Approved Permanent Specification changes from last Committee meeting (10/4/17)
- 405 - Chip Seal Compete section rewrite
- 705.5 - Performance Graded Binders Clarify testing
- 601.7-Mixing Clarify batch ticket requirements
- 603.2.1 - Inspection and Testing Adds reference to MP 603.10.40
- Ride Quality
  - 401.7.2 - Surface Tolerance
  - 501.13 - Surface Test
  - 601.11.43 - Straightedge Testing of Hardened Bridge Decks & 601.15.2-Straightedge Test

Approved Project Specific Special Provisions (SP) from last Committee meeting (10/4/17)
- High Tension Cable Barrier System
  - SP104 - Delete Value Engineering
  - SP211 - Borrow Excavation by Modeling Surface
  - SP639 - Construction Layout Stakes for Electronic Data
- SP405 - Scrub Seal Surface Treatment
- SP421 - Intelligent Compaction
- SP642 - Flocculant Block
- SP667 - LED Dynamic Message Sign
- SP669 - Road Weather Information Systems

Items removed from Committee Agenda
- SP607 - Guardrail Remove and resetting of existing guardrail treatments (not MASH compliant)

Old Business - Provisions discussed at last Committee meeting

<table>
<thead>
<tr>
<th>SECTION</th>
<th>TITLE</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>607</td>
<td>SP's for High Tension Cable Barrier System</td>
<td>Project Specific Special Provisions (SP) for High Tension Cable Barrier System.</td>
</tr>
<tr>
<td>609</td>
<td></td>
<td>Project Specific SP's:</td>
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<tr>
<td></td>
<td>1. SP607 - Guardrail and High Tension Cable Barrier System (7th time to committee)</td>
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<tr>
<td></td>
<td>2. SP609 - Concrete Mow Strip (6th time to committee)</td>
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<td></td>
<td>The provisions have been updated per comments at the last meeting. A redline copy, showing the proposed changes/updates to the provision (from what was presented at last meeting) is included.</td>
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<td></td>
<td>Approval expected in December</td>
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</tbody>
</table>
| 204 | 204.5-Basis of Payment | **4th time to Committee, discussed in June, August & October.** Proposed specification change to Section 204 - Mobilization; with revision to the 204.5 subsection. The change would facilitate mobilization payment on projects that are only going to last a short time.  
No update to the provision.  
A redline copy, showing the proposed changes to the spec is included.  
Approval expected in December |
|---|---|---|
| 614 | 614.5 - Corrosion Protection | **4th time to Committee, discussed in June, August & October.** Proposed specification change to Section 614 - Piling Walls; with revision to the 614.5 subsection. The proposed specification changes the equation for price reduction penalty for piles grouted with grout strength less than 1600 psi compressive strength.  
The provision has been updated per comments at the last meeting.  
Two copies of the provision are included:  
1. Redline copy, showing the proposed changes to the spec.  
2. Proposed specification only  
Approval expected in December |
| 636 | 636.9 - Traffic Control Devices  
636.14.1 - Materials  
636.14.2 - Installation | **4th time to Committee, discussed in June, August & October.** Proposed specification change to Section 636 - Maintaining Traffic with revision to the 636.9, 636.14.1, and 636.14.2 subsections. The revision adds MASH requirements for temporary work zone devices & barriers.  
No updated to the provision.  
A redline copy showing the changes to the specs is included.  
Approval expected in December |
| 679 | Specification changes related to Ride Quality | **3rd time to Committee; discussed in August & October**  
Proposed specifications changes for ride quality.  
1. 679.5.1 - Straightedge Test  
2. Section 720 - Smoothness Testing  
There was a meeting with Industry & DOH personnel to discuss this specification change in August.  
Provision has been updated. A redline copy, showing the changes/updates to the proposed specifications is included.  
Approval expected in December |
| 619 | SP619 - Waterproofing | **3rd time to Committee; discussed in August & October**  
Project Specific Special Provision (SP) for high-strength drainage composite. |
No update to the provision.

Approval expected in December

<table>
<thead>
<tr>
<th>108</th>
<th>SP108 - Interim Completion Date</th>
<th>2nd time to Committee; discussed in October</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Project Specific Special Provision for an Interim Completion Date on resurfacing projects. The SP would facilitate the installation of non-resurfacing items (such as: RPM, guardrail, pavement markings) when added to a project.</td>
<td></td>
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<tr>
<td></td>
<td>The provision has been updated per comments at the last meeting. It is a complete rewrite of the SP.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>201</th>
<th>SP201 - Canopy/Roadside Clearing on Existing Roadway</th>
<th>2nd time to Committee; discussed in October</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Project Specific Special Provision for clearing tree limbs from overhead canopy of existing roadway and/or the removal of overgrown/dead tree and brush from the roadside.</td>
<td></td>
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<tr>
<td></td>
<td>A redline copy, showing the proposed changes/updates to the provision (from what was presented at last meeting) is included.</td>
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</table>

<table>
<thead>
<tr>
<th>401 410 501</th>
<th>Safety Edge</th>
<th>2nd time to Committee; discussed in October</th>
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</thead>
</table>
|             | Proposed specifications, adding Safety Edge to the following Subsections:  
1. 401.10.6 (is a redline copy, showing the changes to the spec from the last meeting)  
2. 410.10.3  
3. 501.9.1 |                                           |
|             | An excerpt from "2010 Typical Section and Related Details" for Shoulder Paving Detail with Safety Edge is included. |                                           |
|             | Approval expected in December |                                           |

<table>
<thead>
<tr>
<th>715</th>
<th>SP715 - Spread Spectrum</th>
<th>2nd time to Committee; discussed in October</th>
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<tbody>
<tr>
<td></td>
<td>Project Specific Special Provision (SP) for spread spectrum.</td>
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<td></td>
<td>A redline copy, showing the proposed changes/updates to the provision (from what was presented at last meeting) is included.</td>
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</table>

**New Business - New Provisions for Spec Committee**

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<tr>
<th>SECTION</th>
<th>TITLE</th>
<th>DESCRIPTION</th>
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</table>
| 105     | SP 105 - Dates of Governing Specifications and Standard Details | This is an update to previously approved SP's. 1st time to Committee.  
Project Specific provision to provide overriding dates for the Standard Specifications and Standard Details Book, Volume I and II. The special provision would be added to the project proposal and will alleviate need for the designer updating plan notes when these manuals are updated.  
The provision is a redline copy, showing the changes/updates to the |
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>102.16</td>
<td>Pre-construction Data</td>
<td><strong>1st time to Committee.</strong> Proposed specification change to 102.16 subsection. The intent of the change is to reduce the proposal size by listing supporting project documents (geotechnical report, environmental documentation, etc.) as an exhibit on bidx. The provision is a redline copy, showing the proposed changes to the specification.</td>
</tr>
<tr>
<td>401.10.3</td>
<td>Spreading and Finishing</td>
<td><strong>1st time to Committee.</strong> Proposed specification change to Section 401; with update to the 401.2 &amp; 401.10.3. Updates binder so that they are in line with 705.5 revision (that was approved at the October meeting). The provision is a redline copy, showing the proposed changes to the specification.</td>
</tr>
<tr>
<td>410.10.1</td>
<td>Spreading and Finishing</td>
<td><strong>1st time to Committee.</strong> Proposed specification change Section 410; with update to the 410.2 &amp; 410.10.1. Updates binder so that they are in line with 705.5 revision (that was approved at the October meeting). The provision is a redline copy, showing the proposed changes to the specification.</td>
</tr>
<tr>
<td>709.4</td>
<td>Weld Wire Reinforcement for Concrete</td>
<td><strong>1st time to Committee.</strong> Proposed specification change to 709.4 subsection. The update adds reference to MP 709.04.40 The provision is a redline copy, showing the proposed changes to the specification.</td>
</tr>
</tbody>
</table>

**Comments**
Comments are requested on these Specification Changes and Project Specific Special Provisions. Please share your comments by December 4, 2017, they help in the decision making process.

Please Send Comments to: [DOHSpecifications@wv.gov](mailto:DOHSpecifications@wv.gov)

**Deadline for new items & updates to these provisions is January 10, 2017**
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, February 7, 2017 at 9am (tentative)
Building 5, Room 855: (If Available. If not available a change in venue will be attached on the door)
2017 Standard Specifications Roads and Bridges
Electronic Copy (pdf): The 2017 Standard Specifications Roads and Bridges can be viewed, printed, or downloaded from the Specifications Website. A link to the Specifications pages is here: http://www.transportation.wv.gov/highways/contractadmin/specifications/Pages/default.aspx


2018 Supplemental Specifications
The 2018 Supplemental Specifications will go in effect on all project lettings after 1/1/18. It will be available to view, print, or download from the Specifications Website in mid-December. A link to the Specifications pages is here:
http://www.transportation.wv.gov/highways/contractadmin/specifications/Pages/default.aspx

2018 Specifications Committee
The Specification Committee typically meet every other month; on the first Wednesday. 2018 meetings will be held in February, April, June, August, October, and December. 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 http://www.transportation.wv.gov/highways/contractadmin/specifications/SpecComit/Pages/default.aspx

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

For questions regarding the Standard Specifications Roads and Bridges, Supplemental Specifications, Project Specific Special Provisions, or the Specifications Committee please e-mail DOHSpecifications@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 Specification & Project Specific Special Provision as they progress thru Specification Committee. This procedure would facilitate a means of tracking changes from meeting to meeting; as the agendas & 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 – Are changes/edits/updated to SP that have been approved by spec committee.

NEW BUSINESS ITEMS:
New items to should be setup & submitted in the following format:
2. Project Specific Special Provisions (SP) – Will be shown in all black.
3. Updates to approved SP – Shown as red-line copy

Each items 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 in which indicate removal or addition of text. You can redline a Microsoft Word document by using the built in “Track Changes” feature or you can manually redline 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, than 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 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
HIGH TENSION CABLE BARRIER SYSTEM

STATE PROJECT NUMBER: ____________________________
FEDERAL PROJECT NUMBER: ____________________________

SECTION 607
GUARDRAIL

DELETE THE HEADING AND CHANGE TO THE FOLLOWING:

SECTION 607
GUARDRAIL AND HIGH TENSION CABLE BARRIER SYSTEM

607.1-DESCRIPTION:

ADD THE FOLLOWING TO THE SUBSECTION:

The work includes furnishing and erecting a 4 wire rope High Tension Cable Barrier (HTCB) system meeting the requirements of National Cooperative Highway Research Program (NCHRP) 350 or Manual for Assessing Safety Hardware (MASH) for the cable barrier system, terminals and all appurtenances. The system shall have a letter of eligibility from FHWA for Test Level 4 (TL4) and a letter of eligibility from FHWA for Test Level 3 (TL3) on slopes of 6:0:1 or flatter side slopes. The HTCB system shall have a letter of eligibility from FHWA for a tested 4 cable system meeting Test Level (TL3) tested on a slope of 6:1 or steeper.

The work shall conform to the lines, grades, and locations shown on the Plans or as directed by the Engineer. The cable barrier shall be placed in accordance with the cable system manufacturer’s instructions and in accordance with the Division approved shop drawings and submittals prepared by the manufacturer of the cable barrier system.

Unless provided for on the plans, the work covered by this special provision includes only work necessary to install the cable barrier system and appurtenances. It includes the following:

1. Furnishing and placement of concrete foundations for the anchors, line posts and the end terminals.
2. Providing and installing the cable system and all hardware and appurtenances for a complete and functional cable barrier system by one manufacture. All components are
to be of the same type.
3. Conducting installation training prior to the installation of the barrier system and maintenance training after installation of the system.

607.2- MATERIALS:

ADD THE FOLLOWING TO THE SUBSECTION:

607.2.1-HTCB Materials: The wire rope shall be galvanized, 3/4”-3x7 meeting requirements of AASHTO M30-92 Type I, Class A coating with minimum breaking strength of 39,000 pounds. Wire rope shall be pre-tensioned. Provide a Certificate of Quality from the wire rope manufacturer with each cable spool specifying breaking strength, modulus of elasticity and the amount of force used to elongate the wire rope.

Provide factory swaged threaded terminals for connecting the wire ropes at the turnbuckles. A maximum of two wedge-type connections that secure the wire rope by compression may be used per wire rope per segment.

Threaded terminals, turnbuckles and fittings shall be galvanized after threading and meet the requirements of ASTM A-153. The fittings shall be designed for the cable arrangement used and fully fitted connections shall have minimum breaking strength of 36,800 pounds, certified by test reports that shall be submitted to the Engineer. Turnbuckles shall be of the solid or closed body type with two holes to determine cable stud thread penetration. Turnbuckles shall be installed at a maximum spacing of 1000 Feet intervals.

The line posts shall meet the manufacturer’s specifications and be consistent with the post size specified in the FHWA NCHRP-350 or MASH acceptance letter. Furnish steel posts meeting the requirements of ASTM A-36 galvanized to ASTM A-123 requirements following fabrication. The posts shall be designed to hold the wire at the design height. The posts shall be inserted in galvanized metal sockets or sleeves conforming to the manufacturer’s design. Provide a low density polyethylene (or similar type material) excluder profiled to fit tightly around the post to prevent debris from entering the sockets.

The line post shall foundation shall be compatible with the concrete mow strip as shown in the plans.

The line post shall have retroreflective sheeting on every fourth post or 50 feet, whichever is less. The sheeting shall be Type XI, Fluorescent-yellow meeting the requirements of Section 715.9.2.4 with a minimum surface area of 9 square inches. Place Fluorescent-yellow sheeting applied directly on both sides of the post. A post cap method of sheeting attachment that may detach upon impact to the line post, shall not be permitted. The retroreflective sheeting shall be placed as high as possible on the line post.

All materials including wire rope, fittings, posts, reflectorized spacers or post caps, and terminals shall meet the approved manufacturer’s specifications and details and shall be approved by the Engineer prior to installation.

“Open wedge” connections as allowed on low tension cable systems shall not be used. Swaged fittings shall be required. Connections at anchorages needed to field adjust the cables may be “closed wedge” compression type fittings.

Any damage (break in the coating) to exposed steel or metal that is required to be galvanized shall be repaired or retouched to the satisfaction of the Engineer or shall be replaced with fittings or materials with the factory coating intact.
The End Terminals shall have a minimum of 120 square inches of Type XI retroreflective sheeting meeting the requirements of Section 715.9.2.4 affixed to each of the terminal posts.

607.2.2-Geotechnical Data: The known soil data to the Division is made part of the Contract documents. Any additional soil data required, shall be the responsibility of the Contractor.

It is the Contractor’s responsibility to supply the cable barrier manufacturer with any soil information needed to design the End Terminal Foundations.

All soil information gathering shall be considered incidental to construction of the cable system at no additional cost to the contract.

The existing median shall be graded to a proposed 6.0:1 or flatter side slope where shown in the plans. The proposed grading and drainage work required shall not be part of this provision and shall be paid for separately per the appropriate items in this contract.

The cable barrier system described below requires side slopes of 6.0:1 or flatter.

607.2.3-Submittals: Submittals listed below shall be provided at least 30 days prior to initiating work and submitted electronically.

1. Provide an FHWA Eligibility Letter for National Cooperative Highway Research Program (NCHRP) 350 or Manual for Assessing Safety Hardware (MASH) FHWA Eligibility Letter for the cable barrier system, terminals and all appurtenances. The system shall be approved for Test Level 4 (TL4) for 6:1 side slopes. The HTCB system shall have a letter of eligibility from FHWA for a tested 4 cable system meeting Test Level (TL3) tested on a slope of 6:1 or steeper.

2. The cable system manufacturer shall be responsible for the design of any transitions between existing or proposed guardrail and the cable system that is not compatible by the manufacturer of the proposed HTCB system as shown on the plans. This design shall be submitted to the Division at least 30 days prior to beginning work and must be approved by the Engineer prior to beginning work on the barrier. The cable may not be tied to any guardrail or bridge structure but must be “overlapped” in a manner approved by the Engineer.

3. Provide manufacturer’s drawings, general notes, specifications and installation manuals for all components proposed for installation.

4. Provide manufacturer’s guidelines and instructions for repairs that may be required to the cable system and all appurtenances following a vehicle hit.

5. Submit material specifications and technical data information on all materials proposed for use on the project.

6. The design of the cable system termini, depth and size of line posts, concrete footings, and the concrete end-anchors shall bear the seal of a Registered Professional Engineer currently licensed in West Virginia.

7. Provide an Installation Plan, with schedule, for the barrier. The Installation Plan shall be linked to the Transportation Management Plan for the project and shall be subject to the approval of the Engineer.

8. Detailed drawings of all post and hardware including a post with all four (4) cable heights defined and construction tolerances to be met.

9. Two (2) sets of As-Built plans shall be submitted showing the locations of the turnbuckles and splice locations of the complete project.
10. The complete foundation design for all Cable End Terminal Foundations shall be submitted to the Engineer. The design shall provide detailed reinforcement layout, dimensions and material properties defined as a minimum. Plans must be sealed by a Registered Professional Engineer licensed in West Virginia.

11. Line Post Foundation shall be designed when geotechnical soil conditions are not met as required by the HTCB manufacturer’s standard criteria.

12. Blank Sample of the proposed Cable Tension Log are to be submitted upon completion.

607.2.4-Design Criteria: Base the minimum design load for the Cable End Terminal to cable connections on the theoretical cumulative tension expected at -20 degrees Fahrenheit.

Limit Cable End Terminal foundation lateral deflection to 1 inch at the proposed ground surface using a minimum factor of safety of 2.0.

607.2.5-Preconstruction Conference: A Preconstruction Conference with all parties shall be held at least 30 days prior to commencement of the work to install the barrier system. At that time, all materials and methods must have been approved by the Engineer.

607.4-ERECTING RAIL ELEMENTS:

ADD THE FOLLOWING TO THE SUBSECTION:

607.4.1-High Tension Cable Barrier System: The cable barrier system and end terminals shall consist of pre-tensioned wire rope (cable), steel line posts set in steel sockets in concrete footings, end-anchors and all fittings meeting National Cooperative Highway Research Program (NCHRP) Report 350 or MASH for Test Level 3.4 for approach slopes of 6H:1V. Regardless of the Letter of Eligibility from FHWA for the 4 cable system, the maximum post spacing shall be 10.5 feet.

The cable barrier system shall be 4 wire ropes with post spacing at 12 feet or less as approved by the Engineer. The dynamic deflection shall be less than 8 feet using NCHRP 350 or MASH testing requirements. In locations where a dynamic deflection distance of 8 feet is not attainable between a fixed object, the post spacing shall be decreased per manufacturer’s engineering calculations to reduce the deflection to achieve the required deflection.

The specified maximum dynamic deflection of 8 feet shall be met along the entire length of each cable barrier segment between end anchors. In addition to meeting the NCHRP 350 or MASH testing requirements, the manufacturer shall provide documentation demonstrating that the proposed system meets the dynamic deflection requirements at the maximum distance between anchors that the system will be installed as specified in the plans. The documentation may be in the form of field testing results and/or computer simulations. Any testing or study supporting the claims shall either be done by the manufacturer and accepted by appropriate governmental entities or done by reputable and recognized testing or evaluation entities using the manufacturer’s materials and system design. If the manufacturer cannot adequately demonstrate the ability of their system to meet the dynamic deflection requirements at the maximum distance between anchors specified in the plans, they shall be required, at the sole discretion of Division, to reduce post spacing and/or add additional anchors until the requirements are met and approved by the Engineer. Any additional cost associated with
reducing the post spacing or adding Cable End Terminals and Cable End Terminal Foundations will be considered incidental to construction, and included in price bid for this item.

The manufacturer of the cable system must have been in operation for at least 3 years and must have successfully installed a minimum of 50 miles of high tension cable systems in the United States. The manufacturer shall present evidence of such to the Engineer at the barrier system preconstruction conference.

The cable barrier system shall be designed so that line post repairs following a vehicle hit can be made quickly by two maintenance technicians using readily available hand tools. In addition, the cable barrier manufacturer shall provide written repair instructions for all elements of the cable system including the cables, anchors, and connections. All repair instructions shall be provided in an electronic version and in a printed and bound version (minimum 2 copies).

607.4.2-Construction Methods:

607.4.2.1-Installation of the Cable Barrier Line Posts: Any grading and excavation shall be completed to finished line and grade prior to installation of the line posts.

Excavate for line posts in accordance with the approved manufacturer’s drawings. Each post shall be at the proper location, elevation, alignment and depth as proposed and approved. Excavation of line post footings shall be performed to place concrete, as required by the manufacturer, in undisturbed soil for the bottom and sides. In the event backfill is necessary, specification procedures must be followed to achieve the proper backfill method and compaction. Size and depth of footings shall be as approved by the Engineer but shall not be less than 14” diameter and 36” deep (14”x36”) unless larger sizes are recommended by the manufacturer and approved by the Engineer.

The galvanized steel line post sleeves shall be placed in concrete footings in accordance with the approved manufacturer’s drawings. Footings shall have reinforcing bars in accordance with the manufacturer’s approved shop drawings.

The line post footings shall be compatible with a concrete mow strip, as called for in the plans, and shall be separated by expansion material sufficient to protect both from cracking.

The line posts shall be set in the line post sleeves paying close attention to the horizontal and vertical alignment of the posts. It is critical that the posts be set to achieve the proper wire rope height. Line posts shall be set to achieve the vertical and horizontal tolerances set by the manufacturer in the approved shop drawings and installation manuals. Posts and foundations not set at the proper line and grade shall be replaced prior to the installation of the wire rope.

607.4.2.2-Installation of End Terminals: Install terminals in conformance with the requirements of the cable system manufacturer’s instructions and as approved by the Engineer.

End terminals shall be placed in excavations of natural, undisturbed ground, to size and shape required by the manufacturer based on soil types and ground conditions. If over-excavation is unavoidable as verified by the Engineer prior to installation of the concrete, the sides must be vertical and additional concrete shall be used to fill completely the excavated area.
Provide an end terminal for each separate connection for each separate run of cable. Cables shall not be tied to anything but an approved terminal and shall not be tied to any proposed or existing guardrail, bridge structure or other unapproved object.

No incomplete runs subject to traffic shall be left overnight or unprotected. At the end of each working day, any section started shall be completed by the end of the day if the roadway is under traffic.

Any end-anchor movement exceeding 1 inch within twelve (12) months of complete installation will require re-construction and re-tensioning of the system by the Contractor at their cost as directed by the Engineer.

### 607.4.2.3-Installation of Wire Rope:

The wire rope shall be installed at the elevation and proper height as approved in the manufacturer’s design and approved drawings. Tension shall be applied meeting manufacturer’s recommendations. Check the tension per manufacturer’s recommendations.

Three weeks following the initial tensioning, check and adjust the tension as necessary. No additional compensation will be provided for any subsequent tensioning required.

Maintain a tension log showing time, date, location, cable temperature, ambient air temperature and final tension reading, signed by the person performing the tension testing. The log will be reviewed to verify that the measured tension matches the temperature/tension chart provided by the manufacturer and is within the stated variance. The log shall be provided to the Engineer after tensioning is complete.

The number and location of splices will be subject to the approval of the Engineer. Splices shall be staggered in accordance with the manufacturer’s recommendations. Cable splices shall be made in accordance with the recommendations of the cable manufacturer.

### 607.4.3-Maintenance During Construction:

Once the cable system has been erected the cable and that section of roadway returned to traffic, the Contractor is responsible for maintaining and repair of the cable barrier system until final acceptance of the entire project. Should the cable barrier be damaged by the traveling public, Contractor shall repair the barrier within 24 hours. The cable barrier posts shall be replaced and the cable reinstalled to the post. If that section of cable has been inspected and certified to by the manufacturer, the cable will be re-inspected and recertified as with the initial installation.

All repairs made to the cable barrier or terminals, no matter the cause of the repair, prior to final acceptance, shall be considered incidental to construction at no additional cost to the contract.

### 607.4.4-Cable System Installation Training and Certification:

#### 607.4.4.1-Manufacturer’s Contractor’s Certification:

A manufacturer’s representative shall be present during the installation of the first section of the cable barrier system and shall supervise installation of all components (i.e. posts, anchors, tensioning). Upon completion of the entire system, a manufacturer’s representative shall inspect and the Contractor shall certify in writing that the cable system was installed in accordance with the manufacturer’s design and requirements.

#### 607.4.4.2-On-Site Installation Training:

All training shall be provided by the cable system manufacturer. Provide a minimum of 2 hours of classroom training on the
installation of the system. This training shall be provided at the WVDOH District Office responsible for the construction of the system. The location and time of this training shall be subject to the approval of the Engineer. Provide on-site field instruction using a minimum 2000-foot section of the system. The amount of training will be as necessary to provide the field training on all aspects of system installation, line post installation, wire rope installation and tensioning and testing, and terminal installation. Provide Certification by the manufacturer of the system for the participants of the training. This certification shall require participants to pass a written examination prepared and given by the system manufacturer. The Contractor shall have certified personnel on the site at all times during the installation of all elements of the system. The training and certification instruction described above shall be provided for a minimum of twenty participants to include the Contractor, WVDOH (Construction, Maintenance and Traffic Operations personnel) and FHWA. Twelve slots shall be reserved for WVDOH and FHWA and the remainder for the Contractor.

607.4.4.3-Training Following Installation: Provide a minimum of two hours of classroom instruction on the maintenance and repair of the cable system. This training shall be provided at the WVDOH District Office responsible for maintenance. The scheduling and location of this training shall be as approved by the Engineer. Provide a minimum of one hour of on-site instruction on the maintenance and repair of the system.

A training session of two hours shall be provided to address the needs of emergency response personnel involved in extricating vehicles from the cables and the safety of the responders with techniques in minimizing damage to the system. The training shall be for a maximum of 20 participants including WVDOH (Construction, Maintenance, and Traffic Operations), FHWA and representatives of local fire and rescue services.

607.6-METHOD OF MEASUREMENT:

ADD THE FOLLOWING TO THE END OF THE SUBSECTION:

The quantity of HTCB will be measured in feet along the top cable constructed, tested and accepted. Each segment of HTCB shall be between Length of Need (LON) points as shown on the plans. The measured length between LON points shall pay for all 4 cables of the system, line post, line post foundation and appurtenances. The length of the End Terminals outside of the LON shall not be included in this measurement. The approved shop drawings shall define the location of the LON point of the system.

The quantity of Cable End Terminals and Cable End Terminal Foundations to be paid for shall be the bid quantity. Added Cable End Terminals and Cable End Terminal Foundations constructed to meet the deflection requirement will not be directly paid for and all cost of these shall be incidental to the original bid quantity, and shall be constructed as shown by the details in the plans.

The hours of training will be the hours of the instructor providing the training as directed by the Engineer.
607.8-PAY ITEMS:

ADD THE FOLLOWING TO THE TABLE:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>607018-001</td>
<td>High Tension Cable Barrier (HTCB)</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>607018-005</td>
<td>Cable End Terminal</td>
<td>Each</td>
</tr>
<tr>
<td>607018-010</td>
<td>Cable End Terminal Foundation</td>
<td>Each</td>
</tr>
<tr>
<td>607018-050</td>
<td>HTCB Installation &amp; Maintenance Training</td>
<td>Hour</td>
</tr>
</tbody>
</table>
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

HIGH TENSION CABLE BARRIER SYSTEM

STATE PROJECT NUMBER: ____________________________
FEDERAL PROJECT NUMBER: ____________________________

SECTION 609

SIDEWALKS

609.1-DESCRIPTION:

DELETE THE SUBSECTION AND REPLACE THE FOLLOWING:

Concrete Mow Strip: This work shall consist of the construction of Portland cement concrete mow strip in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Plans or established by the Engineer.

609.7-EXPANSION JOINTS:

DELETE THE SUBSECTION AND REPLACE THE FOLLOWING:

The Contractor may construct a monolithic post foundation and mow strip in accordance with a manufacturer’s system. Other mow strip and line post foundations may be submitted for approval.

When no manufacturer’s system is proposed, the following shall be constructed:

1. Expansion joints 1/4 inch (6 mm) wide shall be constructed at 30 ft. (9 m) intervals. Expansion joints shall be filled with preformed joint filler, which shall be shaped to fit the concrete section being placed.
2. Expansion joints, of the type specified above, shall be constructed between all such appurtenances and the mow strip.
3. Expansion joint material shall be placed between the concrete mow strip and the line post foundations.
When a manufacturer’s concrete mow strip and the line post foundations system is different than described above and the system has been tested, the contractor shall submit the manufacturer's drawings and tests to construct the tested system.

609.9-METHOD OF MEASUREMENT:

DELETE THE SUB-SECTION AND ADD THE FOLLOWING:

Concrete Mow Strip will be measured in square yards (meters), complete in place and accepted, which will be determined by the length measured upon the surface multiplied by the width constructed as shown on the plans. Any required excavation for the Concrete Mow Strip shall be incidental to the pay item for Concrete Mow Strip.

609.11-PAY ITEMS:

ADD THE FOLLOWING PAY ITEM:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>609020-001</td>
<td>Concrete Mow Strip</td>
<td>Square Yard (Meter)</td>
</tr>
</tbody>
</table>
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
SUPPLEMENTAL SPECIFICATION  
FOR  
SECTION 204  
MOBILIZATION  

204.5-BASIS OF PAYMENT: 

DELETE THE CONTENTS AND REPLACE THE FOLLOWING:  

Partial payments will be made as the work progresses in accordance with the following schedule.  

i. 2.5% of the original contract amount or 50% of the amount bid for mobilization, whichever is less, will be released to the Contractor as the first estimate payable, not less than 15 days after the start of work at the project site.  

ii. 2.5% of the original contract amount or the remaining 50% of the amount bid for mobilization, whichever is less, shall be released with the estimate payable 30 days after the first estimate.  

Upon completion of all work on the project, payment of any amount bid for mobilization in excess of 5% of the original contract amount will be released. When the project is deemed substantially complete, any remaining amount bid for mobilization will be released for payment.  

Nothing herein shall be construed to limit or preclude partial payments otherwise provided for by the contract.  

No deduction will be made, nor will any increase be made, in the lump sum mobilization item amount regardless of decreases or increases in the final total contract amount or for any other cause.
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 614
PILING WALLS

614.5-CORROSION PROTECTION:

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

Piles will be protected from corrosion and sealed by the placement of concrete or grout, from the bottom of the hole to the bottom of the lagging or as directed by the Engineer. Vibration of the concrete or grout is not required. The Contractor shall complete all concrete or grout operations for holes drilled during the work day.

The drilled hole shall be pumped free of water and shall be reasonably free of fall-in soil or other debris prior to the placement of the concrete or grout. When unable to remove the water, the concrete or grout in the bedrock/shale portion of the hole will be pumped or tremied through a pipe beginning at the bottom of the drilled hole. The pipe shall be slowly raised ensuring the pipe end remains at least 2 feet (600 mm) below the surface of the concrete or grout. A means of positively measuring the elevation of the concrete or grout as it is placed shall be provided by the Contractor.

After placing the concrete or grout in the bedrock/shale below water table, the Contractor has the option of either pumping or pouring directly into the hole the remainder of the concrete or grout provided the hole can be pumped to remove remaining water. Placing the concrete or grout from the bottom of the hole to the bottom of the lagging shall be accomplished in one continuous operation.

The Contractor will inform the Engineer, at the preconstruction conference, as to the type of corrosion protection that will be used. Intermixing of concrete and grout will not be allowed, unless approved by the Engineer.

Concrete shall be in accordance with Section 601, Class B. The job site testing is waived.

Grout will be furnished and placed in accordance with the requirements specified herein.

The acceptance sampling and testing of the grout is the responsibility of the Division.

Quality Control of the concrete or grout is the responsibility of the Contractor as designated in Materials Procedure MP 601.03.50. The Contractor shall maintain equipment and qualified personnel, who shall direct all field inspection, sampling, and testing necessary to determine the magnitude of the various properties of the concrete and grout governed by the Specifications and shall maintain these properties within the limits of this Specification. The Quality Control Plan designated in MP 601.03.50 shall be submitted to the Engineer at the pre-
construction conference. Work shall not begin until the Plan is reviewed for conformance with the contract documents.

The required 7-day compression strength of the grout shall be a minimum of 2,000 psi (14 MPa). Piling which has been installed with grout which does not attain the 2,000 psi (14 MPa) strength in 7 days but exceeds a strength of 1,600 psi (11 MPa) shall be subject to paid for at a reduced unit price reduction equal to 80% of the unit bid price for steel pile based on the percentage of strength attained. The penalty would include the entire length of each pile which has been installed with failing grout. Grout with compressive strength of less than 1,000 psi (7 MPa) shall be evaluated by the Engineer as to the adequacy for the use intended. All grout evaluated as unsatisfactory for the use intended shall be removed and replaced or otherwise corrected by and at the expense of the Contractor as required in 105.3.

A grout strength test shall consist of testing three 6 in x 12 in (150 mm x 300 mm) cylindrical specimens. The test results shall be the average of the three specimens. A minimum of one set of three specimens shall be made for each day’s operations.

—— The bid price for the piling with grout compressive strengths greater than or equal to 2,000 psi (14 MPa) will be paid at 100 percent unless the piling installation does not meetSpecifications for other reasons. Between 1,600 psi (11 MPa) and 2,000 psi (14 MPa) compressive strengths, the cost of the grout will be deducted from the actual grout cost on a proportional basis with 2,000 psi (14 MPa) being 100 percent and 1,600 psi (11 MPa) being zero percent payment. With 1,600 psi (11 MPa) grout, the piling installation would be considered to meet 80 percent of the Specifications and the penalty being zero payment for the grout.

—— The penalty would involve only the quantity of grout represented by the failing compressive strength results.

—— The bid price for the piling will be reduced for the piles grouted with grout having less than 1,600 psi (11 MPa) compressive strengths as follows:

Where:

\[
\begin{align*}
A &= \text{Compressive strength of grout} \\
B &= \text{Total foot (meter) of piling grouted with} \\
C &= \text{Unit bid price per foot (meter) of piling} \\
D &= \text{Total $ amount of the cost of grout represented by failing compressive strength results (from Contractor)} \\
E &= 2,000 \text{ psi (14 MPa)} \\
F &= \text{Total penalty}
\end{align*}
\]
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 614
PILING WALLS

614.5-CORROSION PROTECTION:

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

Piles will be protected from corrosion and sealed by the placement of concrete or grout, from the bottom of the hole to the bottom of the lagging or as directed by the Engineer. Vibration of the concrete or grout is not required. The Contractor shall complete all concrete or grout operations for holes drilled during the work day.

The drilled hole shall be pumped free of water and shall be reasonably free of fall-in soil or other debris prior to the placement of the concrete or grout. When unable to remove the water, the concrete or grout shall be pumped or tremied through a pipe beginning at the bottom of the drilled hole. The pipe shall be slowly raised ensuring the pipe end remains at least 2 feet (600 mm) below the surface of the concrete or grout. A means of positively measuring the elevation of the concrete or grout as it is placed shall be provided by the Contractor. After placing the concrete or grout below water table, the Contractor has the option of either pumping or pouring directly into the hole the remainder of the concrete or grout provided the hole can be pumped to remove remaining water. Placing the concrete or grout from the bottom of the hole to the bottom of the lagging shall be accomplished in one continuous operation.

The Contractor will inform the Engineer, at the preconstruction conference, as to the type of corrosion protection that will be used. Intermixing of concrete and grout will not be allowed, unless approved by the Engineer.

Concrete shall be in accordance with Section 601, Class B. The job site testing is waived. Grout will be furnished and placed in accordance with the requirements specified herein. The acceptance sampling and testing of the grout is the responsibility of the Division.

Quality Control of the concrete or grout is the responsibility of the Contractor as designated in Materials Procedure MP 601.03.50. The Contractor shall maintain equipment and qualified personnel, who shall direct all field inspection, sampling, and testing necessary to determine the magnitude of the various properties of the concrete and grout governed by the Specifications and shall maintain these properties within the limits of this Specification. The Quality Control Plan designated in MP 601.03.50 shall be submitted to the Engineer at the pre-construction conference. Work shall not begin until the Plan is reviewed for conformance with the contract documents.
The required 7-day compressive strength of the grout shall be a minimum of 1,600 psi (11 MPa). Piling which has been installed with grout which does not attain the 1,600 psi (11 MPa) strength in 7 days shall be paid for at a reduced unit price equal to 80% of the unit bid price for steel pile. The penalty would include the entire length of each pile which has been installed with failing grout. Grout with compressive strength of less than 1,000 psi (7 MPa) shall be evaluated by the Engineer as to the adequacy for the use intended. All grout evaluated as unsatisfactory for the use intended shall be removed and replaced or otherwise corrected by and at the expense of the Contractor as required in 105.3.

A grout strength test shall consist of testing three 6 in x 12 in (150 mm x 300 mm) cylindrical specimens. The test results shall be the average of the three specimens. A minimum of one set of three specimens shall be made for each day’s operations.
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
SUPPLEMENTAL SPECIFICATION  
FOR  
SECTION 636  
MAINTAINING TRAFFIC  

636.9-Traffic Control Devices:  

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE THE FOLLOWING:  

Traffic control devices for work areas include, but may not be limited to, signs, barricades, drums, cones, channelizer cones, delineators, and flashers. They shall be installed in accordance with standards detailed in the manual “Manual on Temporary Traffic Control for Streets and Highways”, latest version, published by the Division, or as shown on the plans.  

If the Total Contact Bid Amount is over $500,000 or otherwise noted on the plans Traffic Control Devices also include work area signs indicating fines. These signs shall be installed 500' (150 m) after the first maintenance of traffic sign installed for each project. The signs shall be installed in both directions on the road under construction. The sizes, messages, and designs shall as shown in the Sign Fabrication Manual or as directed by the Engineer. With the larger size used for four lane expressway roadways with speeds of 55 MPH or greater and the smaller sign used for two lane roadways with speeds of 50 MPH or greater and with an ADT at 3,000 or greater. A 12’ x 6’ expressway sign (Item 636011-* - 300 units) placed behind guardrail on 3 - 4’ #BB U-Channel or on 3 - 4” x 4” wood post (breakaway) or 8’ x 4’ - two lane highway sign (Item 636011-* - 180 units) placed behind guardrail on 2 - 4 #BB U-Channel or on 2 - 4” x 4” wood post (breakaway). The u-channel supports used shall be from the Division Approved Products List.  

If the project is on an Interstate Highway, an APD (Appalachian Highway Corridor), a controlled access highway with posted speed limit of 40 Miles Per Hour (MPH) or greater, or if otherwise noted on the plans, Traffic Control Devices shall include work area signs designated “GIVE ‘EM A BRAKE” (GEAB). The sign size, message, and design shall be as shown on Sign Fabrication G30-1 or as directed by the Engineer.  

The sign (Item 636011-* 300 units) shall be installed 500’-1500’ after the first lead-in work area sign unless the work zone is greater than one (1) mile, in length, in which case the GEAB sign shall be installed approximately ¼ mile in advance of the active work area. At no time shall the GEAB sign be closer than 500’ from any other work area signing. The sign shall be installed in both directions on the right side of the highway. All GEAB signs not behind guardrail shall be installed on three, 3 pound per foot u-channel posts driven to a depth of 3 ½ feet. The u-channel posts shall be continuous in length, or a combination of a stub driven to a depth of 3 ½ feet, an
approved splice arrangement and an appropriate length supporting post. The posts shall utilize stubs driven to a depth of 3-1/2 feet and shall not extend above ground level more than four (4) inches. An appropriate length upper support u-channel shall be connected to each stub using a breakaway mechanism, appropriate for the operating speed of the roadway, recommended by the u-channel manufacturer which will result in the assembly meeting the crashworthiness requirements of either NCHRP-350 or AASHTO-MASH, latest edition. If the assembly is installed behind guardrail, the supports may be direct driven without a splice, or stubs may be used with the upper supports connected using a method approved by the Engineer, or 2 – 4 #BB U-channel supports may be used. The u-channel supports used shall be from the Division Approved Products List.

GEAB sign shall only be installed in active work areas where workers are present and visible to passing motorists. During periods of inactivity in the work area, the GEAB sign(s) shall be covered or removed.

All traffic control devices manufactured on or before December 31, 2019 installed shall be devices which meet the mandatory crash testing performance requirements of National Cooperative Highway Research Program Report 350 (NCHRP-350) and/or the American Association of State and Highway Transportation Officials publication Manual for Assessing Safety Hardware (AASHTO-MASH), latest version 2009 or 2016. With the exception of Category 1 (as defined by FHWA) work zone devices, as defined by the FHWA, all devices shall have a supporting NCHRP-350 and/or AASHTO-MASH acceptance eligibility letter from the FHWA. Category 1 work zone devices shall have a supporting NCHRP-350 self-certification letter from the device manufacturer or a AASHTO-MASH eligibility from FHWA, that the device meets the mandatory crash testing performance requirements of NCHRP-350 and/or AASHTO-MASH. Devices, including portable barriers, manufactured after December 31, 2019 must have been successfully tested to the 2016 edition of AASHTO-MASH. Such devices manufactured before this date may continue to be used throughout their normal service lives.

All devices shall be assembled and utilized in a manner that is consistent with the crash testing of the devices. For example, portable traffic control sign stands shall only be used within the parameters of the crash testing of the stands unless otherwise allowed for by the FHWA in the FHWA eligibility acceptance letter or by other official written FHWA guidance or policy from FHWA regarding NCHRP-350 or AASHTO regarding MASH. In the case of portable sign stands, these parameters include, but are not necessarily limited to sign mounting height, sign substrate material, maximum sign size, and the application of warning lights. Unless included as part of the testing of the device or allowed for as part of the manufacturer’s self-certification for Category 1 work zone devices, additional ballast added to devices shall only be as allowed for by the FHWA in the FHWA acceptance letter or by other official written FHWA guidance or policy, as described previously.

Devices utilized by the Contractor shall be a model listed on the Division’s Approved Products List (APL), as applicable. Devices compliant with NCHRP-350 or MASH Test Level 3 may be utilized on all roadways. Devices approved and/or certified at-compliant with NCHRP-350 or MASH Test Level 2, but not Test Level 3, shall not be utilized on roads having a normal posted speed limit greater than forty (40) MPH. Devices approved and/or certified at-compliant with NCHRP-350 or MASH Test Level 1 only shall not be utilized on roads having a normal posted speed limit greater than twenty-five (25) MPH.
636.14-TEMPORARY BARRIER:

636.14.1-Materials:

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE THE FOLLOWING:

Temporary Barrier manufactured before December 31, 2019 shall meet the requirements of NCHRP Report 350 and/or MASH-09 for the different test levels as shown in Table 3.1 “Test Matrix for Longitudinal Barriers” in NCHRP Report 350. Temporary Barrier manufactured after December 31, 2019, must have been successfully tested to the 2016 edition of MASH. Specific types of temporary barrier will not be used unless crash tested and approved by the Engineer. Historical performance will help determine use of a product. Poor performance may be grounds for non-acceptance.

Temporary Barriers shall have adequate drainage slots to allow runoff to pass through.

Temporary Barrier shall have 8” x 12” Type B-1 Delineators (white or yellow as appropriate) facing traffic at 40 foot centers.

636.14.2-Installation:

DELETE THE CONTENTS OF THE SUBSECTION AND REPLACE THE FOLLOWING:

This barrier type shall conform to the details on the Plans, set as directed on the Plans, with the barrier sections securely connected together by satisfactory fastening devices to provide a more stable structure against impact.

A Temporary Barrier Installation Plan shall be approved according to Section 105.2.1.2 “Contractor Approval Method”. It shall have information adequate to ensure it meets the installation conditions below and shall include barrier type, barrier connection type, NCHRP/MASH test approval and data, individual segment length, anchorage details, end treatments, and transition details.

The temporary barrier shall be placed to match test conditions as determined by the Engineer. These conditions may include, but not be limited to, anchorages, total length of barrier, individual segment length and connection details. Only one type of temporary barrier shall be used for any one continuous run of barrier in a project. To clarify, the entire length of temporary barrier shall not be intermixed in regard to type of barrier, connection type, or individual barrier length unless that configuration has been tested.

Anchorage spacing and installation, if required, shall be per manufacturer subject to shop drawing review and approval and meet or exceed test conditions. Shop drawing information shall include details for anchor removal and patching and /or repair of pavement or bridge deck.

Where temporary barrier adjoins guardrail barrier, regardless if one is temporary and the other is permanent (newly constructed or previously in existence) or if both are temporary, they must be connected with a Temporary Guardrail Connector conforming to 636.16.2.

Where temporary barrier adjoins bridge parapet or other essentially non-yielding barrier or obstacle, they must be joined in a manner to maintain barrier continuity and prevent vehicle snagging during impact. If they cannot be joined in this manner, a connection device must be
used to assure barrier continuity and to prevent vehicle snagging during impact.

When the temporary barriers are no longer needed, they will become the property of the Contractor, unless otherwise noted on the Plans.

J-J Hook connections shall be tensioned by pulling the barrier segments apart to make this type connection “tight”.

Vehicles, materials or any other equipment shall not be stored in the Temporary Barrier buffer area. Unless required as a part of the contract, vehicles and equipment shall not work in the Temporary Barrier buffer area and if required, shall be limited to that time that it is necessary to be in that area.
DELETE THE ENTIRE CONTENTS AND REPLACE THE FOLLOWING.

679.5-FINAL BRIDGE DECK FINISH:
   679.5.1-Straightedge Test:

DELETE THE ENTIRE CONTENTS AND REPLACE THE FOLLOWING.

   679.5.1-Straightedge Test: After defective or damaged concrete has been repaired and cured in accordance with 679.4.9 and before opening to traffic, the bridge deck shall be grooved perpendicular (or radial) to the centerline of the roadway. Prior to grooving, the entire deck shall be checked by the Contractor in the presence of the Engineer with an approved rolling straightedge or approved inertial profiler and inertial profiler operator as outlined in section 601.11.4 _720.2._
ADD THE FOLLOWING SECTION:

SECTION 720
SMOOTHNESS TESTING

720.1-DESCRIPTION:
To measure and evaluate the ride quality of pavement surfaces in accordance with the International Roughness Index (IRI), as well as the most recent forms of AASHTO R-56, AASHTO M328, and AASHTO R-57.

720.2-EQUIPMENT:

720.2.1-High-speed or low speed inertial profiler: Provide a high-speed or low speed inertial profiler for measuring and evaluating the ride quality of pavement surfaces. The inertial profiler shall be certified at a facility approved by the Materials Control, Soils and Testing Division (MCS&T). Certification facilities should conduct the evaluation in accordance with the most recent edition of AASHTO R-56 “Standard Practice for Certification of Inertial Profiling Systems”. All inertial profilers shall be maintained in accordance with the most recent edition of AASHTO M328 “Standard Specifications for Inertial Profiler”. The Contractor shall submit equipment certification documentation after becoming certified or after recertification. A current decal provided by the certification facility shall be displayed on the inertial profiler to indicate equipment certification compliance.

720.2.2-Inertial Profiler Operator Certification: Certification through the Material Control, Soils and Testing Division shall be required to operate an inertial profiler in the State of West Virginia. The operator shall pass a written exam administered by MCS&T. All operators receiving a passing score on the written exam will be placed on the Material Division’s Approved Source List “WVDOH Certified Profilers”. Certification shall be for a period of four years. Certified operators shall submit an application for certification renewal to MSC&T. After reviewing the certification renewal application, MCS&T may issue the operator a new four-year certification or may require the operator to retest for certification renewal.

720.3-RIDE QUALITY TESTING

720.3.1-Quality Control (QC) Testing: QC testing on NHS routes is the responsibility of the Contractor. QC testing shall be completed no later than ten (10) calendar days after all lanes are continuously open to traffic. Data collection shall be done by a certified inertial profiler and
certified inertial profiler operator (See 720.2.1 and 720.2.1.). Collected profile data shall be submitted via email to dohmcsntroadway@wv.gov within five (5) calendar days of testing. Profile data shall be collected and submitted in accordance with the most recent edition of AASHTO R-57.

720.3.2-Quality Assurance (QA) Testing: QA testing is the responsibility of the Division. The Engineer shall submit a “Bridge and Pavement Testing Request Form” form to MCS&T via email, within five (5) calendar days after all stages of paving are completed. Within ten (10) working days from receiving the request, the Division will conduct QA testing. The Division shall use a certified inertial profiler and certified operator for QA testing.

720.3.3-Quality Assurance Verification (QAV) Testing: QAV testing is the responsibility of the Division. The Division’s profile data and the Contractor’s profile data will be compared to determine the IRI differences. Final project price adjustments will be made using the Contractor’s profile data if the IRI differences are within the allowable limits outlined in Table 720.3.3.

<table>
<thead>
<tr>
<th>Contractor’s IRI Mean (in/mi)</th>
<th>Maximum Allowable Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.0 or Less</td>
<td>8.5% of Contractor’s IRI Mean</td>
</tr>
<tr>
<td>50.1 to 150.0</td>
<td>6.0% of Contractor’s IRI Mean</td>
</tr>
<tr>
<td>150.1 or Greater</td>
<td>7.0% of Contractor’s IRI Mean</td>
</tr>
</tbody>
</table>

720.3.4-Referee Testing: Referee testing is the responsibility of the Division. If the QAV testing IRI differences does not meet the maximum allowable difference from Table 720.4.3, the Division will perform referee testing using a certified inertial profiler and a certified inertial profiler operator in accordance with the most recent edition of AASHTO R56 “Standard Practice for Certification of Inertial Profiling Systems”. The profile data from the referee test shall be used in determining the final project price adjustments.

720.3.4.1-Referee Data: If the referee test data still does not meet the allowable IRI differences MCS&T can recommend the Contractor recertify their inertial profiler and inertial profiler operator that was used on the project.

720.3.5-Testing After Repairs: Should repairs be needed to the surface from the defects in the pavement prior to project closeout, QA and QAV testing shall be conducted after all repairs are made. This will be the final tested value for the lot.

720.4-RIDE QUALITY ANALYSIS

720.4.1-Data Location: The average IRI number used in ride quality analysis shall be the average international roughness number of the two wheel paths.

720.4.2-Omitted Sections: Bridge Structures and any sections tested which are not included in the pavement project shall be removed from the Smoothness Analysis. These removed bridges and sections shall also include a Lead-In and Lead-Out distance to be removed from the Ride
Quality Analysis. The Lead-In distance shall be two hundred (200) feet and the Lead-Out distance shall be two hundred (200) feet.

720.4.3-Sampling Lots: The pavement shall be divided into sampling lots of one-tenth (0.1) lane mile each. Each Lot shall have a smoothness measurement, expressed in inches per mile (in./mi.).

720.4.3.1-Special Cases for sampling lots less than one-tenth (0.1) lane mile: In some cases, sampling lots of one tenth (0.1) lane mile will not be attainable. These cases include areas at the end of the project as well as areas that are before the ‘lead in’ length of bridges. If these areas are less than five-hundredths (0.05) of a lane mile that will be eliminated from Smoothness analysis. If these areas are more than five-hundredths (0.05 mile) lane mile these areas will be included in analysis and pay adjustments will be prorated to the nearest one hundredth (.01) mile. This shall apply to all projects governed by Section 720.

720.4.4-Rounding: IRI numbers shall be rounded to the nearest whole number. Rounding of IRI shall be done in accordance with MP 109.01.01, “Rounding of Numbers”.

720.5-NATIONAL HIGHWAY SYSTEM (NHS) PAVEMENT PROJECT:

Pavement projects located on any NHS route and greater than 0.2 miles of continuous new pavement shall be tested with a high-speed or low speed inertial profiler certified in accordance with Section 720.2.

720.5.1 Determining National Highway System Routes: The “West Virginia NHS Routes by County” Section of the most recent Annual Roadway Inventory Statistics document should be used when determining if a route is on the National Highway System. This document can be found online at: http://www.transportation.wv.gov/highways/programplanning/hti/Highway_Data_Services/Pages/DataResources.aspx

720.5.2 Schedule 1 NHS Pavement Projects: NHS pavement projects with a pavement thickness of four (4) inches or greater shall be classified as Schedule 1 NHS Pavement Projects. The final price adjustments for Schedule 1 NHS Pavement Projects shall be determined using the calculations shown in Table 720.5.1.

<table>
<thead>
<tr>
<th>IRI for each 0.1-mile section (in/mi)</th>
<th>Price Adjustment ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0 or Less</td>
<td>+600</td>
</tr>
<tr>
<td>30.1 to 60.0</td>
<td>-20(IFI) + 1,200</td>
</tr>
<tr>
<td>60.1 to 65.0</td>
<td>0</td>
</tr>
<tr>
<td>65.1 to 95.0</td>
<td>-20(IFI) + 1,300</td>
</tr>
<tr>
<td>95.1 or Greater</td>
<td>Corrective Action Required</td>
</tr>
</tbody>
</table>

720.5.21 Corrective Action for Schedule 1 NHS Pavement Projects: Corrective action shall be required for Schedule 1 NHS Pavement Projects having an IRI greater than
95.1 in/mi. Corrective action shall be performed using diamond grinding, micro milling, or other work methods approved by the Engineer.

**720.5.32 Schedule 2 NHS Pavement Projects:** NHS pavement projects with a pavement thickness three (3) inches or greater and less than four (4) inches shall be classified as Schedule 2 NHS Pavement Projects. The final price adjustments for Schedule 2 NHS Pavement Projects shall be determined using the calculations shown in Table 720.5.2.

<table>
<thead>
<tr>
<th>IRI for each 0.1-mile section (in/mi)</th>
<th>Price Adjustment ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>46.0 or Less</td>
<td>+600</td>
</tr>
<tr>
<td>46.1 to 76.0</td>
<td>-20(IRI) + 1,520</td>
</tr>
<tr>
<td>76.1 to 80.0</td>
<td>0</td>
</tr>
<tr>
<td>80.1 to 120.0</td>
<td>1,200 - 15(IRI)</td>
</tr>
<tr>
<td>120.1 or Greater</td>
<td>-600</td>
</tr>
</tbody>
</table>

**720.5.43 Schedule 3 NHS Pavement Projects:** NHS pavement projects with a pavement thickness less than three (3) inches and more than one (1) inch shall be classified as Schedule 3 NHS Pavement Projects. The final price adjustments for Schedule 3 NHS Pavement Projects shall be determined using the calculations shown in Table 720.5.3.

<table>
<thead>
<tr>
<th>IRI for each 0.1-mile section (in/mi)</th>
<th>Price Adjustment ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>46.0 or Less</td>
<td>+300</td>
</tr>
<tr>
<td>46.1 to 76.0</td>
<td>-10(IRI) + 760</td>
</tr>
<tr>
<td>76.1 or Greater</td>
<td>0</td>
</tr>
</tbody>
</table>

**720.6 NON-NATIONAL HIGHWAY PAVEMENT PROJECTS:**

Pavement projects located on any Non-NHS routes shall be tested with equipment outlined in 720.2.1, 720.2.2 and 720.3 if the project meets all four of the following requirements:

1. Greater than 0.2 miles of continuous pavement,
2. Sixteen (16) feet or wider
3. Thickness of one inch (1) or more of new pavement (including scratch if used)
4. Minimum Average Daily Traffic (ADT) of one hundred (100)

**720.6.1 Ride Quality Analysis Before Project Completion:** Non-NHS pavement projects shall be tested before the pavement project begins the pavement project is completed.

**720.6.1.1 Data Source Collection Before Beginning Project:** The data collection before project begins may be collected from one of the following sources: (a) The Division’s highspeed or low speed inertial profiler, (b) The Contractor’s data if the data was collected with a certified inertial profiler and certified inertial profiler operator, (c) The Division’s data base.
**720.6.2-Data Source Collection After Project Completion:** The data source collection after project completion shall be collected by the Division’s high-speed or low speed inertial profiler. On non-NHS routes Quality Control Testing is optional for the contractor.

**720.6.3-Final Price Adjustments:** Final price adjustment incentives shall be calculated using percent improvement. 0.1-mile sections of after project completion data with an IRI of 170 in/mi or greater will be ineligible for final price adjustment. The final price adjustments for Non-NHS Pavement Projects shall be determined using the calculations shown in Table 720.6.5.

<table>
<thead>
<tr>
<th>Percent Improvement (%</th>
<th>Price Adjustment Incentive ($ per 0.1-mile Section)</th>
</tr>
</thead>
<tbody>
<tr>
<td>75.0 60.0 or Greater</td>
<td>+450</td>
</tr>
<tr>
<td>50.1 to 74.9 30.1 to 59.9</td>
<td>18.45(Percent Improvement) - 900 450</td>
</tr>
<tr>
<td>50.0 30.0 or Less</td>
<td>0</td>
</tr>
</tbody>
</table>

Where:

\[
\text{Percent Improvement (\%) = \frac{\text{Before IRI of Lot} - \text{After IRI of same Lot}}{\text{Before IRI of Lot}} \times 100}
\]

**720.7-PROJECT THAT DO NOT FALL UNDER PREVIOUS CHARACTERIZATIONS:**

At the discretion of the Engineer pavement projects not falling into any of the other classifications shall be measured and evaluated for ride quality analysis under the direction of the Engineer. If recommended by the Engineer this shall be done by the Contractor with a 10-foot straightedge. There will not be any pay adjustments based on Smoothness for these projects.

**720.7.1-New Pavement that is one (1) inch or less in thickness:** Pavement projects that are less than one (1) inch of new pavement will not be tested for Smoothness.
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SPECIAL PROVISION
FOR

STATE PROJECT NUMBER: __________________________
FEDERAL PROJECT NUMBER: __________________________

FOR

SECTION 619
WATERPROOFING

619.1-DISCRIPION:

ADD THE FOLLOWING SUBSECTION:

619.1.1-Geocomposite Drain: Membrane waterproofing shall consist of a contact adhesive and high-strength drainage composite made up of a nonwoven filter fabric that is bonded to the individual dimples of a molded polystyrene core to minimize fabric intrusion into the flow channels caused by backfill pressure. The work shall be done in accordance with the Specifications and as shown on the Plans.

619.2-MATERIALS:

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

619.2.1-Waterproofing Membrane:
619.2.1.1-General: Prefabricated drain shall be a flexible rectangular hollow mat consisting of a supporting polymeric drainage core encased on one face in an engineering fabric envelope and having sufficient flexibility to withstand installation bending and handling without damage.
**619.2.1.2-Core:** The drainage core shall meet the following requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Standard</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>ASTM D1777</td>
<td>0.40 (10.16) in (mm)</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>ASTM D1621</td>
<td>15,000 (719) psf (kPa)</td>
</tr>
<tr>
<td>Maximum Flow Rate 1</td>
<td>ASTM D4716</td>
<td>17 (213) gpm/ft (l/min/m)</td>
</tr>
<tr>
<td>Installed Vertically 2</td>
<td>ASTM D4716</td>
<td>12.5 (157) gpm/ft (l/min/m)</td>
</tr>
</tbody>
</table>

**619.2.1.3-Fabric:** The fabric shall be suitable for subsurface drainage applications and shall meet the following requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Standard</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparent Opening Size</td>
<td>ASTM D4751</td>
<td>40 (0.425) US Std Sieve (mm)</td>
</tr>
<tr>
<td>Water Flow Rate</td>
<td>ASTM D4491</td>
<td>200 (8,148) gpm/ft² (l/min/m²)</td>
</tr>
<tr>
<td>Grab Tensile Strength</td>
<td>ASTM D4632</td>
<td>80 (356) lbs (N)</td>
</tr>
<tr>
<td>Grab Elongation</td>
<td>ASTM D4632</td>
<td>60 %</td>
</tr>
</tbody>
</table>

**619.2.1.4-System:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Performance Index</th>
<th>18,250</th>
</tr>
</thead>
</table>

All flow rates were tested at 3600 psf.

Drainage Performance Index is a function of ASTM D4833, D4632 and D1621

1. In plane flow rate @ gradient of 1.0
2. Installed flow rate with soil overburden at vertical gradient of 1.0

**619.2.1.5-Acceptance:** All components of the edge drain shall be approved before use. The Contractor shall furnish certified test data with the material supplied for each project. Tests for all required properties shall be performed in accordance with the procedures specified. Compliance of this data with the requirements specified will be the basis of acceptance.

**619.3-PREPARATION OF SURFACE:**

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

No waterproofing shall be done in wet weather or when the temperature is below 35° F (2° C), without written authority of the Engineer.

**619.4-DAMPPROOFING:**

DELETE THE SUBSECTION.
619.5-MEMBRANE WATERPROOFING:

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

Adjacent panels should be joined together with the lateral edge of the connecting panel placed over the flanged edge of the previous panel. The fabric from the adjacent panels should overlap the preceding panel. The fabric can be adhered with Contact Adhesive. The top or terminal edge of the membrane should be sealed by wrapping the extra filter fabric around to the back side of the panel, and if there is insufficient fabric, the core shall be cut out from the fabric by a depth of 3 dimples to provide excess fabric for wrapping behind the core. This will prevent soil or other foreign construction materials from intruding into or behind the panels. A “set back” or “ledge” condition may be encountered on some construction applications. Where this condition exists, membrane panels should be installed beginning at the bottom of the wall and ending at the ledge. Subsequent courses of membrane should be installed flat against the upper wall portion and placed so that 4 – 6” (10-15 cm) extend down and over the lower edge. The overlapping membrane sections will be pushed flush against the wall during backfilling. Place collector pipe and outlet pipe as required in plans in accordance other items of work. For installations where a collector pipe is specified, encapsulate the collector pipe in a gravel bed with a supplemental section of filter fabric as a separator/filter.

619.6-DETAILS:

DELETE THE SUBSECTION

619.10-PAY ITEMS:

ADD THE FOLLOWING ITEMS TO THE TABLE:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>619002-001</td>
<td>Membrane Waterproofing Without Protection Course</td>
<td>Square Yard (Meter)</td>
</tr>
</tbody>
</table>
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: ______________________________

FEDERAL PROJECT NUMBER: ______________________________

SECTION 108

PROSECUTION AND PROGRESS

108.7-COMPLETION DATES:

108.7.2–Interim Completion Date:

ADD THE FOLLOWING TO THE SUBSECTION:

108.7.2.1–Paving Completion: The Contractor shall complete work on all Division 300 and Division 400 pay items in order to meet the interim completion date.
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SPECIAL PROVISION
FOR

STATE PROJECT NUMBER: ________________________________
FEDERAL PROJECT NUMBER: ________________________________

FOR

SECTION 201
CLEARING AND GRUBBING

201.1-DESCRIPTION:

ADD THE FOLLOWING SUBSECTION:

201.1.1-Canopy/Roadside Clearing on Existing Roadway: The purpose of this special provision is to provide a means of clearing tree limbs from the overhead canopy of the roadway and/or the removal of overgrown/dead tree and brush from the roadside.

201.5-SELECTIVE CLEARING AND THINNING:

ADD THE FOLLOWING SUBSECTIONS:

201.5.1-Canopy Tree Clearing: To improve the head clearances on the route, the branches or designated trees within the area, shall be removed to a minimum height of 20 feet (6 meters) above the entire roadway, unless otherwise specified on the Plans.

Complete clearing will be required, when specified in the Plans or by the Engineer, to remove shade hazards or improve appearance of the route.

201.5.2-Roadside Clearing: To restore safe sight distance and remove roadside hazards, this work includes, but not limited to, the following:
   i. Clearing all trees and brush from areas as noted in the Plans.
   ii. Clearing trees and brush encroaching on the existing shoulders and/or ditches of the roadway.
iii. All dead or diseased trees or shrubs shall be removed from the existing right of way. This includes uprooted stumps and all branches, tops, trunks, and dead wood resulting from woodcutting operations or from other causes.

iv. Undesirable trees leaning or falling over the highway right of way from outside shall be cut at the property line.

v. Clear all vegetation blocking footpaths, obscuring road signs, under street lights, and obscuring a view of the road ahead.

201.7-DISPOSAL:

ADD THE FOLLOWING:

Chips resulting from roadside tree/brush care may be broadcast on right-of-way, except for ditches, waterways, turf, and surfaced areas, and are not to exceed 6 inches in depth on the right of way.

201.8–METHOD OF MEASUREMENT:

ADD THE FOLLOWING:

The quantity of “Canopy Tree Clearing” and “Roadside Tree/Shrub Clearing” will be measured by the linear foot (meters), or portions thereof measured, along the centerline of the road and include works on both sides of the road.

Any additional work beyond the scope of the original Plans, authorized by the Engineer, will be measured in linear feet (meter) and paid at the unit bid price for the item.

201.9–BASIS OF PAYMENT:

ADD THE FOLLOWING:

“Canopy and Roadside Tree Clearing” shall include the complete execution of the work including all labor, materials, tools, equipment, disposal, and incidentals necessary to complete the work.

201.10-PAY ITEM:

ADD THE FOLLOWING ITEM TO THE TABLE:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>201002-001</td>
<td>Canopy Tree Clearing</td>
<td>Linear Foot (Meter)</td>
</tr>
<tr>
<td>201002-002</td>
<td>Roadside Tree/Shrub Clearing</td>
<td>Linear Foot (Meter)</td>
</tr>
</tbody>
</table>
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATIONS

FOR

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

401.10-PAVING OPERATIONS:

ADD THE FOLLOWING

401.10.6-Safety Edge: When required in the plans, When the total new thickness of pavement is 1.5 inches or greater, asphalt safety edge shall be constructed to the wedge shape meeting the requirements of the plan details on the outside pavement edge. The device utilized shall be a model listed on Division Approved Product Listing.

The resulting finished surface of the safety edge shall be sufficiently consolidated so as to show no segregation, or raveling of the aggregate and shall have the same surface profile and texture of the compacted mat surface.

Safety edge is not to be used through intersections, against a curb or barrier, or when directed by the Engineer. The paving operation shall allow for automatic and/or manual transitions at cross roads, driveways, and intersections. The Engineer may allow short sections of handwork for transitions at driveways, intersections, interchanges, and bridges.

The Contractor shall construct a test section prior to beginning of work to demonstrate wedge construction to the satisfaction of the Engineer.

401.12-METHOD OF MEASUREMENT:

ADD THE FOLLOWING TO THE END OF THE SECTION:

No additional compensation or measurement is necessary nor will addition compensation will be allowed for the placement of Safety Edge.
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION
FOR
SECTION 410
ASPHALT BASE AND WEARING COURSES,
PERCENT WITHIN LIMITS (PWL)

410.10-PAVING OPERATIONS:

ADD THE FOLLOWING

410.10.3-Safety Edge: When the total new thickness of pavement is 1.5 inches or greater, asphalt safety edge shall be constructed on the outside pavement edge. The device utilized shall be a model listed on Division Approved Product Listing.

The resulting finished surface of the safety edge shall be sufficiently consolidated so as to show no segregation, or raveling of the aggregate and shall have the same surface profile and texture of the compacted mat surface.

Safety edge is not to be used through intersections, against curb or barrier, or when directed by the Engineer. The paving operation shall allow for automatic and/or manual transitions at cross roads, driveways, and intersections. The Engineer may allow short sections of handwork for transitions at driveways, intersections, interchanges, and bridges.

401.12-METHOD OF MEASUREMENT:

ADD THE FOLLOWING TO THE END OF THE SECTION:

No additional measurement is necessary nor will addition compensation be allowed for the placement of Safety Edge.
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATIONS
FOR
SECTION 501
PORTLAND CEMENT CONCRETE PAVEMENT

501.9-PLACING CONCRETE:

ADD THE FOLLOWING

501.9.1-Safety Edge: Concrete safety edge shall be constructed on the outside pavement edge using a wedge shape meeting the requirements of the plan details. Safety edge is not to be used through intersections, against curb or barrier, or when directed by the Engineer. The paving operation shall allow for automatic and/or manual transitions at cross roads, driveways, and intersections. The Engineer may allow short sections of handwork for transitions at driveways, intersections, interchanges, and bridges.

501.22-METHOD OF MEASUREMENT:

ADD THE FOLLOWING TO THE END OF THE SECTION:

No additional measurement is necessary nor will addition compensation be allowed for the placement of Safety Edge.
For Information Only
Excerpt from "2010 Typical Section and Related Details"
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: __________________________
FEDERAL PROJECT NUMBER: __________________________

FOR

SECTION 715
MISCELLANEOUS MATERIALS

715.42-TRAFFIC SIGNAL, MATERIALS AND EQUIPMENT:

ADD THE FOLLOWING.

715.42.3-Spread-Spectrum Radio Equipment: This work shall consist of furnishing and installing spread-spectrum radio equipment in accordance with this special provision and as directed by the Engineer. Spread-spectrum radio equipment shall be used for bi-direction data communications between the designated master and local intersection controllers. The prescribed Closed Loop System must be able to integrate both spread-spectrum interconnect as well as twisted pair communication cable interconnect to conform to the Signal Spread-Spectrum Provisions relating to system software functions.

715.42.3.1-Materials:
A. Electrical Items shall conform to the requirements of Section 660.
B. Galvanizing shall conform to the requirements of Section 660 and Subsection 715.42.
C. Steel for fabrication items shall conform to the requirements of Section 660 and Subsection 715.42.

715.42.3.2-Equipment:
A. Transceivers: Transceivers shall interface with the designated master and local intersection controllers providing under this contract and shall conform to the following:
   1. FCC part 15.247
   2. Frequency range 902-928 MHz
   3. Frequency hopping type modulation
4. 250 milliwatt to 1000 milliwatt output power, adjustable
5. 7 channels minimum (50 frequencies minimum)
6. LED status indicators for transmission
7. Standard RS232C data interface with a DB25 connector on the transceiver
8. Data rate a minimum of 4800 bps
9. Antenna connector on transceiver shall be type “N”
10. Transceivers shall operate from 120 VAC or shall include a power supply for conversion of 120 VAC to the transceivers’s voltage
11. Maximum bit error rate of $1 \times 10^{-6}$ at -105 dBm
12. Transceivers shall be designed to prevent EMI and RFI interference
13. Transceivers shall be manufacturer’s proven model designed for spread-spectrum communications
14. Transmitter frequency stability shall be 0.00015% from -30C degrees to +60C.
15. Transceivers shall operate within a temperature range of -30C degrees to +60C degrees and 95% relative humidity at 40 degrees centigrade

B. Master/Repeater Antennas: Master/repeater antenna shall conform to Parts 15.247 and 15.249 of the FCC Telecommunications Manual for field strength of emissions, and be the manufacturer’s proven model and conform to the following:
   1. Fiberglass, omni-directional type
   2. 9dbd gain, omni-directional pattern
   3. Frequency Range 902-928 MHz
   4. Mountable for vertical polarization
   5. “N” type female connector
   6. Minimum wind rating of 150 MPH
   7. Direct DC grounding system
   8. Stainless steel mounting hardware

Transmitting antennas with directional gain greater than 6 dbi shall have the power reduced by the amount in db that the directional gain of the antenna exceeds 6 dbi.

C. Remote Antennas: Remote antennas shall be the manufacturer’s proven model and conform to the following requirements.
   1. Yagi type with a minimum of 7 elements, including driven element
   2. 9 dbd gain
   3. Frequency range 902-928 MHz
   4. Mountable for horizontal and vertical polarization
   5. “N” type female connector
   6. Stainless steal mounting hardware

D. Antenna Cables: Antenna cables having a length of 60 feet or less shall be 0.6” foam “hard line”. Feed line loss of the antenna cables shall be no more than 3 db.

E. Lightning Protection: Lightning protection: Lightning protection for connection within the coax cable run shall conform to the following:
   1. Frequency Range, D.C. GHZ
2. VSWR 1.5:1 Maximum
3. Power Capacity of 200 watts @ 900 MHz
4. Insertion loss of less than 0.3 db @ 900 MHz
5. D.C. Breakdown Voltages 350 VDC
6. Maximum Impulse Current at 8 x 10 microseconds, 5000 amps
7. Impulse Life at 10 x 1000 microseconds 500 amps, 500 occurrences minimum
8. Insulation resistance at 100 VDC, 100 mega ohms
9. Connectors “N” type female

F. Software: Software (two copies) shall be furnished on 3.5” diskettes for use with a standard IBM compatible 80386 CPU laptop computer. One copy shall be provided to the City and one copy to be provided to Traffic Engineering Division. Software shall be menu driven and furnished with operating instructions. The Contractor shall furnish a standard RS232C cable with DB25 connector for connection to the computer and transceivers. Operation of the software on existing T.E.D. laptop computers shall be demonstrated by Contractor at no expense to the T.E.D. Software shall control the following programming and diagnostic parameters:
1. Radio system address
2. Radio loop-back mode
3. Mode – master remote
4. Channel
5. Hop pattern
6. Data interface rate
7. Radio model number, serial number and date of manufacture
8. Owners name
9. Polling check
10. Sync check

715.42.3.3-Procedures:
A. Transceivers: The Contractor shall install spread-spectrum radio transceivers, connecting cables and other incidentals needed in existing traffic control cabinets where the proposed controllers will be installed.

Remote radio transceivers shall be installed in all cabinets. Tests shall be performed by the Contractor to determine the required master and repeater radio transceiver locations and signal strengths and the results shall be submitted to the Traffic Engineering Department for approval prior to the installation of the master and repeater radio transceivers. This project is designed for the number of repeaters as indicated in the bid item. If additional repeaters are required, the Contractor shall provide and install those additional units. Payment for those additional units will be on an each basis at the cost bid by the Contractor for Spread Spectrum radio transceivers and by the Traffic Engineering Division’s permission. Repeater transceivers shall be programmed to prevent interference with master and remote transceivers utilizing separate channels within each sub-system. Repeater locations shall include modem splitter as recommended by the radio manufacturer for the connection of remote transceiver to repeater transceiver and the local controller.
RS232C port. The Contractor shall utilize the existing duplex receptacle (120 VAC, 20A) in each cabinet as needed from AC power to the spread-spectrum transceivers. This receptacle shall be a duplex receptacle to be protected by the cabinet’s main power lightning arrestor.

B. Antennas: The Contractor shall install antennas, antenna masts, antenna cables and connectors at each master, repeater and remote radio transceiver location. The Contractor shall review all sites prior to installation and check clearance of all antennas to be installed with overhead power lines. Any location where the antenna will be closer than 3 feet to the primary power line neutrals, the Contractor shall advise the Engineer. At not time shall an antenna be installed that would cause any conflict with distance regulations by the local power company. Antenna masts shall be mounted on existing steel signal poles closet to the traffic signal controller cabinets. (See plan sheets for locations and height requirements). Masts shall be one inch diameter minimum galvanized or stainless steel conduit and shall be attached to the signal poles by brackets as specified by typicals within the plans and proposals. Brackets shall be designed such that the antenna mast is horizontally positioned away from the pole to prevent interference with the pole cap and any other attachments to the pole. Brackets and associated hardware shall be galvanized steel or stainless steel. Location and length (if not stipulated within the plans and proposals) of the masts shall be determined prior to installation and submitted to the Traffic Engineering Division for approval. Omni-directional antennas shall be installed at the master and repeated radio transceiver locations and directional antennas point directly towards each respective master/repeater location. The Contractor shall connect all antenna connects and seal all exposed antenna connections with an approved antenna connection waterproof sealant. Antenna cables shall be continuous from the antenna to the master, repeater and remote radio transceivers at each site with no connection other than the connection at the antenna and the lightning protection. Antenna lead-in cable shall be adapted from the “hard line” to a suitable size coax cable to the transceivers at each location and shall be “pulled” into the cabinet before any field wire. The length of the adapter cable shall not exceed a maximum of three (3) feet and shall be designed for minimal loss. Antenna cables shall be routed to prevent any kinks. Any cable damaged during installation shall be replaced prior to final acceptance of the project. Antenna cables shall be routed from the existing poles to the existing controller cabinets through existing conduits. When “hard line” cable lengths are longer than 60 feet, the Contractor shall advise the Engineer of such and provide the radio transceiver manufacturer’s recommendation for antenna cable for approval prior to installation. Antenna connector shall be installed in accordance with the manufacturer’s instructions for the particular type of connector used. The Contractor shall be responsible for any special tools required for mounting the connectors to assure maximum mechanical and electrical reliability. The Contractor shall be responsible for drilling any hole in the existing traffic signal pole for routing cables from the antenna into the pole. Holes in the mast arms pole shall be drilled approximately 2 inches from the top of the pole to the top of the hole on the side opposite the mast arm (unless given by plan typical). If slots for the antenna cable do not exist in the
train poles, holes shall be drilled the same as required for mast arms poles except the first hole shall be drilled on the side opposite the span wire. Holes shall be fitted with a protective neoprene grommet and shall be no larger than required to provide a snug fit for the antenna cable. The Contractor shall install silicone sealant between the grommet and the antenna cable to provide a weatherproof seal. A lightning protection device shall be installed within the coax cable runs in existing traffic signal controller cabinets at each master, remote and repeater radio transceiver location. Location of lightning protection shall be determined during installation by the Contractor and submitted to the Engineer for approval. Lightning protection shall not interfere with existing cabinet wiring or traffic control equipment. Lightning protection shall be electrically bonded by a #6 copper remote and repeater transceivers are located a ground road shall be utilized to provide grounding for that location. Ground rods shall not have a resistance to ground of more than 25 ohms. Ground wire shall be routed to the ground rod through the existing conduit used for grounding purposes. At locations where both remote and repeater radio transceivers will be installed in a cabinet, one ground rod may be installed in lieu of two. All connections shall be electrically and mechanically sound.

C. Equipment Testing: A VSWR test shall be conducted at each radio transceiver location with a fully configured antenna system. The VSWR shall not exceed 1.5:1 at 900 MHz. The Contractor shall verify all spread-spectrum radio transceiver tests and signal measurements by a FCC licensed communications or equivalent certified technician. Documentation of the technician’s license and measurements shall be submitted to the Engineer prior to final acceptance of the spread-spectrum radio equipment. During testing of the closed loop system as required in the Special Provision for Closed Loop Equipment, spread-spectrum radio equipment shall have no more than five (5) errors logged during a 72 hour time period and shall maintain communications with all intersections.

715.42.3.4-Measurement and Payment: Spread-Spectrum Radio Transceivers (Master and Locals), repeaters, to be bid as item 660060-02 per each. All other material and work required to install the spread-spectrum radio system to be bid as 660060-001 per Lump Sum. This will include the following: antennas, antenna mast, radio cable, lightning protections, modem splitters, detector cabinets, power installations, all tower work equipment, miscellaneous hardware and items, and testing.

715.42.3.5-Pay Items:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>660060-001</td>
<td>“Miscellaneous Radio Installation”</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>660060-002</td>
<td>“Spread Spectrum Radio Transceiver”</td>
<td>Each</td>
</tr>
</tbody>
</table>
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: __________________________

FEDERAL PROJECT NUMBER: __________________________

SECTION 105
CONTROL OF WORK

105.2 – PLANS AND WORKING DRAWINGS:

ADD THE FOLLOWING:

105.2.2 – Dates of Governing Specifications and Standard Details: These provisions are intended to provide guidance as to which edition of the West Virginia Department of Transportation, Division of Highways, Standard Specifications Roads and Bridges and Volumes I and II West Virginia Department of Transportation, Division of Highways, Standard Details Books are applicable to this Project.

105.2.2.1 – Standard Specifications and Supplemental Specifications Date: The West Virginia Department of Transportation, Division of Highways, Standard Specifications Roads and Bridges, adopted 2017, as amended by West Virginia Department of Transportation, Division of Highways 2018 Supplemental Specifications, shall apply for this project.

Specifications can be found on the following website: 
http://www.transportation.wv.gov/highways/contractadmin/specifications/Pages/default.aspx

105.2.2.1.1 – Item Number and Description: The item number and description shown in the Schedule of Items will govern over item number and/or description shown within the plans.

105.2.2.2 – Standard Details Dates: The West Virginia Department of Transportation, Division of Highways, Standard Details Volume I, dated May 2016 and Volume II, dated January 1, 1994 shall apply to this project.

Standard Detail drawings can be found on the following website:
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 102

BIDDING REQUIREMENTS AND CONDITIONS

102.16-PRE-CONSTRUCTION DATA:

DELETE THE CONTENTS AND REPLACE WITH THE FOLLOWING:

Prospective bidders may review files at the West Virginia Division of Highways, Capitol Complex, Charleston, West Virginia. These files may contain additional information not included in the contract documents including, but not limited to, old plans, old shop drawings, geotechnical information, environmental documents, permit applications, permits, asbestos reports, hazardous waste reports and other data. Copies may be obtained upon request and payment of printing fees. If applicable, this information will be provided as an Exhibit in the project for the posted letting. Additional information and/or files should be requested thru Bidx.
### 401.2 - MATERIALS:

DELETE THE TABLE AND REPLACE THE FOLLOWING.

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

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

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

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

**401.2.1 - Performance Graded Binder Grade:** The standard grade for Performance Graded (PG) binders shall be PG 64S-22, any deviation will be noted in the contract documents. PG 64H-22 shall be used on projects specified with over 20 million ESALs over the design life. PG 64S-22 binder may be used in asphalt placed below the top two lifts in any pavement section, scratch course and patching-and-leveling are not identified as lifts.
401.10-PAVING OPERATIONS:
401.10.3-Spreading and Finishing:

DELETE THE CONTENTS AND REPLACE THE FOLLOWING.

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

For mixes produced with neat (non-modified) asphalts (which may include PG 70-22 PG64H-22, PGS 64-22, PG 64-28 PG 58H-28, and PG 58S-28) the temperature of the mixture at the time of placement shall be within the temperature requirements of the JMF. The JMF temperature range shall be within the master temperature range of 250° and 338° F (121° and 170° C) unless otherwise specified by the asphalt supplier. The mix temperature shall be monitored by inserting a dial type thermometer into the mix through the hole in the truck bed.

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

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

Mixes produced with asphalts that contain modifiers for high or low temperature performance enhancement shall meet the temperature requirements recommended by the asphalt supplier, which will be referenced on the JMF.
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
SUPPLEMENTAL SPECIFICATION

FOR

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

410.2-MATERIALS:

DELETE THE TABLE AND REPLACE THE FOLLOWING.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>SUBSECTION</th>
<th>PG BINDER GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse Aggregate</td>
<td>703.1 thru 703.3 Note 1 &amp; Note 2</td>
<td>For the top two lifts PG 70-22 Note 2 shall be used on projects specified ≥20 million ESALs.</td>
</tr>
<tr>
<td></td>
<td>(See MP 401.02.28 for exceptions and additions required for Superpave Items.)</td>
<td></td>
</tr>
<tr>
<td>Fine Aggregate</td>
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<td>Any deviation from the above criteria will be specified in contract documents.</td>
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<tr>
<td>Performance Graded Binders</td>
<td>705.5</td>
<td>Standard grade shall be a PG 64-22.</td>
</tr>
</tbody>
</table>

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

Note 2 PG 64-22 Binder may be used in asphalt mixtures placed below the top two lifts.

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

401.2.1—Performance Graded Binder Grade: The standard grade for Performance Graded (PG) binders shall be PG 64S-22, any deviation will be noted in the contract documents. PG 64H-22 shall be used on projects specified with over 20 million ESALs over the design life. PG 64S-22 binder may be used in asphalt placed below the top two lifts in any pavement section, scratch course and patching-and-leveling are not identified as lifts.
410.10-PAVING OPERATIONS:

410.10.1-Spreading and Finishing: Before spreading any material, the contact surfaces of curbs, gutters, manholes, and of adjacent Portland cement concrete pavement edges shall be painted or sealed with asphalt material. Exact edge of pavement, except on concrete, shall be established by a string or chalk line for a distance of not less than 500 feet ahead of the spreading operation. For projects where the existing pavement was milled prior to the placement of new asphalt, the edge of pavement shall be the edge of milled section.

For mixes produced with neat (non-modified) asphalts (which may include PG 70-22, PG 64-22, PG 64-28, and PG 58-28) the temperature of the mixture at the time of placement shall be within the temperature requirements of the JMF. The JMF temperature range shall be the liquid asphalt supplier’s specified mixing temperature ±45°F (±25°C) with a maximum mixing temperature of 338°F (170°C). Additional allowances will be made for water injection processes with a minimum mixing temperature of 220°F (105°C).

The mix temperature shall be monitored by inserting a thermometer into the mix through the hole in the truck bed.

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

When the surface temperature falls to within 10°F (6°C) of the weather restrictions of Table 410.8, the mix temperature may be increased up to a maximum of 338°F (170°C) unless otherwise specified by the asphalt supplier. The temperature of each truckload of material shall be monitored for compliance. Any truckload of material which exceeds this maximum temperature may be rejected by the Engineer.

Mixes produced with asphalts that contain modifiers for high or low temperature performance enhancement shall meet the temperature requirements recommended by the asphalt supplier, as determined using the mid-point of the mixing temperature range shown on the asphalt temperature-viscosity charts and allowing for ±25°F (14°C).
709.4-WELDED WIRE REINFORCEMENT FOR CONCRETE:

DELETE THE CONTENTS AND REPLACE WITH THE FOLLOWING:

Welded and non-welded wire fabric for concrete reinforcement shall conform to the requirements of ASTM A1064, as referenced in MP 709.04.40, AASHTO M 55, except as modified.

Fabric reinforcement for pavement shall be not less than 5 feet (1.5 meters) in width and shall be shipped in sheets and not in rolls. Fabric for the slope protection, gutters and miscellaneous items may be shipped in rolls. Sheets shall be bent in the shop as shown on the Plans. Epoxy coated for concrete welded wire fabric for concrete reinforcement shall meet the requirements of ASTM A 884/A 884M.