

20230802 - August Specifications Committee Meeting

August Specifications Committee Meeting Agenda

Meeting Date

Wednesday, August 2, 2023 @ 9:00am

Meeting Location: 1334 Smith Street, Charleston, WV in Lower Level Conference

Also meeting virtually via Google Meet video conference. E-mail distribution message includes instruction.

Approved Permanent Specification changes from last Committee meeting (06/14/23)

- **107.21.3-Basis of Payment:** Clarifies payment of erosion and sediment pay items.
- **420.3.1-Mix Design:** Updates the referenced AASHTO standard to AASHTO R 103.
- **623.3.2- Quality Personnel:** Clarifies the role and duties of the Shotcrete Inspector.
- **707.12-Concrete Sealer:** Adds NTPEP and AASHTO M224 requirements.

Approved Project Specific Special Provisions (SP) from last Committee meeting (06/14/23)

- **SP 601-Structural Concrete**
- **SP 603-Post Tensioning**

Items removed from Committee Agenda

- **None**

Old Business-Provisions discussed at last Committee meeting

SECTION	TITLE	DESCRIPTION
<u>601</u>	SP 601-Surface Resistivity and Super Air Meter Testing S. Thapa	Updated to previously approved SP. 3rd time to Committee; discussed at April and June. Project Specific Special Provision (SP) for Surface Resistivity and Super Air Meter Testing. The update combines the two SPs into one, revises AASHTO reference and testing requirements, and removes the pay item. The SP was approved at the June meeting, however per discussion at CAWV Joint Concrete Committee a revision to Table was added to clarify that the testing is for informational purposes at this time. It is redline copy showing the latest revision. Approval is expected in August.

<p><u>900</u></p>	<p>SP 900 - Railroad Protective Services - Norfolk Southern Railway Company</p> <p>S. Runyan</p>	<p>3rd time to Committee; discussed at April. Project Specific Special Provision (SP) for Norfolk Southern Flagging Services.</p> <p>The method of measurement in SP has been updated per comments. It is redline copy showing the revisions.</p> <p>Approval is expected in August.</p>
<p><u>401</u></p>	<p>401.9.9-Material Transfer Vehicle</p> <p>SP401-Material Transfer Vehicle</p> <p>J. Adkins</p>	<p>3rd time to Committee; discussed at April. Changes to Section 401-Asphalt Base, Wearing, and Patching and Leveling Courses adding Material Transfer Vehicle (MTV) requirements to equipment subsection of specifications. Also a special provision (SP) for when we want to specify use of MTV on projects.</p> <p>Two items:</p> <ul style="list-style-type: none"> • Specification; subsection 401.9.9-Material Transfer Vehicle <ul style="list-style-type: none"> ○ No update • SP401-Material Transfer Vehicle <ul style="list-style-type: none"> ○ Updated the appendix page, per comments at the last meeting
<p><u>636</u></p>	<p>636.11-Flagger</p> <p>M. Khan</p>	<p>3rd time to Committee; discussed at April. Specification Change to Section 636-Maintaining Traffic. The revision clarifies flagger requirements on Interstate and/or Expressways.</p> <p>No update to the specification; it is redline copy showing the revisions.</p> <p>Approval is expected in August.</p>
<p><u>642</u></p>	<p>SP642-High Strength Silt Fence</p> <p>L. Rinehart</p>	<p>3rd time to Committee; discussed at April. Project Specific Special Provision for high strength silt fence.</p> <p>No update to the SP; we are evaluating and considering updates per the last meeting. Hope to have revisions at the October meeting.</p>
<p><u>697</u></p>	<p>SP697-Bridge Safety Inspections</p> <p>Section 697 - Bridge Safety Inspections</p> <p>T. Brown</p>	<p>3rd time to Committee; discussed at April. Provision for bridge inspection on any temporary bridge or stage construction of a new bridge, to correlate with new federal bridge inspection requirements.</p> <p>Two items:</p> <ul style="list-style-type: none"> • SP697-Bridge Safety Inspections. • Section 697 - Bridge Safety Inspections. <p>Both provisions have been updated, adding inspection deadline requirements; the SP is redline copy showing the changes and specification is clean copy.</p> <p>Approval is expected in August.</p>

<p><u>601</u></p>	<p>SP601-Galvanic Anode Protection</p> <p>Eric Williams, Vector Corrosion Technologies Inc.</p>	<p>2nd time to Committee; update of previously approved SP. Project Specific Special Provision for galvanic anode protection. Updates the material requirements, installation requirements, and notes.</p> <p>The SP has been updated per comments at the last meeting (manufacturer representative requirements and pay units to 'Each'); it is redline copy; showing the proposed revisions.</p> <p>Approval is expected in August.</p>
<p><u>106</u></p>	<p>106.3.1-Acceptance Plans</p> <p>J. Adkins</p>	<p>2nd time to Committee; discussed at June. Specification change to Section 106-Control of Materials. The update removes subsection from Acceptance Plans, as the aggregate gradation/price information is included in various sections of spec book.</p> <p>No update to the specification; it is redline copy showing the revision.</p> <p>Approval is expected in August.</p>
<p><u>401</u></p>	<p>401.2-Materials</p> <p>J. Ross</p>	<p>2nd time to Committee; discussed at June. Specification change to Section 401-Asphalt Base, Wearing, and Patching and Leveling Courses. The update removes a note (Note 1) in subsection 401.2 that conflicts with gradation requirements in Section 703 for friable particles.</p> <p>No update to the specification; it is redline copy showing the revision.</p> <p>Approval is expected in August.</p>
<p><u>501</u></p>	<p>501.3-Proportioning</p> <p>A. Gillispie</p>	<p>2nd time to Committee; discussed at June. Specification change to Section 501-Portland Cement Concrete Pavement. The update gives Contractor option to use a reduce cement factor provided the aggregate used in those mix designs meet the requirements for optimized gradation of Section 601.2.4.1. Similar to Section 601.</p> <p>No update to the specification; it is redline copy showing the revision.</p> <p>Approval is expected in August.</p>
<p><u>502</u></p>	<p>502.5-Joints</p> <p>J. Adkins</p>	<p>2nd time to Committee; discussed at June. Specification change to Section 502-Approach Slabs. The update revises referenced subsection to appropriate location in Section 501 (to 501.16-Sealing Joints & not 501.17-Protection of Pavement).</p> <p>No update to the specification; it is redline copy showing the revision.</p> <p>Approval is expected in August.</p>

<u>601</u>	601.3.1-Mix Design Requirements A. Gillispie	2nd time to Committee; discussed at June. Specification change to Section 601-Structural Concrete. The purpose of the change is to add the Nominal Aggregate Size of different aggregate size depending on Class of concrete. No update to the specification; it is redline copy showing the revision. Approval is expected in August.
<u>601</u>	SP601-Distributed Anode System Eric Williams, Vector Corrosion Technologies Inc.	2nd time to Committee; discussed at June. Project Specific Special Provision for distributed anode system. SP updated per comments at the last meeting (add references to plans and removed manufacturer name); it is redline copy showing the revisions.
<u>636</u>	SP636-Automated Flagger Assistance Device G. Mullins	2nd time to Committee; discussed at June. Project Specific Special Provision for automated flagger assistance device. The SP has been No update to the SP. Approval is expected in August.
<u>702</u>	702.1.5-Mortar Strength (Determined by MP 702.01.25) M. Perrow	2nd time to Committee; discussed at June. Specification change to Section 702-Fine Aggregate. The purpose of the change refence to MP 702.01.25 and Type IL cement. No update to the specification; it is redline copy showing the revision. Approval is expected in August.

New Business - New Provisions for Spec Committee

SECTION	TITLE	DESCRIPTION
<u>101</u>	101.2-Definations J. Adkins	1st time to Committee. Specification change to Section 101-Defination of Terms. The revision updates holidays to align with the way they are listed in state code and added the Day after Thanksgiving Day to the list. The specification is redline copy showing the revision.
<u>406</u>	Section 406 - High Friction Surface Treatment B. Whelan	1st time to Committee. Proposed specification change adding High Friction Surface Treatment (HFST) to the specifications. This item has traditionally been utilized via SP406. The specification is redline copy showing the revisions to current SP.

606	606.2-Materials J. Adkins	1st time to Committee. Specification change to Section 606-Underdrains. The update removes "Miscellaneous Concrete" from the material subsection as "Concrete for Miscellaneous Use" is also listed and both currently reference 715.12. The specification is redline copy showing the revision.
607	607.2-Materials J. Adkins	1st time to Committee. Specification change to Section 607-Guardrail. The revision removes "Concrete for Footers" from the material subsection and clarifies "Concrete for Miscellaneous Use" and both currently reference 715.12. The specification is redline copy showing the revision.
636	636.24-Basis of Payment J. Adkins	1st time to Committee. Specification change to Section 636-Maintaining Traffic. The revision updates payment of items after contract completion date. The specification is redline copy showing the revision.
636	636.19.3.3-Digital Speed Limit Sign 636.23.22-Portable Message Signs 636.25-Pay Items J. Adkins	1st time to Committee. Specification change to Section 636-Maintaining Traffic. The revision add digital speed limit sign item, for use on high speed, multi-lane highways, work areas. The specification is redline copy showing the revision.
709	709.46-Steel Posts, Post Braces and Gate Frames for Right-of-Way Fence J. Danberry	1st time to Committee. Specification change to Section 709-Metals. The revision adds MP reference. The specification is redline copy showing the revision.

Comments

Comments are requested on these Specifications Changes and Project Specific Special Provisions. Please share your comments by **July 28, 2023**, they help in the decision making process.

Please Send Comments to: Steve.D.Boggs@wv.gov

Deadline for new items & updates to these provision is **September 9, 2023**.

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/modify them in a timely manner per comments and discussion in Spec Committee. *Failure to submit updates may result in removal of item and/or delays.*

Next Meeting

Wednesday, **October 4, 2023 at 9:00 a.m.**

Meeting will be held virtually via Google Meet video conference. E-mail distribution message includes instruction.

Specification Webpage Updated

Technical Support Division now has a webpage and the specification webpage has moved. The Specification page is here:

<https://transportation.wv.gov/highways/TechnicalSupport/specifications/>

2023 Standard Specification Roads and Bridges

Electronic copy (pdf): The 2023 Standard Specifications Roads & Bridges is posted on the Publications page under Specifications.

Print Version: We are working on getting the book printed and will provide an update during the meeting.

2023 Specifications Committee

The Specification Committee typically meet every other month; on the first Wednesday. 2023 meetings will be held in February (2/1), April (4/5), June (6/14), August (8/2), October (10/4), and December (12/6).

Calendar subject to change, updates will be given, as needed.

Specifications Committee Website

A copy of the meeting agenda can be found on the Specifications Committee Website

<https://transportation.wv.gov/highways/TechnicalSupport/specifications/SPECCOMIT/Pages/default.aspx>

Materials Procedures

Material Procedures (MPs) referenced in provisions are available upon request.

For questions regarding the Standard Specifications Road and Bridges, Supplemental Specifications, Project Specific Provisions, or the Specifications Committee please email Steve.D.Boggs@wv.gov.

File Format Structure and Progression of items thru Specifications Committee

The purpose of the below protocol is to provide guidance on the file structure of Proposed Specifications & Project Specific Provisions as they progress thru 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.

TYPES OF PROVISIONS:

There are three standard types of provisions typically discussed in committee:

1. Specification Changes – These are permanent changes to the WVDOT Standard Specifications.
 - Unless inserted into a project proposal, these changes typically go into effect in January (of subsequent year) with the Supplemental Specifications
2. Project Specific Special Provisions (SP) – Are applied to specifically designated projects.

3. Updates to previously approved SP – Changes/edits/updated to SP that have been approved by spec committee.

NEW BUSINESS ITEMS:

New items should be setup & submitted in the following format:

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

Each item should also include a description with:

- Brief overview of item
- Background info and/or reason for change

NOTE: Red-line 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 or you can manually reline document with font color changes & strike-through.

OLD BUSINESS ITEMS:

Updated provisions that were discussed at the last committee meeting should be setup 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.
- SP's 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

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

**SECTION 601
STRUCTURAL CONCRETE**

601.3-PROPORTIONING

DELETE THE FOURTH PARAGRAPH OF THE SUBSECTION 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, surface resistivity, super air meter (SAM) and rapid chloride permeability tests. For establishment of mixture proportions, rapid chloride permeability tests shall be made on representative samples prepared and tested in accordance with AASHTO T 277. The rapid chloride permeability test specimens shall be tested at an age of 90 days (or at any time prior to 90 days), and the results of this test shall not exceed 750 coulombs. Specimens shall be moist cured for 56 days prior to the start of specimen preparation unless specimens are to be tested prior to 56 days, in which case the specimens shall be moist cured until the time of test. The 28-day compressive strength of the test mix that satisfies the 750 coulomb threshold shall be used as the basis for acceptance of Class H concrete per Section 601.4.5. For establishment of the mixture proportions, surface resistivity testing shall be performed in accordance with AASHTO T358 and SAM testing shall be performed in accordance with AASHTO T 395. A set of three 4-inch x 8-inch cylinders shall be fabricated and moist cured, as specified in AASHTO R39, for 28 days prior to testing. Surface resistivity test results shall be for information purposes only, but ideally, the average result of the three cylinders should not be less than 40 k Ω -cm for 4-inch x 8-inch cylinders. The SAM test results (SAM number), shall be for information purposes only, but ideally the SAM number should be less than or equal to 0.20 for mix design qualification. The cost of all test mix requirements shall be considered incidental to the cost of Class H concrete.

For existing Class H mix designs, which have already approved by the Division, surface resistivity and SAM testing shall be performed on a laboratory trial batch at a Division Approved Concrete Mix Design Laboratory within 4-months of contract award date, and those results, along with the mix design number, shall be submitted to the following email address:

DRAFT

DOHConcreteMixDesign@wv.gov. A Division Approved Concrete Mix Design Laboratory shall be required to demonstrate competency in the performance of AASHTO 395 (SAM test) to MCS&T Division personnel prior to any work. The request to demonstrate competency shall be sent to the following e-mail address at least two-weeks prior to desired date of demonstration: DOHConcreteMixDesign@wv.gov.

ADD THE FOLLOWING SUBSECTION:

601.3.2.2.1-Sequential Pressure Method-Super Air Meter (SAM): The SAM testing shall be performed daily on the first batch, and then every fifth batch thereafter. The results of this SAM testing will be for informational purposes only. The target value of the SAM number at the point of placement should ideally be as shown in Table 601.3.2.2.1. However, SAM numbers obtained from this field testing are not required to meet the requirements of Table 601.3.2.2.1. Ideally, if the SAM number does not conform to the target values of Table 601.3.2.2.1, the Contractor would take immediate steps to adjust the concrete mix, so that the SAM number of succeeding loads is within the acceptable limits shown in Table 601.3.2.2.1. The entrained air content shall still be maintained within the tolerances specified in Section 601.3.2.2.

For each SAM test performed, the SAM number shall be recorded by the Contractor on the same T600 form on which the corresponding normal air content test result is recorded. An electronic copy of that T600 form and an electronic copy of the Concrete Batch Ticket for that concrete shall be sent to the following e-mail address within 72 hours of the completion of the test: DOHConcreteMixDesign@wv.gov.

TABLE 601.3.2.2.1*

SAM Number	<u>Proposed Required Action in Future Specification</u>
Less than 0.25	Accept Concrete
0.25 to 0.30	Accept with Corrective Action Needed
Greater than 0.30	Reduced payment for concrete

* Table 601.3.2.2.1 is for informational purposes. The required action taken in Table 601.3.2.2.1 does not apply based on SAM numbers obtained from the field.

601.4-TESTING:

601.4.1–Sampling and Testing Methods:

ADD THE FOLLOWING TO THE TABLE IN SUBSECTION 601.4.1:

Sequential Pressure Method - Super Air Meter (SAM)	AASHTO T 395
Surface Resistivity	AASHTO T 358

601.4.2-Contractor’s Quality Control:

ADD THE FOLLOWING AFTER THE FIRST PARAGRAPH IN THE SUBSECTION:

Prior to any testing with the SAM by Contractor QC personnel, those Contractor QC personnel must demonstrate competency in the performance of AASHTO 395 (SAM testing) to MCS&T Division personnel. The successful competency upon demonstration will validate their ability to test with the SAM following the guidelines of AASHTO T 395. MCS&T Division will maintain a database of all personnel who have shown successful competency to perform the SAM test. Only the SAM results from these personnel will be accepted, and the name(s) of these personnel shall be included in the contractor's field quality control plan. The request to demonstrate competency shall be send to the following e-mail address at least two weeks prior to the desired date of demonstration: DOHConcreteMixDesign@wv.gov.

601.4.5–Tests for Permeability Acceptance of Class H Concrete:

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

601.4.5–Tests for Permeability Acceptance and Surface Resistivity of Class H Concrete:

ADD THE FOLLOWING PARAGRAPH TO THE END OF THE SUBSECTION:

The Contractor shall also be required to fabricate and test three Surface Resistivity test specimens, in accordance with AASHTO R100 and AASHTO T 358, every time that a set of compressive strength specimens for Class H 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 the same manner as the Class H compressive strength specimens, until as close to the time of testing as possible. The average Surface Resistivity test result of these three test specimens shall be used for information purposes only. The 28-day Surface Resistivity result of each of these three specimens, the Project Number for which they were fabricated, and the approved mix design number which was used to batch the concrete shall be forwarded to the following e-mail address: DOHConcreteMixDesign@wv.gov as soon as testing is completed. Average Surface Resistivity results equal to or greater than 30 kΩ-cm for 4-inch x 8-inch cylinders are considered acceptable. Any Agency or Laboratory which tests Surface Resistivity test specimens have to be certified by MCS&T.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

ADD THE FOLLOWING:

**SECTION 900
RAILROAD PROTECTIVE SERVICES – NORFOLK SOUTHERN
RAILWAY COMPANY**

**900.1–RAILROAD PROTECTIVE SERVICES – NORFOLK SOUTHERN RAILWAY
COMPANY:**

The Contractor shall adhere to the latest edition of *Norfolk Southern's Special Provisions for Protection of Railway Interest*, Section 8 – Contractor Protective Services, which is located within the bid documents. ADD link

The following companies have been pre-approved by Norfolk Southern Railway Company to provide railroad protective services (Railroad Flagger):

Railpros Direct Hire
Gary Killion
682-219-9196
Gary.Killion@railpros.com

Railroad Consultants Direct Hire
Jon Parker
615-663-6594
JParker@railroad-consultants.com

900.2-Blank

900.3-METHOD OF MEASUREMENT

Payment for this item shall be based on the ~~estimated number of flagging days listed in the plans.~~ The amount of approved days (~~hours~~) required by the Contractor's work, as depicted in the

invoice(s) provided by the contractor by the company providing railroad protective services. Additional ~~hours~~ days requested solely for the benefit of the Contractor will not be paid.

900.4–BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid at the contract unit price bid for the item listed below, which price and payment shall be full compensation, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

900.5–PAY ITEM:

ITEM	DESCRIPTION	UNIT
900005-005	Railroad Protective Services – Direct Hire	Day

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 401

ASPHALT BASE, WEARING, AND
PATCHING AND LEVELING COURSES

401.9-EQUIPMENT:

DELETE SUBSECTION 401.9.10-COMPACTION EQUIPMENT AND RENUMBER AS 401.9.11. AND ADD THE FOLLOWING TO SUBSECTION 401.9.10:

401.9.10-Materials Transfer Vehicle: A Materials Transfer Vehicle (MTV) shall be designed to independently transfer and continuously mix asphalt concrete to mitigate thermal and particle size segregation when transferring from the haul equipment to the paving equipment.

An MTV shall have a high-capacity truck unloading system, ~~capable of receiving 600 tons per hour from the hauling equipment, be capable of receiving and transferring material at a rate that exceeds the capacity of the delivery and paving equipment,~~ and have a minimum combined capacity of 15 tons of asphalt concrete, including the MTV storage bin and hopper. An MTV shall include a system contained within an integrated storage bin which continuously mixes the asphalt concrete prior to discharge to the paving equipment. Additionally, the MTV should have a discharge conveyor with the ability to swivel to allow for the delivery of the mixture material to the paver while the MTV operates from an adjacent lane.

The MTV shall be maintained ~~at all times and in satisfactory working conditions and in proper working conditions.~~

401.9.10.11-Compaction Equipment: Compaction shall be performed by self-propelled steel-wheeled or pneumatic-tired rollers. The use of either vibratory or oscillatory type rollers is acceptable. Pneumatic rollers shall be equipped with skirting around the wheel area to prevent heat loss to the tires and tire pads. Hand-held rollers or vibrating plates may be used in small inaccessible areas as approved by the Engineer. Prior to use on any project, the roller shall be inspected to see that it is in good mechanical condition. The total weight, weight per inch of width (steel-wheeled), and average ground contact pressure (pneumatic-tired) shall be documented in the contractors QCP in accordance with MP 401.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____
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**SECTION 401
ASPHALT BASE, WEARING, AND
PATCHING AND LEVELING COURSES**

401.1-DESCRIPTION:

ADD THE FOLLOWING:

401.1.1-Materials Transfer Vehicle: This work shall consist of the use of a Materials Transfer Vehicle (MTV) for transferring asphalt concrete from hauling equipment to the paver during construction. An MTV, as defined in Section 401.9.10, contributes to an efficient non-stop paving operation by reducing thermal and particle size segregation in the material, both of which adversely affect the smoothness and durability of the final pavements. The work shall be constructed in accordance with these specifications and the applicable requirements of Section 401, 402, or 410 of the Specifications.

NOTE: Asphalt paving applications suitable for MTV shall be used on the mainline of the traveled way. MTVs may also be included on all ramps, full width acceleration lanes, full width deceleration lanes and full width turn lanes that are greater than 1000 feet in length. At the Engineer’s discretion, isolated portions of a project may be exempt from use of the MTV if the weight or operation of the MTV is detrimental to the roadway.

401.13-BASIS OF PAYMENT:

ADD THE FOLLOWING:

No additional measurement is necessary nor will additional compensation be allowed for use of an MTV on the project.

Appendix 401A. This sheet is not required with PS&E submission.:

Designer Note: This specification requires use of MTV on paving projects. It is intended for only specified projects which meet criteria listed below. However, the designer needs to be aware of site conditions, such as weight/height of the MTV, should be considered during project selection. If an MTV is used for a project, it shall meet all of the following requirements:

When to use:

- The ~~two-way ADT design speed~~ is equal to or greater than 35 mph.
- The project length is a minimum of one (1) mile of continuous pavement.
- The total tonnage of all asphaltic concrete is greater than 2000 tons.

Where to use:

- Mainline of the traveled way.
- Ramps, full width acceleration lanes, full width deceleration lanes and full width turn lanes that are greater than 1000 feet in length.

Do not use the MTV for the following conditions:

- A project with lane width that is equal to or less than 11 ft.
- A passing lane only project.
- PWL Projects (Section 410- Asphalt Base and Wearing Courses, Percent with Limits (PWL)).
- Scratch Courses

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 636
MAINTAINING TRAFFIC

636.11-FLAGGER OR TRAFFIC DIRECTOR:

636.11.1-Flagger:

DELETE THE CONTENTS OF SUBSECTION 636.11.1 AND REPLACE WITH THE FOLLOWING:

All flaggers shall be furnished by the Contractor, and it shall be the Contractor's responsibility to provide flaggers at ~~any~~ locations necessary to assure the safety of the travelling public. No flaggers are allowed on Interstate mainline; however, they may be allowed on ramps and/or Expressways mainline, when approved by the Traffic Engineering Division. Hand signaling devices and high visibility apparel meeting the requirements of the WVDOH Traffic Control Manual shall be used by the Contractor's personnel assigned to traffic control responsibilities. Approved headgear, if worn, and vests worn by the Contractor's personnel shall not bear the Division symbol. Wireless two-way communication shall be provided to the flaggers when they are out of sight of each other.

Flaggers must be certified by passing an American Traffic Safety Service Association (ATSSA) training. The Contractor may use noncertified flaggers for their benefit, ease of operations, or other activities not receiving payment.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

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SECTION 642
TEMPORARY POLLUTION CONTROL

642.6-TEMPORARY PIPE, CONTOUR DITCHES, BERMS, SLOPE DRAINS, ROCK CHECK DAM, SILT FENCE, AND SUPER SILT FENCE:

ADD THE FOLLOWING SUBSECTION:

642.6.7-High Strength Silt Fence: 42” high Reinforced High Strength Silt Fence is a heavy-duty, high-tensile/ high-modulus, woven geotextile sediment fence. Designed using a value engineering approach, it is equivalent in strength and stiffness to that of wire or chain-link backed silt fence.

642.7-METHOD OF MEASUREMENT:

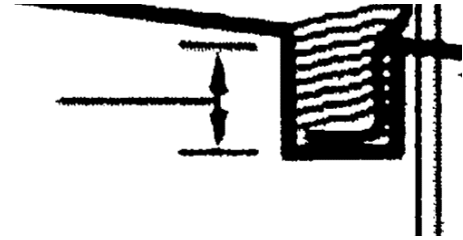
ADD THE FOLLOWING SUBSECTION:

642.7.2-High Strength Silt Fence: Excavate trench a maximum of 4” wide and 6” deep [or as recommended by the manufacturer](#). The trench shall be hand-cleaned following excavation to remove bulky debris such as rocks, sticks, and soil clods. [Roll](#) out [the fence](#) on the ground along the proposed fence line and next to the anchor trench. For the initial post, place the end of Reinforced High Strength Silt Fence along the post height and rotate the post [two full](#) 360 degrees, maintaining tension on the fabric. Secure the fence to the post at all ~~four (4) orange-colored reinforcing~~ bands locations with steel wire (metal T-posts using 16-gage 304 SS wire with mitered ends, securing with safety pliers) or nylon ties (puncture two 0.25” openings, spaced at a width apart that is roughly equivalent to the post width, and secure the fence to the post using 8” nylon heavy-duty cable ties/zip-ties that are UV resistant and have a minimum 120-lb tensile strength). [Metal T-posts shall conform to the requirements of either AASHTO](#)

M 281 / ASTM A702 or ASTM A499 and coated to meet the requirements of AASHTO M 111 unless otherwise directed on project plans.

Drive the initial post (72” metal t-post) with the attached fence to a depth of 36” below surface. Using spacing no greater than 6’ on center, drive interior posts to 36” depth below surface, and attach the fencing as you go. To attach fencing, position 42” high Reinforced High Strength Silt Fence in front of the adjacent t-post, pulling the fencing tight and fasten it to the post at all four (4) ~~orange-colored reinforcing~~ band locations. After the interior posts have been fastened, secure the fence to the final post by pulling the final section of fencing taut, and then **rotating the post 360 degrees** while maintaining tension on the fence system. Secure the fence to the post at all four (4) ~~orange-colored reinforcing~~ band locations with the steel wire or nylon ties. Drive the final post into the ground to a 36” depth below the surface. The woven geotextile fence shall be specifically designed and fabricated to withstand high tensile stresses and to prevent excessive material elongation and strain. It shall resist fence deflection and ultimate failure due to ripping, sagging or overturning from forces associated with excessive backwater depths, debris flows and overtopping. Ensure bottom 6” to 8” of fabric has been placed in trench or as recommended by the manufacturer. Backfill trench (overfill) with soil placed on and around fabric as shown in the diagram below. Compact soil backfill manually or via mechanical equipment such as the front wheel of a tractor, skid steer, roller, compactor or other device (ASTM D 6462 Standard Practice for Silt Fence Installation).

**BURY FILTER CLOTH 6"
MINIMUM TO GROUND**



The High Strength Silt Fence shall have Fencing and Filter Fabric that is 34” to 36” above ground with filter fabric extending 6” to 8” below ground surface.

Wide width tensile strength ASTM D 4595 (>5000 lbs/ft MD, >3500lbs/ft TD).

Wide Width Test Elongation ASTM D 4595 (< 10% MD, <9% TD).

Grab Tensile Strength ASTM D 4632 (>500 lbs. MD, >280 TD).

CBP Puncture ASTM D 6241 (> 1800 lbs.).

Trapezoidal Tear ASTM D 5433 (>195 lbs. MD, >170lbs. TD).

Mullen Burst ASTM E 3786 (>750 psi).

Apparent Opening Size ASTM D 4751 (Sieve #70).

Water Flux ASTM D 4491 (>18 gpm/sf). UV Stability ASTM D 4355 (>90% strength retained Machine Direction).

(MD=Machine Direction, TD=Traverse Direction)

Once sedimentation has reached a third of the Reinforced High Strength Silt Fence height, all accumulated sediment shall be removed and disposed of as directed by the Engineer. The Contractor shall inspect all silt fences after each rainfall event of at least 0.50.25 inches or greater. Any deficiencies or damage shall be repaired by the Contractor. If the Reinforced High Strength Silt Fence height is damaged or inadvertently moved during the sedimentation removal process,

the contractor shall ~~immediately~~ replace and/or repair any Reinforced High Strength Silt Fence immediately after the damage occurs. The Contractor shall be responsible for all details, devices, accessories, and special construction necessary to properly furnish, install, adjust and place in continuous satisfactory service, and complete the work in an acceptable manner.

642.8-BASIS OF PAYMENT

ADD THE FOLLOWING SUBSECTION:

642.8.1-High Strength Silt Fence: Reinforced High Strength Silt Fence shall be measured by the linear foot complete and in place Reinforced High Strength Silt Fence shall be paid per Linear Foot or Units as shown in the plans and/or other Erosion and Sediment Control Specifications as referenced in the plans.

642.9-PAY ITEMS:

ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
642015-005	High Strength Silt Fence	Linear Foot

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

SECTION 697

**SAFETY INSPECTION OF IN-SERVICE BRIDGES
DURING CONSTRUCTION**

697.1–DESCRIPTION:

The work shall consist of performing all bridge safety inspection requirements of the Federal Highway Administration’s current National Bridge Inspection Standards (NBIS) for normally scheduled inspections, temporary structures, and for any structure or portion thereof that utilizes staged construction until the construction project is fully complete. The inspection team leader shall meet the minimum requirements of a team leader as specified by the NBIS, shall be approved by WVDOH Operations Division, and shall be on site during the duration of all inspection activities. Operations Division shall be notified of the times and dates that any field inspection activities will be occurring.

697.1.1–Inspection Requirements for Normally-Scheduled Inspections: A list of upcoming scheduled bridge safety inspections and the respective inspection types required for the existing structure, or any portion(s) of the existing structure that remain(s) open to traffic, shall be noted in the construction plans. Each inspection shall be performed and completed during the month and year as noted in the plans in accordance with the department’s requirements for the noted inspection type as described in the current edition of the WVDOH Bridge Inspection Manual. In cases where an inspection and inspection type are scheduled but no portion(s) of the existing structure remain(s) open to traffic, the Pay Item for that particular inspection will be non-performed. An inspection report, in accordance with the WVDOH Bridge Inspection Manual for the given inspection being performed, shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department’s inspection data software. The inspection and the finalized inspection report must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection report has been finalized and approved by Operations Division.

697.1.2–Inspection Requirements for Temporary Structures: An initial inspection shall be performed immediately prior to opening any temporary structure or portion thereof to public traffic. The initial inspection shall be in accordance with current NBIS requirements and in accordance with the department’s requirements for an Inventory Inspection as described in the current edition of the WVDOT Bridge Inspection Manual. An In-Depth Routine Inspection, in accordance with the WVDOT Bridge Inspection Manual, shall be performed concurrently with the Inventory Inspection. An Inventory Inspection Report and an In-Depth Routine Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department’s inspection data software. The inspection and the finalized inspection reports must meet the approval of WVDOT Operations Division. The District Construction Engineer shall be notified in writing once the inspection reports have been finalized and approved by Operations Division.

A Bridge Rating Submission in accordance with Design Directive 202, meeting the requirements for Rating by District Bridge Engineer, shall be attached to the Inventory Inspection Report for the temporary structure. It will not be necessary to include a title sheet with a proposed sheet index. However, all other required items listed for the submission shall be supplied. Load rating of the temporary structure will be performed by WVDOT evaluation personnel once the Inventory Inspection Report has been submitted.

If a temporary structure or portion thereof is open to traffic twenty-four (24) months after the inspection date of the initial inspection, a routine inspection shall be performed in accordance with current NBIS requirements and in accordance with the department’s requirements for a Routine Inspection as described in the current edition of the WVDOT Bridge Inspection Manual. A Routine Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department’s inspection data software. The inspection and the finalized inspection report must meet the approval of WVDOT Operations Division. The District Construction Engineer shall be notified in writing once the inspection report has been finalized and approved by Operations Division.

In cases where a panel-type bridge is being utilized, such as those bridges manufactured by Mabey, Acrow, or Bailey, a Special Inspection shall be performed at a maximum interval of every six (6) months, beginning at the inspection date of the initial Inventory Inspection, for the entire period that the structure is open to traffic. This inspection shall be in accordance with the WVDOT Bridge Inspection Manual and shall consist of a hands-on inspection of all truss members, connections, pins, and retainer clips. A Special Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department’s inspection data software. The inspection and the finalized inspection report must meet the approval of WVDOT Operations Division. The District Construction Engineer shall be notified in writing once the inspection report has been finalized and approved by Operations Division. If a panel-type bridge is anticipated and a pay item has been included on the project to accommodate the inspection(s), the pay item will be non-performed if a panel-type bridge is not ultimately used.

697.1.3–Inspection Requirements for Structures Utilizing Staged Construction: An initial inspection shall be performed on each individual construction stage immediately prior

to opening each stage or portion thereof to public traffic. A revised initial inspection will be required for each additional phase prior to opening each phase to public traffic. The initial inspection shall be in accordance with current NBIS requirements and in accordance with the department's requirements for an Inventory Inspection as described in the current edition of the WVDOH Bridge Inspection Manual. An In-Depth Routine Inspection, in accordance with the WVDOH Bridge Inspection Manual, shall be performed concurrently with each Inventory Inspection. An Inventory Inspection Report and an In-Depth Routine Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department's inspection data software. The inspection and the finalized inspection reports must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection reports have been finalized and approved by Operations Division.

If a construction stage, subsequent construction stages, or portions thereof are open to traffic twenty-four (24) months after the inspection date of the most recently performed In-Depth Routine Inspection, a routine inspection shall be performed in accordance with current NBIS requirements and in accordance with the department's requirements for a Routine Inspection as described in the current edition of the WVDOH Bridge Inspection Manual. A Routine Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department's inspection data software. The inspection and the finalized inspection report must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection report has been finalized and approved by Operations Division.

697.2–Blank

697.3–METHOD OF MEASUREMENT:

Bridge safety inspection work will be paid for per each inspection and inspection type performed for each individual bridge or construction stage.

697.4–PENALTIES FOR LATE PERFORMANCE OR NON-PERFORMANCE:

In order for West Virginia to be compliant with the National Bridge Inspection Standards (NBIS), all bridge safety inspections are required to be performed and completed within the given month and year they are due. Therefore, if an inspection is not performed and completed within the month and year it comes due, all work shall be suspended on the project and all payments withheld until the inspection has been fully completed and the complete inspection report has been delivered to the Division. In addition, liquidated damages will be assessed to the Contractor in accordance with the amounts depicted in Section 108.7, beginning with the first day of the subsequent month that the inspection was due until the inspection report is received from the Contractor. If the Division is required to perform the inspection, or hire a separate entity to perform the inspection, the Contractor shall be responsible for all costs incurred by the Department. No extensions shall apply or be applicable for any reason, regardless of extensions that might be given for other work being performed on the project.

697.5–BASIS OF PAYMENT:

Payment for the above described work, including all materials, equipment, labor, and any other incidental work necessary to complete this item, will be considered completely covered by the contract unit price for the item below.

697.6 PAY ITEM:

ITEM	DESCRIPTION	UNIT
697001-*	NBIS Bridge Safety Inspection, “designation”, “type”	Each

- * Sequence number
- “designation” Bridge, temporary bridge, or stage name designation
- “type” Inspection type, typically Inventory Inspection or In-Depth Routine Inspection

Note 1: Each individual bridge inspection should be added as separate line item in project proposal.

Example:

- 697001-001, NBIS Bridge Safety Inspection, Temporary Bridge, Inventory Inspection, Each
- 697001-001, NBIS Bridge Safety Inspection, Stage One, In-Depth Routine Inspection, Each

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION

FOR

ADD THE FOLLOWING:

SECTION 697
SAFETY INSPECTION OF IN-SERVICE BRIDGES
DURING CONSTRUCTION

697.1–DESCRIPTION:

The work shall consist of performing all bridge safety inspection requirements of the Federal Highway Administration’s current National Bridge Inspection Standards (NBIS) for normally scheduled inspections, temporary structures, and for any structure or portion thereof that utilizes staged construction until the construction project is fully complete. The inspection team leader shall meet the minimum requirements of a team leader as specified by the NBIS, shall be approved by WVDOH Operations Division, and shall be on site during the duration of all inspection activities. Operations Division shall be notified of the times and dates that any field inspection activities will be occurring.

697.1.1–Inspection Requirements for Normally-Scheduled Inspections: A list of upcoming scheduled bridge safety inspections and the respective inspection types required for the existing structure, or any portion(s) of the existing structure that remain(s) open to traffic, shall be noted in the construction plans. Each inspection shall be performed and completed during the month and year as noted in the plans in accordance with the department’s requirements for the noted inspection type as described in the current edition of the WVDOH Bridge Inspection Manual. In cases where an inspection and inspection type are scheduled but no portion(s) of the existing structure remain(s) open to traffic, the Pay Item for that particular inspection will be non-performed. An inspection report, in accordance with the WVDOH Bridge Inspection Manual for the given inspection being performed, shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department’s inspection data software. The inspection and the finalized inspection report must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection report has been finalized and approved by Operations Division.

697.1.2–Inspection Requirements for Temporary Structures: An initial inspection shall be performed immediately prior to opening any temporary structure or portion thereof to public traffic. The initial inspection shall be in accordance with current NBIS requirements and in accordance with the department’s requirements for an Inventory

Inspection as described in the current edition of the WVDOH Bridge Inspection Manual. An In-Depth Routine Inspection, in accordance with the WVDOH Bridge Inspection Manual, shall be performed concurrently with the Inventory Inspection. An Inventory Inspection Report and an In-Depth Routine Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department's inspection data software. The inspection and the finalized inspection reports must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection reports have been finalized and approved by Operations Division.

A Bridge Rating Submission in accordance with Design Directive 202, meeting the requirements for Rating by District Bridge Engineer, shall be attached to the Inventory Inspection Report for the temporary structure. It will not be necessary to include a title sheet with a proposed sheet index. However, all other required items listed for the submission shall be supplied. Load rating of the temporary structure will be performed by WVDOH evaluation personnel once the Inventory Inspection Report has been submitted.

If a temporary structure or portion thereof is open to traffic twenty-four (24) months after the inspection date of the initial inspection, a routine inspection shall be performed in accordance with current NBIS requirements and in accordance with the department's requirements for a Routine Inspection as described in the current edition of the WVDOH Bridge Inspection Manual. A Routine Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department's inspection data software. The inspection and the finalized inspection report must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection report has been finalized and approved by Operations Division.

In cases where a panel-type bridge is being utilized, such as those bridges manufactured by Mabey, Acrow, or Bailey, a Special Inspection shall be performed at a maximum interval of every six (6) months, beginning at the inspection date of the initial Inventory Inspection, for the entire period that the structure is open to traffic. This inspection shall be in accordance with the WVDOH Bridge Inspection Manual and shall consist of a hands-on inspection of all truss members, connections, pins, and retainer clips. A Special Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department's inspection data software. The inspection and the finalized inspection report must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection report has been finalized and approved by Operations Division. If a panel-type bridge is anticipated and a pay item has been included on the project to accommodate the inspection(s), the pay item will be non-performed if a panel-type bridge is not ultimately used.

697.1.3–Inspection Requirements for Structures Utilizing Staged Construction: An initial inspection shall be performed on each individual construction stage immediately prior to opening each stage or portion thereof to public traffic. A revised initial inspection will be required for each additional phase prior to opening each phase to public traffic. The initial inspection shall be in accordance with current NBIS requirements and in accordance with the department's requirements for an Inventory Inspection as described in the current edition of

the WVDOH Bridge Inspection Manual. An In-Depth Routine Inspection, in accordance with the WVDOH Bridge Inspection Manual, shall be performed concurrently with each Inventory Inspection. An Inventory Inspection Report and an In-Depth Routine Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department's inspection data software. The inspection and the finalized inspection reports must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection reports have been finalized and approved by Operations Division.

If a construction stage, subsequent construction stages, or portions thereof are open to traffic twenty-four (24) months after the inspection date of the most recently performed In-Depth Routine Inspection, a routine inspection shall be performed in accordance with current NBIS requirements and in accordance with the department's requirements for a Routine Inspection as described in the current edition of the WVDOH Bridge Inspection Manual. A Routine Inspection Report shall be compiled and submitted to the District Bridge Engineer within sixty (60) calendar days of completing the inspection utilizing the Department's inspection data software. The inspection and the finalized inspection report must meet the approval of WVDOH Operations Division. The District Construction Engineer shall be notified in writing once the inspection report has been finalized and approved by Operations Division.

697.2–Blank

697.3–METHOD OF MEASUREMENT:

Bridge safety inspection work will be paid for per each inspection and inspection type performed for each individual bridge or construction stage.

697.4–PENALTIES FOR LATE PERFORMANCE OR NON-PERFORMANCE:

In order for West Virginia to be compliant with the National Bridge Inspection Standards (NBIS), all bridge safety inspections are required to be performed and completed within the given month and year they are due. Therefore, if an inspection is not performed and completed within the month and year it comes due, all work shall be suspended on the project and all payments withheld until the inspection has been fully completed and the complete inspection report has been delivered to the Division. In addition, liquidated damages will be assessed to the Contractor in accordance with the amounts depicted in Section 108.7, beginning with the first day of the subsequent month that the inspection was due until the inspection report is received from the Contractor. If the Division is required to perform the inspection, or hire a separate entity to perform the inspection, the Contractor shall be responsible for all costs incurred by the Department. No extensions shall apply or be applicable for any reason, regardless of extensions that might be given for other work being performed on the project.

697.5–BASIS OF PAYMENT:

Payment for the above described work, including all materials, equipment, labor, and any other incidental work necessary to complete this item, will be considered completely covered by the contract unit price for the item below.

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697.6-PAY ITEM:

ITEM	DESCRIPTION	UNIT
697001-*	NBIS Bridge Safety Inspection, "designation", "type"	Each

- * Sequence number
- "designation" Bridge, temporary bridge, or stage name designation
- "type" Inspection type, typically Inventory Inspection or In-Depth Routine Inspection

Note 1: Each individual bridge inspection should be added as separate line item in project proposal.

Example:

- 697001-001, NBIS Bridge Safety Inspection, Temporary Bridge, Inventory Inspection, Each
- 697001-001, NBIS Bridge Safety Inspection, Stage One, In-Depth Routine Inspection, Each

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 TO THE END OF THE SECTION:

601.1.1-Embedded Galvanic Anodes: This work consists of installing embedded galvanic anodes in conjunction with Patching Concrete Structures (removing all loose, disintegrated, and delaminated concrete; preparing the surface; furnishing and placing reinforcing steel as required; placing forms; and placing concrete patches, including curing of same).

601.2-MATERIALS:

DELETE THE CONTENTS AND ADD THE FOLLOWING TO THE END OF THE SECTION:

Furnish pre-manufactured galvanic anodes designed for ~~cathodic protection controlling corrosion~~ when embedded in concrete and tied to steel reinforcing. The core of the anode shall consist of a minimum of ~~100~~ 160 grams of electrolytic high grade zinc in compliance with ASTM B 418 Type II cast around ~~a pair of~~ steel tie wires and encased in a highly alkaline cementitious shell with a pH of 14, ~~or encased in a material that uses activation methods to~~ with sufficient alkalinity to assure performance over the 20 year design life of the anode. The galvanic anode shall contain no intentionally added constituents which are corrosive to reinforcing steel, e.g. chloride, bromide, etc. The anodes shall have one side that is less than 1½-inches in height.

Furnish galvanic anodes in accordance with these specifications. Supply a certification of compliance that the anode and spacing meets the basis of design to the engineer before starting work. Deliver, store, and handle all materials according to the manufacturer's instructions.

Repair concrete shall be hydraulic cement-based material with a 28-day moist cured electrical resistivity less than ~~15,000~~ 50,000 ohm-cm according to ASTM C 1760. Concrete mixes containing high levels of supplementary cementitious materials such as silica fume, ground-granulated blast furnace slag, fly ash or metakaolin may not meet the resistivity requirement. Insulating materials such as epoxy bonding agents shall not be used unless otherwise called for in the design.

601.10-PLACING CONCRETE:

DELETE THE TITLE AND CONTENTS OF SUBSECTION 601.10, AND REPLACE WITH THE FOLLOWING:

601.10-GALVANIC ANODE INSTALLATION:

Install embedded galvanic anodes in accordance with manufacturer's recommendations, as shown on the plans, and as listed in this specification.

1. Install galvanic anodes to existing reinforcement along the perimeter of the repair at spacing as specified on the plans. In no case shall the distance between anodes exceed ~~30-28 inches; nor shall the distance between the anode;~~ Keep the anodes as close to the edge of the repair as practical while allowing for new mortar to completely encapsulate the anodes, and the edge of the repair exceed 6 with a least 4 inches around anodes.
2. Provide a 1-inch clearance between anodes and substrate to allow repair material to encase anode. Ensure that there is at least 1-inch cover over the anode. If necessary, increase the size of the repair cavity to accommodate the anodes.
3. Secure the galvanic anodes as close as possible to the patch edge using the anode tie wires (bare wire). Wrap tie wires around the cleaned and uncoated reinforcing steel at least one full turn in opposite directions and then tighten the tie wires to allow little or no free movement. If the anode is to be tied onto a single bar, or if less than 1½-inch of concrete cover is expected, place anode beneath the uncoated bar and secure to reinforcing steel. If 1½-inch concrete cover will exist over the anode, the anode may be placed at the intersection between two bars and secured to each bar.

Confirm electrical connection between every anode tie wire and uncoated reinforcing steel with a multi-meter. Electrical connection is acceptable if the DC resistance measured with the multi-meter is 1 Ohm or less or the DC potential is 1 mV or less. The maximum DC resistance shall be 1 Ohm. Confirm electrical continuity of every exposed uncoated reinforcing steel within the repair area. Steel reinforcement continuity is acceptable if the DC resistance measured with the multi-meter is 1 Ohm or less or the DC potential is 1 mV or less shall be considered continuous when the DC resistance is 1 Ohm or less. If necessary, establish the electrical continuity with uncoated steel tie wire.

Provide the Engineer with a report documenting the resistance measurement for every reinforcing bar in each repair area. The report shall be signed by the contractor’s employee responsible for supervision of the repair work.

The contractor will have a representative from the galvanic anode manufacturer to provide training and on-site technical assistance during the initial installation of the galvanic anodes.

601.14-METHOD OF MEASUREMENT:

DELETE THE ENTIRE SECTION:

601.15-BASIS OF PAYMENT:

ADD THE FOLLOWING TO THE END OF THE SECTION:

This work shall be paid for as Item ~~615075-001 Miscellaneous Bridge Work, Distributed Anode System (DAS)~~ 601030-025, Galvanic Anode Protection, per ~~Lump Sum Each~~. It will include all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

NOTE:

~~Do not use this specification for patch areas less than 5 ft². Anode spacing shall be specified by the designer. Anode spacing is dependent upon the reinforcing steel density; chloride content; and amount of zinc per anode. The density of the reinforcing steel is the total surface area of the bar (ft²) within a square foot of concrete (regardless of depth). Corrosion levels in the concrete can be broken into three measurable categories based on ASTM C 1152 Acid Soluble Chloride of Mortar and Concrete: Light corrosion levels: < 4 lb/yd³, Moderate corrosion levels 4 to 8 lb/yd³ and High corrosion levels: > 8 lb/yd³. In lieu of coring to determine chloride thresholds, the following general guidelines may be considered: Light corrosion for concrete aged 0-15 years and exposed to deicing salt or concrete of any age not directly exposed to deicing salt; Moderate corrosion for concrete aged 16-30 years and exposed to deicing salt; High corrosion for concrete 31 years and older and exposed to deicing salt. The following anode spacing guidelines are based a minimum zinc content of 100 grams per anode and to mitigate the initiation of new corrosion activity:~~

Steel Density Ratio	Anode Spacing (Inches)		
	Light Corrosion Levels	Moderate Corrosion Levels	High Corrosion Levels
<0.3	30	30	30
0.31–0.6	28	26	24
0.61–0.9	26	23	20

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0.91—1.2	22	20	18
1.21—1.5	20	18	16
1.51—1.8	18	16	14
1.81—2.1	17	14	12

NOTE: Anode spacing shall be specified by the designer. Anode spacing is dependent upon the reinforcing steel density; the level of corrosion risk (i.e. amount of chloride and the corrosivity of the local environment); and amount of zinc per anode. The density of the reinforcing steel is the total surface area of the bar (ft²) within a square foot of concrete (regardless of depth).

Corrosion levels in the concrete can be broken into three measurable categories based on ASTM C 1152 Acid-Soluble Chloride of Mortar and Concrete:

- Low to Moderate corrosion levels: < 5 lb/yd³.
- High corrosion levels 5 to 9 lb/yd³.
- Extremely High corrosion levels: > 9 lb/yd³.

In lieu of coring to determine chloride thresholds, the following general guidelines may be considered:

- Light corrosion for concrete aged 0-15 years and exposed to deicing salt or concrete of any age not directly exposed to deicing salt.
- Moderate corrosion for concrete aged 16-30 years and exposed to deicing salt.
- High corrosion for concrete 31 years and older and exposed to deicing salt.

The basis of design is as follows:

- Anode: Type 1A Embedded Galvanic Anode with a minimum of 160 grams of zinc.
- Service Life: 20 years minimum
- Efficiency*Utilization Factor: 85%
- Minimum current density delivered 4 inches outside the edge of repair in the parent concrete between anodes:
 - Low to Moderate Risk – 0.4 mA/m² of steel surface area
 - High Corrosion Risk – 0.8 mA/m²
 - Extremely High Risk – 1.6 mA/m²
- Anode aging factor: 12.5 years (Approximate half-life, the time when anode current drops by 50%)

<u>Steel Density Ratio</u> <u>(Steel Surface Area divided by concrete surface area)</u>	<u>Basis of Design / Anode Spacing (Inches)</u>		
	<u>Low to Moderate Corrosion Risk</u> <u>(0.4 mA/m² @ 20 years)</u>	<u>High Corrosion Risk</u> <u>(0.8 mA/m² @ 20 years)</u>	<u>Extremely High Corrosion Risk</u> <u>(1.6 mA/m² @ 20 years)</u>
<u>< 0.3</u>	<u>28</u>	<u>28</u>	<u>25</u>
<u>0.31 – 0.6</u>	<u>28</u>	<u>25</u>	<u>17</u>
<u>0.61 – 0.9</u>	<u>28</u>	<u>20</u>	<u>14</u>
<u>0.91 – 1.2</u>	<u>25</u>	<u>17</u>	<u>11</u>
<u>1.21 – 1.5</u>	<u>22</u>	<u>15</u>	<u>10</u>
<u>1.51 – 1.8</u>	<u>20</u>	<u>14</u>	<u>9</u>
<u>1.81 – 2.1</u>	<u>19</u>	<u>13</u>	<u>8</u>

- Alternate (or equal) anodes shall provide design details based on the following

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- factors:
- Initial and final current to steel from field monitoring.
 - Anode aging factor base on continual monitoring of field installations sufficient to determine the actual half-life of the anode in field installations. If insufficient data exists to determine anode aging factor, an anode aging factor of 4 years shall be used.
 - Efficiency*Utilization factor determined by removing anodes from field installation and measuring actual versus theoretical zinc consumption.
 - Anode spacing to achieve specified current density at 20 years.

601.16-PAY ITEMS:

DELETE THE CONTENTS AND ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
<u>615075-001*</u>	<u>Miscellaneous Bridge Work, Distributed Anode System (DAS);</u>	<u>Lump Sum</u>
<u>601030-025</u>	<u>Galvanic Anode Protection</u>	<u>Lump Sum Each Item</u>

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 106

CONTROL OF MATERIALS

106.3-SAMPLES:

106.3.1-Acceptance Plans:

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

~~**106.3.1.1-Percent Within Tolerance:** The percentage of each lot or subplot of material, product, item of construction, or completed construction within the specified tolerances will be determined by the procedures as referenced by the specification requirements. 43 When West Virginia AP-A is referenced, it will consist of Tables 106-1 to 106-5 inclusive, published in MP 106.00.20.~~

106.3.1.2₁-Sampling of Reworked Lots or Sublots: It is the intent of these Specifications that lots or sublots of materials, products, items of construction or completed construction meet specification requirements at the time of submission. Lots or sublots generally will not be resampled unless reworked before submission. Sampling after reworking will be at the expense of the Contractor.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 401

**ASPHALT BASE, WEARING, AND
PATCHING AND LEVELING COURSES**

401.2-MATERIALS:

DELETE THE TABLE AND REPLACE WITH THE FOLLOWING:

MATERIAL	SUBSECTION
Coarse Aggregate	703.1 thru 703.3 ^{Note 1} & ^{Note 2} (See MP 401.02.28 for exceptions and additions required for Superpave Items.)
Fine Aggregate	702.3 (See MP 401.02.28 for additions required for Superpave Items)
Mineral Filler	702.4
Performance Graded Binders	705.5

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

Note 1 When slag is specified in the contract, the coarse aggregate shall be slag which meets the requirements of 703.3, except as amended in this subsection.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 501
PORTLAND CEMENT CONCRETE PAVEMENT

501.3-PROPORTIONING:

ADD THE FOLLOWING BEFORE PARAGRAPH FIVE:

The Contractor may develop mix designs with a reduced target cement factor as indicated in Table 501.3.1.1 in lieu of Table 501.3.1, provided the aggregates used in those mix designs meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. The \bar{A} requirements will not apply for mix designs that use optimized aggregate gradation.

TABLE 501.3.1.1

Minimum 28-Day Design Strength	Minimum Cement Factor	Maximum Water Content	Nominal Maximum Aggregate Size	Target Entrained Air
Pounds per square inch	lbs./c.y.	lb. of water / lb. of cement	Inches	Percent
3,000 Compressive or 500 Flexural ^{Note 1}	524 ^{Note 2}	0.44	1 or ¾	7.0

Note 1 Flexural strength when tested by the third point method.

Note 2 An equal mass of a SCM may be substituted for Portland cement up to the following maximum amount. Only one SCM is permitted in a mix design.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 502
APPROACH SLABS**

502.5-JOINTS:

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE WITH FOLLOWING:

Approach slabs shall have longitudinal joints in line with the longitudinal joints of the adjacent pavement. Longitudinal joints shall be sawed to a minimum depth of one-fourth of the plan depth of the slab plus $\frac{1}{4}$ inch; the width shall be $\frac{1}{4}$ inch, with a tolerance of plus or minus $\frac{1}{16}$ inches. Sawing shall be performed within five days after the slab is placed and prior to opening to construction traffic. Joints shall be sealed in accordance with the requirements of Sections ~~501.17~~ 501.16 and 503.

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 TABLE 601.3.1D AND REPLACE WITH THE FOLLOWING:

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	½ <u>or</u> ¾	7.5
K	4,000	618	0.44	1 <u>or</u> ¾	7.0
B	3,000	524	0.49	1 <u>or</u> ¾	7.0
C	2,500	454	0.58	1 <u>or</u> ¾	6.0
D	2,000	360	0.62	1 <u>or</u> ¾	5.5
H	4,000	See Table 601.3.1E	0.40	1 <u>or</u> ¾	6.5
DC ^{Note 3}	4,500	665	0.44	½ <u>or</u> ¾	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.

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 ¾ 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.

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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 TO THE END OF THE SECTION:

601.1.1-Distributed Anode System (DAS): The work under this section consists of supplying, installing, and energizing a zinc-based galvanic corrosion protection system, including required electrical connections, materials, testing, and ensuring continuity of the reinforcing steel to all elements as outlined in the construction drawings.

Distributed embedded galvanic anodes are designed to provide galvanic corrosion protection. The anodes are connected to reinforcing steel and embedded in concrete to mitigate corrosion.

601.2-MATERIALS:

ADD THE FOLLOWING TO THE END OF THE SECTION:

The distributed galvanic anode units shall be alkali-activated with a pH greater than 14 and shall not contain intentionally added constituents that are corrosive to reinforcing steel as per ACI 222R such as chlorides, bromides, or other halides. The anode core shall be manufactured with zinc in compliance with ASTM B418 Type II (Z13000) with iron content less than 15 ppm and that is evenly distributed around a steel core which is continuous along the length of the unit. Unless otherwise specified, the anode unit shall be supplied with a pair of uncoated steel tie wires with optional loop ties to make connections to the reinforcing steel.

Typical Individual anode units shall be based on the sizes in Table 601.15 and information that will be called out in plan drawings. approximately [enter nominal dimensions from table below].—The typical length of individual anode units shall be [enter length of each anode] [as

~~shown on the drawings]~~39 inches, unless otherwise noted in the plans. Anode units shall be supplied with uncoated, steel tie wires for ~~either~~ {direct connection to the steel or connection to an inter-anode connecting header wire as per the design}.

Distributed galvanic anodes shall be Galvashield DAS ~~available from Vector Corrosion Technologies~~ or approved equal.

The spacing of the distributed galvanic anode units will be as per the outlined design.

Application for approved equals shall be requested in writing two weeks before submission of project bids. Application for galvanic anode approved equals shall include verification of the following information:

1. Type of activation mechanism must be stated and demonstrated.
2. The distributed anode contains no intentionally added constituents corrosive to reinforcing steel or detrimental to concrete, e.g. chloride, bromide, sulfate, etc.
3. Initial startup current per anode per area at specified average annual temperature of structure.
4. Aging term - This is the number of years over which the electric current produced by the installed anode drops to half of the initial measured current.
5. Submittal of monitored performance data for two examples of satisfactory field performance where said aging term has been achieved.
6. Initial mass of zinc.
7. Efficiency and utilization determined from site performance data of no less than seven years.
8. Anode units contain zinc around uncoated, (non-galvanized) steel tie wires.
9. Third party product evaluation, such as from Concrete Innovations Appraisal Service, BBA, etc.
10. Using the information above, model how the alternative design will meet the minimum current density at the end of life of ~~{enter service life here}~~ per design.

601.10-PLACING CONCRETE:

DELETE THE SECTION AND REPLACE WITH THE FOLLOWING:

601.10-DISTRIBUTED ANODE SYSTEM (DAS) INSTALLATION:

The galvanic corrosion protection system shall consist of alkali-activated distributed galvanic anodes placed ~~either~~ {evenly across the concrete surface or} {in a single line, per plan drawings}. The anode units are connected to the reinforcing steel to be protected and encased in concrete with a minimum of 1 ½ inch of clear concrete cover over the anode units. After the anode units are installed and encased in concrete, the system provides galvanic protection to the embedded reinforcing steel.

Remove loose or delaminated concrete. Use the smallest practical size chipping hammer to minimize damage to sound concrete.

Clean exposed reinforcing steel of rust, mortar, etc. to provide sufficient electrical connection and mechanical bond. If a significant reduction in the cross section of the reinforcing steel has occurred, replace, or install supplemental reinforcement as directed by the engineer of

record. Secure loose reinforcing steel by tying tightly to other bars with steel tie wire. Verify electrical continuity of all reinforcing steel, including supplemental steel.

Reinforcing steel shall be tested for electrical continuity by procedures as directed by the cathodic protection technician. Electrical connection is acceptable if the DC resistance measured with the multi-meter is 1 W or less or the DC potential is 1 mV or less. Reinforcing steel found to be discontinuous shall be bonded to continuous reinforcement by steel tie wire.

Any new steel added to the structure, such as supplemental reinforcing, wire mesh or rebar shall be electrically continuous. The new steel shall be connected to the anode grid or bonded to existing reinforcing steel. After the distributed galvanic anodes are installed, the continuity of the connection between anode tie wire and reinforcing steel is verified using the same procedures prior to concrete placement.

Distributed anodes shall be placed in locations as per the design and indicated on the drawings. Secure anodes to prevent movement during concrete placements.

The distributed anode system must be connected to the reinforcing steel to be protected. The anodes are directly tied to cleaned exposed steel or can be interconnected to header wires to create a distributed anode grid. The anode grid shall be connected to reinforcing steel with a minimum of two connections per 500 ft² of concrete area.

If no exposed steel exists after preparation of the substrate, a small area of concrete shall be removed to expose reinforcing steel for anode connection. Electrical connections to the reinforcing steel shall be established by tying the header wire to the exposed steel or by alternate methods. Proposed electrical connection details shall be approved by the anode manufacturer and shall be detailed on the shop drawing submittal for approval by the engineer.

After the distributed galvanic anodes have been installed. Place approved concrete taking care to avoid damage to the anodes, connections, and wiring. Consolidate concrete around anodes assuring no voids exist. ~~For vertical and overhead repairs like columns and beams, use the following “Minimum concrete cover depth over the anodes shall be ¾ inches.”~~ For horizontal applications like bridge deck overlays and joint replacements, ~~use the following “Minimum concrete cover depth over the anodes shall be 1.5 inches.”~~

601.10.1-Manufacturer Technical Assistance: The contractor will enlist and pay for the services of a NACE-qualified cathodic protection technician (CP2 or greater) supplied by the galvanic anode manufacturer. The qualified corrosion technician shall have verifiable experience in the installation and testing of embedded galvanic protection systems for reinforced concrete structures.

The technician shall provide contractor training and support for development of application procedures, shop drawings for submittals, anode, and concrete installation, reinforcing steel connection procedures, and verification of electrical continuity of embedded steel. The contractor shall coordinate its work with the designated technician to allow for site support during project startup and initial anode installation.

601.15-BASIS OF PAYMENT:

ADD THE FOLLOWING TO THE END OF THE SECTION:

This work shall be paid for as Item 601030-030, Distributed Anode System (DAS), per Lump Sum. It will include all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

TABLE 601.15

<p>NOTE: <i>Typical Distributed Anode System (DAS) Sizes and Weights:</i></p> <ul style="list-style-type: none"> • <i>Lengths: Standard 39 inches but can be customized to project requirements.</i> • <i>Nominal Dimensions ***:</i> DAS: <i>0.6 lb./ft.</i> <i>1.1" x 1.5"</i> • DAS-X: <i>1.65 lb./ft.</i> <i>1.25" x 2"</i> • <i>*** Typically, +/- 1/8"</i> • <i>Design based on aging term of 12.5 years and an efficiency/utilization of 75%.</i> 		
Corrosion Risk Category	Chloride Level *	Minimum Current Density at end of life **
Low to Moderate	<5lbs/yd ³	0.6mA/m ² (0.06mA/ft ²)
High	5-9lbs/yd ³	1.2mA/m ² (0.11mA/ft ²)
Extremely High	>9lbs/yd ³	2.4mA/m ² (0.22mA/ft ²)
<p><i>* Chloride content is based on lb/yd³</i> <i>** Designer to specify end of life minimum current</i></p>		

601.16-PAY ITEMS:

ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
601030-030	Distributed Anode System	Lump Sum

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: _____

FEDERAL PROJECT NUMBER: _____

**SECTION 636
MAINTAINING TRAFFIC**

636.11-FLAGGER OR TRAFFIC DIRECTOR:

ADD THE FOLLOWING SECTION:

636.11.3–Automated Flagger Assistance Device: An automated flagger assistance device (AFAD) system consists of two AFAD units of the same make and model that can be paired and operated by one or two certified flaggers. AFADs shall only be used in situations where there is only one lane of approaching traffic in the direction to be controlled.

The Contractor shall furnish, install, and maintain a portable, self-contained, trailer mounted red/yellow lens AFAD for temporary traffic control as specified in the Contract Documents or as directed. Flaggers operating the AFADs shall meet the requirements specified in 636.11.1. The AFAD system shall be MASH compliant. The operator(s) must have an unobstructed view of the AFAD and approaching traffic in both directions. The operator(s) shall have no other tasks assigned to them. One operator may operate both AFADs if there is an unobstructed view of both devices and queued traffic. If the AFAD system is equipped with a network of cameras and the manufacturer’s recommended guidelines allow so, the Engineer, may allow the operator to work from a position that does not include an unobstructed view. The operator must be at the job site.

A red/yellow AFAD shall alternately display a steadily illuminated circular red LED lens and a flashing circular yellow LED lens to control traffic. The AFAD shall have at least one (1) set of circular red and circular yellow lenses that are twelve (12) inches in diameter. The red shall be on top and yellow on the bottom. The bottom of the housing shall be at least seven (7) feet above the pavement.

The gate arm shall be made of a lightweight rigid material that deflects if an errant vehicle strikes the gate arm. The gate arm shall deflect and return to a functional position after the errant vehicle clears the gate arm. The length of the gate arm shall be at least eight (8) feet and the end of the arm shall reach at least the center of the lane being controlled. The gate arm

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shall not extend in the opposite lane. If a vehicle strikes the gate arm, an intrusion alarm of a minimum 115 decibels shall immediately sound until turned off by the operator.

A “Stop Here on Red” sign shall be installed on the right-hand side of the approach at the point at which drivers are expected to stop when the steady circular red lens is illuminated. The sign shall be rectangular, and each shall be at least 24x30 inches in size with the letters at least six (6) inches high. To inform traffic to stop, the AFAD shall display a steadily illuminated circular red lens and the gate arm shall be in the down position. To inform traffic to proceed, the AFAD shall display a flashing circular yellow lens and the gate arm shall be in the upright position.

The maximum distance between AFAD units shall be 1,000 feet without any side road intersections, unless prior approval is obtained by the Engineer. AFAD’s shall be placed in the field such that traffic can clearly see the units without interference from the sun.

636.23–METHOD OF MEASUREMENT:

ADD THE FOLLOWING:

636.23.29-Automated Flagger Assistance Device (AFAD): The AFAD shall be measured in hours and shall be paid for the actual authorized time controlling traffic. Payment shall include operator, any incidentals, temporary storage, maintenance, and removal of the AFAD as authorized or approved by the Engineer.

~~**636.24 BASIS OF PAYMENT:**~~

~~————DELETE THE FIRST PARAGRAPH AND REPLACE WITH THE FOLLOWING:~~

~~The quantities, determined as provided above, will be paid for at the contract unit price bid for the items listed below, which prices and payment shall be full compensation for furnishing all the materials and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies and incidentals necessary to complete the work. When aggregate for maintaining traffic, dust palliatives, flagger, traffic director, cleaning of traffic control devices or the electric arrow are contained in the contract as pay items, payment for such pay items will not be made subsequent to the date of required completion of the project.~~

636.25–PAY ITEM:

ADD THE FOLLOWING TO THE TABLE:

ITEM	DESCRIPTION	UNIT
636014-*	Automated Flagger Assistance Device	Hour

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 702
FINE AGGREGATE

702.1-FINE AGGREGATE FOR PORTLAND CEMENT CONCRETE:

702.1.5-Mortar Strength (Determined by AASHTO T71)

DELETE THE TITLE AND CONTENTS OF SUBSECTION 702.1.5 AND REPLACE WITH THE FOLLOWING:

702.1.5-Mortar Strength (Determined by ~~AASHTO T71~~ MP 702.01.25): Fine aggregate failing the organic impurities test shall be subjected to the test for mortar making properties. The fine aggregate shall develop a compressive strength at the age of seven days; ~~when using Type I or II cement, or at three days when using Type III~~ Type II cement, of not less than 90 percent of the strength developed by a mortar prepared in the same manner with the same cement and graded Ottawa sand having a fineness modulus of 2.4 plus or minus 0.10.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 101

DEFINITION OF TERMS

101.2-DEFINITIONS:

ADD THE FOLLOWING TO THE DEFINITION OF HOLIDAY:

Holidays-Official holidays are New Year's Day, Martin Luther King's Birthday, ~~Jr. Day~~, President's' Day, Memorial Day, West Virginia Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, The day after Thanksgiving Day (Lincoln's Day), Christmas Day, and any day in which an election (Primary, ~~or~~ General, or Special) is held throughout the State and such other days as the President, Governor, or other duly constituted authority shall proclaim to be holidays. If a holiday falls of Sunday, the following Monday shall be observed in lieu thereof. If a holiday falls on a Saturday, the previous Friday shall be observed in lieu thereof.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION

FOR

ADD THE FOLLOWING SECTION:

SECTION 406
HIGH FRICTION SURFACE TREATMENT

406.1-DESCRIPTION:

This work shall consist of the construction of a high friction surface treatment (HFST) material, composed of binder material and aggregate, upon an existing surface, 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 Contractor shall notify the Engineer a minimum of two weeks prior to starting any high friction surface treatment operation.

~~406.1.1-Interim Completion Date / Overall Completion Date: When specified, the Contractor shall complete HFST work by interim completion date of: _____. The Contractor shall be assessed liquidated damages per Section 108.7.1 for each calendar day that the HFST work is not complete.~~

~~The overall completion date will be 1 year after interim completion date and allow for final skid testing.~~

406.2-MATERIALS:

The binder shall be a multi-component modified exothermic polymer resin binder treatment. The binder shall cure exothermically and hold the aggregate firmly in position and meet the following requirements:

TABLE 406.2A-MULTI-COMPONENT MODIFIED BINDER RESIN SYSTEM

Property	Test Method*	Specification Limits
Viscosity	ASTM D2556	7 – 30 P
Durometer Hardness	ASTM D2240	60 - 80
Cure Rate (Dry through time)	ASTM D1640	3 hours max.
Adhesive Strength	ASTM C1583	250 PSI min. (100% substrate failure)
Compressive Strength		1000 psi (@ 3 hours 5000 psi @ 7 days
Elongation at break point	ASTM D-638	30% min.
Gel Time	ASTM C-881	10 minutes min.
Water Absorption	ASTM D-570	1% max.
Mixing Ratio	Per Manufacturer's Recommendations	

*Additional testing notes for laboratory: Prepare all samples per manufacturer's recommendation.

- Viscosity – prepare one pint sample and mix for 2 to 3 minutes before testing. Use X1.1 for spindle selection and test at a temperature of $73 \pm 2^\circ\text{F}$.
- Gel Time – Prepare a 60 g sample per manufacturer's recommendation. Perform testing at a temperature of $73 \pm 2^\circ\text{F}$.
- Cure Rate – Prepare specimens of 50-55 wet mil thickness.
- Cure the following test specimens for 7 days at $73 \pm 2^\circ\text{F}$, and test immediately without delay.
- Durometer Hardness – Use the type 1 precision type D method.
- Compressive Strength – Prepare specimen according to Method "B", 2" x 2" cube, using 2.75 parts of sand to one part mix polymer resin by volume. Sand must conform to ASTM C778, 20-30 sand.
- Ultimate Tensile Strength Prepare Type 1 specimens in accordance to ASTM D638.
- Elongation at break point – Prepare Type 1 specimens in accordance to ASTM D638.

The aggregate shall be bauxite material that is clean, dry and free from foreign matter and meets the following requirements:

TABLE 406.2B-AGGREGATE

Property	Test Method*	Specification Limits
SFC – Side Force Coefficient	ASTM E670	0.70 minimum
SRV/SRT – Skid Resistance Value Test	ASTM E274	65.0 mm min (70 mm)
AAV-Aggregate Abrasion Value	AASHTO T 96	20.0 max.
Aggregate Gradation	AASHTO T 27	95.0–100.0% Passing No. 6 0.0-5.0 % Passing No. 16
Aluminum Oxide Content	ASTM C25	87% min

* As an option, and with approval of the Engineer, the current edition of a corresponding AASHTO test may also be used in lieu of any ASTM test.

406.2.1-Quality Control Testing: Quality control is the responsibility of the Contractor as specified in 106.1.

The Contractor shall design a quality control plan in accordance with applicable section of MP307.00.50, excluding attachment 1, detailing the methods by which the quality control program will be conducted. Samples shall be obtained at a minimum frequency of one sample per day of aggregate placement.

406.3-ACCEPTANCE TESTING:

The material shall be evaluated by AASHTO Product Evaluation and Audit Solutions.

Acceptance sampling and testing of aggregates is the responsibility of the Division, except for furnishing the necessary materials. Quality control sampling and testing performed by the Contractor may be used by the Division for Acceptance.

406.3.1-Skid Testing: Test Sections are defined as a continuous lane of pavement to which a layer of high friction surface treatment (HFST) has been applied. The Engineer will submit a "Pavement Testing Request" form to DOHMCSnTRoadway@wv.gov, within five (5) days after all lanes are continuously open to traffic. The Division or an independent testing firm at the discretion of the Division, will perform initial skid testing within ninety (90) days after receiving the request. Skid testing will be performed with the ribbed tire as prescribed in AASHTO T242, *Frictional Properties of Paved Surfaces Using a Full-Scale Tire*. The frequency of tests shall be five (5) per lane-mile or three (3) per lane, whichever is greater. An average Friction Number (FN) of less than 69 will be deemed unacceptable and will require reinstallation of the complete surface system of the failed test section at no cost to the Division.

The Engineer will submit a second "Pavement Testing Request" form six (6) to nine (9) months after completion. The Division or independent testing firm will perform final skid testing no more than twelve (12) months after project completion. An average FN of less than 64 will be deemed unacceptable and will require reinstallation of the complete system of the failed test section at no cost to the Division.

406.3.2-Acceptance for the Grading of Aggregate: Acceptance for gradation shall be on the basis of test results on consecutive random samples from a lot. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. Generally, at the beginning of the project, the average shall be started on the second sample in accordance with MP 300.00.51. A subplot is the quantity of material represented by a single gradation test. In the case where only one sample is taken, this subplot shall be considered the lot. The material shall be sampled and tested in accordance with the applicable specification. The gradation test results shall be plotted on a control chart in accordance with MP 300.00.51. When the average, or when the most recent three consecutive individual test values fall outside the guidelines for this aggregate the lot of material represented will be considered nonconforming to the extent that the last of its sublots is nonconforming. When this occurs, the last subplot shall have its price adjusted in accordance with Table 406.12.1. In the case where the average is nonconforming and the last subplot contained is conforming, then there would be no price adjustment. In no event, however, shall a subplot of material have its price adjusted more than once, and the first adjustment, which is determined, shall apply.

406.3.2.1-Degree of Nonconformance: When a subplot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming and this value shall be multiplied by its appropriate multiplication factor as set forth in Table 406.3.2.1 to determine the degree of nonconformance on that sieve.

TABLE 406.3.2.1

Nonconforming Sieve Size	Multiplication Factor
No. 6 (3.35mm)	1.5
No. 16 (1.18mm)	2.0

The total measure of nonconformance of an individual subplot is the sum of all nonconformances on the various sieve sizes of that subplot. When the total degree of nonconformance has been established and it is 12.0 or less, the material will be paid for at an adjusted contract price as specified in Table 406.11.1. When the degree of nonconformance is greater than 12.0, the nonconforming subplot shall be resolved on an individual basis, requiring a special investigation by the Engineer to determine the appropriate course of action to be followed.

CONSTRUCTION METHODS

406.4-WEATHER RESTRICTIONS:

The polymer binder material shall not be placed on a wet surface, when the ambient air or surface temperature is either *below 50 degrees Fahrenheit or ambient temperature above 110 degrees Fahrenheit, or when the anticipated weather conditions or pavement surface temperature would prevent proper application of the surface treatment as determined by the Engineer in consultation with the manufacturer's representative.

*Applications below 50 degrees Fahrenheit will be considered acceptable if the manufacturer can demonstrate a cure rate (dry through time) of <3 hours at current field conditions.

Do not place the HFST with visible moisture on the prepared surface at the time of placing. Test for moisture in the pavement by taping an 18"x18" plastic sheet to the pavement per ASTM D4263. Perform the plastic sheet test only when surface temperatures and ambient conditions are within the established parameters for application of the overlay system. In the event of rain, the pavement must be allowed to air dry prior to performing the plastic sheet test. A 2 hour minimum test duration is allowed in lieu of the 16 hours specified in ASTM D4263.

406.5-PLACING:

The Contractor shall ensure that a manufacturer's representative is on site to provide technical assistance during the startup operations and as necessary during the surface preparation, material placement and during any necessary remedial work.

The Contractor shall cover and protect all existing pavement markings and utilities that are left in place prior to placement. All inadequately sealed joints and cracks greater than 1/4" shall be cleaned and filled with a crack sealant approved by the polymer resin manufacturer.

For applications on new asphalt pavements, install the polymer binder and high friction aggregate topping a minimum of 30 days after placement of the new pavement.

Surfaces shall be clean, dry, and free of all dust, oil, debris and any other material that might interfere with the bond between the polymer resin binder material and existing surfaces. Adequate cleaning of all surfaces will be determined by the manufacturer's representative. Utilities, drainage structures, curbs and any other structure within or adjacent to the treatment location shall be protected from the application of the surface treatment materials. Cover and protect all existing pavement markings that are adjacent to the application as directed by the Engineer. Pavement markings that conflict with the surface application shall be removed by

grinding and the surface shall be swept clean prior to the polymer binder application.

Clean concrete pavement surfaces by shot blasting and vacuum sweeping. Shot blast all surfaces to remove all curing compounds, loosely bonded mortar, surface carbonation, and deleterious material. Ensure that the prepared surface complies with the International Concrete Repair Institute (ICRI) standard for surface roughness CSP 5. After shot blasting, vacuum sweep or air wash, with a minimum of 180cfm of clean and dry compressed air, all surfaces to remove all dust, debris, and deleterious material. Maintain air lance perpendicular to the surface and the tip of the air lance within 12 inches of the surface.

Utilities, drainage structures, curbs, and any other structures within or adjacent to the treatment location must be protected against the application of the HFST materials.

When magnesium phosphate concrete is placed prior to the HFST bridge deck overlay, the magnesium phosphate concrete must be placed at least 72 hours prior to placing the polymer resin binder.

When modified high alumina based concrete is placed prior to the HFST bridge deck overlay, the polymer resin binder must not be placed on the concrete until at least 30 minutes after final set of the modified high alumina based concrete.

Expansion joints and deck drains must be adequately isolated prior to applying HSFT.

All debris, excess aggregate, material containers, and other waste shall be disposed of off the Right-of-Way according to Section 207 by the Contractor at no direct cost to the Department.

Any roadway features disturbed by the work of the Contractor's operations shall be restored in kind by the Contractor and approved by the Engineer at no cost to the Department.

406.5.1-Mixing and Application: The HFST must conform to the following:

1. Surface preparation work, surface temperature, placement of the HFST must be in conformance with the binder supplier's specifications, these special provisions and as approved by the Engineer.
2. The spread rate range for polymer resin binder shall be 3-3.5 sq yd./gal.
3. The spread rate range of retained aggregate shall be 13-20 lb/sq yd.
4. HSFT must be allowed to cure for the minimum duration as recommended by the supplier's specifications and during that time the application area must be closed to all traffic including Contractor's equipment.

Mechanical Application:

The applicator equipment must be capable of placing the resin binder and high friction aggregate, at the spread rates limits defined above, in a single pass. It shall provide adequate capacity of aggregate and resin binder capable of placing 1,500 lineal feet of HFST.

The polymer binder shall be blended and mixed in the ratio per the manufacturer's specification (+/- 2% by volume); the polymer binder shall be continuously applied once blended.

The mechanical aggregate spreader shall be capable of applying up to a continuous 12 foot width application. The high friction aggregate shall begin within 20 seconds (+/- 1 sec) of the base polymer binder application onto the pavement section. Complete coverage of aggregate shall be completed within 60 seconds of the resin binder contacting the pavement. No exposed wet spots of the polymer binder shall be visible once the aggregate is installed.

The operations shall proceed in such a manner that will not allow the mixed material to separate, cure, dry, be exposed or otherwise harden in such a way as to impair retention and

bonding of the high friction surfacing aggregate, walking, standing or any form of contact or contamination with the wet uncured resin will result in that section of resin being removed and replaced at the contractor's expense.

Hand Application:

Hand application acceptable only for areas deemed to be low volume and less than 300 feet in length, unless otherwise noted in the plans. The resin binder and aggregate shall be placed at the application limits defined above.

The resin binder shall be mixed in accordance to the manufacturer's recommendations and uniformly spread over the surface. The high friction aggregates shall be completed within 60 seconds of the resin binder contacting the pavement. No exposed wet spots of the polymer binder shall be visible once the aggregate is installed.

406.6-CLEANING AND SWEEPING & RECOVERED AGGREGATE:

Excess and loose aggregate must be removed from the traveled way and shoulders by street sweeping. Application of HFST requires a second street sweeping 24-48 hours after application. All cost for street sweeping shall be included in HFST pay item.

The excess aggregate may be recovered and reused. The excess aggregate shall be recovered by a mechanical sweeper and shall be clean, dry and uncontaminated. Aggregate shall not be recovered from areas that were not previously cleaned.

The recovered aggregate may be used at a rate no higher than 1 part recovered aggregate to 2 parts virgin aggregate. The recovered aggregate and virgin aggregate shall be a homogeneous blend and is subject to sampling and testing for gradation.

406.7-ENVIRONMENTAL REGULATIONS:

All regulations of the State of West Virginia shall be met involving the storage, application, and disposal of all materials on the project.

406.8-JOINTS:

The longitudinal construction joints between adjacent lanes shall be kept clean of material foreign to the type of surface being treated. The joints shall be constructed without overlaps or gaps between the materials.

The transverse joint at the end of successive sections or lanes shall be adequately protected to prevent overlapping of the binder material. Following its use, the materials shall be removed and disposed of satisfactorily.

406.9-PROTECTION OF PAVEMENT AND TRAFFIC CONTROL:

The Contractor shall be responsible for the protection of the surface against damage by their equipment and personnel. Traffic shall not be permitted on any part of the work under construction until the treatment has cured sufficiently to prevent raveling or pickup under traffic. The applicable provisions of 636 shall apply for regulating traffic.

406.10-METHOD OF MEASUREMENT:

No materials shall be removed from the Project for any purpose until the operation has been completed and the quantities of materials incorporated into the operations have been determined, except when authorized by the Engineer.

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The Quantity of “High Friction Surface Treatment”, when specified to be paid by the square yard, shall be measured by the total area the surface treatment is applied measured in place and accepted.

When items for maintaining traffic are included in the Contract, they will be measured and paid as provided in Section 636.

406.11-BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract unit prices bid for the items listed below, which prices and payments shall be full compensation for furnishing all the materials and doing all the work described above in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

The Quantity of “High Friction Surface Treatment” when specified to be paid by the square yard shall include the cleaning and sweeping, binder material, aggregate and all labor and equipment required to perform the operation.

406.11.1-Price Adjustment: Aggregates not conforming with the requirements of gradation as described in TABLE 406.2B-Aggregate, will be paid for at the adjusted contract price based on the degree of nonconformance as specified in Table 406.11.1.

TABLE 406.11.1

Adjustment of Contract Price for Gradation Not Within Specifications	
Degree of Nonconformance	Percent of Contract Price To Be Reduced
1.1 to 3.0	2
3.1 to 5.0	4
5.1 to 8.0	7
8.1 to 12.0	11
Greater than 12	*

* The Division will make a special evaluation of the material and determine the appropriate action.

406.12-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
406001-*	High Friction Surface Treatment	Square Yard

* Sequence Number

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 606
UNDERDRAINS**

606.2-MATERIALS:

DELETE MISCELLANEOUS CONCRETE ~~AND ITS SUBSECTION~~ FROM THE TABLE ~~AND REPLACE WITH THE FOLLOWING~~:

MATERIAL	SUBSECTION	TYPE OR GRADATION
Concrete for Miscellaneous Uses	715.12	
Miscellaneous Concrete	715.12	

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 607
GUARDRAIL**

607.2-MATERIALS:

DELETE CONCRETE FOR FOOTERS FROM THE TABLE AND DELETE MISCELLANEOUS CONCRETE AND REPLACE WITH THE FOLLOWING:

MATERIAL	SUBSECTION
Concrete for Footers	715.12
Miscellaneous Concrete <u>for Miscellaneous Uses</u>	715.12

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

**SECTION 636
MAINTAINING TRAFFIC**

636.24-BASIS OF PAYMENT:

DELETE THE FIRST PARAGRAPH AND REPLACE WITH THE FOLLOWING:

The quantities, determined as provided above, will be paid for at the contract unit price bid for the items listed below, which prices and payment shall be full compensation for furnishing all the materials and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies and incidentals necessary to complete the work. When aggregate for maintaining traffic, dust palliatives, flagger, traffic director, pilot truck, cleaning of traffic control devices, or the electric arrow are contained in the contract as pay items, payment for such pay items ~~will not be made subsequent to the date of required completion of the project. shall~~ not exceed the plan quantity for use after the contract completion date.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 636
MAINTAINING TRAFFIC

636.19-PORTABLE MESSAGE SIGNS:

ADD THE FOLLOWING SUBSECTION:

636.19.3.3-Digital Speed Limit Sign: A Digital Speed Limit (DSL) Sign shall conform to the general requirements of 636.19. DSL shall only be used for work zones for High-Speed (>55 mph) Multi-Lane Highways. The exact placement and any relocations of a DSL will be as directed by the Engineer.

Unless otherwise directed by the Engineer, the work zone speed limit referenced in the plans, shall be displayed on the DSL when workers are present. However, when workers are not present in the work zone, the design speed shall be based on the original posted speed limit or the warranted speed limit reduction for when workers are not present. The digital display legends and Speed Limit Sign Beacons on the DSL Sign Assemblies shall not be automatically changed/activated/deactivated using a pre-programmed schedule.

The Speed Limit Sign Beacons shall be in the alternating flashing mode (Activated) only when workers are present within the warranted work zone condition. All other times, the Speed Limit Sign Beacons shall not be flashing (Deactivated). Activate the Speed Limit Sign Beacons no earlier than 30 minutes before workers arrive in the warranted work zone condition and deactivate no later than 30 minutes after workers depart the warranted work zone condition. Change the digital display legend on the DSL Sign Assembly to the warranted speed limit no earlier than 30 minutes before workers arrive and no later than 30 minutes after workers depart from a warranted work zone condition. From the time of initial installation through the final removal, all activations and deactivations of the Speed Limit Sign Beacons, as well as all changes in the speed limit on the digital display legends of each DSL Sign Assembly, shall be logged at the time of occurrence. At any time, all or part of the logged time of occurrence may be requested by the Engineer or local law enforcement. Upon request, provide the log time of occurrence information to the Engineer within 1 working day.

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636.23-METHOD OF MEASUREMENT:

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

~~**636.23.22-Portable Message Sign:** The quantity of “Changeable Message Sign” and “Speed Motoring Trailer” shall be the actual number of days that the sign is used on the project.~~

636.23.22-Portable Message Signs:

636.23.22.1- Changeable Message Sign: The quantity of “Changeable Message Sign” shall be the actual number of days that the sign is used on the project.

636.23.22.2- Speed Motoring Trailer: The quantity of “Speed Motoring Trailer” shall be the actual number of days that the sign is used on the project.

636.23.22.3- Digital Speed Limit Sign: The quantity of “Digital Speed Limit Sign” shall be the actual number of days that the sign is used on the project.

636.25-PAY ITEMS:

ADD THE ITEM TO THE TABLE:

ITEM	DESCRIPTION	UNIT
<u>636031-*</u>	<u>Digital Speed Limit Sign</u>	<u>Day</u>

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 709

METALS

709.46-STEEL POSTS, POST BRACES AND GATE FRAMES FOR RIGHT-OF-WAY FENCE:

ADD THE FOLLOWING TO THE END OF THE SUBSECTION:

Studded tee post producers to be considered for inclusion on the studded tee post producers Approved Product List (APL) must follow the procedures specified in MP 709.46.50.