not exceed 1750 coulombs.~~

601.3.1–Mix Design Requirements:

ADD THE FOLLOWING AFTER THE FIRST PARAGRAPH IN THE SUBSECTION:

Oven-dry density testing, in accordance with ASTM C567, shall be performed on each batch of Class H Lightweight Concrete during the mix design development process. The average oven-dry density of the two mix design batches shall be $115 \pm 5 \text{ lb/ft}^3$ and shall be noted as DENSOD. The average unit weight of the plastic concrete, determined in accordance with AASHTO T121, of both batches of Class H Lightweight Concrete, determined during the mix design development process, shall also be recorded and noted as UWDesign.

The following formula shall be used to determine the maximum allowable unit weight of fresh concrete when tested in the field:

$$UW_{\text{Max}} = 120 \times (UW_{\text{Design}} \div \text{DENSOD})$$

Where:

UW_{Max} = Maximum allowable unit weight of fresh concrete when tested in the field

(lb/ft³) UW_{Design} = Average unit weight of fresh concrete from both mix design batches

(lb/ft³) DENSOD = Average oven dry density from both mix design batches (lb/ft³)

601.3.2-Field Tolerances and Adjustments:

601.3.2.4–Total Solids $\bar{A}$:

ADD THE FOLLOWING PARAGRAPH AFTER THE TABLE:

The Design Mix $\bar{A}$ Tolerance for Class H Lightweight concrete shall be based on the nominal maximum size (NMS) of the lightweight coarse aggregate in the mix. The tolerance used in Table 601.3.2.4 for the standard AASHTO Size Number Aggregate with the same NMS as the NMS of the lightweight coarse aggregate in the mix shall apply.

601.4–TESTING:

601.4.1–Sampling and Testing Methods:

ADD THE FOLLOWING TO THE TABLE:

Standard Test Method for Determining Density of Structural Lightweight Concrete	ASTM C567
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ADD THE FOLLOWING AT THE END OF THE SUBSECTION:

Air content testing of Class H Lightweight Concrete shall be performed in accordance with AASHTO T196 (Air Content of Freshly Mixed Concrete by the Volumetric Method).

601.4.5-Tests for Surface Resistivity Acceptance of Class H Concrete:

DELETE THE TITLE AND CONTENTS OF SUBSECTION 601.4.5 AND REPLACE WITH THE FOLLOWING:

601.4.5-Tests for Surface Resistivity Acceptance of Class H Lightweight Concrete:

The Contractor shall also be required to fabricate three surface resistivity test specimens in accordance with AASHTO T 358 every time that a set of compressive strength specimens for Class H Lightweight Concrete is fabricated. These test specimens shall be moist cured in accordance with the accelerated moist-curing method defined in AASHTO T358 until as close to the time of test as possible, and they shall be tested at an age of 28-days. These test results shall be used by the Engineer as the basis for evaluation as to the adequacy of the material for the use intended. The minimum surface resistivity test result for full payment shall be 15 kΩ-cm. Table 601.4.5 specifies the penalty structure for payment of material that has a surface resistivity test result lower than 15 kΩ-cm.

TABLE 601.4.5

<u>Resistivity Result (kΩ-cm)</u>	<u>Percent of Unit Bid Price Paid</u>
<u>>12.0-14.0</u>	<u>80%</u>
<u>>10.0-12.0</u>	<u>50%</u>
<u>>10</u>	<u>Remove & Replace</u>

ADD THE FOLLOWING SUBSECTION:

601.4.6–Additional Field Tests for Class H Lightweight Concrete: A unit weight test, in accordance with AASHTO T121, shall be conducted in the field on the first three batches of Class H Lightweight concrete produced on a project and then at least once per half-day of operation after that. If the result of any of these field unit weight tests exceeds the average unit weight of the plastic concrete established in the approved mix design (UWDesign) by more than 2%, the Contractor shall take immediate corrective action to lower the unit weight of the concrete (adjustment to the lightweight coarse aggregate proportion in the mix shall be permitted), and additional unit weight tests shall be performed on subsequent batches of concrete until the unit weight of the concrete is not more than 2% greater than UWDesign. If the result of any unit weight test conducted in the field exceeds UWMax (as defined in subsection 601.3.1), the concrete shall be rejected, and a unit weight test shall be performed on the following batch of concrete.

Each time that a set of cylinders is fabricated in the field for compressive strength testing, the Contractor shall fabricate an additional set of cylinders for oven-dry density in accordance with ASTM C567. The Contractor shall have these specimens tested by a Laboratory which is accredited by AASHTO re:source for ASTM C567. The average oven-dry density of that set of cylinders shall be considered the density of the same quantity of concrete which is represented by the compressive strength cylinders. Any quantity of concrete with an oven-dry density of more than 120 lb/ft³ shall be considered as not meeting specification requirements. The Engineer shall evaluate the concrete with this oven-dry density and decide whether to allow it to remain in place.

601.15-BASIS OF PAYMENT:

601.15.2–Price Adjustments:

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

If the Engineer allows Class H Lightweight Concrete with an oven-dry density exceeding 120 lb/ft³, as determined by oven-dry density tests conducted on samples fabricated in the field as outlined in subSection 601.4.6, to remain in place, a price adjustment of 2.0% of the unit bid price of Class H Lightweight Concrete shall be assessed to the quantity of concrete in question for every 1 lb/ft³ by which it exceeds 120 lb/ft³.

601.16-PAY ITEMS:

ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
601009-015	Class H Lightweight Concrete	Cubic Yard (Meter)

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 603

PRESTRESSED CONCRETE MEMBERS

603.6-CONCRETE:**603.6.2-Mix Design:****603.6.2.1-Class S-P Concrete Mix Design Testing:**

REMOVE AND REPLACE TABLE 603.6.2.1C WITH THE FOLLOWING:

TABLE 603.6.2.1C

Hardened Property Test	Total # Specimens	Specimen Size	Age at Testing	Magnitude of Loading	Approval Condition
Compressive Strength (AASHTO T 22)	7	4"x8" or 6"x12" cylinders	1 @ 24 ± 2 hrs. 1 @ 3days ± 2 hrs. 1 @ 7days ± 2 hrs. 1 @ 14days ± 2 hrs. 3 @ 28days ± 4 hrs.	Load Until Failure	per Design
Modulus of Elasticity ^b (ASTM C469)	7	6"x12" cylinders	1 @ 3days ± 2 hrs. 1 @ 7days ± 2 hrs. 1 @ 14days ± 2 hrs. 3 @ 28days ± 4 hrs.	40% of compressive strength (obtained above)	$\geq 57,000\sqrt{f'_c}$ ^a
Creep ^b (ASTM C512)	8 total (3 loaded, 3 remain unloaded, 2 tested for compressive strength)	6"x12" cylinders	72 ± 2 hours at age of initial loading	40% of compressive strength at time of loading	Creep Coefficient ^c ≤ 1.19 at 90 days ^a
Length Change (ASTM C157)	3	3"x3"x11" prisms	56 days	28-day cure per ASTM C157 then Air Storage for 28-days	≤ 0.0002 at 28 days of Air Storage ^a

TABLE 603.6.2.1C

Hardened Property Test	Total # Specimens	Specimen Size	Age at Testing	Magnitude of Loading	Approval Condition
Concrete Surface Resistivity ^b (AASHTO T358)	3	4"x8" cylinders	28 days		> 30 kΩ-cm
Freeze-Thaw Resistance (ASTM C666-Procedure A) ^b	3	3"x4"x16" prisms	28 day cure prior to testing	300 cycles (0°F to 40°F)	Durability Factor ≥ 80

- a. If the values obtained from testing the Class S-P mix do not meet the specified values in Table 603.6.2.1C, then the Fabricator's Engineer may submit calculations for prestress losses, camber, and long term deflections to the Division for review in accordance with subsection 105.2.1.1, the Division Approval Method for shop drawings. If the Fabricator's calculations show that the values exceeding the specified values in Table 603.6.2.1C will not adversely affect the prestress losses, camber, and long term deflections, and the Division approves these calculations, then the Class S-P mix in question may be used to fabricate prestressed bridge members.
- b. After the discontinuation of steam curing, test specimens shall be removed from the molds within 23.5 ± 0.5 hours and moist cured in the laboratory at a temperature between 73.5 ± 3.5 °F until the time of test. Freeze-Thaw Resistance testing shall begin when the specimens are at an age of 28 days.
- c. The Creep Coefficient shall be defined as the Creep Strain at 90 days divided by the Initial Elastic Strain at the Time of Initial Loading. The Initial Elastic Strain shall be determined within two (2) minutes after the application of the initial load.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 662
ROADWAY LIGHTING

662.11-LIGHTING SUPPORTS:

DELETE THE CONTENTS AND REPLACE WITH THE FOLLOWING:

Lighting supports shall be located in accordance with the details shown on the Plans governing the spacings and ~~set-backs~~ setbacks to provide ~~continuously a uniform and~~ properly aligned lighting support installation, unless otherwise ~~ordered~~ approved by the Engineer. All anchor bolts shall be installed, tightened and tested in accordance with ~~subsections 658.5.1, 658.5.3, and 658.5.4~~ 658.5.6.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 688

FIELD PAINTING OF METAL STRUCTURES

688.5-CONTRACTOR CERTIFICATIONS AND SUBMITTALS:

ADD THE FOLLOWING SUBSECTION:

688.5.3-Small Quantity Field Painting Exemption: Small quantity field painting operations may be performed without SSPC QP-1 and SSPC QP-2 certification requirements when incidental touch-up, repair, and localized zone cleaning of existing coating systems do not exceed a cumulative total of one thousand (1000) square feet per structure. This limitation shall apply to the total area of all qualifying work and shall not be exceeded through multiple mobilizations, work crews, or staging operations.

RENUMBER THE FOLLOWING SUBSECTIONS:

688.5.~~34~~-Quality Control Plan for Painting: Minimum requirements and document form are set forth in MP 688.02.20.

688.5.~~45~~-Containment/Disposal Control Plan for Existing Steel Structures: Minimum requirements and document form are set forth in MP 688.03.20.

SECTION BREAK

NEW BUSINESS ITEMS

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 108
PROSECUTION AND PROGRESS

DELETE THE ENTIRE CONTENTS OF SECTION 108 AND REPLACE WITH THE FOLLOWING:

108.1-SUBLETTING OF CONTRACT:

The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the Contract or Contracts or any portion thereof, or of their right, title, or interest, without written approval of the Engineer prior to any of the subject work being performed. The Contractor will be permitted to sublet a portion thereof but shall perform, with his/her own organization, work amounting to not less than 30 percent (30%) of the total contract cost, except that any items designated in the Contract as "specialty items" may be performed by subcontract and the cost of any such specialty items so performed by subcontract may be deducted from the total cost before computing the amount of work required to be performed by the Contractor with his/her own organization.

Subcontract percentages are based on the original contract amount. No subcontracts, or transfer of contract, shall in any case release the Contractor of his/her liability under the Contract and Bonds.

The Contractor shall request the approval of each subcontractor, including lower-tier subcontractors. No work shall be performed by a subcontractor until the subcontractor has completed a Contractor Prequalification Application, received a Certificate of Qualification from the Division in the categories of work the subcontractor will be providing on the project, and the request has been approved. Each subcontract, including lower-tier subcontracts, shall be in writing and shall physically contain all of the applicable provisions, requirements, specifications, and safety plans. The Contractor may certify that a copy of all the applicable provisions, requirements, specifications, and safety plans has been provided and is physically incorporated in each subcontract including lower-tier subcontracts. Requests for approval of DBE subcontractors, however, shall also be accompanied by a copy of the proposed subcontract without the required attachments.

The Contractor shall maintain a complete subcontract file including lower-tier subcontractors at the home office, which shall be available to authorized personnel for review without notice, or at any other appropriate location as determined by the Division after a five (5) day notice. Such file may contain a single copy of all the applicable provisions, requirements and specifications in lieu of individual subcontract files containing the applicable attachments.

108.1.1-Subletting of Contract Materials: Roadside production of materials is construed

to be the production of crushed stone, gravel, or other materials with portable or semi-portable crushing, screening, or washing plants established or re-opened in the vicinity of the work for the purpose of supplying materials to be incorporated into the work on a designated project or projects, and in all cases, unless performed by the Contractor, shall be considered as subcontracting.

The purchase of sand, gravel, crushed stone, crushed slag, batched concrete aggregates, ready mixed concrete, or any other materials produced at and furnished from established and recognized commercial plants, together with the delivery of such materials to the site of work by means of vehicles owned or operated by such plants or by recognized commercial hauling companies, shall not be considered as subcontracting under these provisions. Except as stated, all hauling of materials from roadside production sources or from railroad or water delivery points to batching plants, mixing plants, or directly to their place of use in the road, and all hauling of materials from batching plants and mixing plants to their place of use in the road, unless done by the Contractor's own equipment or by recognized hauling companies, shall be considered as subcontracting under these provisions. If batching plants or mixing plants are set up at rail or water delivery points and materials in part supplied to such plants by rail or water transportation companies, the remaining materials required at such batching or mixing plants may be hauled to such plants without such hauling being considered as subcontracting.

108.2-NOTICE TO PROCEED:

The Notice to Proceed will stipulate the date on which it is expected the Contractor shall begin work and from which date Contract time will be charged. In the event a Notice to Proceed cannot be issued, a Conditional Notice to Proceed may be issued upon the mutual agreement of the Division and the Contractor. The Conditional Notice to Proceed will be used to allow the Contractor to begin work on a portion of the project not impacted by the issue that created the need for the Conditional Notice to Proceed.

108.3-PROSECUTION OF THE WORK:

108.3.1-General Construction Schedule Requirements: 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 subsection 108.3.2 with all graphic and tabular supporting documentation, hereinafter referred to as "Schedule."

Schedules will be required for ~~all projects where the~~ any project with Contract Bid Amount ~~is greater than \$2,000,000~~ \$7,500,000. Additionally, ~~any Project that contains~~ Projects which contain an Incentive/Disincentive clause, and all Design Build, Alternative Project Delivery, and Public Private Partnership projects shall require a Schedule, regardless of Contract Bid Amount.

Unless otherwise specified, Schedules will not be required for projects ~~on~~ with the Contract Bid Amount of \$7,500,000 or less or on project which the major portion of the work is resurfacing, landscaping, signing, lighting, installing signals, guardrail or bridge painting, ~~or on which the~~ regardless of 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~~ in 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, and 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~~ accordance with subsection 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.

108.3.1.1.1-Primavera P6 Software Schedule Options Settings: The Contractor shall calculate the Project Schedule (i.e., F9 in P6) to ensure all changes have been incorporated

before submission to the Engineer. The Contractor shall apply the following Primavera P6 software Schedule Options settings when scheduling the Project Schedule:

- a. Unmark the 'Make open-ended activities critical' checkbox.
- b. Unmark the 'Use Expected Finish Dates' checkbox. Expected finish dates are prohibited.
- c. Unmark the 'Level resources during scheduling' checkbox. The use of resource-leveling to determine sequence, order, or timing of the activities is not allowed and shall be cause for rejecting the schedule.
- d. Specify 'Retained Logic' for scheduling progressed activities.
- e. Specify 'Longest Path' to define critical activities.
- f. Specify 'Finish Float = Late Finish – Early Finish' to compute Total Float.
- g. Specify 'Predecessor Activity Calendar' as the calendar for scheduling relationship lags.

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 as defined in subsection 108.3.1.3.

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 Detailed Construction 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~~ Notice to Proceed 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. Non-procurement activities Original Durations (OD) are not to exceed 20 workdays or 30 calendar days. 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.

Naming Convention - Each electronic submittal file shall have a unique file name using a file naming convention that identifies the file by the Contract ID, version of Progress Schedule (e.g., PS1, BS, BSR1, U01, U04RB), type of submission (e.g., Preliminary Schedule, Baseline Schedule Narrative,), and Data Date of the submission. For example: 2020000569_PS1_Preliminary Schedule_04-01-26.xer.

Design and Permit Activities - Include design and permit activities with the necessary conferences and follow-up actions and design package submission dates. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. Provide a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Also include review and correction periods associated with each item.

Procurement Activities - Include in the schedule activities associated with the critical submittals and their approvals, procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

Required submittals shall be included in the schedule activities for their preparations, submission, and review periods as indicated in subsection 105.2. 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~~ its 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 subsection 108.3.5.

108.3.2-Detailed Construction Schedule (Schedule): The Schedules shall be prepared using scheduling software Primavera Project Manager P6 version 6.0 or higher.

The following criteria shall apply to the development and maintenance of the Schedule:

- ~~1. 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.~~
- ~~2. 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 7ten (10) digit Contract ID Number followed by an underscore, followed by the Project Name. Any additional description may follow the underscore.~~
- ~~3.1.~~ The use of Project Codes is prohibited.
- ~~4.~~ The use of Global Activity Codes are prohibited, however, Project Activity Codes may be used. The Project Activity Code names shall begin with the Project's specific ~~seven~~ seven (7) ten (10) digit Contract ID Number followed by an underscore. Any additional description may follow the underscore.
- ~~6.3.~~ Calendars - Global Calendars are prohibited (except as noted below in section 47). However, Project Calendars may be used. The Project Calendar names shall begin with the project's specific ~~seven (7) ten (10)~~ digit contract number, followed by an underscore. Any additional description may follow the underscore. In addition, the Project Default Calendar shall be assigned as a Project Calendar.
- ~~7. 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 7 digit Contract ID Number followed by an underscore, followed by the Project Name.~~
- ~~8. 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.~~
- ~~Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a seven (7)-day calendar for Engineer Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop Seasonal Calendar(s) and assign to seasonally affected activities as applicable.~~
- ~~A minimum of two (2) project calendars shall have activities assigned to them in the schedule. A WVDOT Standard five (5) Day Workweek with all the WV state holidays and a WVDOT Seven Day Calendar for submittals, reviews, cure time, etc.~~
- ~~Regardless of the actual or planned working hours per day, all calendars shall be based on a standard eight (8) work hours/day, with the same daily start and finish times.~~
- ~~9.4.~~ 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 five (5) Day Workweek with holidays”

~~WV DOT Standard five (5) Day Workweek with holidays.~~

5. Work Breakdown Structure (WBS): The Baseline Schedule shall be organized using a logical Project Work Breakdown Structure (WBS). The Work shall be broken down to an appropriate level of WBS nodes and sub-nodes to allow for a hierarchical grouping and summarization of related activities required to complete each phase, feature, deliverable, or work package, as appropriate. Each WBS element shall be defined using a short alpha-numeric WBS Code and a WBS Name describing the WBS element. The WBS should identify the location of the work being performed including sta. numbers (i.e. WB, NB, Bridge Name or No., etc.).
- ~~10-6.~~ The first activity on the Schedule shall be Project Award which shall be designated as a milestone starting on the actual Contract Award date.
- ~~11-7.~~ The second 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 seven (7) day lag from Project Award on projects with an Incentive/Disincentive clause).
- ~~12-8.~~ 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 subSection 108.3.1.
9. Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.
- ~~13-10.~~ Schedule calculation will be computed by Retained Logic method.
- ~~14-11.~~ Only contractual Constraints can be used on activities when preparing the Schedule, otherwise the use of Constraints is prohibited, unless approved by the Engineer.
Contractual Constraints that ignore or affect network logic are prohibited. Submit additional constraints to the Engineer for approval on a case by case basis.
End Project Finish Milestone and Constraint - The last activity in the schedule must be a finish milestone titled "Substantial Compete."
Constrain the project schedule to the Contract Completion Date in such a way that if the schedule calculates an early finish, then the float calculation for " Substantial Compete" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "Substantial Compete" milestone float calculation reflects negative float on the longest path.
Interim Completion Dates and Constraints - Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.
- ~~15-12.~~ All Actual Start Dates and Actual Finish Dates shall be reasonably captured in updated schedules.
- ~~16. 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~~
13. No costs are to be assigned to activities for the preparation, review, or approval of submittals. The cost in the baseline schedule shall match the bid amount.
- ~~17.—~~

14. Network Logic: The Schedule as well as Baseline Schedule shall be calculated using the Critical Path Method (CPM). Logic relationships shall be assigned based on the Precedence Diagram Method (PDM) to establish relationships between the activities and the sequence in which the Contractor plans to accomplish the Work. Logic relationships shall be assigned as follows:
- a) Activity relationship types shall be limited to finish-to-start (FS), start-to-start (SS), and finish-to-finish (FF). SS and FF relationship types shall only make up 10% of the schedule, unless approved by the engineer.
 - b) All activities, except for the first activity, shall be assigned at least one predecessor relationship and all supporting data activities, except the last activity shall be assigned at least one (1) successor relationship.
 - c) If an activity is assigned as a predecessor with a start-to-start (SS) relationship, then the activity must also be assigned as a predecessor to another related activity with a finish-to-start (FS) or finish-to-finish (FF) relationship, as applicable. Dangling logic is prohibited.
 - d) The Contractor shall avoid the use of redundant logic relationships when possible. Redundant logic is unnecessary relationships (predecessors/successors) that do not change activity dates, adding clutter and reducing schedule reliability. They occur when an activity is tied to another through an indirect path that is already covered by direct, shorter logical links. The Contractor shall provide an explanation of the reason for redundant logic upon the request of the Engineer.
 - e) Activity IDs shall not include the contract ID number or Item number. Character usage shall be limited.
 - f) All Activities names shall include the location of the work performed. If there are multiple locations or lengthy excavation sections the activity shall include the station for the activity and specific location (i.e. WB, NB, Bridge Name or No., etc.). Activity names shall not include the contract ID number or Item number. Character usage shall be limited.
15. Default Progress Data Disallowed- Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. Disable program features that calculate one of these parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Daily Work Reports. Failure to document the AS and AF dates will result in disapproval of the Contractor's schedule.
16. Out-of-Sequence Progress - Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Division. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative and in the periodic schedule update meetings.
17. Added and Deleted Activities - Do not delete activities from the project schedule or add new activities to the schedule without approval from the Engineer. Activity ID and description changes are considered new activities and cannot be changed without Contracting Officer approval.
18. Original Durations - Activity Original Durations (OD) must be reasonable to perform

- the work item. OD changes are prohibited unless justification is provided and approved by the Contracting Officer.
19. Leads, Lags, and Start to Finish Relationships - Lags must be reasonable as determined by the Engineer and not used in place of realistic original durations, must not be in place to artificially absorb or create float, or to replace proper schedule logic.
 - a) Leads (negative lags) are prohibited.
 20. Start to Finish (SF) relationships are prohibited.
 21. Retained Logic - Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not allowed.
 22. Critical Path – a fully logic-linked CPM schedule in which the critical path is clear, continuous, and readily identifiable at all times.

108.3.2.1-Design Build Submission Requirements: Provide the submissions as described below. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, the Contractor will be deemed not to have provided an estimate upon which a progress payment can be made.

The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. Include in the design-build schedule detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any that required the Engineer's actions; and long lead item acquisition prior to design completion. Also cover in the initial design-build schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion milestones, and detailed construction activities through the dry-in, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by The Engineer acceptance of associated designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone. No payment will be made for work items not fully detailed in the Project Schedule.

108.3.2.2-Detailed Construction Schedule (Schedule) Narrative Requirements:

A Baseline Schedule Narrative describing the Contractor's overall plan to accomplish the Work. The Baseline Schedule Narrative shall be the basis for the Baseline Schedule and shall provide the following supporting information, as applicable:

1. Milestones: Current status of the Project milestones including, as applicable Contract milestones and other key events such as major traffic switches.
2. Work By Others: Work to be performed by the Division and other involved parties (e.g., utilities), including activities requiring coordination; and a description of when the work must be performed to avoid impacts to the Work.

3. Overall Sequence of Work: Explanation of the proposed overall sequence of Work, including where the Work will begin and how the Work and crews will flow through the Project.
4. Project Critical Path: Description of the project critical path indicating the series of operations that are expected to drive the completion date of the project. A listing of the Project Schedule critical path activities will not be accepted as a substitute.
5. ROW Acquisitions - Current status of ROW acquisitions.
6. Relocation Status - Current status of relocations required.
7. Permit Actives Status - Current status of required permits.
8. Submittal Status - Current status of required submittals.
9. Mandatory Inspections Required - Description of the required inspections including sequence of work and the time they are scheduled to be performed.
10. Lags: Identification of all logic relationships with Lag and an explanation of the reason for each Lag.
11. Constraints: Identification of all schedule Constraints used in the Baseline Schedule and an explanation of the reason for each Constraint.
12. Calendars: Description of the project calendar(s) used in the Baseline Schedule, identifying the Calendar and the proposed number of work days per week, number of shifts per day, and number of hours per day. Also, the anticipated number of non-working days per month shall be identified for each calendar with considerations, as applicable, for holidays, normal adverse weather conditions; as well as seasonal or other known or specified restrictions (i.e. traffic, local events, environmental, permits, utility, etc.).
13. Issues and Concerns: Any known or foreseeable issues or concerns that are currently affecting or anticipated to affect the schedule. Also, describe how the issues will affect the schedule and any actions taken or needed to avoid or mitigate the impact.

~~___ 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.pdf~~ 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;~~
- ~~5.4.~~ Dollar value of activity;
- ~~6.5.~~ Remaining duration of activity, in working days;
- ~~7.6.~~ Earliest start date, by calendar date;
- ~~8.7.~~ Earliest finish date, by calendar date;
- ~~9.8.~~ Actual start date, by calendar date;
- ~~10.9.~~ Actual finish date, by calendar date;
- ~~11.10.~~ Latest start date, by calendar date;
- ~~12.11.~~ Latest finish date, by calendar date;

~~13.12. Total float for activity;~~

~~14.13. 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.~~

~~**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, Public Private Partnerships, and Alternative Project Delivery projects 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). For projects where the Contract Bid Amount is less than \$7,500,000, Project Control Meetings may occur less frequently if deemed appropriate by the Regional Engineer, but not less than quarterly.~~

~~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, atAt least five (5) working days before the meeting Project Control Meeting, the Construction Coordinator shall provide the Engineer with a complete update of all schedule~~

activity information included in subsection 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~~ Regardless of frequency of Project Control Meetings, the Construction Coordinator shall provide the Engineer with a complete update of all Schedule activity information included in subsection 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.

108.3.4.1-Schedule Updating: An Update Schedule, which shall be based on a copy of the most recent accepted Project Schedule, shall be prepared according to the following:

1. All activities completed prior to the Data Date shall be updated to show actual start and actual finish dates. ~~And~~ All ongoing activities shall be updated to show actual start dates and remaining duration to indicate the amount of time required to complete the remaining work as of the Data Date. Actual dates on or after the Data Date are prohibited.
2. Activity percent complete for on-going activities shall be based on cost of work completed as of the Data Date relative to the total cost of work planned.
3. All schedule related changes requested or approved by the Engineer shall be incorporated into the Update Schedule, including as applicable, added or deleted work, changes to Contract Milestones, changes in sequence of work, changes in duration, changes to Contract Amount, and other time-related changes.
- 4.4. Activity logic shall be modified as necessary to correct out-of-sequence progress for on-going and remaining activities to reflect the Contractor's current plan for completing the remaining Work.

108.3.4.2-Schedule Narrative: The Contractor shall submit with the monthly Schedule Update a narrative report which shall ~~Narrative~~ describing the current status of the project, deviations from scheduled performance, and changes in Contractor's work plan, and the current work plan for accomplishing the remaining work as of the Data Date. The Schedule Update Narrative shall include, ~~but not be limited to,~~ a description of progress along the:

1. Milestones: The current status of scheduled Milestone dates, including a description of any deviations from the last accepted Project Schedule and the Contract. The Contractor shall provide an explanation for any Milestone that is scheduled to occur later than the date specified in the Contract and any actions taken or proposed to correct the delay.
2. Progress % Complete: The current status of the Project in terms of earnings relative to the SOR, based on the Progress Earnings Schedule. If progress is falling behind, provide an explanation for the progress deficiency and any actions taken or proposed to correct the deficiency.
3. Work Performed Last Period: The work performed during the last update period and any deviations from the work scheduled. A listing of the Project Schedule activities will not be accepted as a substitute.

4. Changes in Work Plan: Any major changes in the Contractor's work plan in terms of sequence of construction, shifts, means and methods, manpower, or equipment.
5. Changes to Schedule: Any non-progress changes made to the Project Schedule since the previous submission including, changes requested or approved by Engineer. Also, any justification why changes requested by the Engineer should not be accomplished. A Claim Digger report or Schedule Comparison report will not be accepted as a substitute.
6. Project Critical Path: The critical path-in-terms work and any deviations from the previous submission. A listing of the Project Schedule critical path activities will not be accepted as a substitute.
7. Days Lost Last Period: Number of days-ahead-or-behind-the-Schedule-dates, any problem areas (current and- lost during the last update period, including activities affected and how the activities were affected; as well as any impacts on the critical path or project milestones. Also, describe any actions taken or proposed to mitigate any resulting delays.
8. Pending Contract Issues: The status of pending issues such as access, permits, conflicts with other related or adjacent work, Change Orders, time extension requests, etc.
9. Issues and Concerns: Any issues encountered during the last update period that are currently affecting the Project Schedule or other Project concerns that are anticipated), any delaying factors and their impact, and- to affect the schedule, including 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. required to mitigate or avoid the effects.
10. Work Planned Next Period: Work planned for the next update period, including any actions needed or expected performance by the Division or other involved parties (e.g., utilities) to avoid impacts to the Work.

____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 subsection 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 subsection 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 will issue a written notice to the Contractor to submit a Revised Construction Progress Schedule. The

Contractor shall respond in writing within seven (7) days, either agreeing to comply with the Engineer's request or providing justification why the request should not be accomplished.

The Engineer may request the Contractor to submit a revised Schedule (the Baseline schedule shall be preserved) 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 approved Contract ~~modification~~ Change.

The revised **construction** Schedule shall indicate all the requirements described in subsection 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.

If the Engineer requests a Revised Progress Schedule or accepts the Contractor's proposed revisions, the Contractor shall submit a Revised Progress Schedule in lieu of the subsequent required Update Progress Schedule submission or as requested by the Engineer.

If the Engineer does not accept the Contractor's proposed revisions, the Contractor shall not incorporate the proposed revisions into the Project Schedule. In which case, the Contractor shall proceed under the previously accepted Progress Schedule.

Revised Schedule – A Revised Schedule, which shall be based on the most recent accepted Project Schedule. The Revised Schedule shall be prepared according to subsection 108.3.4 and as follows:

1. All activities completed prior to the Data Date shall be updated to show actual start and actual finish dates. ~~And~~ All ongoing activities as of the Data Date shall be updated to show actual start dates and remaining duration to indicate the amount of time required to complete the remaining work. Actual dates beyond the Data Date are prohibited.
2. Activity percent complete for on-going activities shall be based on cost of work completed as of the Data Date relative to the total cost of work planned.
3. All schedule related changes requested or approved by the Engineer shall be incorporated into the Revised Schedule, including as applicable, added or deleted work, changes in sequence of work, changes in duration, and changes to the Contract Amount, Contract Milestones, Completion Date, and other time-related requirements.
4. Activity logic shall be modified as necessary to correct out-of-sequence progress for on-going and remaining activities to reflect the Contractor's current plan for completing the remaining Work.

Revised Schedule Narrative – A Revised Schedule Narrative, which shall be the basis for the Revised Project Schedule, shall be prepared according to subsection 108.3.4; however, it shall reflect the current status of the project as of the submittal date, approved changes in the Work, and the proposed plan for completing the remaining Work.

108.3.6-Submission of Recovery Schedule: A Recovery Schedule shall be required when a progress evaluation has resulted in unsatisfactory performance status.

A. Progress Deficiency and Schedule Slippage – The Engineer will assess the current status of the Work each month, based on the monthly Update Progress Schedule submission, and relative to the Schedule of Record. The Contractor's actual progress may be considered unsatisfactory, as determined by the Engineer, if any of the following conditions occur:

- 1. The Actual Progress Percent Complete for Work completed to date, based on the current estimate, falls behind the Baseline Cumulative Progress Percent Complete by more than ten (10) percent, relative to the Schedule of Record.**
- 2. A Contract milestone or the Project Completion Date is currently projected to complete more than twenty-one (21) days after the date specified in the Contract, as applicable.**

108.3.7-Added Work or Proposed/Approved Changes: Prepare a proposed fragnet for added work or proposed changes with a sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Engineer prior to incorporation into the project schedule. The fragnet shall be submitted with the change order documentation. The fragnet will be labeled with a level of effort indicated the Change Order No. A revised progress schedule will be required if the approved fragnet affects the critical path.

108.4-LIMITATION OF OPERATIONS:

The Contractor shall conduct the work at all times in such manner and in such sequence as will assure the least interference with traffic. The Contractor shall have due regard to the location of detours and to the provisions for handling traffic. The Contractor shall not open up work to the prejudice or detriment of work already started, and the Engineer may require the Contractor to finish a section on which work is in progress before work is started on any additional sections if the opening of such section is essential to public convenience.

108.5-CHARACTER OF WORKERS; METHODS AND EQUIPMENT:

The Contractor shall at all times employ sufficient labor and equipment for prosecuting the several classes of work to full completion in the manner and time required by these Specifications. All employees shall have sufficient skill and experience to perform properly the work assigned to them.

Employees engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform all work properly and satisfactorily.

Any person who, in the opinion of the Engineer, does not perform his/her work in a proper and skillful manner or is intemperate or disorderly shall, at the request of the Engineer, be removed forthwith. Any Contractor or his/her subcontractor employing such person shall not reemploy such person on the project without the written approval of the Engineer. Should a Contractor fail to remove such a person or persons as required above or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Engineer may suspend the work by written notice until such order is complied with.

All equipment which is proposed to be used on the work shall be of sufficient size and in

such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the project shall be such that no damage to the roadway, adjacent property, or other highways will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed in the Contract, the Contractor is free to use any methods or equipment that the Contractor demonstrates will accomplish the Contract work in conformity with the requirements of the Contract.

When the Contract specifies that the construction be performed by the use of certain methods and/or equipment, such methods and/or equipment shall be used unless others are authorized by the Engineer. Should the Contractor desire to use a method or type of equipment other than specified in the Contract, the Contractor shall request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed to be used and an explanation of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor shall be fully responsible for producing construction work in conformity with Contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet Contract requirements, the Contractor shall discontinue the use of the substitute methods or equipment and shall complete the remaining construction with the specified methods or equipment. The Contractor shall remove the deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the construction items involved nor in Contract time as a result of authorizing a change in method or equipment under these provisions.

108.6-DETERMINATION AND EXTENSION OF CONTRACT TIME:

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 Subsection 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 all Items of Work are complete, as reasonably determined by the Engineer; with the exception of permanent roadway striping. 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 subsection 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~~ their 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. An evaluation of contract time shall be considered based on a working day calendar equal to a WVDOT Standard five (5) Day Workweek with all the WV state holidays (however, seasonal limitations and an accommodation for a four (4) – ten (10) hour day work week may apply and be considered). 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 noncompensable 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~~execution 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~~contract execution 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:
 - a. 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 (60%) of the total scheduled daily hours, and
 - b. 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~~Division. 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 Subsection 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~~ Division may request the Contractor to submit his/her costs and conditions for demobilization and remobilization. The ~~Department~~ Division 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 subsection 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 subsection 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 subsection 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.

108.7-COMPLETION DATES:

108.7.1-Failure to Complete on Time and Liquidated Damages: Time is an essential element of the Contract, and it is important that the work be completed within the time specified. The cost to the Division for the administration of the Contract, including engineering, inspection, and supervision, will increase as the time required to complete the work is increased.

Therefore, for each calendar day the project is deemed not to be Substantially Complete after the Contract Time specified for completion of the work, subject to such extensions of

contract time required or permitted in 108.6, the Division will assess liquidated damages against the Contractor. Daily charges will be deducted for each calendar day, as defined in 101.2, on all contracts, except daily charges will not be deducted between November 30 and April 1. The total amount of daily charges will be deducted from any monies due the Contractor, not as a penalty but as liquidated damages. Unless specified elsewhere in the Contract, the amount of the daily charge will be calculated using Table 108.7.1 on the date of the project letting.

TABLE 108.7.1
Schedule of Liquidated Damages

Original Contract Amount		Daily Charges Per Calendar Day
For More Than	To and Including	
\$0	\$500,000	\$350
\$500,000	\$2,000,000	\$650
\$2,000,000	\$10,000,000	\$1,600
\$10,000,000	\$25,000,000	\$3,100
\$25,000,000		\$4,200

108.7.2-Interim Completion Date: When an interim completion date has been specified in the Contract documents for the Contractor to complete a specific amount of work, pay item, or structure, and if the Contractor fails to meet the interim date, the Division will assess a per calendar day charge as liquidated damages, as specified in subsection 108.7.1, unless otherwise specified elsewhere in the Contract documents, until such amount of work, pay item, or structure has been completed. Extension of interim completion dates will be governed by the provisions of subsection 108.6. The liquidated damages provided for in this subsection are in addition to those provided for elsewhere in this Section.

108.7.3-Incentive/Disincentive for Early Completion: When an Incentive/Disincentive (I/D) provision has been included in the Contract documents, Subsection 108.7.1 relating to liquidated damages remains in effect and is applicable to the total Contract time; however, there will be concurrent assessment of liquidated damages with disincentive assessments. Extension of the date(s) established for completion of work stages covered by the I/D provision and/or the Contract completion date will be governed by the provisions of subsection 108.6.

108.8-DEFAULT AND TERMINATION OF CONTRACT:

If the Contractor:

1. Fails to begin work under the Contract within the time specified in the "Notice to Proceed"; or
2. Fails to perform the work with sufficient employees and equipment or sufficient materials to assure the prompt completion of the work; or
3. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew a new such work as may be rejected as unacceptable and unsuitable;
4. Discontinues the prosecution of the work; or
5. Fails to resume work which has been discontinued within a reasonable time after notice to do so; or
6. Becomes insolvent or is declared bankrupt or commits any act of bankruptcy or insolvency; or

7. Allows any final judgment to stand against the Contractor unsatisfied for a period of ten (10) days; or
8. Makes an assignment for the benefit of creditors; or
9. For any other cause whatsoever, fails to carry out the Contract terms in an acceptable manner; the Engineer will give notice in writing to the Contractor and his/her Surety of such delay, neglect or default.

If the Contractor or Surety, within a period of ten (10) days after such notice, shall not proceed in accordance therewith, the Division will, upon written notification from the Engineer of the fact of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority, without violating the Contract, to terminate the Contract. The Division may appropriate or use any or all materials and equipment on the ground as may be suitable and acceptable and may enter into an agreement with another contractor for the completion of the Contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Engineer will be required for the completion of the Contract in an acceptable manner.

All cost charges incurred by the Division, together with the cost of completing the work under Contract, will be deducted from any money due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the Contract, then the Contractor and the surety shall be liable and shall pay to the Division the amount of such excess.

108.9-TERMINATION OF CONTRACT FOR CONVENIENCE OF THE STATE:

The Division may terminate the entire Contract or any portion thereof, if the Engineer determines that a termination is in the Division's interest. The Engineer will deliver to the Contractor a Notice of Termination specifying the extent of termination and the effective date.

1. **Submittals and Procedures** - After receipt of a Notice of Termination, the Contractor shall immediately proceed with the following obligations:
 - a. Stop work as specified in the notice.
 - b. Place no further subcontracts or orders for materials, services, or facilities for the terminated portion of the Contract.
 - c. Terminate all subcontracts that relate to the work terminated.
 - d. Settle all outstanding liabilities and termination settlement Proposals arising from the termination of the contract or portion thereof.
 - e. Transfer title and deliver to the Division (1) fabricated, partially fabricated, or unfabricated parts, work in process, completed work, supplies, and other material produced or acquired for the work terminated, and (2) the completed or partially completed plans, drawings, information, and other property that, if the Contract had been completed, would be required to be furnished to the Division.
 - f. Complete performance of the work not terminated.
 - g. Acceptable materials obtained by the Contractor for the Project that have not been incorporated in the work shall be inventoried in conjunction with the Engineer at a date identified by the Engineer.
 - h. Take any action necessary, or that the Engineer may direct, for the protection and preservation of the property related to the Contract that is in the possession of the Contractor and in which the Division has or may acquire an interest.
2. **Settlement Provisions** - When the Division orders termination of all or a part of the

Contract effective on a certain date, completed items of work as of that date will be paid for at the Contract bid price. Payment for partially completed work will be made either at agreed prices or under the provisions below. Items that are eliminated in their entirety by such termination shall be paid for as provided in Subsection 109.5.

- a. **Additional Costs** - Within sixty (60) working days of the effective termination date, the Contractor shall submit a claim for additional damages or costs not covered above or elsewhere in the Contract. Such claim may include such cost items as reasonable idle equipment time, mobilization efforts, bidding and project investigative costs, overhead expenses attributable to the project terminated, legal and accounting charges involved in claim preparation, subcontractor costs not otherwise paid for, actual idle labor cost if work is stopped in advance of termination date, guaranteed payments for private land usage as part of the original Contract, and any other cost or damage for which the Contractor feels reimbursement should be made.

The Contractor and the Division may agree upon the whole or any part of the amount to be paid because of the termination. The amount may include a reasonable allowance for profit on work done. Anticipated profits will not be considered as part of any settlement. The agreed amount may not exceed the total Contract price as reduced by the amount of payments previously made, and the Contract price of work not terminated. The Contract shall be amended, and the Contractor paid the agreed amount.

- b. **Additional Cost Review** - If the Contractor and the Division fail to agree on the whole amount to be paid the Contractor because of the termination of work, the Division will pay the amounts determined as follows, but without duplication of any amounts agreed upon above:
- i. For Contract work performed before the effective date of termination, the total (without duplication of any items) of:
 - 1) The cost of work performed;
 - 2) The cost of settling and paying termination settlement Proposals under terminated subcontracts that are properly chargeable to the termination portion of the Contract if not included in subparagraph 1 above; and
 - 3) A sum, as profit on (1) above determined by the Division to be fair and reasonable. The Division shall allow no profit under this subdivision if the Contractor's costs incurred on work performed exceed the bid item payments made.
 - ii. The reasonable costs of settlement of the work terminated, including:
 - 1) Accounting, legal, clerical, and other expenses reasonably necessary for the preparation of termination settlement proposals and support data;
 - 2) The termination and settlement of subcontracts (excluding the amounts of such settlements); and
 - 3) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.
 - iii. Except for normal spoilage, and to the extent that the Division expressly accepts the risk of loss, Division will exclude from the fair value, all that is destroyed, lost, stolen, or damaged so as to become undeliverable to the Division or to the buyer.

- iv. In arriving at the amount due the Contractor under this clause, there will be deducted the following:
 - 1) All unliquidated advance or other payments to the Contractor under the terminated portion of the Contract;
 - 2) Any claim that the Division has against the Contractor under the Contract; and
 - 3) The agreed price for or the proceeds from the sale of materials, supplies, or other things acquired and sold by the Contractor not recovered by or credited to the Division.

If termination is partial, the Contractor may file a Proposal with the Division for an equitable adjustment of the price(s) of the continued portion of the Contract. The Division will make any equitable adjustment agreed upon. Any Proposal for an equitable adjustment under this clause shall be requested within sixty (60) working days from the effective date of termination unless extended in writing by the Engineer.

The Division may, under the terms and conditions it prescribes, make partial payments and payments against costs incurred by the Contractor for the termination portion of the Contract, if these payments will not exceed the amount to which the Contractor is entitled.

The Contractor shall maintain and make available all project cost records to the Division for audit to the extent necessary to determine the validity and amount of each item claimed. This includes all books and other evidence bearing on the Contractor's costs and expenses under the Contract. These records and documents shall be made available to the Division at the Contractor's office, at all reasonable times, without any direct charge. If approved by the Division, photographs, microphotographs, or other authentic reproductions may be maintained instead of original records and documents.

Termination of the Contract or portion thereof shall not relieve the Contractor of contractual responsibilities of the work completed, nor shall it relieve the Surety of its obligation for and concerning any just claim arising out of the work performed.

108.10-FIELD OFFICE OVERHEAD:

The Division may consider compensating the Contractor for field office overhead costs as long as the Contractor can provide documentation that the field office overhead costs are not covered by the project bid items.

108.10.1-General: Field Office Overhead (also referred to as job-site or project-level overhead) consists of time-related, non-quantity-bearing costs that are directly attributable to on-site project administration and support.

Payment for Field Office Overhead is not included in the Contract Price unless expressly provided by bid item or adjustment authorized by the Division.

108.10.2-Eligibility: The Division may, consider compensation for Field Office Overhead costs only when all the following conditions are satisfied:

- a) The Contractor has experienced an excusable and compensable delay as defined elsewhere in the Contract;
- b) The delay resulted in an actual extension of the Contract Time, as supported by an accepted Schedule demonstrating impact to the Critical Path;

- c) The claimed Field Office Overhead costs are time-dependent and are directly attributable to the delay period;
- d) The Contractor demonstrates that such costs are not otherwise included, paid for, or recoverable through Contract bid items, unit prices, markups, or previously approved adjustments; and
- e) The costs would not have been incurred but for the Division responsible delay.

108.10.3-Exclusions: The Division shall not consider compensation for Field Office Overhead costs for:

- a) Costs already included in unit prices, lump sum items, mobilization, general requirements, or indirect cost recovery;
- b) Inefficiency, resequencing, acceleration, or extended performance which affect the critical path due to Contractor-caused or concurrent delays;
- c) Anticipated or estimated costs not actually incurred.

108.11-HOME OFFICE OVERHEAD: (UNABSORBED OR EXTENDED OVERHEAD):

108.11.1-General: Home Office Overhead consists of indirect corporate costs not directly chargeable to a specific project, including but not limited to: executive management, accounting, legal, human resources, or similar general business expenses.

Payment for Home Office Overhead is expressly excluded from the Contract unless specifically authorized under this Section.

108.11.2-Eligibility Requirements: The ~~Department shall~~ Division will consider payment to the Contractor for any unabsorbed or extended home office overhead costs for which payment is not previously provided for Home Office Overhead only if all of the following criteria are met:

- a) The Contractor has ~~incurred~~ experienced an excusable, and compensable delay that delays solely attributable to the Work Division, with no concurrent delay to the critical path caused or contributed to by the Contractor, subcontractors, suppliers, or third parties.
- a)b) The delay has resulted in an actual extension of the Project completion date of at least forty-five (45) cumulative calendar days beyond the Scheduled or Revised Contract Completion Date or the Revised Completion Date. These days are cumulative throughout the project, as demonstrated by an accepted CPM Schedule.
- c) Payment for such Home Office Overhead is not otherwise provided for in the Contract, through bid prices, markup, Change Orders, or other compensation.
- b)d) The delay for which payment of home office overhead is sought is only due to delays defined in qualifies exclusively under the compensable delay provisions identified in subsection 108.6.2.2.

108.11.3-Period of Eligibility: Payment will Compensation, shall be considered for every limited to eligible day beyond delay days occurring after the Scheduled or Revised Contract completion date at the rate determined below up to substantial completion, as determined by the Engineer Completion Date, and shall cease upon Substantial Completion.

108.11.1-108.11.4-Method of Calculation – Home Office Overhead Payment: When

eligible, the Contractor's Home Office Overhead shall be calculated using the following formulas, which are intended to reflect accepted industry practices for allocating overhead:

108.11.4.1-Daily Home Office Overhead Rate: ~~Calculate the home office overhead daily rate using the following formula:~~ The Contractor's daily Home Office Overhead rate and eligible payment shall be calculated using the following formulas:

$$D = (A \div B) \times C$$

$$F = D/E$$

$$\text{Eligible Overhead Payment} = F \times G$$

Where:

$$\begin{aligned} (A \div B) \times C &= D \\ (D \div E) &= F \\ (F \times G) &= \text{Amount Claimed} \end{aligned}$$

Where:

~~A = Contract billing amount~~

~~B = Contractor's total billings for Contract period~~

~~C = Contractor's total overhead for contract period~~

~~D = Overhead allocable to Contract~~

~~E = Days of performance~~

~~F = Daily contract overhead~~

~~G = Number of days of delay~~

• A = Actual Contract billing amount

• B = Contractor's total billings during the Actual Contract period

• C = Contractor's total Home Office Overhead during the Actual Contract period

• D = Home Office Overhead allocable to the Actual Contract

• E = Days of Actual Contract Duration

• F = Daily Home Office Overhead rate

• G = Number of eligible delay days ~~Current refers to the original or previously revised amount, period, or duration at the inception of the delay.~~

108.11.5-Subcontractor Home Office Overhead: ~~Requests for subcontractor, use the above formula to calculate the subcontractor's daily home office overhead rate; however, in the subcontractor calculation, A is equal to the~~ Home Office Overhead will be evaluated separately. In such cases:

- A shall equal the subcontractor's portion of the original contract amount ~~Contract value, as determined established by the sum of all approved~~ executed ~~subcontracts issued for each individual subcontractor; and~~
- ~~Formula items~~ All eligibility criteria applicable to the Contractor shall also apply to the subcontractor.

108.11.6-Audit Rights and Records: ~~Items~~ B and C are subject to verification by audit at the election sole discretion of the Engineer. ~~Any~~

- The Contractor shall cooperate fully and provide complete access to all records deemed necessary for verification.
- All costs associated with the such audit will shall be the sole responsibility of borne

- solely by the Contractor.-
 - Information obtained through ~~any such audit shall, if requested by the Contractor,~~ auditing shall be treated as confidential financial information and, upon request, handled as a trade secret ~~for purposes of exemption exempt~~ from disclosure under the West Virginia Freedom of Information Act, to the extent permitted by law.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 206

BASE COURSE REINFORCEMENT GEOGRID

DELETE THE TITLE AND CONTENTS OF SUBSECTION 206.2 AND REPLACE WITH THE FOLLOWING:

206.2-REFERENCE DOCUMENTS:

ASTM Standards:

D1388	Flexural Rigidity
D4355	Practice of Sampling of Geosynthetics for Testing
D4595	Test Method of Tensile Properties of Geotextiles by the Wide Width Strip Method

Corps of Engineers:

COE	CW02215 Percent open area
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Geosynthetic Research Institute:

GG1	Standard Test Method for Geogrid Rib Tensile Strength
GG2	Standard Test Method for Geogrid Junction Strength

206.2: BLANK

206.3-GEOGRID MATERIAL:

206.3.1-General:

DELETE THE CONTENTS OF THE FIRST PARAGRAPH IN SUBSECTION 206.3.1 AND REPLACE WITH THE FOLLOWING:

~~The Contractor shall be responsible for obtaining the geogrid reinforcement materials and associated components that~~ The material shall be evaluated by AASHTO Product Evaluation and Audit Solutions and meet all requirements of the Specification.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 626

RETAINING WALL SYSTEMS

626.5-MATERIALS:

626.5.1-Mechanically Stabilized Earth Components:

626.5.1.1-Facing Elements:

626.5.1.1.6-Geosynthetics Soil Reinforcing or Attachment Devices:

ADD THE FOLLOWING TO THE SECOND PARAGRAPH OF SUBSECTION 626.5.1.1.6:

The geosynthetic used shall meet the minimum requirements shown on the shop drawings. Each roll of geosynthetic material shall be labeled as to its properties. Geosynthetic soil reinforcing materials shall be evaluated by AASHTO Product Evaluation and Audit Solutions and meet all requirements of this Specification. Geosynthetics shall be made of polypropylene, high-density polyethylene or high tenacity polyester fibers having cross-sections sufficient to permit significant mechanical interlock with the soil/backfill. Geosynthetics shall have a high tensile modulus in relation to the soil/backfill. Geosynthetics shall have a high resistance to deformation under sustained long term design loads while in service and resistant to ultraviolet degradation, to damage under normal construction practices and to all forms of biological or chemical degradation normally encountered in the material being reinforced.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 471

LONGITUDINAL JOINT STABILIZER ~~MATERIALS~~

471.1-DESCRIPTION OF WORK:

This work shall consist of the construction of a wearing course, composed of bituminous material and aggregate, in one or more applications upon the completed and accepted base course or existing surface, and/or the application of a Longitudinal Joint Stabilizer (LJS) material. Application of such materials shall be in accordance with these Specifications and in reasonably close conformity with the lines, grades, thicknesses, and cross sections shown on the Plans or established by the Engineer.

The type of surface treatment will be indicated on the Plans. For wearing courses, the contractor may select the emulsion grade from the table below.

This project shall include the application of a LJS material as described herein. The Contractor's bid prices shall include all costs associated with furnishing all labor, material, and equipment necessary to perform all operations for the application of an in-depth LJS system. Separate bid prices will be utilized for the payment of material and for the payment of associated labor and equipment costs. The stabilization method shall be by spray application of a cationic maltene emulsion composed of petroleum oils and resins with polymer emulsified with water. All work shall be in accordance with the specifications herein.

The area to be treated shall include the joint itself, as well as a twelve (12) inch ~~(300 mm)~~ minimum width of asphalt on both sides of the joint.

The contractor shall notify the engineer a minimum of two (2) weeks prior to starting any surface treatment operation.

471.2-MATERIALS:

~~Material specifications and test methods for the LJS material are included in Materials specification 708.11, included as part of this Contract.~~

~~Sub-sections 405.2.1 through 405.2.3 below apply to wearing course materials only.~~

~~Sub-section 471.2.1 specifies the material performance and acceptance procedure for the LJS material.~~

The Contractor shall furnish a quality inspection report showing the source, manufacturer, and date shipped for each load of LJS material. The Contractor shall also submit a certified statement from the LJS material manufacturer showing that the LJS material to be used on the project conforms to the physical and chemical requirements specified in subsection 471.2.2. When directed by the Engineer, the Contractor shall take representative samples of the material for testing for conformance with subsection 471.2.2.

471.2.1–Longitudinal Joint Stabilizer Performance Requirements and Material Acceptance:

471.2.1.1–Performance Requirements: The LJS material shall have the capability to fully penetrate the asphalt pavement surface in the area around the longitudinal joint to be treated. The in-depth LJS shall be absorbed and incorporated into the asphalt binder. Verification of this shall be by analysis of the chemical properties of the asphalt binder. The viscosity of the asphalt binder shall be improved to the following extent:

The viscosity shall be reduced by a minimum of thirty (30) % percent as determined by dynamic shear rheometer (DSR) method for asphalt testing in accord with AASHTO –T315-05. This analysis shall apply to extracted asphalt binder, taken from cores extracted thirty days following application in the upper ½” of pavement.

471.2.1.2–Material Acceptance: Prior to beginning work on the project, the Contractor shall submit a testing report by a reputable independent third party or government agency with the capability of performing the testing described in ~~sub~~Section –471.2.1.1. This testing report shall demonstrate that the LJS material to be utilized on this project will fulfill the requirements of the testing described in ~~Sections~~subsection –471.2.1.1.

The Contractor shall furnish a quality inspection report showing the source, manufacturer, and the date shipped for each load of LJS material. The Contractor shall also submit a certified statement from the LJS material manufacturer showing that the LJS material to be used on this project conforms to the required physical and chemical requirements ~~of subsection 708.11 specified in 471.2.2.~~ When directed by the Engineer, the Contractor shall take representative samples of material for testing for conformance with ~~subsection 708.11 the requirements specified in 471.2.2.~~

The LJS material utilized on this project shall be JOINTBOND LJS material, as manufactured by D&D Emulsion, Inc., Mansfield, Ohio and distributed by Pavement Technology Inc. Westlake, Ohio, or an approved equal material which can be shown as specified herein to meet the performance and testing requirements described in Section 471.2.1.1, as well as the physical and chemical requirements of subsection -708.11.

471.2.2–Longitudinal Joint Stabilizer Material Requirements: The LJS material shall be a polymerized maltene emulsion composed of a petroleum resin oil base and SBR copolymer uniformly emulsified in water. Prior to beginning work on the project, the Contractor shall submit a certified statement from the LJS material manufacturer showing that the LJS material to be used on this project conforms to the physical and chemical requirements specified herein.

471.2.2.1–Emulsion Tests:

<u>Test</u>	<u>Test Method</u>	<u>Requirement</u>
<u>Residue, % W</u> (see Note 1)	<u>ASTM D-244 (Mod.)</u>	<u>39 min. / 44 max.</u>
<u>Miscibility Test</u>	<u>ASTM D-699</u>	<u>No Coagulation</u>
<u>Particle Charge Test</u> (see Note 2)	<u>ASTM D-244</u>	<u>Positive</u>

Note 1 ASTM D 244 Evaporation Test for percent of residue is made by heating 100 gram sample to 149 C until foaming ceases, then cool immediately and calculate results.

Note 2 The test procedure shall be identical with ASTM D-244, except that distilled water shall be used in place of two percent sodium oleate solution.

471.2.2.2–Residue From Distillation Tests:

<u>Test</u>	<u>Test Method</u>	<u>Requirement</u>
<u>Flash Point, COC, °C</u>	<u>ASTM D-92</u>	<u>200 min.</u>
<u>Viscosity at 60°C, cSt</u>	<u>ASTM D-445</u>	<u>100 min. / 200 max.</u>
<u>Particle Size</u> (See note 3)	<u>Light Transmittance/DDE</u>	<u>30 max.</u>
<u>Asphaltenes, %w</u>	<u>ASTM D-2006-70</u>	<u>1.00 max.</u>
<u>Maltene Dist. Ratio</u> (PC + A1 (See note 4)) / (S + A2)	<u>ASTM D-2006-70</u>	<u>0.2 min. / 0.8 max.</u>
<u>PC/S Ratio</u> (See note 4)	<u>ASTM D-2006-70</u>	<u>0.5 min.</u>
<u>Saturated Hydrocarbons, S</u> (See note 4)	<u>ASTM D-2006-70</u>	<u>21 min. / 28 max.</u>

Note 3 See Section 471.2.2.2.1 for the test procedure.

Note 4 Chemical composition is determined in accordance with ASTM Method D-2006-70: PC = Polar Compounds, A1 = First Acidaffins, A2 = Second Acidaffins, S = Saturated Hydrocarbons

471.2.2.2.1–Particle Size Test Procedure:

471.2.2.2.1.1–Scope: This procedure covers the determination of the percent light transmittance of the LJS emulsion.

471.2.2.2.1.2–Apparatus:

1. Container may be glass, plastic or metal having a capacity of 6,000 ml.
2. Graduated cylinder, 1,000 ml, or greater
3. Light transmittance measuring apparatus, such as Bausch and Lomb or Lumetron spectrophotometer
4. Graduated pipette having 1 ml capacity to 0.01 ml accuracy
5. Suction bulb for use with pipette
6. Test tubes compatible with spectrophotometer, 3/4" X 6, Bausch and Lomb,
7. Catalog No. 33-17-81 (B&L)

471.2.2.2.1.3–Calibration of Spectrophotometer: Calibrate the spectrophotometer as follows:

- A. Set the wavelength at 580 mu,

- B. Allow spectrophotometer to warm-up for thirty (30) minutes.
- C. Zero percent light transmittance (%LT) scale.
- D. Rinse test tube three times with tap water and fill to top of circle marking on B&L test tube or approximately 2/3 full.
- E. Place tube in spectrophotometer and set %LT scale at 100, and
- F. Repeat steps (c) and (e) two times or until no further adjustments are necessary.

471.2.2.2.1.4–Procedure:

1. Shake, stir or otherwise thoroughly mix emulsion to be tested. Place a sample of the emulsion in beaker and allow to stand one minute.
2. Place 2,000 ml tap water in container.
3. Using a suction bulb, draw 1.00 ml emulsion into pipette. Wipe the outside of the pipette.
4. Using suction bulb, dispense the emulsion into container.
5. Rinse the pipette by drawing in diluted emulsion solution and dispensing it.
6. Clean the pipette with soap or solvent and water. Rinse with acetone.
7. Thoroughly stir the diluted emulsion.
8. Rinse the tube to be used with the diluted emulsion three times and fill it to top of circle.
9. Calibrate the spectrophotometer.
10. Place the diluted emulsion sample tube in spectrophotometer, cover the tube, and read the percent light transmittance (%LT) to nearest tenth.
11. Repeat steps 9 and 10 until three identical consecutive readings are obtained.
12. The elapsed time from the addition of emulsion to dilution of water and final %LT reading should not exceed five (5) minutes.

471.3-CONSTRUCTION REQUIREMENTS:

471.3.1-Weather Restrictions: The temperature of LJS materials at the time of application shall be as recommended by the manufacturer. The LJS material shall be applied only when the existing surface to be treated is thoroughly dry and when it is not threatening to rain. The LJS material shall not be applied when the ambient temperature is below 40 ~~degrees–°Fahrenheit–(4 degrees–Celsius)~~ or may reach less than 40 ~~degrees–°Fahrenheit–(4 degrees–Celsius)~~ within the next twelve (12) hours.

471.3.2-Equipment: Equipment shall include equipment for heating bituminous material, a self-powered bituminous material pressure distributor, an aggregate spreader, and compaction equipment. Equipment shall also include scrapers, hand brooms, shovels, and other items as may be necessary to thoroughly clean the base or surface.

Equipment for heating bituminous material shall consist of a retort coil so designed that steam will not be introduced into the material and shall not degrade the emulsion.

The distributor shall be so designed, equipped, maintained and operated that bituminous material at even heat may be applied uniformly on variable widths of surface up to 15 ft. ~~(4.6 m)~~ at readily determined and controlled rates from 0.05 to 2.0 gal. Per sq. yd. ~~(0.22 to 9.3 liters–m²)~~ with uniform pressure and with an allowable variation from any specified rate not to exceed 0.02 gal. per sq. yd. ~~(0.09 liter–m²)~~ The distributor shall also have a cab-metering system, that will automatically adjust the flow of the bituminous material as the speed of the

truck changes and allow the operator to adjust the rate of application from the cab of the truck.

Distributor equipment shall include a tachometer, pressure gages, and accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and full circulation spray bars adjustable laterally and vertically. A manifold connection shall be provided and hand spraying equipment shall be available to cover areas and patches inaccessible to the distributor.

The spreader for cover grades of coarse aggregates shall be self-propelled. It shall be a mechanical revolving cylinder type or mechanical roller hopper spreader that can be so adjusted to spread accurately the required amounts of materials per square yard. The spreader for other grades of coarse aggregate shall be a self-propelled mechanical stone spreader capable of laying a uniform surface.

Compaction equipment shall be a pneumatic-tired roller conforming to the requirements of ~~Section~~subsection 401.9.10.

471.3.9-Joints: This operation shall be performed as prescribed in ~~Section~~subsection 405.10.

471.3.10-Protection of Pavement and Traffic Control: This operation shall be performed as prescribed in ~~Section~~subsection 405.11.

471.3.11-Sequence of Operations and Quantities of Materials: This operation shall be performed as prescribed in ~~Section~~subsection 405.12

471.3.12-Longitudinal Joint Stabilizer: Unless otherwise approved by the project Engineer, the Contractor shall be required to coordinate such that a technical representative of the LJS manufacturer is on hand prior to the first day of application of LJS material on the project. The technical representative shall also be on hand for and shall supervise the field testing test strip applications described herein.

Unless prevented by the weather restriction requirements in Section 471.3, the LJS material shall be applied immediately after construction of the longitudinal joint, but not prior to the point at which the asphalt has sufficiently cooled and hardened such that the LJS application equipment will not cause damage to the asphalt. Otherwise, the longitudinal joint stabilizer shall be applied within twenty-four (24) hours of completion of the joint.

The LJS shall be applied by a distributor truck or approved applicator at the temperature recommended by the manufacturer and at the pressure required for the proper distribution. The LJS shall be so applied such that uniform distribution is obtained at all points of the areas to be treated. Distribution shall be commenced with a running start to insure full rate of spread over the entire area to be treated. Areas inadvertently missed shall receive additional treatment as may be required by hand sprayer application.

Unless otherwise directed by the Engineer, the standard application width shall be twelve (12) inches ~~(300 mm)~~ on either side of the construction joint as a minimum.

The in-depth joint sealer shall be spread at a rate typically within the range of 0.06 to 0.18 gallons per square yard ~~(0.27 to 0.81 Liters per square meter)~~. More specific typical application rates are shown in the following table:

Surface Type / Applicable Joint Specification	Typical Application Rate, Gal/SY (L/SM)
Aged, Volatilized Pavement	0.06 – 0.10 (0.27 – 0.45)
New Pavement, No Required Joint Testing	0.12 – 0.18 (0.54 – 0.81)
New Pavement, Joint Density Provisions from Control Strip	0.10 – 0.12 (0.45 – 0.54)
New Pavement, Core Sampling at Joint	0.07 – 0.10 (0.32 – 0.45)

These typical application rates are given for perspective and guidance purposes only. Specific application rates to be used on the project shall be based on test strips applied as recommended by the LJS manufacturer. Test strips shall be applied at various rates of application for the purpose of selecting the rate of application that will be absorbed within a twenty (20) minute period.

Where more than one application is to be made, succeeding applications shall be made as soon as penetration of the preceding application has been completed and the Engineer grants approval for additional applications.

Grades or super elevations of surfaces that may cause excessive runoff, in the opinion of the Engineer, shall have the required amounts of LJS applied in two applications as directed.

In the event that blotting of a misapplication of LJS material is required, sand shall be applied. The truck used for applying sand shall be equipped with a spreader that allows the sand to be uniformly distributed onto the pavement. The spreader shall be adjustable so as to accommodate various treatment widths. Applied sand will be swept and removed prior to opening the area to traffic.

If, after the LJS has been allowed to penetrate for a period of approximately thirty (30) minutes, a significant residue remains on the surface of the treated area a light coating of dry sand shall be applied to the surface. The sand shall be swept and removed from the pavement and properly disposed of at the Contractor's expense.

The distributor truck or other approved applicator for spreading the LJS material shall be self-propelled and shall have pneumatic tires. The distributor truck or applicator shall be designed and equipped to distribute the LJS material uniformly on variable widths of surface at readily determined and controlled rates from 0.06 to 0.18 gallons per square yard ~~(0.27 to 0.81 Liters per square meter)~~, and with an allowable variation from any specified rate not to exceed five (5) percent of the specified rate.

The distributor or applicator equipment shall be computerized so as to control the rate of application selected regardless of forward speed of the applicator vehicle and shall include full circulation spray bars, pump tachometer, volume measuring device and a hand hose attachment suitable for application of the LJS material manually to cover areas inaccessible to the distributor. The distributor or applicator shall be equipped to circulate and agitate the LJS material within the tank.

A check of distributor or applicator equipment as well as application rate accuracy and uniformity of distribution shall be made when directed by the Engineer.

471.4-METHOD OF MEASUREMENT:

Application of the LJS material will be measured by the Gallon ~~(Liter)~~ of material applied. The final quantity of material paid for shall be the actual quantity of material applied, rounded up to the nearest gallon ~~(liter)~~.

The surface area of LJS material applied on this project, for the purposes of payment of the "LJS (labor and equipment)" pay item shall be calculated at the rate of 0.22 square yards ~~/ per~~ linear foot ~~(0.093 square meters / linear meter)~~.

When the "Longitudinal Joint Stabilizer" pay item is specified, the surface area of LJS material applied shall be calculated at the rate of 0.22 square yards per linear foot.

471.5-BASIS OF PAYMENT:

The Quantity of "LJS (material)" when specified to be paid by the Gallon ~~(Liter)~~ shall include only the required quantity of LJS material to complete the work (material only).

The Quantity of "LJS (material)" when specified to be paid by the square yard ~~(square meter)~~ shall include all labor, tools, equipment, supplies, and incidentals (exclusive of the LJS material) necessary to complete the work.

The accepted quantity of "Longitudinal Joint Stabilizer" will be paid for at the contract unit price per square yard. Payment shall include all LJS material, labor, tools, equipment, supplies, and incidentals necessary to complete the work.

471.6-PAY ITEMS:

ADD THE FOLLOWING PAY ITEMS TO THE TABLE:

ITEM	DESCRIPTION	UNIT
471006-001	LJS (material)	Gallon (Liter)
471006-002	LJS (equipment & labor)	Square Yards (Square Meters)
<u>471006-005</u>	<u>Longitudinal Joint Stabilizer</u>	<u>Square Yard</u>
<u>Note:</u>	<u>When Item 471006-001 and 471006-002 are used, both items should be included in the project.</u>	

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 501

PORTLAND CEMENT CONCRETE PAVEMENT

501.19-TOLERANCE IN PAVEMENT THICKNESS:

DELETE THE ENTIRE CONTENTS OF SUBSECTION 501.19 AND REPLACE WITH THE FOLLOWING:

It is the intent of these Specifications that the pavement shall be constructed in substantial conformity with the specified thickness. Paving operations shall be directed toward obtaining an ~~average and~~ uniform thickness equal to or greater than the specified thickness.

~~_____ For the purpose of establishing an adjusted unit price for pavement areas deficient in thickness, the thickness characteristics will be determined in accordance with the criteria specified.~~

~~_____ The pavement thickness characteristics will be determined from non-destructive testing methods, in accordance with MP 700.10.01. Individual thickness measurements shall be considered acceptable if it equals or exceeds the specified thickness. If the measurement is not acceptable, utilize subsection 501.23.1.1.~~

~~_____ **501.19.1-Sampling Units and Sampling Requirements** **Testing Frequency:** The pavement thickness characteristics will be determined from an analysis of measurements made by non-destructive methods in accordance with MP 700.10.01. These Thickness measurements will be ~~made~~ taken by the Division at random locations with a frequency of one (1) measurement ~~from each sampling unit as defined per 800 feet per paving width. The individual thickness measurements shall represent the entire 800 foot section.~~~~

~~_____ If the accuracy of a result from the non-destructive method is questioned by the Engineer, then a core shall be taken from the location at which the non-destructive measurement was taken. ~~The subject core thickness shall then be used to verify the measurement from the non-destructive method, and if~~ a difference of more than 1/4 inch between the two measurements exists, the core measurement shall be used for acceptance purposes, instead of the non-destructive method measurement. The Contractor shall refill and properly cure all core holes at no additional cost to the Division.~~

~~_____ **501.19.1.1-Highway Proper:** The total length of paving lane in linear feet in the highway proper shall be divided by 500 to determine the largest whole number which shall be the number of sampling units in the highway proper. The width of the sampling unit~~

shall be the width of the paving lane, and the length of the sampling unit shall be determined by dividing the total length of paving lane in linear feet in the highway proper by the number of sampling units determined in the manner set forth. When paving lane width exceeds twenty four (24) feet, the Division may establish shorter sampling units.

When the number as determined above is less than ten (10), the total length of the paving lane in linear feet shall be divided into ten (10) equal sampling units.

501.19.1.2 Auxiliary Features: Intersections, entrances, exits, crossovers, ramps, etc., may be considered individually or collectively so as to form sampling units most nearly the length previously established in the highway proper.

501.19.2-Deficient Thickness (Detection and Delineation) Testing Request: One thickness measurement will be taken, by the method outlined in MP 700.10.01, from each sampling unit. That thickness measurement shall represent the thickness of the pavement in that unit.

When a sampling unit is represented by a measurement which is less than 0.922 of the specified pavement thickness (T), the sampling unit will be evaluated as set forth in 501.19.2.1.

At least two (2) weeks prior to paving, the Engineer will request the applicable reflectors via the form found in the MCS&T Toolbox.

The Engineer will submit a pavement testing request to MCS&T via the form found in the MCS&T Toolbox.

501.19.2.1 When a thickness measurement, which represents a sampling unit, has a value of 0.922T or less, the area of deficient thickness in that sampling unit will be delineated by taking exploratory cores at approximately twenty (20) foot intervals, parallel to the centerline, in each direction from the measurement taken in subsection 501.19.2, until a core is obtained, in both directions, which is greater than 0.922T inch thickness (length). Areas thus defined shall be removed and replaced at no additional cost to the Division. These exploratory cores will not be used in the analysis of the remainder of the unit. The balance of the sampling unit will be treated as a separate sampling unit.

One additional core will be obtained from another random location in that sampling unit and shall represent the thickness of the remainder of that sampling unit. The thickness of the sampling unit represented by this core, when greater than 0.922T, will be included in the measurements specified in subsection 501.23.1.1.

501.19.3 Refilling of Cores: As soon as directions are issued by the Engineer, the Contractor shall refill and properly cure all test holes at no additional cost to the Division.

501.23-BASIS OF PAYMENT:**501.23.1-General:**

DELETE THE CONTENTS OF SUBSECTIONS 501.23.1.1, 501.23.1.2, AND 501.23.1.3 AND REPLACE WITH THE FOLLOWING:

~~501.23.1.1-The measurements which represent the thickness of the sampling units shall be analyzed to determine the average value of the pavement thickness. This value will be used to determine the degree of compliance with the provisions set forth in subsection 501.19 and to develop certain factors to be used in the derivation of equitable deductions as set forth in subsections 501.23.1.2 and 501.23.1.3, in the event the provisions of this Specification are not met.~~

~~No payment will be made for pavement areas that are 0.922T or less in thickness, the area being defined in the manner set forth in subsection 501.19.2.~~

~~1. If Any area the thickness measurement of pavement which is deficient in thickness by more than 0.7 inches and is considered by the Engineer to be inadequate to perform satisfactorily shall be removed and replaced at no added cost to the Division.~~

~~2. If the The balance of the item, the portion of the item not treated in the manner set forth above, thickness measurement is deficient by less than or equal to 0.7 inches, area defined by the deficient thickness measurement will be treated in the manner set forth in Table 501.23.1.1. subsections 501.23.1.2 or 501.23.1.3.~~

~~501.23.1.2 When the average value of the pavement thickness is equal to or greater than the specified thickness, the quantity of pavement represented by this average thickness will be paid at the contract unit price.~~

~~501.23.1.3 When the average value of the pavement thickness is less than the specified thickness, the fraction of pavement having a thickness greater than 0.922T will be paid for at a unit price as set forth in the following schedule, and no payment will be made for the remainder of the pavement being considered.~~

TABLE 501.23.1.1

Average Value of Pavement- Measured Thickness	Unit Price as Percent of Contract Unit Price
0.01 to 0.10 inches Less Than Specified Thickness	98.0
0.11 to 0.20 inches Less Than Specified Thickness	96.0
0.21 to 0.30 inches Less Than Specified Thickness	94.0
0.31 to 0.40 inches Less Than Specified Thickness	92.2
0.41 to 0.50 inches Less Than Specified Thickness	90.3
0.51 to 0.60 inches Less Than Specified Thickness	88.4
0.61 to 0.70 inches Less Than Specified Thickness	86.5
More than 0.70 inches Less Than Specified Thickness	0.0

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 506

CONCRETE PAVEMENT REPAIR

506.2-MATERIALS:

DELETE THE CONTENTS OF SUBSECTION 506.2 AND REPLACE WITH THE FOLLOWING:

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

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

A non-shrink cementitious grout ~~meeting the requirements of ASTM C1107~~ or an approved epoxy adhesive shall be used to firmly anchor dowel bars in 30 minutes. If used, the non-shrink grout shall meet the requirements of ASTM C1107. If used, the epoxy adhesive shall be evaluated by AASHTO Product Evaluation and Audit Solutions and ~~meeting~~ the requirements of AASHTO M 235, Type IV, Grade 3, Class B or C. ~~shall be used to firmly anchor dowel bars in 30 minutes.~~ This material shall be approved by the Engineer for the intended application.

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

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 601 STRUCTURAL CONCRETE

601.3-PROPORTIONING:

DELETE THE THIRD PARAGRAPH OF SUBSECTION 601.3 AND REPLACE WITH THE FOLLOWING:

Design mixture testing for Class H concrete shall be in accordance with MP 711.03.23 and shall include air content, slump, compressive strength, and surface resistivity test. For establishment of mixture proportions, surface resistivity tests shall be conducted on representative samples prepared and tested in accordance with AASHTO T 358. The specimens shall be moist cured ~~then tested at an age of 28 days, and the~~ in accordance with the accelerated moist-curing method defined in AASHTO T358 until as close to the time of test as possible and then tested at an age of 28-days in accordance with AASHTO T358. The surface resistivity result shall be equal to or greater not be less than 30 40 kΩ-cm. The cost of all test mix requirements shall be considered incidental to the cost of Class H concrete.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 601
STRUCTURAL CONCRETE

601.4-TESTING:

601.4.5-Tests for Surface Resistivity Acceptance of Class H Concrete:

DELETE THE FIRST PARAGRAPH OF SUBSECTION 601.4.5 AND REPLACE WITH THE FOLLOWING:

The Contractor shall also be required to fabricate three (3) surface resistivity test specimens in accordance with AASHTO T 358 every time that a set of compressive strength specimens for Class H is fabricated. These test specimens shall be moist cured in accordance with the accelerated moist-curing method defined in AASHTO T358 until as close to the time of test as possible, and ~~they then shall be~~ tested at an age of 28-days in accordance with AASHTO T358. These test results shall be used by the Engineer as the basis for evaluation as to the adequacy of the material for the use intended. The minimum surface resistivity test result for full payment shall be 30 kΩ-cm. Table 601.4.05 specifies the penalty structure for payment of material that has a surface resistivity test result lower than 30 kΩ-cm.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 626

RETAINING WALL SYSTEMS

DELETE THE ENTIRE CONTENTS OF SECTION 626 AND REPLACE WITH THE FOLLOWING:

626.1-DESCRIPTION:

This work shall consist of furnishing the design, wall construction plans, materials, and construction of cast-in-place reinforced concrete, ~~or~~ Mechanically Stabilized Earth (MSE), Modular Block or Precast Gravity walls in accordance with these specifications and in reasonably close conformity with the lines, grades, design, and dimensions shown in the plans.

626.2-GENERAL:

Unless specified otherwise in the contract documents the wall may be, at the Contractor's option, any one of the wall systems on the approved ~~source~~ products list corresponding to the applicable Pay Item; this list is posted on the MCS&T web page under the heading Approved Source/Product Listing.

The Contractor shall indicate which wall system is to be constructed by the bid alternative chosen in the proposal. No change of the wall system indicated in the bid proposal shall be permitted after the bid opening unless approved by the Engineer.

The wall design and detail plans for construction shall be submitted to the Engineer for approval. The time required for preparation and review of these submittals shall be charged to the allowable contract time. Delays caused by untimely submittals or insufficient data will not be considered justification for time extensions. No additional compensation will be made for any additional material, equipment, or other items found necessary to comply with the project specifications as a result of the Engineer's review. The proposed wall design shall be compatible with the Contractor's proposed method of construction, and shall be compatible with any method of construction shown in the plans. The Division does not assume nor warrant any wall system's compatibility with any particular construction methods.

626.3-DESIGN CRITERIA:

626.3.1-General: The size of all structural elements shall be determined such that the design load stresses do not exceed the allowable stresses found in the AASHTO LRFD Bridge Design Specifications, latest edition.

Analysis of external stability of the in-place retaining wall system will be the responsibility of the Division. Any staged or temporary construction affecting wall stability shall be the responsibility of the Contractor.

The parapets on any portion of the retaining walls as shown in the plans shall be designed to resist traffic loads in accordance with the AASHTO LRFD Bridge Design Specifications, latest edition.

626.3.2-Mechanically Stabilized Earth: The design for the MSE wall shall consider the internal stability of the wall mass. The design shall conform to the requirements found in AASHTO LRFD Bridge Design Specifications, latest edition.

External loads, which affect the internal stability such as those, applied through piling, bridge footings, temporary construction, etc. shall be accounted for in the design. A design life of 100 years shall be used throughout the design. The factor of safety for pullout resistance shall not be less than 1.50 based on pullout resistance at $\frac{3}{4}$ inch deflection.

The allowable bearing pressure under the stabilized mass shall be as shown in the plans. The minimum length of the soil reinforcing system, as measured from the back of the front face to the end at the back of the soil stabilized mass, shall be as shown in plans, and shall be the same from top to bottom of the wall at any cross section.

All appurtenances behind, in front of, under, mounted upon, or passing through the wall such as drainage structures, utilities, or other items shown in the plans must be accounted for in the design of the wall.

626.3.3-Precast Gravity Wall: The design for the precast gravity wall shall consider the internal stability of the wall mass. The design shall conform to the requirements found in AASHTO LRFD Bridge Design Specifications, latest edition.

External loads, which affect the internal stability such as those, applied through piling, bridge footings, temporary construction, etc. shall be accounted for in the design. A design life of 100 years shall be used throughout the design.

626.3.43-Cast-in-Place Reinforced Concrete: When a Cast-in-Place Reinforced Concrete option is included in the plans the following shall be applicable.

The information shown in the plans for the cast-in-place alternative is schematic; however, all dimensions shown in the plans shall be considered minimums.

The allowable bearing pressure of the foundation soils, the unit weight of the retained soils, and the characteristics of the retained soils necessary for design purposes shall be as shown in the plans.

626.4-SUBMITTALS:

626.4.1-General: The Contractor shall submit complete design calculations, explanatory notes, and detail plans for the proposed wall system. The detail plans shall include all details, dimensions, quantities, and cross sections necessary to construct the wall and shall include but not be limited to the following items:

A plan and elevation sheet or sheets for the wall which shall contain the following:

1. An elevation view of the wall which shall indicate the elevations at the top of the wall at all horizontal and vertical break points and at least every fifty (50) feet along the face of the wall, all steps in the footings or leveling pads, the original and final ground lines,

- the maximum bearing pressures, and the summary of quantities for each wall.
2. A plan view of the wall which shall indicate the offsets from the construction centerline to the face of the wall at all changes in horizontal alignment and the centerline of any drainage structure or drainage pipe behind, passing through, or under the wall.
 3. A typical cross section or cross sections showing elevation relationship between existing ground conditions and proposed grades.
 4. All general notes required for constructing the wall. The required batter to compensate for the elongation of the soil reinforcing during erection shall be shown for each different required height.
 5. All horizontal and vertical curve data affecting the wall.
 6. All details for footings or leveling pads shall be shown including details for steps in the footings or leveling pads.
 7. All details for construction of walls with appurtenances behind, under, mounted upon, or passing through the wall such as drainage structures or utilities shall be clearly indicated.
 8. The wall manufacture shall submit copies of their Quality Assurance/Quality Control Manuals on each project.
 9. Required architectural treatments shall be as indicated and as detailed in the plans. All details for any required architectural treatments shall be shown including:
 - a. Product data and installation instructions for manufactured form systems, form liners, release agents, ties, and accessories. The release agent manufacturer shall certify that the products supplied comply with regulations controlling the use of volatile organic compounds (VOC's).
 - b. Shop drawings for fabrication and erection. These drawings shall show all items that visually affect the exposed concrete, including, but not limited to, general form construction, jointing, specially formed joints or reveals, and patterns of placement. The Engineer's review will be for general architectural applications and features only. Formwork design for structural stability and sufficiency is the Contractor's responsibility and shall not be submitted for the Engineer's review.
 - c. Mockup or Sample Facing elements. The Contractor shall construct a mockup or sample facing element using the proposed formwork and facing materials in order to demonstrate the required finishes and textures. Actual construction of concrete shall not proceed until the Engineer has accepted the sample units.

At the time the detail plans are submitted for review, they shall be accompanied by design calculations and explanatory wall notes. These documents shall be legible and shall demonstrate that the design criteria have been met. Specified minimum factors of safety and the maximum soil pressure beneath the wall footing or earth stabilized mass shall be clearly indicated.

The plans shall be prepared on reproducible sheets twenty-two (22) x thirty-four (34) inches including borders. Each sheet shall have a title block in the lower right hand corner. The title block shall include the sheet number of the drawing, name or designation of the wall, the state and federal project designation, project name, fabricator and Contractor name. Design calculations and notes shall be prepared on sheets 8½ x 11 inches, and shall contain the project designation, wall designation, date of preparation, initials of designer and checker, and page number at the top of the page. The Detail Plans, Design Calculations, and

Explanatory Notes shall be signed and stamped by a Professional Engineer registered in West Virginia and knowledgeable in the proposed alternative wall system.

The initial submission shall include three sets of the detail plans, calculations, and notes. One set of notes and plans will be returned to the Contractor with any indicated corrections. When the plans and notes are stamped approved by the Engineer, the Contractor shall furnish the Engineer with the requested number of sets of prints and a Mylar set of the plans for distribution by the Division. The Contractor shall perform no work or ordering of materials for the structures until the Engineer has approved the submittal.

626.4.2-Mechanically Stabilized Earth: The details and material specifications for the wall facing elements and incidental accessories shall be included with detail plans for approval by the Engineer.

The designation as to the type of facing element, the length of the soil reinforcing systems, the distance along the face of the wall where changes in lengths of the soil reinforcing systems occur, and the limit of mesh, strip, or anchor shall be clearly shown in the plans.

All wall facing elements shall be detailed. The details shall show all dimensions necessary to construct the element, all reinforcing steel in the element, and the location of soil reinforcing system devices embedded in the elements.

626.4.3-Precast Gravity Walls: The details and material specifications for the precast blocks shall be included with detail plans for approval by the Engineer.

626.4.43-Cast-in-Place Reinforced Concrete: The plans for the cast-in-place wall shall contain a complete reinforcing bar schedule showing all bending details and bar marks. The plans shall also show the location of all construction joints, expansion joints, or other joints in the wall. All wall thickness shall be shown and transition details at wall thickness changes.

626.5-MATERIALS:

626.5.1-Mechanically Stabilized EarthRetaining Wall Components: The Contractor shall make arrangements to purchase the facing elements, reinforcing mesh or strips, attachment devices, joint materials, and all other necessary components. Materials not conforming to this section of the specifications or from sources not listed in the contract documents shall not be used without written consent from the Engineer.

626.5.1.1-Facing ElementsConcrete Elements:

626.5.1.1.1-Reinforced Concrete Facing-Elements: The MSE facing elements and Gravity Wall components shall be fabricated in accordance with Section 601 of the Specifications with the following exceptions and additions:

- A. Concrete for the reinforced concrete facing elements shall attain a minimum compressive strength of 4,000 psi at 28 days. All concrete shall have air entrainment of 7 % plus or minus 2.5 % with no other additives. Specified concrete properties are to be tested in accordance with applicable provision of subsection 601.4.1 of the Specifications. Acceptance of a Production Lot will be made if the compressive strength test result is greater than or equal to, 4,000 psi. A Production Lot is defined as a group of panels that will be represented by a single compressive strength test result is greater than or equal to, 4,000 psi. A Production Lot is

defined as a group of elements that will be represented by a single compressive strength sample and will consist of a single day's production. A minimum of two (2) cylinders shall be required for every compressive strength sample.

- B. The units shall ~~be fully supported until the concrete reaches a minimum compressive strength of 1,000 psi~~ not be removed from forms until the concrete has reached a minimum of 50% of the 28-day design strength.
- C. Unless otherwise indicated in the plans or elsewhere in the specifications, the concrete surface for the front face shall have a Class 1 finish as defined by subsection 601.11 and a uniform surface finish for the rear face. The rear face of the element shall be screeded to eliminate open pockets of aggregate and surface distortions in excess of ¼ inch. The panels shall be cast on a flat area. The clevis loops, tie strip guide, or other galvanized devices shall not contact or be attached to the face element reinforcement steel.
- D. The date of manufacture, the production Lot number, and the piece mark shall be clearly scribed on an unexposed face of each element.
- E. All units shall be handled, stored, and shipped in such a manner as to eliminate the dangers of chipping, discoloration, cracks, fractures, and excessive bending stresses. Elements in storage shall be supported in firm blocking to protect the element connection devices and the exposed exterior finish.
- F. All units shall be manufactured within the following tolerance:
 - 1. Element Dimensions: Position of element connection devices within one (1) inch, except for coil and loop embeds which shall be 3/16 inch. All other dimensions within 3/16 inch.
 - 2. Element Squareness: Squareness as determined by the difference between the two diagonals shall not exceed ½ inch.
 - 3. Element Surface Finish: Surface defects on smooth formed surfaces measured over a length of five (5) feet shall not exceed ¼ inch. Surface defects on the textured-finished surfaces measured over a length of five (5) feet shall not exceed 5/16 inch.

Units shall be rejected because of failure to meet any of the requirements specified above. In addition, any or all of the following defects shall be sufficient cause for rejection:

- 1. Defects that indicate imperfect molding.
- 2. Defects indicating honeycombed or open textured concrete.
- 3. Cracked or severely chipped elements.
- 4. Color variation on front face of panel due to excess form oil or other reasons.

All reinforcing steel shall be in accordance with Section 602 and shall be epoxy coated. Precast concrete ~~Mechanically Stabilized Earth wall facing~~ elements shall also conform to MP 604.02.40.

~~—626.5.1.1.2 Modular Block Facings: The length and width of each block shall be within ±1/8 inch. The height of each block shall be within ±1/16 inch. Hollow units shall have a minimum wall thickness of 1.25 inch. When a broken face finish is used the dimension of the front face shall be within one (1) inch of the theoretical dimension of the unit.~~

~~— All units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or performance of the construction. Cracks greater than 1/64 inch wide and greater than 25% of the block height is grounds for rejection.~~

~~— The front face or faces of units that are to be exposed shall be free of chips, cracks or other imperfections that can be seen when viewed from a distance of thirty (30) feet under diffused lighting. Up to 5% of the shipment may contain slight cracks or small chips not larger than one (1) inch.~~

~~— Color and finish shall be shown on the shop drawings and shall be erected with a running bond configuration.~~

~~— When cap units are used they shall be cast to or attached to the top of the modular block wall in strict accordance with the manufacturer's recommended procedure.~~

~~— **626.5.1.1.2.1 Modular Block Mix Design:** Each manufacturing facility shall provide a copy of their mix design, including test results and material sources, to MCS&T Division for each type of block that they manufacture. A separate mix design shall be required for each type of block, as the compaction of each type of block may vary and affect the various test results. An approved independent laboratory shall perform the testing when establishing the mix design. After initial approval, each mix design shall remain approved for a period of three years after the date of initial approval. If there are any changes in the mix, such as changes in material sources, any materials such as pigments are added, or the pigment color is changed, then a new mix design shall be required. The modular block units shall conform to the following:~~

~~— All of the units shall conform to ASTM C1372, except that:~~

- ~~(a) The minimum compressive strength requirements shall be 4000 psi for any individual unit. The average of five units shall be used as the mix design strength.~~
- ~~(b) The maximum 24 hour water absorption shall not exceed 7%. The average of five units shall be used as the mix design absorption.~~
- ~~(c) The freeze/thaw durability of wall units tested in accordance with ASTM C1262 in a 3% saline solution shall be the minimum of the following:~~
 - ~~1. The weight loss of each of five test specimens at the conclusion of 90 cycles shall not exceed 1% of its initial weight.~~
 - ~~2. The weight loss of each of 4 of the 5 test specimens at the conclusion of 100 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5th specimen to not exceed 10%.~~
- ~~(d) The freeze/thaw durability of cap units shall be tested in accordance with ASTM C1262 in a 3% saline solution shall be the minimum of the following:~~
 - ~~1. The weight loss of each of five test specimens at the conclusion of 40 cycles shall not exceed 1% of its initial weight;~~
 - ~~2. The weight loss of each of 4 of the 5 test specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5th specimen not to exceed 10%.~~
- ~~(e) ASTM C1262 test results shall be recorded and reported in 10 cycle intervals.~~

~~—626.5.1.1.2.2 Modular Block Production:~~ Each manufacturing facility shall provide the Engineer with a copy of their quality control plan and procedures.

~~—Sampling and Testing shall conform to ASTM C140, except: Section 6.2.4 shall be deleted and replaced with the following:~~

~~"The specimens shall be coupons cut from a face shell of each unit and sawn to remove any face shell projections. The coupon size shall have a height to thickness ratio of 2 to 1 before capping and a length to thickness ratio of 4 to 1. The coupon shall be cut from the unit such that the coupon height dimension is in the same direction as the unit height dimension. Compressive testing of full size units will not be permitted. The compressive strength of the coupon shall be assumed to represent the net area compressive strength of the whole unit."~~

~~—Each manufacturing facility is required to sample and test each block type at the rate of one sample per 5000 units of continuous production from each mix design or fraction thereof (if production is interrupted) as part of their overall quality control testing. Each manufacturing facility shall forward all quality control test reports and documentation to the MCS&T Division. The manufacturing facility or other testing facilities may perform this quality control testing.~~

~~—The average compressive strength of each lot of the modular block units shall be a minimum of 90% of the mix design strength, and the average absorption of each lot shall be between 1.5% less than to 0.5% greater than the mix design absorption. If the compressive strength or absorption criteria are not met, then the modular block in that lot are rejected and cannot be incorporated into the work unless that lot is tested and found to be acceptable under section 626.5.1.1.2.1.~~

~~—Cap units and wall units shall be sampled and tested as separate block types.~~

~~—Minimum manufacturer testing shall include 6 randomly selected units and the following testing:~~

- ~~a. Compressive strength (average of 3 units)~~
- ~~b. 24 hour absorption (average of 3 units)~~

~~—The MCS&T Division will randomly select 6 units for testing by the Division for every 15,000 units of continuous production from each mix design or fraction thereof (if production is interrupted). MCS&T may require the manufacturer to conduct freeze/thaw durability testing when inconstancies in the test results arise.~~

~~—626.5.1.1.2.3 Modular Block Sealing:~~ All modular block retaining wall surfaces shall be sealed. This work shall consist of preparation, furnishing and applying the surface sealer to the exposed front face, of all the wall units, as well as the back side of the upper courses of the wall layer of reinforcement, and the top of the uppermost block or cap unit.

~~—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.~~

~~—Due to the potentially hazardous ingredients contained in sealer formulations extreme care must be exercised in their handling and use, and the manufacturer's recommendations shall be closely followed.~~

~~—Construction Requirements:~~

- ~~1. The Contractor shall comply with the manufacturer's written instructions for preparing, handling and applying the surface sealer.~~
- ~~2. The surface to be treated shall receive a light water blast to the extent that the surface is clean and free of oils.~~
- ~~3. Before the surface sealer is applied, the surface shall be dry and free of all dust, debris, and frost.~~
- ~~4. Surface sealers shall be applied at the heaviest application rate specified by the manufacturer.~~

~~—All materials and work performed as specified above will be incidental to the construction of the wall.~~

626.5.1.1.32-MSE Wire Facings**Face Retaining Walls:** Wire facing shall be shop fabricated of cold drawn steel wire conforming to the minimum requirements of AASHTO M 336 and welded into the finished configuration in accordance with AASHTO M 55. Galvanizing shall conform to the minimum requirements of AASHTO M 111.

Retention material shall be placed along the back face of the wire facing to retain the backfill behind the wall. Retention material shall be capable of retaining the backfill, UV resistant and shall have a high permittivity.

626.5.1.1.43-Soil Reinforcing and Attachment Devices: All reinforcing and attachment devices shall be carefully inspected to insure they are true to size and free from defects that may impair their strength and durability. Ensure that pins used to align the precast components during construction are of the size, shape and material required for the wall system chosen.

626.5.1.1.54-Metal Soil Reinforcing or Attachment Devices: Cutting of reinforcing strips or mesh at vertical obstacles shall not be permitted. Care must be taken to avoid damage to the galvanized coating during handling, storing, and shipping.

The following requirements shall apply to all soil reinforcing and attachment devices:

- A. Reinforcing strips shall be hot rolled from bars to the required shape and dimensions. Their physical and mechanical properties shall conform to ASTM A36. Galvanization shall be required and shall conform to the minimum requirements of AASHTO M 111.
- B. Reinforcing mesh shall be shop fabricated of cold drawn steel wire conforming to the requirements of paragraph one of subsection 709.4. Galvanization shall be applied after the mesh is fabricated and shall conform to the minimum requirements of AASHTO M 111.

- C. The tie strips shall be shop fabricated of a hot rolled steel conforming to the minimum requirements of ASTM A570, Grade 50 or equivalent. Galvanization shall be required and shall conform to AASHTO M 111.
- D. Loop embedments shall be fabricated of cold drawn steel wire conforming to ASTM A510, UNS G10350 or AASHTO M 336. Loop embeds shall be welded in accordance with ASTM A 185. Both shall be galvanized in accordance with ASTM B633 or AASHTO M 111.
- E. Bolts shall meet the requirements of AASHTO M 164. Nuts shall meet the requirements of AASHTO M291 Grade DH or AASHTO M 292 2H. Fasteners shall be galvanized in accordance with AASHTO M 232.
- F. Connector pins and mat bars shall be fabricated from cold drawn steel conforming to AASHTO M 336 and welded to the soil reinforcement mats as shown in the plans. Galvanization shall be required and shall conform to AASHTO M 111.

626.5.1.1.65-Geosynthetics Soil Reinforcing or Attachment Devices: Cutting of geosynthetic reinforcing longitudinal to the wall face at vertical obstacles shall not be permitted. End to End splicing of geosynthetic material will not be permitted.

The geosynthetic used shall meet the minimum requirements shown on the shop drawings. Each roll of geosynthetic material shall be labeled as to its properties. Geosynthetics shall be made of polypropylene, high-density polyethylene or high tenacity polyester fibers having cross-sections sufficient to permit significant mechanical interlock with the soil/backfill. Geosynthetics shall have a high tensile modulus in relation to the soil/backfill. Geosynthetics shall have a high resistance to deformation under sustained long term design loads while in service and resistant to ultraviolet degradation, to damage under normal construction practices and to all forms of biological or chemical degradation normally encountered in the material being reinforced.

Store the geosynthetics in conditions above 20° F and not greater than 140° F. Prevent mud, wet cement, epoxy, and like materials from coming into contact with and affixing to the geosynthetic material. Rolled geosynthetic may be laid flat or stood on end for storage. Cover the geosynthetic and protect from sunlight prior to placement in the wall system.

Carefully inspect all reinforcement to ensure they are the proper size and free from defects that may impair their strength and durability.

The geosynthetic reinforcement structure shall be dimensionally stable and able to retain its geometry under construction stresses and shall have high resistance to damage during construction. The contractor shall submit a manufacturer's certification that the geosynthetics supplied meets the design criteria shown on the shop drawings, measured in full accordance with all test methods and standards specified. In case of dispute over validity of values, the Engineer can require the contractor to supply test data from an approved laboratory to support the certified values submitted.

The Contractor's submittal's package shall include actual test results for tension/creep, durability/aging, construction damage, pullout, quality control and a copy of the Manufacturers installation procedures. Also included should be the Long-Term Design Strength (LTDS) of the Geosynthetic material. The Manufacturer shall also provide written certification that all resin used to produce the geosynthetic is virgin and classified as high density polyethylene, polypropylene, or high tenacity polyester and is capable of

withstanding direct exposure to sunlight for 14 days with no measurable deterioration as per ASTM D4355.

The allowable tensile strength shall not exceed 30% for class 1 walls and 25% for all other walls of the ultimate tensile strength of the reinforcement used. The allowable tensile properties of geosynthetic reinforcement as shown on the shop drawings shall be calculated using the following method.

<u>Property</u>	<u>Method</u>
Tensile Strength Ultimate, kN/m	ASTM D4595
Long-term (Ta), kN/m	FHWA/SA-93-025

Where: $T_a = T_{ult} / \{ (R_{Fcr}) (R_{fid}) (R_{fdu}) \}$

Tult Ultimate Tensile Strength shall be the minimum average roll value ultimate tensile strength as tested per ASTM D4595.

RFcr Partial Factor for Creep Deformation is the ratio of Tult to the creep limited strength determined in accordance with ASTM D5262. The test results shall be extrapolated for a 100 year design life per GRI GG4. Creep performance data of a polymer product at a designed temperature is limited to one order of magnitude in extrapolation. Creep performance data at an elevated temperature permits an additional order of magnitude in extrapolation with time temperature superposition principals. Elevated temperature testing of the specific geogrid for 10,000 hours or creep testing at room temperature for 100,000 hours is required. Creep limited strength testing is required on representative samples of the finished product for each product proposed for use and not a single component of the geogrid (i.e. polymer strand). Default values for RFcr are not allowed.

Rfid Partial Factor for Installation Damage, shall be determined from construction damage tests for each product proposed for use with project specific representative or more severe backfill and construction techniques. The backfill soil used if other than project specific, shall have a D50 > 1” (30 mm) sieve. Testing shall be consistent with GRI GG4. A Maximum Rfid value shall be used if such testing has not been conducted.

RECOMMENDED VALUES FOR R _{fid}		
Geosynthetic	Min. R _{fid}	Max. R _{fid}
HDPE uniaxial geogrid	1.20	1.45
PP biaxial geogrid	1.20	1.45
PVC - coated PET geogrid	1.30	1.85
Acrylic-coated PET geogrid	1.30	2.05
Woven geotextiles (PP and PET)	1.40	2.20
Nonwoven geotextiles (PP and PET)	1.40	2.50
Silt – film woven PP geotextiles	1.60	3.00

R_{fd} Partial Factor for Durability / Aging is the combined partial factor for potential chemical and biological degradation. R_{fd} shall be determined from polymer specific (HDPE and PP as identified by specific gravity and melt flow index and PETP as identified by CEG number and intrinsic viscosity) durability testing covering the range of expected soil environments. Prior to approval by the Engineer, the manufacturer shall submit test results from a minimum of at least four (4) tests conducted in accordance with EPA 9090 at temperatures of 73° and 122°F. EPA 9090 test results shall include the following minimum number of leachate types:

PH	Minimum # of test results
3 ≤ pH ≤ 7	1
7 < pH < 9	1
9 < pH < 11	1
1 ≤ pH ≤ 14	1

As a minimum, the following tests should be performed for geogrids after immersion in the above-described leachates:

TEST	TEST PROCEDURE	MAX % CHANGE ALLOWED
Mass per Unit Area	EPA 9090	±1.0
Dimensions	EPA 9090	±1.0
Thickness	ASTM D374C	±5.0
Wide Width Strip Tensile	ASTM D374C	-2.0

FS_d shall not be less than the recommended minimum values discussed in FHWA/RD-89-186 and listed below:

High Density Polyethylene (HDPE)	1.10
Coated High Tenacity Polyester (PETP)	1.15
Polypropylene (PP)	1.25
Geotextiles	1.60
Uncoated High Tenacity Polyester (PETP)	1.60

1. Composite (flexible/coated) geogrids shall be evaluated based on the durability characteristics of the interior reinforcement polymer. Therefore, any protective coating shall be removed prior to durability testing unless a minimum 40-micron coating thickness is used on flexible geogrids and certified by the manufacturer.
2. For soils of potential concern, as presented below (modified soils shall include lime stabilized soil, cement stabilized soil or concrete), only polymers listed as “no effect”

shall be used within or adjacent to (3 feet shortest measurable distance) these soil environments (Ref: Table 28, FHWA/RD-89-186).

SOIL ENVIRONMENT	PETP	PE	PP	PVC
Acid Sulfate Soils	?	NE	?	?
Organic Soils	NE	NE	NE	?
Salt Affected Soils	?	NE	NE	NE
Ferroginous	NE	NE	X	?
Calcareous	X	NE	NE	?
Modified Soils	X	NE	NE	?

NE = No Effect

? = Questionable Use

X = Not Recommended

RECOMMENDED MINIMUM VALUES FOR R_{fdu}					
Products	Aging Reduction factor, R_{fdu} – 100 years				
	$pH \leq 3$	$3 < pH \leq 5$	$5 < pH < 8$	$8 < pH < 9$	$pH > 9$
PET Geotextiles Mn < 20,000 40 < GEG < 50	*	2.0	1.6	2.0	*
PET Coated Geogrids Mn > 25,000 GEG < 30	*	1.3	1.15	1.3	*
Polypropylene and HDPE Geogrids	1.1	1.1	1.1	1.1	1.1

* Use of materials in this pH range is not recommended but can be used if product specific testing is done.

626.5.1.2: Blank Modular Block Components

626.5.1.2.1-Modular Block Facings: The length and width of each block shall be within $\pm 1/8$ inch. The height of each block shall be within $\pm 1/16$ inch. Hollow units shall have a minimum wall thickness of 1.25 inch. When a broken face finish is used the dimension of the front face shall be within one (1) inch of the theoretical dimension of the unit.

All units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or performance of the construction. Cracks greater than $1/64$ inch wide and greater than 25% of the block height is grounds for rejection.

The front fact or faces of units that are to be exposed shall be free of chips, cracks or other imperfections that can be seen when viewed from a distance of thirty (30) feet under diffused lighting. Up to 5% of the shipment may contain slight cracks or small chips not larger than one (1) inch.

Color and finish shall be shown on the shop drawings and shall be erected with a running bond configuration.

When cap units are used they shall be cast to or attached to the top of the modular block wall in strict accordance with the manufacturer's recommended procedure.

626.5.1.2.2-Modular Block Mix Design: Each manufacturing facility shall provide a copy of their mix design, including test results and material sources, to MCS&T Division for each type of block that they manufacture. A separate mix design shall be required for each type of block, as the compaction of each type of block may vary and affect the various test results. An approved independent laboratory shall perform the testing when establishing the mix design. After initial approval, each mix design shall remain approved for a period of three years after the date of initial approval. If there are any changes in the mix, such as changes in material sources, any materials such as pigments are added, or the pigment color is changed, then a new mix design shall be required. The modular block units shall conform to the following:

All of the units shall conform to ASTM C1372, except that:

- (a) The minimum compressive strength requirements shall be 4000 psi for any individual unit. The average of five units shall be used as the mix design strength.
- (b) The maximum 24 hour water absorption shall not exceed 7%. The average of five units shall be used as the mix design absorption.
- (c) The freeze/thaw durability of wall units tested in accordance with ASTM C1262 in a 3% saline solution shall be the minimum of the following:
 - 1. The weight loss of each of five test specimens at the conclusion of 90 cycles shall not exceed 1% of its initial weight.
 - 2. The weight loss of each of four (4) of the five (5) test specimens at the conclusion of 100 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5th specimen to not exceed 10%.
- (d) The freeze/thaw durability of cap units shall be tested in accordance with ASTM C1262 in a 3% saline solution shall be the minimum of the following:
 - 1. The weight loss of each of five test specimens at the conclusion of 40 cycles shall not exceed 1% of its initial weight;
 - 2. The weight loss of each of 4 of the 5 test specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5th specimen not to exceed 10%.
- (e) ASTM C1262 test results shall be recorded and reported in 10 cycle intervals.

626.5.1.2.3-Modular Block Production: Each manufacturing facility shall provide the Engineer with a copy of their quality control plan and procedures.

Sampling and Testing shall conform to ASTM C140, except: subsection 6.2.4 shall be deleted and replaced with the following:

"The specimens shall be coupons cut from a face shell of each unit and sawn to remove any face shell projections. The coupon size shall have a height to thickness ratio of two (2) to one (1) before capping and a length to thickness ratio of four (4) to one (1). The coupon shall be cut from the unit such that the coupon height dimension is in the same direction as the unit height dimension.

Compressive testing of full size units will not be permitted. The compressive strength of the coupon shall be assumed to represent the net area compressive strength of the whole unit."

Each manufacturing facility is required to sample and test each block type at the rate of one sample per 5000 units of continuous production from each mix design or fraction thereof (if production is interrupted) as part of their overall quality control testing. Each manufacturing facility shall forward all quality control test reports and documentation to the MCS&T Division. The manufacturing facility or other testing facilities may perform this quality control testing.

The average compressive strength of each lot of the modular block units shall be a minimum of 90% of the mix design strength, and the average absorption of each lot shall be between 1.5% less than to 0.5% greater than the mix design absorption. If the compressive strength or absorption criteria are not met, then the modular block in that lot are rejected and cannot be incorporated into the work unless that lot is tested and found to be acceptable under subsection 626.5.1.1.2.1.

Cap units and wall units shall be sampled and tested as separate block types.

Minimum manufacturer testing shall include 6 randomly selected units and the following testing:

- a. Compressive strength (average of 3 units)
- b. 24 hour absorption (average of 3 units)

The MCS&T Division will randomly select six (6) units for testing by the Division for every 15,000 units of continuous production from each mix design or fraction thereof (if production is interrupted). MCS&T may require the manufacturer to conduct freeze/thaw durability testing when inconsistencies in the test results arise.

626.5.1.2.4-Modular Block Sealing: All modular block retaining wall surfaces shall be sealed. This work shall consist of preparation, furnishing and applying the surface sealer to the exposed front face, of all the wall units, as well as the back side of the upper courses of the wall layer of reinforcement, and the top of the uppermost block or cap unit.

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.

Due to the potentially hazardous ingredients contained in sealer formulations extreme care must be exercised in their handling and use, and the manufacturer's recommendations shall be closely followed.

Construction Requirements:

1. The Contractor shall comply with the manufacturer's written instructions for preparing, handling and applying the surface sealer.

2. The surface to be treated shall receive a light water-blast to the extent that the surface is clean and free of oils.
 3. Before the surface sealer is applied, the surface shall be dry and free of all dust, debris, and frost.
 4. Surface sealers shall be applied at the heaviest application rate specified by the manufacturer.
- All materials and work performed as specified above will be incidental to the construction of the wall.

626.5.1.3-Joint Materials: Joint materials are to be installed to the dimensions and thicknesses in accordance with the plans or approved shop drawings, unless otherwise indicated:

- A. Provide either preformed EPDM rubber pads conforming to ASTM D2000 for 4AA, 812 rubbers; neoprene elastomeric pads have a Durometer Hardness of 55 ± 5 ; or polyethylene bearing pads meeting the density requirements of ASTM D1505 in horizontal joints between elements.
- B. Cover all joints between elements on the backside of the wall with a geotextile fabric that meets the requirements of Section 715.11.4 of the Specifications. The minimum width and lap of the fabric shall be as follows:
Vertical and horizontal joints: 12"; lap-4".

626.5.1.4-Acceptance: The Contractor shall furnish the Engineer a Certificate of Compliance certifying the above materials comply with the applicable contract specifications.

626.5.2-Concrete Leveling Pad: All concrete used in the leveling pad shall as a minimum conform to Section 601 of the Specifications for Class C Concrete.

626.5.3-Select Granular Backfill:

626.5.3.1-Test Requirements: All backfill material used in the structure volume shall conform to the following gradation limits as determined by AASHTO T-27:

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

Bottom Ash or Fly Ash material will not be considered as select granular backfill unless it is specified in the contract documents.

The backfill shall conform to the following additional requirements:

- A. The plasticity index (P.I.) as determined by AASHTO T-90 shall not exceed 6, or the material is described as non-plastic.
- B. The material shall exhibit an angle of internal friction of not less than 34 degrees (unless otherwise stated in the plans), as determined by the standard Direct Shear Test, utilizing a sample of the material compacted to 95% of AASHTO T-99,

Methods C or D (with oversized correction as outlined in Note 7) at optimum moisture content. No angle of internal friction testing is required for backfills where 80% of sizes are greater than $\frac{3}{4}$ inch.

- C. Soundness: The materials shall be substantially free of shale or other soft, poor durability particles. The material shall have a magnesium sulfate soundness loss of less than 30% after Four cycles as determined by AASHTO T-104 or a sodium sulfate loss of less than 15% after five cycles as determined in accordance with AASHTO T-104.
- D. Electrochemical Requirements: The backfill materials shall meet the following criteria:

Requirements	Test Methods
***Resistivity greater than 3,000 ohm Centimeters	AASHTO T-288
**Ph 5-10	AASHTO T-289 <u>ASTM G-51</u>
*Chlorides less than 100 parts per Million	AASHTO T-291
*Sulfates less than 200 parts per million	AASHTO T-290
Organic Content: 1% maximum	AASHTO T-267

- * If resistivity is greater than 5,000 ohm-cm, the chlorides and sulfates requirements may be waived. Requirement is waived if geosynthetics are used for soil reinforcements and attachment devices.
- ** May be adjusted if geosynthetic material is used for soil reinforcements or attachment devices see shop drawings and section 626.5.1.1.6.
- *** Requirement is waived if geosynthetics are used for reinforcements and attachment devices.

- E. Steel slag as defined in 703.3.1 shall not be used in this item.

626.5.3.2-Quality Control Testing: Quality control of the select granular backfill material for backfill is the responsibility of the Contractor as specified in 106.1.

The Contractor shall maintain necessary equipment and qualified personnel to perform all sampling and testing necessary to determine the magnitude of the various properties of the material governed by the Specifications and shall maintain these properties within the limits of the Specifications. The Contractor shall submit a Quality Control Plan detailing the methods by which the Quality Control Program will be conducted. The plan prepared in accordance with the guidelines set forth in the appropriate portions of MP 307.00.50 and MP 717.04.21, shall be submitted to the Engineer at the preconstruction conference. The work shall not begin until the plan is reviewed for conformance with the contract documents.

626.5.3.3-Sampling and Testing: Frequency of sampling and testing shall be in accordance with the Contractor's Quality Control Plan. The minimum sampling and testing frequencies for gradation and Atterberg limits shall be as indicated in Attachment 1 of MP 307.00.50. The material shall be sampled in accordance with MP 700.00.06. The minimum sampling and testing frequency for compaction will be in accordance with MP 717.04.21. Material failing gradation requirements during placement shall be

evaluated immediately and may be subject to retesting to verify the angle of internal friction at the expense of the contractor.

626.5.3.4-Acceptance: The Contractor shall furnish certified test results that the select granular backfill meets the contract specifications. The test results for the select granular backfill shall not be used to verify compliance for a period exceeding one year. The Division may request that the tests be performed at any time if the material changes. Additional tests for gradations and plastic limits shall be determined during the placement of the material.

Acceptance for compaction shall be on a lot-by-lot basis. A lot shall be divided into five approximately equal sized sub-lots. A sub-lot shall consist of the quantity of material to backfill a single lift for 100 feet of wall and at least one test per lift. One moisture and density measurement shall be made at a random location within each of the five sub-lots; random locations shall be determined in accordance with MP 712.21.26. For material having 40% or more retained on the $\frac{3}{4}$ inch (75mm) sieve, MP 700.00.24 shall be used to determine the target maximum dry density. For material having less than 40% retained on the $\frac{3}{4}$ inch (75 mm) sieve, the target dry density shall be the maximum dry density as determined by the AASHTO T-99 five point laboratory proctor performed on the material in accordance with subsection 626.5.3.1 (B). The moisture content of the material shall be maintained at a level sufficient to facilitate compaction. For applications where spread footings are used to support a bridge or other structural loads, the target percentage of dry density shall be 100% for other applications the target percentage of dry density shall be 95%. If the results of five density tests on a Lot indicates that at least 80% of the material, in accordance with 106.3.1 (West Virginia AP-A), has been compacted to the specified target percentage of dry density, the Lot will be accepted. If less than 80% has been compacted to the specified target percentage of dry density and/or the moisture content is outside the tolerance range, no additional material shall be placed until the Lot has been reworked to meet the specified requirements. Reworking and retesting shall be at the expense of the Contractor. When the Division performs the testing in the evaluation of reworked Lots, the testing will be at the expense of the Contractor at the unit cost specified in subsection 109.2.2.

The backfill material must compact to a stable condition. If the material is not stable under the weight of construction equipment, the contractor must correct the problem or replace the material even if test results indicate that the material meets the moisture and density specifications.

The contractor's gradation data shall be evaluated in accordance with applicable sections of Section 307 except that Table 704.6.2 shall not apply. Gradation limits shall be in accordance with Table 703.4. The certification is to include the test results. A revised unit price for calculation purposes will be established based on the delivered quantities and delivered aggregate cost.

626.6-MECHANICALLY STABILIZED EARTH WALL :

626.6.1-Foundation Preparation: The foundation for the structure shall be graded level for a width equal to the length of reinforcement elements plus one (1) foot or as shown in the plans. Prior to wall construction, except where constructed on rock, the foundation shall be compacted with a smooth wheel vibratory roller. Any foundation soils found to be

unsuitable shall be removed and replaced with select granular backfill as per subsection -614.5.1.4 of the specifications.

Construction methods for the following shall be per the indicated section of the Specifications:

<u>Item</u>	<u>Section</u>
Unclassified Borrow Excavation	211
Structure Excavation	212
Wet Excavation	212
Rock Excavation	212
Select Material for Backfilling	212
Concrete	601
Reinforcing Steel	602

626.6.2-Wall Erection: A MSE wall supplier representative shall be present a minimum of three (3) days and as required thereafter during erection of the wall to assist the fabricator, contractor, and Engineer. The cost of the representative shall be considered incidental to the unit price of the MSE Wall System.

When facing elements are handled by means of lifting devices they shall be lifted by connecting to the upper edge of the element.

Facing elements shall be placed so that their final position is vertical or battered as shown in the plans. Facing elements shall be placed in successive horizontal lifts in the sequence shown in the plans as backfill placement proceeds. As backfill material is placed behind the elements, the elements shall be maintained in position by means of temporary wedges or bracing according to the wall supplier's recommendations. The Contractor shall not have more than two levels of temporary wedges in place at any time during wall erection. Concrete facing vertical tolerances and horizontal alignment tolerances shall not exceed $\frac{3}{4}$ inch. The overall vertical tolerance of the wall (top to bottom) shall not exceed $\frac{1}{2}$ inch per ten (10) feet of wall height.

Reinforcement elements shall be placed normal to the face of the wall, unless otherwise shown in the plans. Prior to placement of the reinforcing elements, backfill shall be compacted in accordance with these Specifications.

626.6.3-Backfill Placement: Construction methods shall be in accordance with section 212 of the Specifications which requires separation fabric between random material and the select granular backfill material. A minimum non woven geotextile of 6 ounces per square yard shall be placed on the back face of the excavation between the granular backfill material and the random excavated material.

Backfill placement shall closely follow erection of each course of facing elements. Backfill shall be placed in such a manner as to avoid any damage or disturbance of the wall materials or misalignment of the facing or reinforcing elements. Any wall materials that become damaged during backfill placement shall be removed and replaced at the Contractor's expense. The Contractor at his expense shall correct any misalignment or distortion of the wall facing elements due to placement of backfill outside the limits of this specification. At each reinforcement level, the backfill shall be placed to the level of the connection. Backfill placement methods near the facing shall assure that no voids exist directly beneath the reinforcing elements.

The backfill required to be placed in front of the wall, from the leveling pad to finished ground, shall be placed immediately after the select granular backfill is above the first layer of soil reinforcing.

The maximum lift thickness after compaction shall not exceed six (6) inches unless approved by the Engineer. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill materials shall have placement moisture content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift. The moisture content of the select granular material shall be maintained at a level sufficient to facilitate compaction.

Compaction within three (3) feet of back face of the wall shall be achieved by at least three (3) passes of a lightweight mechanical tamper, roller, or vibratory system.

At the end of each day's operation, the Contractor shall slope the last level of the backfill away from the wall facing to rapidly direct runoff away from the wall face. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

One foot behind the modular block units and the modular block unit cores shall be filled with crushed granular material with less than 2% passing the #200 (75 μ m) sieve and shall be consistent with the manufacture recommendation. If the modular block unit cores are not accessible the engineer may upon the advice of the wall designer omit the fill in the modular block cores.

626.7-PRECAST GRAVITY WALL:

626.7.1-Foundation Preparation: The foundation for the structure shall be graded level for a width equal to the length of bottom block plus one (1) foot or as shown in the plans. Prior to wall construction, except where constructed on rock, the foundation shall be compacted with a smooth wheel vibratory roller. Any foundation soils found to be unsuitable shall be removed and replaced with select granular backfill as per subsection 614.5.1.4 of the specifications.

Construction methods for the following shall be per the indicated section of the Specifications:

<u>Item</u>	<u>Section</u>
<u>Unclassified Borrow Excavation</u>	<u>211</u>
<u>Structure Excavation</u>	<u>212</u>
<u>Wet Excavation</u>	<u>212</u>
<u>Rock Excavation</u>	<u>212</u>
<u>Select Material for Backfilling</u>	<u>212</u>
<u>Concrete</u>	<u>601</u>
<u>Reinforcing Steel</u>	<u>602</u>

626.7.2-Wall Erection: A Gravity wall supplier representative shall be present a minimum of three (3) days and as required thereafter during erection of the wall to assist

the fabricator, contractor, and Engineer. The cost of the representative shall be considered incidental to the unit price of the Gravity Wall System.

Facing elements shall be placed so that their final position is vertical or battered as shown in the plans. Facing elements shall be placed in successive horizontal lifts in the sequence shown in the plans as backfill placement proceeds. As backfill material is placed behind the elements, the elements shall be maintained in position by means of temporary wedges or bracing according to the wall supplier's recommendations. The Contractor shall not have more than two levels of temporary wedges in place at any time during wall erection. Concrete facing vertical tolerances and horizontal alignment tolerances shall not exceed $\frac{3}{4}$ inch. The overall vertical tolerance of the wall (top to bottom) shall not exceed $\frac{1}{2}$ inch per ten (10) feet of wall height.

626.7.3-Backfill Placement: Construction methods shall be in accordance with Section 212 of the Specifications which requires separation fabric between random material and the select granular backfill material. A minimum non woven geotextile of six (6) ounces per square yard shall be place on the back face of the excavation between the granular backfill material and the random excavated material.

Backfill placement shall closely follow erection of each course of facing elements. Backfill shall be placed in such a manner as to avoid any damage or disturbance of the wall materials or misalignment of the facing elements. Any wall materials that become damaged during backfill placement shall be removed and replaced at the Contractors expense. The Contractor at his expense shall correct any misalignment or distortion of the wall facing elements due to placement of backfill outside the limits of this specification.

The backfill required to be placed in front of the wall, from the leveling pad to finished ground, shall be placed immediately after the select granular backfill is above the first layer.

The maximum lift thickness after compaction shall not exceed six (6) inches unless approved by the Engineer. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill materials shall have placement moisture content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift. The moisture content of the select granular material shall be maintained at a level sufficient to facilitate compaction.

Compaction within three (3) feet of back face of the wall shall be achieved by at least three (3) passes of a lightweight mechanical tamper, roller, or vibratory system.

At the end of each day's operation, the Contractor shall slope the last level of the backfill away from the wall facing to rapidly direct runoff away from the wall face. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

626.8-MODULAR BLOCK WALL:

626.8.1-Foundation Preparation: The foundation for the structure shall be graded level for a width equal to the length of bottom block plus one (1) foot or as shown in the plans. Prior to wall construction, except where constructed on rock, the foundation shall be

compacted with a smooth wheel vibratory roller. Any foundation soils found to be unsuitable shall be removed and replaced with select granular backfill as per subsection 614.5.1.4 of the specifications.

Construction methods for the following shall be per the indicated section of the Specifications:

<u>Item</u>	<u>Section</u>
<u>Unclassified Borrow Excavation</u>	<u>211</u>
<u>Structure Excavation</u>	<u>212</u>
<u>Wet Excavation</u>	<u>212</u>
<u>Rock Excavation</u>	<u>212</u>
<u>Select Material for Backfilling</u>	<u>212</u>
<u>Concrete</u>	<u>601</u>
<u>Reinforcing Steel</u>	<u>602</u>

626.8.2-Wall Erection: A Modular Block wall supplier representative shall be present a minimum of three (3) days and as required thereafter during erection of the wall to assist the fabricator, contractor, and Engineer. The cost of the representative shall be considered incidental to the unit price of the Gravity Wall System.

Facing elements shall be placed so that their final position is vertical or battered as shown in the plans. Facing elements shall be placed in successive horizontal lifts in the sequence shown in the plans as backfill placement proceeds. As backfill material is placed behind the elements, the elements shall be maintained in position by means of temporary wedges or bracing according to the wall supplier's recommendations. The Contractor shall not have more than two levels of temporary wedges in place at any time during wall erection. Concrete facing vertical tolerances and horizontal alignment tolerances shall not exceed $\frac{3}{4}$ inch. The overall vertical tolerance of the wall (top to bottom) shall not exceed $\frac{1}{2}$ inch per ten (10) feet of wall height.

626.8.3-Backfill Placement: Construction methods shall be in accordance with section 212 of the Specifications which requires separation fabric between random material and the select granular backfill material. A minimum non woven geotextile of six (6) ounces per square yard shall be place on the back face of the excavation between the granular backfill material and the random excavated material.

Backfill placement shall closely follow erection of each course of facing elements. Backfill shall be placed in such a manner as to avoid any damage or disturbance of the wall materials or misalignment of the facing elements. Any wall materials that become damaged during backfill placement shall be removed and replaced at the Contractors expense. The Contractor at his expense shall correct any misalignment or distortion of the wall facing elements due to placement of backfill outside the limits of this specification.

The backfill required to be placed in front of the wall, from the leveling pad to finished ground, shall be placed immediately after the select granular backfill is above the first layer.

The maximum lift thickness after compaction shall not exceed six (6) inches unless approved by the Engineer. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill materials shall have placement moisture

content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift. The moisture content of the select granular material shall be maintained at a level sufficient to facilitate compaction.

Compaction within three (3) feet of back face of the wall shall be achieved by at least three (3) passes of a lightweight mechanical tamper, roller, or vibratory system.

At the end of each day's operation, the Contractor shall slope the last level of the backfill away from the wall facing to rapidly direct runoff away from the wall face. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

626.79-RETAINING WALL, CAST-IN-PLACE REINFORCED CONCRETE:

626.79.1-General: Except as otherwise shown in the plans or herein, construction methods for cast-in-place retaining walls shall comply with the Specifications.

Construction methods for the following shall be per the indicated section of the Specifications:

<u>Item</u>	<u>Section</u>
Unclassified Borrow Excavation	211
Structure Excavation	212
Wet Excavation	212
Rock Excavation	212
Select Material for Backfilling	212
Concrete	601
Reinforcing Steel	602

626.79.2-Architectural Forms:

626.79.2.1-General: Construct forms to sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, level, and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, chamfers, blocking, screeds, bulkheads, and other items as required.

Fabricate forms to prevent cement paste from leaking while placing concrete and for easy removal without hammering or prying against exposed concrete surfaces. Provide crush plates where stripping might damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete. Solidly butt joints and provide backup material at joints to prevent leakage and fins. Assemble forms so that they may be easily removed without damaging exposed concrete surfaces

Provide temporary form openings where inaccessible formwork interior can be cleaned and inspected before placing concrete. Place temporary form openings as inconspicuously as possible, consistent with project requirements.

When drilling forms used for exposed concrete, drill from the contact face to the outside to suit the ties used and to prevent leakage of concrete mortar. Do not splinter the forms by driving ties through improperly prepared holes.

Unless otherwise shown in the plans:

Provide sharp, clean corners at intersecting planes with no visible edges or offsets; or provide accurately formed chamfered corners using $\frac{3}{4} \times \frac{3}{4}$ inch strips, surfaced to produce uniformly straight lines and tight edge joints.

626.79.2.2-Form Coatings: Coat form contact surfaces with form-release agent before placing reinforcement. Do not allow excess material to accumulate in forms or to come into contact with reinforcement or surfaces that will be bonded to fresh concrete. Apply coating according to manufacturer's instructions.

Coat steel forms with non-staining, rust-preventative release agent, or otherwise protect from rusting. Rust-stained steel formwork is not acceptable.

626.79.2.3-Reusing Forms: Split, frayed, delaminated, or otherwise damaged form-facing materials are not acceptable. Clean and apply a new form-release agent to concrete contact surfaces.

626.810-METHOD OF MEASUREMENT:

626.810.1-General: The unit of measurements shall be the area in square feet lying in a plane outside the front face of the structure as determined by the dimensions in the contract documents. The area is taken from the top of the leveling pad to the top of the wall and shall include coping but shall not include barriers, footings, or leveling pads. The area shall be subject to adjustment as provided in subsections 104.2 and 109.2 of the Specifications. No adjustments of pay quantity shall be allowed for changes in wall design to facilitate the Contractor's methods of construction of wall type.

Unless otherwise specified in the contract documents, items such as concrete barriers that are not part of normal retaining wall construction shall be measured separately for payment.

The quantity of earthwork shown in the plans does not include any work within the wall pay limits shown in the plans. Any adjustments to the required amount of embankment or select granular backfill due to the particular wall system proposed by the contractor shall be considered incidental to the project. No separate payment shall be made for increased embankment or increased select granular backfill requirements. The Contractor shall be responsible for any of the cost of changes in waste, borrow, or earthwork quantities from those shown in the plans caused by the requirements of the proposed wall system.

626.810.2-Mechanically Stabilized Earth: The unit price shall include in place: facing elements, soil reinforcing and attachment devices and associated hardware, coping and trim, or similar items that are normal parts of wall construction. No separate payment of these items shall be made.

The unit price shall also include, in place, all the following items shown within the wall pay limits in the plans: select granular backfill, fabric for separation, excavation, embankment, foundation preparation, and leveling pads. No separate payment of these items shall be made.

626.10.3-Precast Gravity Wall: The unit price shall include in place: facing elements, coping and trim, or similar items that are normal parts of wall construction. No separate payment of these items shall be made.

The unit price shall also include, in place, all the following items shown within the wall pay limits in the plans: select granular backfill, fabric for separation, excavation, embankment, foundation preparation, and leveling pads. No separate payment of these items shall be made.

626.10.4-Modular Block Wall: The unit price shall include in place: facing elements, coping and trim, or similar items that are normal parts of wall construction. No separate payment of these items shall be made.

The unit price shall also include, in place, all the following items shown within the wall pay limits in the plans: select granular backfill, fabric for separation, excavation, embankment, foundation preparation, and leveling pads. No separate payment of these items shall be made.

626.810.35-Cast-in-Place Reinforced Concrete: The unit price shall include in place: concrete, reinforcing, joint materials, underdrains, weepholes, or similar items that are normal parts of wall construction. No separate payment of these items shall be made.

The unit price shall also include in place: all the following items shown within the wall pay limits in the plans: select material for backfilling, excavation, embankment, fabric for separation, and foundation preparation. No separate payment of these items shall be made.

626.911-BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract price per unit of measurement, respectively, for each pay item listed below and shown in the bid schedule, which prices and payment will be full compensation for the work prescribed in this section.

626.1012-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
626001-*	Retaining Wall, Cast-In-Place Reinforced Concrete	Square Foot
626002-*	MSE Retaining Wall , “vendor name”	Square Foot
626003-*	MSE Modular Block Retaining Wall , Class “class”	Square Foot
626004-*	MSE Wire Face Retaining Wall, “vendor name”	Square Foot
<u>626005-*</u>	<u>Precast Gravity Retaining Wall, “vendor name”</u>	<u>Square Foot</u>

* Sequence number

“class” = a number designating class in accordance with the following table:

Class	Wall Height	Allowable substitutions for each class
I	40 ft. or less	-----
II	20 ft. or less	Class I
III	10 ft. or less	Class I or II
IV	5 ft. or less	Class I, II, or III

See Division Approved Source/Product Listing page for approved vendor list.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 679
OVERLAYING OF PORTLAND CEMENT CONCRETE BRIDGE DECKS

679.2-MATERIALS

679.2.2-Specialized Concrete Mix Design and Testing:

DELETE THE CONTENTS OF SUBSECTION 679.2.2 AND REPLACE WITH THE FOLLOWING:

Specialized concrete shall consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, latex or silica fume admixture, chemical admixtures, and water. The use of fibers in the specialized concrete shall be allowed.

The Contractor shall determine mixture proportions in general accordance with ACI 211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete." Establishment of mixture proportions shall be coordinated with the manufacturer of the latex or silica fume admixture. The dosage rate in lbs./cy of fibers for any application shall be the manufacturer's recommendation to meet the requirements of 715.3. The dosage rate shall not be less than the submitted rate used for product approval which can be found in the approved products list. The dosage rate shall not exceed 5.0 lbs./cy, unless the manufacturer can demonstrate, through a field demonstration, that the concrete mixture will be workable and fiber balling is not a problem.

Prior to the start of construction, the Contractor shall design and submit to the Engineer for approval the proportion of materials, including admixtures, to be used which will result in a workable concrete having the applicable properties enumerated below, including those of subsections 679.2.2.1 or 679.2.2.2. This mix design shall be prepared in accordance with MP 711.03.23.

Design mixture testing shall include air content, slump, ~~and~~ compressive strength results at 28 days, Sequential Air Meter (SAM), and ~~results of~~ concrete surface resistivity tests results.

Mix Designs assessed as very early strength latex modified concrete overlays shall be approved based upon the compressive strength results at the specified time for opening of traffic as noted in the plans. For very early strength latex modified concrete overlays compressive strength cylinders shall be moist cured in accordance with ASTM C192 if the curing period is two (2) days or less; otherwise after two (2) days cylinders shall be air cured in the lab at a temperature between 73.5 ± 3.5 °F until the specified time for opening of traffic.

Compressive strength cylinders for silica fume concrete shall be cured in accordance with ASTM C192 for 28 days. ~~However, but compressive strength cylinders~~ for latex modified concrete or for very early strength latex modified concrete compressive strength cylinders shall be moist cured in accordance with ASTM C192 for two (2) days then air cured in the lab at a temperature between 73.5 ± 3.5 °F for 26 days.

For establishment of mixture proportions, the surface resistivity testing silica fume concrete specimens shall ~~be follow the accelerated moist-curing procedure defined in AASHTO T-358 and then tested at an age of 28 days in accordance with AASHTO T-358. moist cured for seven (7) days in accordance with ASTM C192, then cured for 21 days in lime-saturated water at 100.0 ± 3.5 °F, then tested at an age of 28 days.~~ For establishment of mixture proportions, the surface resistivity testing for latex modified concrete or very early strength latex modified concrete specimens shall be moist cured for two (2) days in lime saturated water at 100.0 ± 3.0 °F, then cured for 26 days in air at 73.5 ± 3.5 °F, then resubmerged in the lime-saturated water at a temperature of 73.5 ± 3.5 °F for seven (7) days and tested at an age of 35 days in accordance with AASHTO T358~~in accordance with ASTM C192, then cured for 26 days in air at 100.0 ± 3.5 °F and a minimum of 50% relative humidity, then resubmerged in the lime-saturated water for seven (7) days and tested at an age of 35 days.~~

The surface resistivity result will consist of average surface resistivity of three (3) cylinders and shall be at least ~~30~~ 40 kΩ-cm and used as the basis for acceptance of the Specialized Concrete Overlay requirements.

The SAM test shall be performed on representative sample from both of the batches at the minimum cement factor as outlined in Section 3.3 of MP 711.03.23. These samples shall be prepared and tested in accordance with AASHTO T395. The SAM number for both of these samples shall be less than or equal to 0.20.

Concrete for any slump test shall be deposited in a manner and location that excludes the effects of vibrations caused by traffic and concrete placement operations.

The total concrete constituents shall contribute less than 0.10% water soluble chloride ion by weight of cement. Use one (1) brand and/or one (1) source for any concrete constituent.

The Contractor shall obtain a written statement from the manufacturer of the latex or silica fume admixture that confirms the compatibility of the material combination and the sequence in which they are combined. The written statement, along with the results of all required tests, shall be furnished to the Engineer prior to the pre-construction meeting (refer to subsection 679.2.2.3). Substantiating data showing compliance with the requirements of this specification shall also be submitted. This data shall also include the sources of coarse and fine aggregates as well as the brands of all admixtures to be used.

Contractor's Quality Control: Quality control of the specialized concrete is the responsibility of the Contractor as designated in MP 601.03.50. The Contractor shall maintain equipment and qualified personnel, including at least one (1) certified Portland Cement Concrete Technician who shall direct all field inspection, sampling, and testing necessary to determine the magnitude of the various properties of concrete governed by the Specifications and shall maintain these properties within the limits of this Specification. The Contractor's personnel who conducts the field sampling and testing shall be a certified Portland Cement Concrete Inspector. The quality control plan designated in MP 601.03.50 shall be submitted to the Engineer at the preconstruction conference. Work shall not begin until the plan is reviewed for conformance with the contract documents.

Compressive strength specimens shall be made and cured in accordance with AASHTO R 100 and MP 601.04.20 at the frequency required in MP 601.03.50 except that specimens for latex modified concrete or very early strength latex modified concrete compressive strength shall be moist cured for two (2) days and air cured at a temperature of 73.5 ± 3.5 °F for 26 days.

However, when placing very early strength latex modified concrete or very early strength latex modified concrete deck overlays, a minimum of six (6) compressive strength specimens shall be cast for determining the required strength for the opening of traffic within the last 15 minutes of each concrete placement. These cylinders shall be cured as similarly as possible to field placement conditions of the concrete overlay. The average strength of three (3) of these specimens shall be used to determine the opening of traffic.

During construction, a minimum of three (3) specimens shall be fabricated for surface resistivity testing in accordance with AASHTO T358 every time that a set of compressive strength specimens is fabricated.

~~When For~~ silica fume concrete ~~is used, these specimens shall be moist cured for 28 days.~~ Three (3) specimens shall be follow the accelerated moist-curing procedure defined in AASHTO T-358 and then tested at an age of 28 days in accordance with AASHTO T-358. The average result of the three (3) values from these specimens shall be reported as the result required in Note (a) in subsection 679.2.2.2.

~~When For~~ latex modified concrete or very early strength latex modified concrete, is used ~~these specimens may shall~~ be moist cured for two (2) days ~~in accordance with ASTM C192 in lime saturated water at 100.0 ± 3.0 °F, then cured for 26 days in air at 73.5 ± 3.5 °F 100.0 ± 3.5 °F and a minimum of 50% relative humidity,~~ then resubmerged in the lime-saturated water at a temperature of 73.5 ± 3.5 °F for seven (7) days and tested at an age of 35 days in accordance with AASHTO T358. The average result of the three (3) values from these specimens shall be reported as the result required in Note (a) in subsection 679.2.2.1.

Gradation testing shall be performed in accordance with subsection 601.3.2.4.

DELETE THE CONTENTS OF SUBSECTION 679.2.2.5 AND REPLACE WITH THE FOLLOWING:

679.2.2.5 Price Adjustments for Accepted Concrete with Low Surface Resistivity Results:

Table 679.2.2.5

Resistivity Result (kΩ-cm)	Percent of Unit Bid Price Paid <u>Percent of Material Cost Only*</u>
>25-29	90%
>20-25	70%
>15-20	50%
≤15	Remove & Replace

* Labor, equipment, etc. are exempt from this price adjustment

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 715
MISCELLANEOUS MATERIALS

715.14-ELASTOMERIC BEARING PADS:

DELETE THE TITLE AND CONTENTS OF SUBSECTION 715.14.1 AND REPLACE WITH THE FOLLOWING:

~~**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).~~

715.14.1-Approval for Bearing Pads With Shims: Approval for bearing pads with shims shall be determined by MP 715.14.01.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 601
STRUCTURAL CONCRETE

601.1-DESCRIPTION:

ADD THE FOLLOWING AFTER THE TENTH PARAGRAPH IN THE SUBSECTION:

Class S concrete shall be used for bridge decks and other bridge elements when designated in the plans. This mix shall be used to produce a concrete of high durability with low shrinkage potential.

601.2-MATERIALS:

ADD THE FOLLOWING TO THE TABLE:

MATERIAL	SECTION OR SUBSECTION
Expansive Hydraulic Cement	701.5

601.3-PROPORTIONING:

ADD THE FOLLOWING AFTER THE FIFTH PARAGRAPH:

Design mixture testing for Class S concrete shall be in accordance with MP 711.03.23 and shall include air content, slump, compressive strength, surface resistivity, sequential air method (SAM) number, and shrinkage tests. The Contractor shall complete the following tests for mix design acceptance of Class S concrete before mix design submittal and approval:

- **Surface Resistivity-** For establishment of the mixture proportions, specimens for surface resistivity tests shall be made on representative samples prepared and tested in accordance with AASHTO T 358. A set of three 4-inch x 8-inch

cylinders shall be fabricated and moist cured in accordance with the accelerated moist-curing procedure defined in AASHTO T-358 and tested at an age of 28 days in accordance with AASHTO T-358 from both of the batches at the minimum cement factor as outlined in Section 4.3.1 of MP 711.03.23, ~~as specified in AASHTO R 39, for 28 days prior to testing, and~~ The surface resistivity results of this test shall not be less than 40 kΩ-cm.

- **SAM number-** For establishment of the mixture proportions, SAM number tests shall be performed on a representative sample from both of the batches at the minimum cement factor as outlined in Section 4.3.1 of MP 711.03.23. These samples shall be prepared and tested in accordance with AASHTO T 395. The SAM number for both of these samples shall be less than or equal to 0.20.
- **Shrinkage-** For establishment of the mixture proportions with Portland cement, the 28-day drying shrinkage shall not exceed 0.035% based on average of three specimens from a representative sample from one of the batches at the minimum cement factor as outlined in Section 4.3.1 of MP 711.03.23. The time that the specimens are stored in lime-saturated water, specified in Section 10.3 of ASTM C157, shall be 7 days instead of 28 days, including the time in the molds. At the end of that 7 day water storage period, the specimens shall be removed from the lime-saturated water and stored in air, at the conditions specified in Section 5.4.1 of ASTM C157, for an additional 28 days. At the completion of that air storage period, a second comparator reading shall be taken.
For establishment of the mixture proportions with Expansive hydraulic cement, the 28-day drying shrinkage shall not exceed 0.035% based on average of three specimens from a representative sample one of the batches at the minimum cement factor as outlined in Section 4.3.1 of MP 711.03.23. This sample shall be tested in accordance with ASTM C878. The initial 7-day expansion shall range from 0.03% to 0.06%. Specimens shall be moist cured for 7 days before beginning the 28-drying shrinkage testing.
The cost of all test mix requirements shall be considered incidental to the cost of Class S concrete.

601.3.1-Mix Design Requirements:

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

Prior to the start of construction, the Contractor shall design and submit to the Engineer for approval the proportion of materials, including admixtures, to be used which will result in a workable concrete having the applicable properties enumerated below, including those of Table 601.3.1A. A mix design prepared in accordance with MP 711.03.23, shall be required for each class of concrete to be used in the work. The mix design shall be accompanied by a statement giving the source of materials and certified test data from a Division approved laboratory demonstrating the adequacy of the mix design. The Contractor shall notify the Engineer of any change in the source of materials or the addition of admixtures during the progress of the work, since such change may necessitate a new mix design. The Contractor shall also state the $\bar{A}$ value of the fine aggregate and the $\bar{A}$ value of the combined grading of

the coarse aggregate, fine aggregate, and cement used in the mix design. Each mix design shall remain approved for a period of three years from the date of approval, after which the mix design may be re-approved for an additional time period. The guidelines for this re-approval process are set forth in MP 711.03.23.

Approved Hydration Control Stabilizing Admixtures, as defined in subsection 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 subsection 601.7, may be added to an existing approved concrete mix design in accordance with the procedures outlined in MP 711.03.23.

TABLE 601.3.1A

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
A	3500	682	0.51	7, 78, or 8	7.5
K	4000	658	0.44	57, 67	7.0
B	3000	564	0.49	57, 67	7.0
C	2500	494	0.58	57, 67	6.0
D	2000	400	0.62	57, 67	5.5
H	4000	See Table 601.3.1C	0.40	57, 67	6.5
DC	4500	705	0.44	7, 78, 8	6.0

* An equal mass of a SCM may be substituted for Portland cement up to the maximum amount in Table 601.3.1B. Only one SCM is permitted in a mix design, except for Class H concrete. The target cement factor of Class H concrete shall consist of Option 1 or Option 2 from Table 601.3.1C. The Contractor may choose either option.

** When using a SCM, masses of these materials shall be considered as cement for purposes of establishing maximum water content.

*** 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 shaft foundation.

TABLE 601.3.1B

Material	Class of Concrete	Quantity
Fly Ash	All Classes Except H	20%
Slag Cement	All Classes Except H	50%
Silica Fume	All Classes Except H	8%

TABLE 601.3.1C

Option	Cement	Fly Ash	Slag Cement	Silica Fume
1	470 lbs.	132 lbs.		30 lbs.
2	423 lbs.		195 lbs.	30 lbs.

MP 711.03.26 shall be used to control the cement factor in all classes of concrete except Class H and Class S.

The Contractor may develop mix designs with a reduced target cement factor as indicated in Table 601.3.1D in lieu of Table 601.3.1A, provided the aggregates used in those mix designs meet the requirements for optimized aggregate gradation in subsection 601.3.2.4.1. The $\bar{A}$ requirements will not apply for mix designs that use optimized aggregate gradation.

The Contractor shall develop Class S mix designs according to the requirements of Table 601.3.1D. The aggregates used in Class S mix designs shall meet the requirements for optimized aggregate gradation in subsection 601.3.2.4.1. The $\bar{A}$ requirements will not apply to Class S concrete.

TABLE 601.3.1D

Class of concrete	Design 28 Day Compressive Strength	Target Cement Factor	Maximum Water Content	Nominal Maximum Aggregate Size	Entrained Air
	Pounds per Square inch	lbs./c.y. ^{Note 1}	lb. of water/lb. of cement ^{Note 2}	Inches	Percent
A	3,500	642	0.51	$\frac{1}{2}$ or $\frac{3}{8}$	7.5
K	4,000	618	0.44	1 or $\frac{3}{4}$	7.0
B	3,000	524	0.49	1 or $\frac{3}{4}$	7.0
C	2,500	454	0.58	1 or $\frac{3}{4}$	6.0
D	2,000	360	0.62	1 or $\frac{3}{4}$	5.5
H	4,000	See Table 601.3.1E	0.40	1 or $\frac{3}{4}$	6.5
S	4,000	600	0.42 ^{Note 4}	1 or $\frac{3}{4}$	6.5
DC ^{Note 3}	4,500	665	0.44	$\frac{1}{2}$ or $\frac{3}{8}$	6.0

^{Note 1} An equal mass of a SCM may be substituted for Portland cement up to the maximum amount in Table 601.3.1B. Only one SCM is permitted in a mix design, except for Class H concrete. The target cement factor of Class H concrete shall consist of Option 1 or Option 2 from Table 601.3.1E. The Contractor may choose either option. This footnote does not apply to Class S concrete for the substitution of a SCM for cement. The substitution of a SCM for cement is specified in the last paragraph of this subsection.

^{Note 2} When using a SCM, masses of these materials shall be considered as cement for purposes of establishing maximum water content.

^{Note 3} Nominal maximum aggregate size of $\frac{3}{4}$ inches 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 shaft foundation.

^{Note 4} The maximum water content for a mix design with Expansive hydraulic cement may be increased to 0.45.

TABLE 601.3.1E

Option	Cement	Fly Ash	Slag Cement	Silica Fume
1	440 lbs.	127 lbs.		25 lbs.
2	397 lbs.		186 lbs.	25 lbs.

The target cement factor for Class S concrete shall include at least one of the SCMs from Table 601.3.1F as a replacement portion by equal mass. The SCM(s) shall be limited to not more than two of the SCMs listed in Table in 601.3.1F. However, the maximum replacement percentage for

any individual SCM shall not be exceeded, and the total replacement percentage of any combination of SCMs shall not exceed 50%.

TABLE 601.3.1F

Material	Quantity	
	Minimum %	Maximum %
Fly Ash	15	25
Slag Cement	25	50
Silica Fume	6	10

601.3.1.1-Mix Design Using Potentially Reactive Aggregate:

601.3.1.1.1-Selecting Preventive Measures For ASR:

601.3.1.1.1.3-Level of Prevention:

DELETE THE TABLE AND REPLACE WITH FOLLOWING:

TABLE 601.3.1.1.1.3

Determining the Level of Prevention

Level of ASR Risk	Classes of Concrete		Precast Concrete Member	Prestressed Concrete Member
	D	A, B, C, K, H, S, DC		
Risk Level 0	V	V		V
Risk Level 1	W	X		Y
Risk Level 2	X	Y		Z
Risk Level 3	Y	Z		See footnote**

** It is not permitted to construct prestressed concrete members (Section 603) with Aggregate Reactivity Class of R3. Measures must be taken to reduce the level of risk in these circumstances by selecting the aggregates only from the Reactivity Classes of R0, R1, or R2.

601.3.1.1-Mix Design Using Potentially Reactive Aggregate:

601.3.1.1.1-Selecting Preventive Measures For ASR:

601.3.1.1.1.4-Requirements for Various Prevention Levels:

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

These requirements shall apply to all classes of concrete except Class H and Class S. The prevention levels for Class H and Class S concrete is specified in subsection 601.3.1.1.1.5.

601.3.1.1-Mix Design Using Potentially Reactive Aggregate:

601.3.1.1.1-Selecting Preventive Measures For ASR:

601.3.1.1.1.4-Requirements for Various Prevention Levels:

601.3.1.1.1.4.2-Preventions Level W, X and Y:

DELETE AND REPLACE THE CONTENTS OF TABLE 601.3.1.1.1.4.2b WITH THE FOLLOWING:

TABLE 601.3.1.1.4.2b
Minimum Replacement Level of SCM (percentage by mass of cementitious material)

Type of SCM*****	Alkali Content of SCM* (Na ₂ O _e)	Level W	Level X	Level Y
Fly ash** (Cao ≤18%)	≤3.0	15	20	25*****
	>3.0, ≤4.5	20	25*****	Not Allowed
Slag Cement	≤1.0	25	35	50
Silica Fume***	≤1.0	1.2 x LBA or 2.0 x KGA	1.5 x LBA or 2.5 x KGA	1.8 x LBA or 3.0 x KGA

* The alkali content of all approved SCM sources is listed on the WVDOH approved list of SCMs (APL). If the alkali content of an SCM source is not listed on the APL, the Division will test the SCM from the source to determine the alkali content prior to its use on any WVDOH project.

** The CaO content of approved fly ash sources is listed on the WVDOH approved list of fly ash (APL). If the CaO content of a fly ash source is not listed on the APL, the Division will test the fly ash from the source to determine the CaO content prior to its use on any WVDOH project.

***The minimum level of silica fume (as a percentage by mass of cementitious material) is calculated on the basis of the alkali (Na₂O_e) content of the concrete contributed by the Portland cement and expressed in lb/yd³ (LBA in Table 601.3.1.1.4.2b). LBA is calculated by multiplying the cement content of the concrete in lb/yd³ by the alkali content of cement divided by 100. For example, for a concrete containing 500 lb/yd³ of cement with an equivalent alkali content of 0.81 percent of Na₂O_e, the value of LBA = 500 x 0.81/100 = 4.05 lb/yd³. For this concrete, the minimum replacement level of silica fume for Level Y is 1.8 x 4.05 = 7.3 percent. Regardless of the calculated value, the minimum level of silica fume shall not be less than 7 percent when it is only method of prevention. Mix design with silica fume > 8% shall be reviewed and approved by the Engineer.

**** Mix designs with minimum 25% of fly ash shall be reviewed and approved by the Engineer.

***** If two SCMs are used in Class S concrete in combination, the minimum mass replacement levels given in Table 601.3.1.1.4.2b for the individual SCMs may be reduced, provided the sum of the parts of each SCM is greater than or equal to one. For example, if silica fume and slag cement are used together, the silica fume level may be reduced to one-third of the minimum silica fume level in the Table 601.3.1.1.4.2b provided the slag cement is at least two-thirds of the minimum slag level required.

Note: The minimum replacement levels in Table 601.3.1.1.4.2b are appropriate for use with Portland cements of moderate to high alkali contents (0.71 to 1.00 percent Na₂O_e). Table 601.3.1.1.4.2c provides recommendations for adjusting the level of SCM when the equivalent alkali content of the Portland cement is above or below this range. The replacement levels should not be below those given in Table 601.3.1.1.4.2b for prevention level W, regardless of the equivalent alkali content of the Portland cement.

DELETE AND REPLACE THE CONTENTS OF OPTION 3 WITH THE FOLLOWING:

Option 3: Using the Lithium Nitrate Admixture: The 30 percent (30%) aqueous solution of Lithium Nitrate Admixture meeting the requirements of subsection 707.17 shall be used for all level of prevention including “Level Z” given in Table 601.3.1.1.3 except for Class H and Class S concrete. The dosage rate of Lithium Nitrate Admixture shall be based upon the alkali content of cement used in a concrete mix.

Calculation of lithium nitrate (LiNO_3) admixture dosage (100 percent) for mitigation without use of SCMs with a 30 percent (30%) aqueous solution of lithium nitrate.

$$\text{Gallons of LiNO}_3/\text{yd}^3 = (\text{A} \times \text{B} \times 0.55)/100$$

Where:

A = Pound of Portland cement per cubic yard in a concrete mix

B = Percentage of Alkali content of cement used in a concrete mix

Example: If the cement content of concrete is 550 lbs/yd^3 and the total alkali content of the cement is 0.82 percent (0.82%), the dosage of lithium nitrate admixture is: $(550 \times 0.82 \times 0.55)/100 = 2.48 \text{ Gal/yd}^3$.

The water content of the mix shall be adjusted by removing 0.85 gallons of water per gallon of lithium nitrate solution.

Example: Amount of water to be reduced (using the value from above example) $\text{Gal/yd}^3 = 0.85 \times 2.48 = 2.11$

Any concrete mix using a 100 percent (100%) lithium nitrate admixture dosage will be accepted without evaluation. The contractor shall evaluate the effectiveness of less than 100 percent (100%) lithium nitrate admixture in a concrete mix, alone or in combination with fly ash or slag cement or silica fume, in the reduction of expansion in accordance with ASTM C1567*, when a reactive aggregate(s) is (are) used in a concrete mix, at a Division approved lab (an AASHTO accredited Lab, accredited for ASTM C1567) at the contractor's expense. The dosage rate shall not be less than 50 percent (50 %) when only a lithium nitrate admixture is using for evaluation and no SCMs are included in the concrete mix. The sampling and shipping of all aggregate shall be witnessed by a representative of the Division. The ASTM C1567 test results will be considered valid for 5 years from the date of testing.

If both of the aggregates (coarse and fine) used in a concrete mix are reactive (R1, R2 or R3), the contractor shall evaluate the effectiveness of the lithium nitrate admixture, alone or in combination with fly ash or slag cement or silica fume for both of the aggregates separately. When the same source material** is proposed for the use both as coarse and as fine aggregate, test only a selection of the reactive fine aggregate or reactive coarse aggregate, unless there is reason to expect that the coarse aggregate has a different composition than the fine aggregate or vice-versa. The combination of cement, lithium nitrate admixture, alone or in combination with fly ash or slag cement or silica fume, and aggregate that expands less than 0.10% at 16 days after casting will be considered as meeting the "Requirements for Various Prevention Levels (subsection 601.3.1.1.1.4)" except for Class H and Class S concrete.

The approved lithium nitrate admixture shall meet the requirements of subsection 707.17 and will be listed as "Type S" admixture with footnote of approved admixture for ASR mitigation on the MCS&T web page under Division Approved Source/Product Listing (APL) for Type S: Special Performance. The alkali level of fly ash used in the subject mix shall not exceed 4.5%. The alkali level of slag cement used in the subject mix shall not exceed 1.00%. The alkali level of silica fume used in the subject mix shall not

exceed 1.00%. Mix design shall be reviewed and approved by the Engineer.

- * Modify the w/c ratio of the mortar used in the ASTM C1567 test to 0.50. Replace Section 5.3 (Sodium Hydroxide Solution) of ASTM C1567 with the following: Sodium Hydroxide Solution - Each liter of solution shall contain 40.0 g of NaOH dissolved in 800 ml of water. Add 71 ml of the lithium nitrate admixture multiplied by the decimal equivalent of the lithium nitrate admixture dosage. (For example, to test a 75% lithium nitrate admixture dosage, each liter of solution will contain 0.75 times 71 ml of lithium nitrate admixture.) This mixture shall be diluted with additional distilled or deionized water to obtain 1.0 liter of solution. The volume proportion of soaking solution to mortar bars in a storage container shall be 4 ± 0.5 volumes of solution to 1 volume of mortar bars. The volume of a mortar bar may be taken as 184 ml. Include sufficient test solution to ensure complete immersion of the mortar bars.
- ** Same source material applies to same Limestone, Diabase, Quartzite and Basalt source.

601.3.1.1-Mix Design Using Potentially Reactive Aggregate:

601.3.1.1.1-Selecting Preventive Measures For ASR:

601.3.1.1.1.5-Requirements for Various Prevention Levels for Class H Concrete:

DELETE THE TITLE OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

601.3.1.1.1.5-Requirements for Various Prevention Levels for Class H and Class S Concrete:

601.3.1.1-Mix Design Using Potentially Reactive Aggregate:

601.3.1.1.1-Selecting Preventive Measures For ASR:

601.3.1.1.1.6-Evaluation of the effectiveness of SCM to prevent deleterious expansion:

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

The contractor may evaluate the effectiveness of an SCM in the reduction of expansion in accordance with ASTM C1567*, when a reactive aggregate(s) is (are) used in a concrete mix, at a Division approved lab (an AASHTO accredited Lab, accredited for ASTM C1567) at the contractor's expense. The sampling and shipping of all aggregate shall be witnessed by a representative of the Division. ASTM C1567 test will be considered valid for 5 years from the date of testing.

If both of the aggregates (coarse and fine) used in a concrete mix are reactive (R1, R2 or R3), the contractor shall evaluate the effectiveness of SCM for both of the aggregates separately. When the same source material** is proposed for the use both as coarse and as fine aggregate, test only a selection of the reactive fine aggregate or reactive coarse aggregate, unless there is reason to expect that the coarse aggregate has a different composition than the fine aggregate or vice-versa. The combination of cement, SCM and

aggregate that expand less than 0.10% at 16 days after casting will be considered as meeting the “Requirements for Various Prevention Levels (subsection 601.3.1.1.4)” except for Class H and Class S concrete. The evaluation with the higher percentage of SCM replacement shall be selected for the minimum replacement level of SCM for prevention level in a mix design using potentially reactive aggregate.

When more than one mix design, for the same Producer/Supplier, is submitted for evaluation, only one evaluation of the effectiveness of an SCM in the reduction of expansion in accordance with ASTM C1567 testing data, as outlined in paragraphs first through four of this subsection, will be required for that entire group of mix designs (except Class H and Class S) if all of the mix design in that entire group of mix designs have the same combination of cement, SCM and aggregate sources.

The alkali level of fly ash shall not exceed 4.5%. The alkali level of slag cement shall not exceed 1.00%. The alkali level of silica fume shall not exceed 1.00%. Mix designs with minimum 25% of fly ash shall be reviewed and approved by the Engineer. Mix design with silica fume > 8% shall be reviewed and approved by the Engineer.

* Modify the w/c ratio of the mortar used in the ASTM C1567 test to 0.50.

** Same source material applies to same Limestone, Diabase, Quartzite and Basalt source.

601.3.2-Field Tolerances and Adjustments:

601.3.2.1-Consistency:

DELETE THE CONTENTS OF THE FOURTH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

Upon addition of a superplasticizer at the job site, the mixing drum shall be turned for a minimum of 60 revolutions or 5 minutes at mixing speed to establish a workable mixture of uniform composition and consistency. If a second job site addition of superplasticizer is used; the mixing drum shall be turned a minimum of 30 additional revolutions at mixing speed. All additions and mixing of the superplasticizer shall be completed before placement of the concrete is started. The total number of revolutions shall not exceed 300, and the concrete shall be discharged within the time limits in subsection 601.7. The slump of Class H and Class S concrete shall not exceed seven (7) inches under any circumstances.

601.3.2.2-Air Content:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

The target value of the entrained air at the point of placement shall be as shown in Tables 601.3.1A and D. However, when pumping concrete, the air content shall be measured before the concrete pump, and the target value of the entrained air shall be as shown in Tables 601.3.1A and D at that point. If the entrained air does not conform with the target value within plus or minus 2.5 percentage points, the Contractor shall take immediate steps to adjust the air content of succeeding loads by making necessary adjustments in the mixture. The air content shall be measured on loads already batched and enroute, as well as the first load to which any adjustments were made in batching procedures. If the air content exceeds the target value plus 3.0 percentage points the

concrete shall be rejected. When the concrete is delivered in a truck mixer and the air content is less than the target value minus 2.5 percentage points the concrete shall be rejected, or the Contractor may use additional air entraining agent in an amount that is intended to achieve the target value specified. The addition is permitted under the conditions listed below. The target of the entrained air content of Class H and Class S concrete at the time of placement shall be as shown in Tables 601.3.1A and D. If the entrained air does not conform with the target value within plus or minus 1.5 percentage points, the Contractor shall take immediate steps to adjust the air content of succeeding loads by making necessary adjustments in the mixture. If the entrained air content of Class H and Class S concrete does not conform to the target value plus 2.0 percentage points, the concrete shall be rejected. When Class H or Class S concrete is delivered in a truck mixer and the air content is less than the target value minus 2.0 percentage points, the concrete shall be rejected, or the Contractor may use additional air-entraining agent in an amount that is intended to achieve the target value specified. The addition is permitted under the conditions listed below.

- i. The air entraining agent is the same as used in the approved mix design and is thoroughly mixed with a minimum of 2 gallons of water. The solution will be directed to the front of the mixer.
- ii. The mixer is turned a minimum of 30 revolutions, at mixing speed, or the number of revolutions established in tests to comply with uniformity requirements, whichever is more.

Immediately after mixing, the air content and slump shall be measured by a certified inspector.

An air adjustment may be attempted twice per truck. If after the second addition the specified air content is not achieved, the concrete shall be rejected. These procedures do not alter the limits placed on time to discharge, the total revolutions of the mixing drum, or the specified slump.

601.4-TESTING:
601.4.1-Sampling and Testing Methods:

ADD THE FOLLOWING TO THE TABLE:

Surface Resistivity Test	AASHTO T 358
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ADD THE FOLLOWING SUBSECTION:

601.4.6-Surface Resistivity Tests for Acceptance of Class S Concrete: The Contractor shall also be required to fabricate and test three (3) Surface Resistivity test specimens, in accordance with AASHTO R 100 and AASHTO T 358, every time that a set of compressive strength specimens for Class S concrete is fabricated. These test specimens shall be 4-inch x 8-inch, and they shall be tested at an age of 28-days. These test specimens shall be moist cured in accordance with the accelerated moist-curing procedure defined in AASHTO T-358 and tested at an age of 28 days in accordance with AASHTO T-358. The surface resistivity result shall not be less than 30 kΩ-cm. until as close to the time of testing as possible and the results of this test shall not be less than 30 kΩ-cm. If the testing result is less than 30 kΩ-cm, then the concrete represented by resistivity value may be removed and replaced by the Contractor. If

the Contractor elects to leave the material in place, the Engineer shall evaluate it as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the use intended shall be removed and replaced by the Contractor. When the Engineer's evaluation indicates that the work may satisfactorily remain in place, the subject material shall be paid for at a reduced unit price based on Table 601.4.6.

Table 601.4.6

<u>Resistivity Result (kΩ-cm)</u> Resistivity result obtained (values expressed in kΩ-cm)	Percent of <u>Unit Bid Price Paid</u> for material in question
<u>>25-29</u> 28-29	<u>90%</u> 95%
<u>>20-25</u> 26-27	<u>70%</u> 90%
<u>>15-20</u> 24-25	<u>50%</u> 85%
<u>≤ 15</u> 22-23	<u>Remove & Replace</u> 80%
<u>20-24</u>	<u>70%</u>
<u><20</u>	<u>Remove and replace</u>

601.6-HANDLING, MEASURING, AND BATCHING OF MATERIALS:

ADD THE FOLLOWING PARAGRAPH AFTER THE FOURTH PARAGRAPH

When Expansive hydraulic cement is used, to avoid potential localized volcanic expansions, it is recommended to use pre-blended Type K expansive cement. Alternatively, the Expansive component can be added by a pre-mixed slurry at the plant or by slurry pump at the jobsite, instead of pre-blended cement, to prevent potential localized volcanic expansions.

601.7-MIXING:

DELETE AND REPLACE THE CONTENTS OF THE SIXTH PARAGRAPH OF THE SUBSECTION WITH THE FOLLOWING:

For all classes of concrete except Class H, Class S, and concrete for specialized overlays, the total amount of water in a concrete mix, including any water added at the job site, shall not be more than the amount which would cause the water-cement ratio (w/c) of that concrete mix to exceed the w/c which corresponds to the Mix Design Approved Strength, as outlined in Section 5.4 of MP 711.03.23. The maximum water amount shall also be shown in Attachment 4 or 5 of MP 711.03.23 for all approved concrete mix designs. However, under no circumstances shall the w/c in Table 601.3.1A be exceeded.

601.9-ADVERSE WEATHER CONDITIONS:

601.9.1-Cold Weather Concreting:

DELETE AND REPLACE THE FOLLOWING CONTENTS IN THE LAST PARAGRAPH:

Class H, Class S, and Class K Concrete Cold Weather Provisions: Cold weather periods shall be defined as those periods when temperatures above 50° F do not occur for more than half of any 24-hour duration. The temperature of the surface on which the concrete is to be placed shall not be less than 45° F immediately prior to placement of the concrete. During the cold weather periods, as defined above, the temperature of the concrete immediately after placement shall be between 55 and 75° F.

601.10-PLACING CONCRETE:

601.10.1-General:

601.10.1.2-Concrete Placement Limitations:

DELETE AND REPLACE THE CONTENTS OF THE FIRST PARAGRAPH IN THE SUBSECTION:

Immediately prior to, and during, placement of Class H and Class S concrete, if the evaporation rate exceeds 0.10 lb./sq. ft. per hour (see Figure 1), the Contractor shall make provisions (i.e. wind breaks, fogging, etc.) to reduce the rate prior to placing concrete. These provisions shall be maintained during the placement of the concrete. If the evaporation rate obtained from Figure 1 is close enough to the maximum allowable value of 0.10 lb./sq. ft. per hour that there may a discrepancy in the exact numerical value, the following equation shall be used to obtain a more accurate value.

601.10.4-Placing Concrete Bridge Decks:

601.10.4.1-Fogging Equipment:

REMOVE AND REPLACE THE CONTENTS OF THE SUBSECTION WITH THE FOLLOWING:

When Class H and Class S concrete is used, fogging equipment shall be available for use in accordance with these specifications. The fogging nozzles shall produce an atomized mist. Fogging nozzles shall incorporate compressed air to create the mist. Handheld or hand operated equipment shall be permitted when the Contractor has demonstrated that his operator has been trained in its use.

601.11-FINISHING CONCRETE SURFACES:

601.11.4-Finishing Concrete Bridge Decks:

601.11.4.2-Class H Bridge Decks:

DELETE THE TITLE AND CONTENT OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

601.11.4.2-Class H and Class S Bridge Decks: The surface of the Class H and Class S 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 of curbs or parapets.

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

601.11.4.4-Class H Concrete Finished Deck Grooving:

DELETE THE TITLE OF THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

601.11.4.4-Class H and Class S Concrete Finished Deck Grooving:

601.12-CURING AND PROTECTING CONCRETE:

601.12.1-Curing Under Normal Conditions:

DELETE AND REPLACE THE CONTENTS OF THE SECOND PARAGRAPH WITH THE FOLLOWING:

Concrete surfaces shall be kept completely and continuously moist. Curing shall be continued for a period of at least 7 days. This curing period may be reduced if the contractor presents evidence that the in-place concrete has attained 70% of the specified strength for the class of concrete under cure. Under no circumstances, shall the period of cure be less than 3 days. The reduced curing period option is not applicable to Class H, Class S, or Class K concrete. When placing concrete elements with a minimum dimension greater than two (2) feet, 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. Surfaces may have coverings temporally removed for finishing, but the covering shall be restored as soon as possible.

601.12.2-Curing Under Cold Weather Conditions:

DELETE THE FOURTH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

Class H, Class S, and Class K Concrete Provisions: The surface temperature of the concrete shall be maintained between 55 and 75°F for 72 continuous curing hours immediately after placement. After this 72 hour period, a minimum concrete surface temperature of at least 50°F shall be maintained for an additional 96 continuous curing hours.

601.12.4-Curing Class H Concrete:

REMOVE AND REPLACE THE CONTENTS OF THE TITLE AND SUBSECTION WITH THE FOLLOWING:

601.12.4-Curing Class H and Class S Concrete: It is the nature of Class H and Class S concrete material to quickly form a plastic film at the surface upon drying. This film is to be protected from drying and cracking by prompt covering with wet burlap. Regardless of the type of concrete placed, the use of membrane curing compounds will not be allowed. Floor drains shall be immediately unplugged to permit the deck to drain.

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 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.

601.13-PROTECTIVE SURFACE TREATMENT:

601.13.1-Silane Treatment for Bridge Superstructure:

REMOVE AND REPLACE THE SECOND PARAGRAPH OF THE SUBSECTION WITH THE FOLLOWING:

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

601.14-METHOD OF MEASUREMENT:

REMOVE AND REPLACE THE FIRST AND SECOND PARAPGRAPH OF THE SUBSECTION WITH THE FOLLOWING:

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

The quantity of work done for Class H, Class S, and Class K concrete will be measured in cubic yards, 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.

601.16-PAY ITEMS:

ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
601010-*	Class S Concrete	Cubic Yard
601025-009	Modified Concrete, Class S	Cubic Yard
601026-005	Modified Architectural Concrete, Class S	Cubic Yard