

# 20230201 - February's Specifications Committee Meeting

## February Specifications Committee Meeting Agenda

### Meeting Date

**Wednesday, February 1, 2022 @ 9:00am**

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

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

### Approved Permanent Specification changes from last Committee meeting (12/7/22)

- **Section 708-Subsections 708.4-Joint and Crack Sealant, Hot Poured for Concrete and Asphalt Pavements and 708.4.1.2-Test Requirements:** Update adds NTPEP testing requirements.

### Approved Project Specific Special Provisions (SP) from last Committee meeting (12/7/22)

- **SP for Disadvantaged Business Enterprise (DBE) Utilization**

### Items removed from Committee Agenda

- **None**

### Old Business-Provisions discussed at last Committee meeting

| SECTION | TITLE  | DESCRIPTION   |
|---------|--|---|
| 628     | SP628-Ground Anchors<br><br>Champion: A. Mongi | <b>Update of previously approved SP; 2nd time to Committee.</b><br>Update revises terminology to ground anchors so that the provision could be used for both rock and soil anchors (where very deep bedrock is encountered).<br><br>No update to the SP; it is redline copy showing the revisions to current one.<br><br><i>Approval is expected in February.</i> |
| 219     | 219.4.2-Testing<br><br>D. Brayack              | <b>2nd time to Committee; discussed at December.</b><br>Specification changes to Section 219-CLSM. Update clarifies daily set of cylinders requirement.<br><br>No update to the specification; it is redline copy showing the revisions.<br><br><i>Approval is expected in February.</i>  |

|     |  |   |
|-----|--|---|
| 501 | 501. 2-Materials, 501.3-<br>Proportioning, 501.8-Mixing<br>Concrete, 501.9-Placing<br>Concrete, 51.12.5-Floating, &<br>501.12.7-Final Finish   | <p><b>2nd time to Committee; discussed at December.</b></p> <p>Given the wide use of fibers in Portland cement concrete with several DOT's and several fiber companies showing interest in entering our approved list we have decided to pursue the inclusion of fibers into our standard specification. This fiber specification was constructed through dialogue with other DOT's, industry, academia, and peer reviewed at MCS&amp;T. We believe that adding fibers into our Specification will help to achieve better performance of concrete as desired.</p> <p>Four specification changes</p> <ol style="list-style-type: none"> <li>1. Section 501-Portland Cement Concrete Pavements. Subsections 501.2, 501.3, 501.8, 501.9, 51.12.5, &amp; 501.12.7</li> <li>2. Section 601-Structural Concrete. Subsections 601.2, 601.3, 601.7, 601.10.2, 601.10.6, &amp; 601.11.5</li> <li>3. Section 679-Overlaying Portland Cement Concrete Bridge Decks. Subsections 679.2.1.6, 679.2.2, 679.2.3.3, 679.2.3.4, 679.2.3.6, &amp; 679.3.7.4.1</li> <li>4. Subsection 715.3-Fibers for Portland Cement Concrete</li> </ol> <p>The specification have been updated and are redline copy showing the revisions with latest revisions in blue font.</p> |
| 601 | 601.2-Materials, 601.3-<br>Proportioning, 601.7-Mixing,<br>601.10.2-Chutes and Troughs,<br>601.10.6-Placing Concrete<br>Containing Fibers, & 601.11.5-<br>Texturing & Grooving Bridge<br>Decks Containing Fibers for<br>Portland Cement Concrete   |   |
| 679 | 679.2.1.6-Fibers, 679.2.2-<br>Specialized Concrete Mix<br>Design and Testing, 679.2.3.3-<br>Proportioning and Mixing<br>Equipment, 679.2.3.4-Mobile<br>Mixer Units, 679.2.3.6-Placing<br>and Finishing Equipment, &<br>679.3.7.4.1-Surface Texturing<br>Concrete Containing Fibers for<br>Portland Cement Concrete |   |
| 715 | 715.3-Fibers for Portland<br>Cement Concrete   |   |
|     | A. Gillispie   |   |

### New Business - New Provisions for Spec Committee

| SECTION        | TITLE  | DESCRIPTION  |
|----------------|--|--|
| 109            | 109.20-Weight Tickets<br><br>S. Smith                  | <p><b>1st time to Committee.</b></p> <p>Specification changes to Section 109-Measurement and Payment. Update clarifies daily set of cylinders requirement.</p> <p>The specification is redline copy showing the revisions.</p>   |
| 201<br><br>202 | 201.7-Disposal<br><br>202.4-Buildings<br><br>J. Adkins | <p><b>1st time to Committee.</b></p> <p>Specification changes to Section 201-Clearing and Grubbing and Section 202-Buidling Demolition, Well and Septic Tank Abandonment updating terminology from 'roadway prism' to 'construction limits'.</p> <p>Two specification changes:</p> <ul style="list-style-type: none"> <li>• 201.7-Disposal</li> <li>• 202.4-Buildings</li> </ul> |

|            |   |  |
|------------|---|--|
|            |   | The specifications are redline copy showing the revisions.   |
| <b>410</b> | <b>410.13.6-Bond Strength</b><br><br>C. Farley  | <b>1st time to Committee.</b><br>Specification changes to Section 410-Asphalt Base and Wearing Courses Percent With Limits (PWL). Update clarifies values used in calculation.<br><br>The specification is redline copy showing the revisions.   |
| <b>615</b> | <b>615.3.3-Welded Stud Shear Connectors</b><br><br>D. Lipscomb  | <b>1st time to Committee.</b><br>Specification changes to Section 615-Steel Structures. Update adds MP reference.<br><br>The specification is redline copy showing the revisions.  |
| <b>712</b> | <b>712.4-Galvanized Steel Deep Beam Guardrail, Fasteners and Anchor Bolts</b><br><br><b>712.5-Zinc-Aluminum-Magnesium Alloy Coating Guardrail, Fasteners and Anchor Bolts</b><br><br>G. Hanna | <b>1st time to Committee.</b><br>Specification changes to Section 712-Guardrail and Fence. Update adds NTPEP testing requirements.<br><br>Two specification changes: <ul style="list-style-type: none"> <li>• 712.4-Galvanized Steel Deep Beam Guardrail, Fasteners and Anchor Bolts</li> <li>• 712.5-Zinc-Aluminum-Magnesium Alloy Coating Guardrail, Fasteners and Anchor Bolts</li> </ul><br>The specifications are redline copy showing the revisions. |

## Comments

Comments are requested on these Specifications Changes and Project Specific Special Provisions. Please share your comments by **January 27, 2023**, 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 provision is **March 6, 2023**.

If you are the 'champion' of any specification changes and/or project specific special provisions currently in the Specification Committee, it is your responsibility to edit/update/modify them in a timely manner per comments and discussion in Spec Committee. *Failure to submit updates may result in removal of item and/or delays.*

## Next Meeting

Wednesday, **April 5, 2023 at 9:00 a.m.**

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

## Specification Webpage Updated

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

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

## 2023 Standard Specification Roads and Bridges

Electronic copy (pdf): The 2023 Standard Specifications Roads & Bridges is now posted on the Specifications Website.

Print Version: We hope to have hard copy of 2023 Standard Specifications Roads and Bridge; however, at this time we do not yet have a contract for publishing it. We are anticipating to have it April 2023.

## 2023 Specifications Committee

The Specification Committee typically meet every other month; on the first Wednesday. 2023 meetings will be held in February (2/1), April (4/5), June (6/7), August (8/2), October (10/4), and December (12/6).

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

## Specifications Committee Website

A copy of the meeting agenda can be found on the Specifications Committee Website. See Specification Webpage for details.

## Materials Procedures

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

For questions regarding the Standard Specifications Road and Bridges, Supplemental Specifications, Project Specific Provisions, or the Specifications Committee please email [DOHSpecifications@wv.gov](mailto: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 Specifications & Project Specific Provisions as they progress thru Specifications Committee. This procedure would facilitate a means of tracking changes from meeting to meeting; as the agenda & provisions are posted publicly online on the Spec Committee website.

### TYPES OF PROVISIONS:

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

1. Specification Changes – These are permanent changes to the WVDOT Standard Specifications.
  - o Unless inserted into a project proposal, these changes typically go into effect in January (of subsequent year) with the Supplemental Specifications
2. Project Specific Special Provisions (SP) – Are applied to specifically designated projects.
3. Updates to previously approved SP – Changes/edits/updated to SP that have been approved by spec committee.

### NEW BUSINESS ITEMS:

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

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

Each item should also include a description with:

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

NOTE: Red-line copy is a form of editing which indicates removal or addition of text. You can redline a Microsoft Word document by using the built-in "Track Changes" feature or you can manually reline document with font color changes & strike-through.

**OLD BUSINESS ITEMS:**

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

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

**PROGRESSION OF ITEMS THRU COMMITTEE AND APPROVAL:**

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

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

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

STATE PROJECT NUMBER: \_\_\_\_\_

FEDERAL PROJECT NUMBER: \_\_\_\_\_

SECTION 628

~~ROCKGROUND~~-ANCHORS

**628.1-GENERAL:**

**628.1.1-Description:** This work shall consist of furnishing and installing ~~rock ground~~ anchors in accordance with this special provision, AASHTO LRFD Bridge Construction Specifications (4<sup>th</sup> Edition, 2017), and in reasonably close conformity with the dimensions, locations and details shown on the Plans or established by the Engineer.

**628.1.2-Prequalification of Contractor:** A contractor experienced in permanent ~~rock ground~~ anchor installation shall perform the ~~rock ground~~ anchor work. The anchor contractor's qualifications must be submitted to the Engineer fourteen (14) calendar days before ~~rock ground~~ anchor work begins. The following is a list of the requirements:

1. The contractor must be experienced in the design and construction of permanently anchored walls.
2. The contractor's staff shall include at least one registered Professional Engineer in the state of West Virginia with at least five years of supervisory experience in the design and construction of permanently anchored walls.
3. The foreman shall have a minimum of five years' experience in constructing permanently anchored walls.
4. The contractor shall have constructed (or have under construction) a minimum of five projects (in the last five years) that are similar in concept and scope to the proposed wall.

**628.1.3-CONTRACTOR'S DESIGNS:**

The Contractor shall prepare a complete design for the anchors they propose to use. This design shall conform to the criteria on the Plans, Specifications, and other documents referenced therein. The design shall be based on the Contractor's experience on similar work and on accepted practice described in AASHTO LRFD Bridge Construction Specifications "Section 6: Ground Anchors". The design shall also include the corrosion protection scheme for the tendon as well as the anchor head.

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The Contractor is cautioned that the soil and rock information shown on the Plans is based on a limited number of borings. The actual conditions and elevations may differ from those shown.

Any design different from that shown on the Plans shall be prepared and sealed by a duly licensed Professional Engineer in the state of West Virginia. The design and working drawings shall be reviewed by the Engineer to confirm that the design meets the design requirements.

The Contractor may use a nominal (ultimate) grout-rock bond stress higher than 118 psi, provided that a field pullout test is performed by the Contractor to confirm the higher bond stress. The anchor to be pullout tested shall have a minimum bond length of 10 feet. The pullout test shall be done at no cost to the Division. The requirement for the pullout test can be waived if the contractor shows a proof test result of anchors bonded in sandstone and installed in the vicinity of the project site. If the Contractor chooses to use a higher bond stress, the Contractor will be responsible for failed performance tests and/or proof test as a result of using a higher bond stress. The cost of installing and re-testing additional anchors will be the responsibility of the Contractor.

For alternate designs it shall be assumed that all structural parts shown on the Plans, such as wales, piles and connections, are fully stressed. Any additional stresses imposed on such structural parts and on the anchors themselves, due to design changes such as a steeper slope of the anchors, will require strengthening of various parts. Such strengthening shall be done at no cost to the Division, nor will the contract amount be reduced because of any shortening of anchors due to design changes.

**628.2-MATERIALS:**

Materials shall conform to the requirements specified in the following Subsections:

| <b>MATERIAL</b>    | <b>SUBSECTION</b> |
|--------------------|-------------------|
| Portland Cement    | 701.1             |
| Fine Aggregate     | 702.1             |
| Prestressing Steel | 709.2             |
| Structural Steel   | 709.12            |

Minimum grout strength at stressing shall be 3,500 psi. Expansion additives in grout will not be allowed. Grout shall not be re-tempered or used after it has begun to set. Proportioning mix design requirements (including requirements for submission to the Division), quality control, and testing of grout (including number, size and shape of samples) shall conform to the applicable provisions of Subsections 601.3 and 601.4.

All other materials, including sheaths, grease, tubes, centralizers and spacers, shall be of good quality, acceptable to the Engineer. The contractor shall submit Manufacturer's certificates and catalogs, tests reports or other such documents, as required by the Engineer.

**628.3-PREPARATION OF ANCHOR:**

The anchor tendons shall consist of seven-wire low relaxation strands. The tendons shall be fabricated in accordance with approved details and shall be free of dirt, or other deleterious substances. Light rust or rust stains that can be wiped off with a rag may be allowed. Prior to installation, they shall be handled and stored in such a manner as to avoid corrosion and physical damage. Damage such as abrasions, cuts, nicks, welds, weld splatters, or heavy corrosion and pitting will be cause for rejection. Rejected tendons shall be replaced at no cost to the Division in

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terms of either material replacement or resulting time delay. Care shall be taken during handling and installation to prevent any sharp bends of the tendon.

Couplers and similar hardware should be avoided, but if their use is necessary, the grout cover shown in plans over the tendons shall be provided over hardware, too.

The bond length shall be degreased prior to installation.

A smooth, shop extruded, tight fitting polypropylene (or polyethylene) sheath will encapsulate the entire stressing length of each tendon. The sheath shall have a minimum wall thickness of 0.04 inches. The sheath should be heat shrunk onto the strand.

A grease film compounded to provide corrosion inhibiting and lubricating properties shall fill the space between the sheath and the stressing length of the tendons. The coefficient of friction between the steel tendon and the polypropylene shall not exceed 0.05. The contractor shall provide certified test data confirming that this coefficient of friction does not exceed 0.05. The allowable content of deleterious substances in the grease shall not exceed the following:

| COMPOUND  | TEST METHOD              | MAXIMUM QUANTITY |
|-----------|--------------------------|------------------|
| Chlorides | ASTM D 512               | 2 ppm            |
| Nitrates  | ASTM D 992               | 2 ppm            |
| Sulfides  | APHA "Sulfides in Water" | 2 ppm            |

Test samples are to be prepared in accordance to the following procedure:

1. Coat the inside (bottom and sides) of a liter glass beaker (dimensions approximately O.D. - 110 mm. Height - 144 mm) with 100 ± 10 grams of grease.
2. Fill beaker with a measured amount of distilled water, approximately 1000 cc.
3. Heat beaker at a controlled temperature of 100° F (± 3° F). Maintain for 4 hours. Do not heat on a hot plate. Heat either in an oven or with an immersion heater so that the water will remain clear for tests.
4. Run a blank on distilled water.
5. Decant water and analyze for soluble ions. Test only for salts in leached water used in the test.

For corrosion protection, the entire length of the anchor shall be encased in a polypropylene (or polyethylene) tube grouted both inside and outside at the same time. The tube within the bond length shall be corrugated.

If the bond length is grouted and the anchor stressed before grouting the stressing length, the Contractor must provide a mean to ensure that the grout covers the entire bond length plus two feet of the stressing length.

Provide spacers to center the strands inside the polypropylene tube and centralizers to center the polypropylene tube in the hole, both in the stressing and in the bond portion. These centralizers shall be provided at a maximum of five-foot intervals throughout the bond length of the anchor in the stressing length, so that no less than 0.5 inches of grout cover is achieved surrounding the anchor.

Place spacers at five foot and ten foot intervals throughout the tendon length to ensure grout cover on all elements. Centralizers and spacers may be made of any material, except wood, not deleterious to the prestressing steel or plastic sheath. Spacers and centralizers must be approved by the Engineer prior to use.



The entire polypropylene (or polyethylene) tube, together with any trumpet used under the anchor head, including all joints, shall be water and mortar tight. Provide seals, gaskets and the like as required.

The tendons, the anchor head, and any other metallic parts of the anchor, shall be electrically insulated from piles and wales, to the Engineer's satisfaction.

#### **628.4-INSTALLATION:**

**628.4.1-General:** Anchor centerlines shall not deviate from their planned location by more than 3 degrees, nor shall they approach each other closer than 4 feet at their lower ends.

A resistance factored unit bond stress and a set of estimated required bonded lengths and corresponding grouted diameters are specified on the plan. Should the Contractor decide to use a different factored unit bond stress, he shall be responsible for determining the bond length necessary to develop adequate load capacity to satisfy anchor testing acceptance criteria for the design load. Any ~~rock~~ ground anchor that does not meet the test acceptance criteria shall be replaced at no additional cost to the Division.

The diameter of the drilled hole shall be adequate for grouting inside and outside the polypropylene tube. The hole shall be free of fall-in soil or other debris immediately prior to grouting.

**628.4.2-Hole in the Stressing Length:** Casing of portions of many or all holes may be needed to maintain an open clean hole. There will be no additional compensation for such casings; their cost shall be included in the bid prices.

**628.4.3-Hole in the Bond Length:** Drilling Logs shall be prepared in a manner approved by the Engineer, and submitted daily. They shall contain the following information:

1. Characteristics of all materials encountered during the drilling process, and their specific location(s) within the holes
2. Length of each run with percentage of core recovery
3. The location of special features such as mud seams, open cracks, broken rock, etc.
4. Points where abnormal loss or gain to drill water has occurred
5. Groundwater levels or other items of interest for grouting
6. All significant actions of the bit
7. If any weak material, such as coal, clay, weathered rock or the like is encountered within the required bond length, the hole shall be extended to compensate for the weak material.
8. If large voids are encountered, consolidation grouting and re-drilling of the hole will be required. The grout shall be injected at the lowest point of the drill hole and shall proceed such that the hole is filled progressively from the bottom to the top, in order to prevent air voids.

Consolidation grout should have a water/cement ratio of between 0.45 and 0.55. Variations from these ratios shall require an approval from the Engineer prior to the placement. Special measures (such as stiff grout mixes) may be required to prevent or reduce grout loss. A consolidation-grouted hole shall not be re-drilled until the grout has had a minimum of 24 hours to set up.

**628.4.4-Grouting:** During grouting, the end of the grout pipe shall be covered by at least 2 feet of wet grout. Grouting shall proceed from the bottom up, to prevent air voids. The grout in the stressing length must not interfere with the stressing operation; tendons in the stressing length must not develop any bond to the surrounding grout. To achieve this, the grout inside the polypropylene tube shall preferably be placed after stressing.

The grout shall be placed over the entire bond length without interruption. The anchor shall then remain undisturbed until the grout has reached strength of 3500 psi. The following data shall be recorded and submitted to the Engineer, about the grouting operation, on a daily basis:

1. Type of Mixer
2. Type of Cement and Water/Cement Ratio
3. Type of Additives (if approved)
4. Grout Pressure
5. Test Sample Strengths (prior to stressing)
6. Volume of Grout placed in the Bond and in the Stressing Lengths

**628.4.5-Corrosion Protection of Anchorage:** Following acceptance of the anchor by the Engineer, the portion of each tendon extending past the lock-off plate shall be cut off with Carborundum blades in a manner that will not develop excessive heat. The tendon anchorage shall not be damaged by the cutting operation. All stressing anchorages shall be encased in concrete at least 4 inches or as shown on the plan.

The trumpet shall be sealed by bearing plate and shall overlap the unbonded length corrosion protection by at least 6 inches. The trumpet shall be long enough to accommodate movement of the structure and the tendon during testing and stressing. The trumpet shall also be long enough to enable the tendon to make a transition from the diameter of the tendon along the unbonded length to the diameter of the tendon at the wedge plate without damaging the encapsulation.

The trumpet shall be completely filled with grout, which must be placed after the ground anchor has been tested and stressed to the lock-off load. The trumpet shall either have a temporary seal between the trumpet and the unbonded length corrosion protection or shall fit tightly over the unbonded length corrosion protection for a minimum of 6 inches.

#### **628.5-ANCHOR TESTS:**

In the following sections, AL denotes alignment load (0.10P) and P denotes the anchor design load.

**628.5.1-Performance Test:** A performance test shall be carried out on the first anchor stressed for each tieback group shown on the plans and on one additional anchor selected by the Engineer. During the performance test, the contractor shall incrementally load and unload the anchor in accordance with the following schedule. The movement of the tendon shall be recorded to the nearest 0.001 inches at each increment, with respect to an independent (fixed) reference point. The load applied by the jack shall be monitored with a pressure gauge and preferably a load cell.

Each load shall be held for a minimum of one minute with the maximum loading being held for 60 minutes.

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All leaks in the jacking system shall be repaired as discovered and the test restarted at the initial reading.

| Cycle 1         | Cycle 2         | Cycle 3         | Cycle 4         | Cycle 5         | Cycle 6                                |
|-----------------|-----------------|-----------------|-----------------|-----------------|--|
| AL              | AL              | AL              | AL              | AL              | AL                                     |
| 0.25 <u>PDL</u> | 0.25 <u>PDL</u> | 0.25 <u>PDL</u> | 0.25 <u>PDL</u> | 0.25 <u>PDL</u> | 0.25 <u>PDL</u>                        |
|                 | 0.50 <u>PDL</u> | 0.50 <u>PDL</u> | 0.50 <u>PDL</u> | 0.50 <u>PDL</u> | 0.50 <u>PDL</u>                        |
|                 | 0.25 <u>PDL</u> | 0.75 <u>PDL</u> | 0.75 <u>PDL</u> | 0.75 <u>PDL</u> | 0.75 <u>PDL</u>                        |
|                 |                 | 0.50 <u>PDL</u> | 1.00 <u>PDL</u> | 1.00 <u>PDL</u> | 1.00 <u>PDL</u>                        |
|                 |                 | 0.25 <u>PDL</u> | 0.75 <u>PDL</u> | 1.20 <u>PDL</u> | 1.20 <u>PDL</u>                        |
|                 |                 |                 | 0.50 <u>PDL</u> | 1.00 <u>PDL</u> | 1.33 <u>PDL</u> (Max)                  |
|                 |                 |                 | 0.25 <u>PDL</u> | 0.75 <u>PDL</u> | - Hold for creep test                  |
|                 |                 |                 |                 | 0.50 <u>PDL</u> | - Reduce for lock-off load, <u>PDL</u> |
|                 |                 |                 |                 | 0.25 <u>PDL</u> |  |

Where:

AL = Alignment load

DL = Design load for ground anchor

All anchors undergoing performance tests shall hold the maximum load, i.e. 1.33P, for 10 minutes (or 60 minutes). The jack shall be repumped as necessary in order to maintain a constant load. During this period, the anchor movement with respect to a fixed reference point shall be recorded at 0 seconds, 30 seconds, 1 minute, 2, 3, 4, 5, 6, and 10 minutes (and 15, 20, 25, 30, 45, and 60 minutes). The dial gauge used for monitoring movement shall be capable of reading the entire movement without resetting. Upon passing the acceptance criteria in 628.5.4, the anchor shall be adjusted to lock-off load, P.

**628.5.2-Lift-Off Test:** A lift-off test shall be part of the performance test. After transferring the load to the end anchorage, a lift-off reading shall be made. The load determined from the lift-off reading shall be within 5 percent of the desired transfer or lock-off load otherwise the end anchorage shall be reset to the design load and another lift-off reading shall be made.

Lift-off tests can be made a minimum of 24 hours, and a maximum of 7 days, after the design load has been locked-off in the anchor. The results of the test shall be submitted to the Engineer on the day of the test. All tendons which are to be lift tested must have an adequate length of tendon left protruding over the anchorage to permit jacking. The jack utilized for lift-off testing shall be calibrated within two weeks of testing and at intervals of approximately 3 months throughout testing. The contractor shall furnish the calibration chart and submit it to the Engineer.

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**628.5.3-Proof Test:** All anchors not performance tested shall be proof tested by incrementally loading the anchor in accordance with the following schedule. Load and movement shall be monitored as stated in 628.5.1.

|   |
|---|
| <b>Load</b>                                       |
| AL  |
| 0.25- <del>P</del> <u>DL</u>                      |
| 0.50- <del>P</del> <u>DL</u>                      |
| 0.75- <del>P</del> <u>DL</u>                      |
| 1.00- <del>P</del> <u>DL</u>                      |
| 1.20- <del>P</del> <u>DL</u>                      |
| 1.33- <del>P</del> <u>DL</u> (Max)                |
| - Hold for creep test                             |
| - Reduce to lock-off load, <del>P</del> <u>DL</u> |

Where:

AL = Alignment load

DL = Design load for ground anchor

The proof test results shall be compared to the performance test results. Any significant variation from the performance test results may require a performance test on the next anchor. Lift-off tests for proof tested anchors may be required as designated by the Engineer. The Contractor shall do all additional tests due to inadequate results of a proof test at no cost to the Division.

Upon passing the acceptance criteria in 628.5.4, the anchor shall be adjusted to lock-off load, P.

**628.5.4-Acceptance Criteria:** A performance-tested or proof-tested ~~rock~~ ground anchor with a 10-minute load hold shall be accepted if (1) the ~~rock~~ ground anchor resists the maximum test load with less than 0.04” of movement between 1 minute and 10 minutes; and (2) the total elastic movement at maximum test load exceeds 80% of the theoretical elastic elongation of the unbonded length; or (3) the total elastic movement at the maximum test load does not exceed the theoretical elastic elongation of the unbonded length plus 50% of the theoretical elongation of the bonded length.

A performance-tested or proof-tested ~~rock~~ ground anchor with a 60-minute load hold shall be accepted if (1) the ~~rock~~ ground anchor resists the maximum test load with a creep rate that does not exceed 0.08” in the last log cycle of time; and (2) the total elastic movement at maximum test load exceeds 80% of the theoretical elastic elongation of the unbonded length.

The initial lift-off reading shall be within +5% of the design lock-off load. If this criterion is not met, the tendon load shall be adjusted accordingly and the initial lift-off reading repeated.

If any anchor fails to meet the acceptance criteria, the Contractor shall determine, if possible, the reason for failure. An additional anchor shall be installed in accordance with this specification at a location approved by the Engineer and tested to verify that the capacity of the new anchor meets the 1.33 P load. The Division will make no payment for failed anchor.

An additional anchor in this area shall be performance tested when a failure occurs, at no cost to the Division.

Records shall be kept of the load and elongation for each increment of loading for each tieback and shall be furnished to the Engineer following the completion of each test.

#### **628.6-METHOD OF MEASUREMENT:**

**628.6.1-~~Rock~~Ground Anchors, Installed, per each:** The work performed for ~~rock~~ ground anchor installation shall be included in this item. The quantity of work performed to install the ~~rock~~ ground anchors as described above and to the depth shown on the plans will be paid for at the contract unit price bid for this item below. This price and payment shall include furnishing all material required for installation of the anchor, grouting of the anchor as specified or required, proof testing of all anchors, covering of anchor heads, and replacing failed anchors.

**628.6.2-~~Rock~~Ground Anchor Performance Test, per each:** This item covers the cost of a performance test, over and above that of the proof test. (Cost of proof test is included in the item, "~~Rock~~Ground Anchors, Installed").

**628.6.3-Additional Anchor Length, per foot:** This item will be applicable if the actual elevation of sound soil/rock is, on the average, lower than that indicated on the Plans, and if weak materials are encountered in the sound soil/rock, as described under 628.4.3 above. The measurement will be based on the anchor slope shown on the Plans.

This item shall be exercised after the installation of soldier piles but prior to the fabrication of tiebacks. The anchor stressing lengths shall be reevaluated and adjusted if needed by the Engineer based on top of sound soil/rock information obtained during soldier pile installation. The reevaluated anchor stressing lengths will be compared to the Contractor's bid quantity to determine the quantity for this bid item.

**628.6.4-Drilled Hole, 4" Diameter, per linear foot:** This item will occur if large voids are encountered in the sound soil/rock as described under 628.4.3 above. The hole diameter of 4" coincides with item, "Additional Anchor Length", and the anchor specifications used under item "~~Rock~~Ground Anchors, Installed". The required length of re-drilling will be measured, based on the anchor slope shown on the Plans.

**628.6.5-Pressure Injected Grout, per cubic foot:** This item will be applicable if large voids are encountered in the sound soil/rock as described under 628.4.3 above. Measurement will be based on the actual cubic foot amount of cement used in the grout that is injected in the void.

#### **628.7-BASIS OF PAYMENT:**

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

#### **628.8-PAY ITEMS:**

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| ITEM       | DESCRIPTION                                    | UNIT        |
|------------|--|-------------|
| 628007-001 | <del>Rock</del> Ground Anchors, Installed      | Each        |
| 628007-002 | <del>Rock</del> Ground Anchor Performance Test | Each        |
| 628007-003 | Additional Anchor Length                       | Linear Foot |
| 628001-001 | Drilled Hole, 4" Diameter                      | Linear Foot |
| 628002-001 | Pressure Injected Grout                        | Cubic Foot  |

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 219**

**CONTROLLED LOW-STRENGTH MATERIAL**

**219.4-CONSTRUCTION METHODS:**

**219.4.2-Testing:**

DELETE THE CONTENTS OF THE SECOND PARAGRAPH IN SUBSECTION 219.4.2 AND REPLACE WITH THE FOLLOWING:

The Contractor shall determine the flow, and shall mold one set (3 cylinders) of standard six (6) inch by twelve (12) inch compressive strength specimens for every 100 cubic yards, or fraction thereof, of material that is placed per day. These cylinders shall be cured and tested in accordance with ASTM D4832 except that they shall be stored at the construction site in the storage container until the fourteenth day after preparation. After the fourteenth day, they shall be transported to the site of the curing environment, specified in ASTM D4832, where they will be cured for the remainder of the 28 day period. The average compressive strength at 28 days shall meet the strength requirements listed in section 219.3. Material not meeting the minimum compressive strength at 28 days shall be removed at the Contractor's expense. The Division shall evaluate Type A material that exceeds the maximum compressive strength.

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**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 501**

**PORTLAND CEMENT CONCRETE PAVEMENT**

**501.2-MATERIALS:**

ADD THE FOLLOWING TO THE TABLE:

| MATERIAL      | SUBSECTION   |
|---------------|--------------|
| <u>Fibers</u> | <u>715.3</u> |

**501.3-PROPORTIONING:**

ADD THE FOLLOWING AFTER THE FIRST PARAGRAPH:

The addition of fibers in concrete pavement or concrete overlay shall be allowed. The dosage rate in lbs./cy of fibers for any application shall be the manufacturer's recommendation to meet the requirements of 715.3. The dosage rate shall not be less than the submitted rate used for product approval which can be found in the approved products list. The dosage rate shall not exceed 5.0 lbs./cy, unless the manufacturer can demonstrate, through a field demonstration, that the concrete mixture will be workable and fiber balling is not a problem.

**501.8-MIXING CONCRETE:**

ADD THE FOLLOWING TO THE END OF THE SUBSECTION:

Mix fibers as recommended by the manufacturer such that the addition of the fibers does not create balling. Notify the Engineer in writing of the dedicated personnel for this task, the procedure for distributing fibers into the concrete mixture, and the mixing method. Any of the following fiber addition methods are acceptable on all jobs:

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



A minimum of 70 revolutions at mixing speed after all the fibers are added is required for proper mixing and dispersion of fibers in trucks. Allowing bags of fiber to dissolve in the ready-mix concrete trucks or mixers will not be allowed. Fibers shall never be the first material added in any mixing process.

#### **501.9-PLACING CONCRETE:**

ADD THE FOLLOWING TO THE END OF THE SUBSECTION:

When placing concrete containing fibers, in order to provide consolidation and bury surface fibers, open slab surfaces should be struck off with a vibrating screed or laser screed. Magnesium floats in the form of a bullfloat, channel radius float, or highway straightedge should be used to establish a surface and close tears or open areas. The use of wood floats is not permitted. Any fiber balls should be removed immediately with a hoe or rake. The contractor should adjust the batching and mixing procedure to avoid the further creation of fiber balls as soon as they are noticed on a project.

#### **501.12-FINAL STRIKE-OFF, CONSOLIDATION AND FINISHING:**

##### **501.12.5- Floating:**

ADD THE FOLLOWING PARAGRAPH TO THE END OF THE SUBSECTION:

When placing concrete containing fibers, in order to provide consolidation and bury surface fibers, open slab surfaces should be struck off with a vibrating screed or laser screed. Magnesium floats in the form of a bullfloat, channel radius float, or highway straightedge should be used to establish a surface and close tears or open areas. The use of wood floats is not permitted. Care should be taken to avoid tilting the blades of any float at too great of an angle which could expose the fibers to the surface.

##### **501.12.7-Final Finish:**

ADD THE FOLLOWING SUBSECTION:

**501.12.7.1-Final Finish Containing Fibers for Portland Cement Concrete:** The final finish selected for concrete pavement or overlay containing fibers shall be an artificial grass carpet drag followed by tining. The tining tool selected must meet the groove and all other requirements of section 501.12.7. Caution must be used to avoid significant disturbance and removal of fibers from the surface. The tining rakes should be held at a small angle to the horizontal surface to prevent lifting or exposing the fibers. Texturing should also be done only in one direction and should never pull against the established pattern. The artificial grass carpet shall meet the following requirements:

- 1) Mounted on a Work Bridge or Paver
- 2) Width equal to the concrete placed

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- 3) Artificial grass type
- 4) Molded polyethylene pile face
- 5) Blade length of from 5/8 inch to 1 inch
- 6) Total weight of at least 70 ounces per square yard

The roadway will be textured as accepted by the Engineer. The use of burlap sack for texturing shall not be permitted. All texturing should be accomplished with a single pass of the tool.

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**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 601  
STRUCTURAL CONCRETE**

**601.2-MATERIALS:**

ADD THE FOLLOWING TO THE TABLE:

| MATERIAL      | SECTION OR SUBSECTION |
|---------------|-----------------------|
| <u>Fibers</u> | <u>715.3</u>          |

**601.3-PROPORTIONING:**

DELETE THE FOLLOWING SECTION AND REPLACE WITH FOLLOWING:

The proportions for any concrete designated as modified shall be submitted by the Contractor to the Engineer for approval. The Design 28 Day Compressive Strength shall be as shown in the plans. The contractor’s mix design shall utilize Table 601.3.1, except the Target Cement Factor may be revised to obtain the modified strength.

~~Class H concrete shall consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, silica fume admixture, fly ash or slag cement, chemical admixtures, and water.~~

Establishment of mixture proportions shall be coordinated with the manufacturer of the silica fume admixture.

Design mixture testing for Class H concrete shall be in accordance with MP 711.03.23 and shall include air content, slump, compressive strength, and rapid chloride permeability tests. For establishment of mixture proportions, rapid chloride permeability tests shall be made on representative samples prepared and tested in accordance with AASHTO T 277. The rapid chloride permeability test specimens shall be tested at an age of 90 days (or at any time prior to 90 days), and the results of this test shall not exceed 750 coulombs. Specimens shall be moist cured for 56 days prior to the start of specimen preparation unless specimens are to be tested prior to 56 days, in which case the specimens shall be moist cured until the time of test. The 28-day compressive strength of the test mix that satisfies the 750 coulomb threshold shall be used as the basis for acceptance of Class H concrete per Section 601.4.5. The cost of all test mix requirements shall be considered incidental to the cost of Class H concrete.

For establishment of mixture proportions, as an alternative to the curing methods for rapid chloride permeability testing outlined in the previous paragraph, specimens may be moist cured for 7 days in accordance with ASTM C192, then cured for 21 days in lime-saturated water at 100.0 ± 3.5 °F, then tested at an age of 28 days. This method of curing shall be noted as the accelerated RCPT curing method.

The dosage rate in lbs./cy of fibers for any application shall be the manufacturer's recommendation to meet the requirements of 715.3. The dosage rate shall not be less than the submitted rate used for product approval which can be found in the approved products list. The dosage rate shall not exceed 5.0 lbs./cy, unless the manufacturer can demonstrate, through a field demonstration, that the concrete mixture will be workable and fiber balling is not a problem.

## **601.7-MIXING:**

ADD THE FOLLOWING TO THE END OF THE SUBSECTION:

**601.7.1 Mixing of Fibers into Concrete:** Mix fibers as recommended by the manufacturer such that the addition of the fibers does not create balling. Notify the Engineer in writing of the dedicated personnel for this task, the procedure for distributing fibers into the concrete mixture, and the mixing method. Any of the following fiber addition methods are acceptable on all jobs:

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

A minimum of 70 revolutions at mixing speed after all the fibers are added is required for proper mixing and dispersion of fibers in trucks. Allowing bags of fiber to dissolve in the ready-mix concrete trucks or mixers will not be allowed. Fibers shall never be the first material added in any mixing process.

## **601.10-PLACING CONCRETE:**

### **601.10.2-Chutes and Troughs:**

ADD THE FOLLOWING PARAGRAPH TO THE END OF THE SUBSECTION:

When discharging the concrete containing fibers into a hopper assembly on a pump truck, the chute shall be raised 12 to 18 in. above the grate (if grate is present) on the pump to allow the fibers to pass through the grate.

ADD THE FOLLOWING SUBSECTION TO THE END OF THE SECTION:

**601.10.6-Placing Concrete Containing Fibers:** To provide consolidation and bury surface fibers, open slab surfaces should be struck off with a vibrating screed or laser screed. Magnesium floats in the form of a bullfloat, channel radius float, or highway straightedge

should be used to establish a surface and close tears or open areas. The use of wood floats is not permitted.

## **601.11- FINISHING CONCRETE SURFACES:**

ADD THE FOLLOWING SUBSECTION:

**601.11.5-Texturing & Grooving Bridge Decks Containing Fibers for Portland Cement Concrete:** Where a texture finish is required, an artificial grass carpet drag longitudinally, or broom finish transversally shall be selected. The use of burlap sack for texturing shall not be permitted. The artificial grass carpet shall meet the following requirements:

- 1) Mounted on a Work Bridge
- 2) Width equal to the concrete placed
- 3) Artificial grass type
- 4) Molded polyethylene pile face
- 5) Blade length of from 5/8 inch to 1 inch
- 6) Total weight of at least 70 ounces per square yard

All texturing equipment should be pulled in one direction only and never against the established pattern. The Contractor shall texture in a transverse or longitudinal direction. Once begun, the direction of texturing shall not change. All texturing shall be performed prior to the beginning of curing operations. Only one pass of the texturing equipment over the finished area will be permitted. Texturing shall be in strict accordance with the time requirements of 601.12.4 for applying wet burlap.

If texturing is done in the transverse direction, the Contractor shall texture using a broom finish as soon as practicable after finishing machine passage, without any additional finishing operations between the machine passage and texturing operations.

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

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

Texture resulting from the drag shall stop within one foot of curbs or parapets. Any hand finishing operations shall be kept to a minimum for Class H bridge decks. Grooving bridge deck containing fibers for Portland cement concrete shall follow the requirements of section 601.11.4.4.

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

**679.2-MATERIALS:**

**679.2.1-General:**

ADD THE FOLLOWING SECTION:

**679.2.1.69-Fibers:** Fibers shall meet the requirements of section of 715.3.

**679.2.2- Specialized Concrete Mix Design and Testing:**

DELETE THE FIRST AND SECOND PARAGRAPHS OF THE SUBSECTION AND ADD THE FOLLOWING:

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

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

**679.2.3-Equipment:**

**679.2.3.3-Propportioning and Mixing Equipment:**

DELETE THE SUBSECTION AND REPLACE WITH THE FOLLOWING:

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

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

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

Proportioning and Mixing Equipment shall consist of the following:

**679.2.3.4-Mobile Mixer Units:**

DELETE THE TABLE AND REPLACE WITH THE FOLLOWING:

|                             |           |
|-----------------------------|-----------|
| Coarse Aggregate            | ±2%       |
| Fine Aggregate              | ±2%       |
| Cement + fly ash            | 0% to +4% |
| Water                       | ±1%       |
| Cement + microsilica powder | 1%        |
| <u>Fibers</u>               | <u>1%</u> |
| Latex Admixture             | 1%        |
| Other Admixtures            | 3%        |

**679.2.3.6-Placing and Finishing Equipment:**

ADD THE FOLLOWING PARAGRAPH TO THE END OF THE SUBSECTION:

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

**679.3-CONSTRUCTION METHODS:**

**679.3.7-Placing and Finishing Specialized Concrete Overlay**

**679.3.7.4-Surface Texturing:**

ADD THE FOLLOWING SUBSECTION:

**679.3.7.4.1-Surface Texturing Concrete Containing Fibers for Portland Cement Concrete:** Where a texture finish is required, an artificial grass carpet drag longitudinally, or broom finish transversally shall be selected. The use of burlap ~~sack~~ for texturing shall not be permitted. The artificial grass carpet shall meet the following requirements:

1. Mounted on a Work Bridge
2. Width equal to the concrete placed
3. Artificial grass type
4. Molded polyethylene pile face
5. Blade length of from 5/8 inch to 1 inch
6. Total weight of at least 70 ounces per square yard

All texturing equipment should be pulled in one direction only and never against the established pattern. The Contractor shall texture in a transverse or longitudinal direction. Once begun, the direction of texturing shall not change. All texturing shall be performed prior to the beginning of curing operations. Only one pass of the texturing equipment over the finished area will be permitted. Texturing shall be in strict accordance with the time requirements of 679.3.7.5 for applying wet burlap.

If texturing is done in the transverse direction, the Contractor shall texture using a broom finish as soon as practicable after finishing machine passage, without any additional finishing operations between the machine passage and texturing operations.

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

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

Texture resulting from the drag shall stop within one foot of curbs or parapets. Any hand finishing operations shall be kept to a minimum. Grooving bridge deck containing fibers for Portland cement concrete shall follow the requirements of section 679.5.2.



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 715  
MISCELLANEOUS MATERIALS

**715.3-BLANK**

DELETE SUBSECTION 715.3 AND REPLACE WITH THE FOLLOWING:

**715.3-FIBERS FOR PORTLAND CEMENT CONCRETE:**

Fibers for Portland cement concrete shall include be pre-approved fibers from the WVDOH approved list of fibers for Portland cement concrete. The requirements for shotcrete fibers are separate and are addressed in Section 623.2. Product submittals shall include: a completed Form HL-468 (available on the WVDOH Materials Division Web Page), a copy of the technical data sheet, the current Material Safety Data Sheet (MSDS), and the independent AAHSTO accredited laboratory testing data meeting the requirements of 715.3.3. Any incomplete submittals will not be evaluated for inclusion on WVDOH approved list of fibers for Portland cement concrete.

**715.3.1-Definitions:**

**Micro Fibers:** Fibers with diameters less than 0.012 inch.

**Macro Fibers:** Fibers with diameters equal to or greater than 0.012 inch.

**Equivalent Diameter:** Diameter of a circle having an area equal to the average cross-sectional area of a fiber.

**Balling:** A 1-inch diameter or greater conglomerate of fibers at the point of placement.

**Aspect Ratio:** Length/Equivalent Diameter, Ratio.

**Hybrid Fibers:** The combination of macro and micro fibers in a mix design containing fibers for Portland cement concrete.

**715.3.2-Materials:** Fibers shall be synthetic †Type III in accordance with ASTM C1116 and ASTM D7508. Hybrid fibers shall be required for use in bridge decks.

**715.3.3 Fibers for Post Crack Tensile and Flexural Capacity, and Plastic Shrinkage Cracking Control:** Fibers shall meet the requirements of Table 715.3.3 unless solely intended for plastic shrinkage cracking control which shall only be required to meet the requirements of the crack reduction ratio of Table 715.3.3.

**TABLE 715.3.3**

| <b><u>Required Hardened Fiber-Reinforced Concrete Properties</u></b>                      | <b><u>Specification</u></b>    | <b><u>Requirement</u></b>     |
|---|--------------------------------|-------------------------------|
| <u>Equivalent Flexural Strength <math>f_{e 150}^{150}</math>, min. <sup>a</sup></u>       | <u>ASTM C1609 <sup>b</sup></u> | <u>150 psi.</u>               |
| <u>Equivalent Flexural Strength Ratio <math>R_{T,150}^{150}</math>, min. <sup>a</sup></u> | <u>ASTM C1609 <sup>b</sup></u> | <u>25%</u>                    |
| <u>Crack Reduction Ratio, (CRR), min. reduction</u>                                       | <u>ASTM C1579</u>              | <u><math>\geq 85\%</math></u> |

<sup>a</sup> The specimens shall be tested when the concrete ultimate flexural strength at peak stress ( $f_p$ ) is a minimum of 650 psi. For 6 inch by 6 inch by 20 inch beam containing fibers the maximum allowable net deflection value of L/150 of the 18 inch span length is 0.12 inches.

<sup>b</sup> ASTM C1609 will use roller supports that meet the requirements of ASTM C1812.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 109**

**MEASUREMENT AND PAYMENT**

**109.20-WEIGH TICKETS:**

DELETE THE CONTENTS OF PARAGRAPH THREE (3) AND FOUR (4) OF 109.20 AND REPLACE WITH THE FOLLOWING:

A weigh ticket shall be required with each load of material from a commercial source which would normally have truck scales. This includes, but is not limited to, all asphalt paving materials and all aggregates regardless of the contract pay unit. The weigh ticket shall include gross, tare, and net weights, time and date of loading, Item Number or Description of Materials, Contract Number or Project Number, ~~number of axles on haul unit~~, license number of haul unit, and signature of the weigher certifying that all information on the ticket is correct. If the weigher's name is printed by the computer on the ticket, then it only needs to be initialed by the weigher.

For material from a commercial source or a batch plant, which would not normally have truck scales, a weigh ticket documenting the tare weight, ~~number of axles on the haul unit~~, license number of haul unit, date weighed, location of scales, and signature of the weigher certifying that all information on the ticket is correct, may be supplied for each haul unit as an alternate to the ticket required in the previous paragraph. The tare weight ticket shall be supplied for each contract on a yearly basis and when modifications are made to the vehicle or combination of vehicles. The weight of the material delivered shall be calculated and furnished by the vendor/supplier shipping the material to the project site or DOH facility. This includes, but is not limited to, concrete, structural steel, piling, reinforcing steel and all prepackaged material of known weight, such as cement, grout, fertilizer, lime, abrasives, etc.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATION

FOR

SECTION 201  
CLEARING AND GRUBBING

**201.7-DISPOSAL:**

DELETE THE CONTENTS OF THE EIGHTH PARAGRAPH IN SUBSECTION 201.7 AND REPLACE WITH THE FOLLOWING:

The in ground trench is to be placed outside the ~~roadway prism construction limits~~, unless otherwise approved by the Engineer. If the trenches are not to be eliminated in the subsequent excavation operation, they shall be backfilled. All backfill within ~~the roadway prism construction limits~~ shall be accomplished in accordance with the requirements of Section 207. Compaction of backfill outside ~~the roadway prism construction limits~~ shall be performed so as to obtain a minimum density equal to that of the surrounding ground.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**SUPPLEMENTAL SPECIFICATION**  
**FOR**  
**SECTION 202**  
**BUILDING DEMOLITION, WELL AND SEPTIC TANK ABANDONMENT**

**202.4-BUILDINGS:**

DELETE THE CONTENTS OF THE FIRST PARAGRAPH IN SUBSECTION 202.4  
AND REPLACE WITH THE FOLLOWING:-

Buildings and appurtenances shall be removed to the existing ground level, which operation shall include removal of concrete slabs or any other type of floor resting upon the ground. Basements shall be cleared of all debris, appliances, wood or metal partition walls, wood floors, etc., so that only the foundation walls and basement floor remain. The basement floors shall be shattered. If pits, trenches, holes, or basements are not to be eliminated in subsequent excavation operation, they shall be backfilled. All backfill within the ~~roadway prism construction limits~~ shall be accomplished in accordance with the requirements of Section 207. Compaction of backfill outside the ~~roadway prism construction limits~~ shall be performed so as to obtain a minimum density equal to that of the surrounding ground.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

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

**410.13-BASIS OF PAYMENT**

**410.13.6-Bond Strength Adjustment:**

DELETE THE CONTENTS OF THE FIRST PARAGRAPH IN SUBSECTION 410.13.6 AND REPLACE WITH THE FOLLOWING.

For Interstates and divided NHS Routes, bond Strength PWL calculations shall be in accordance with MP 401.13.50, Guide to Statistical Analysis of Material Using Quality Level Analysis-Percent within Limits. However, for the purpose of relieving large standard deviations from abnormally strong samples, any sample with a strength exceeding 150 psi will be evaluated as 150 psi instead of the actual strength. However, the actual strength shall still be recorded as such on the reporting form and is used in the lower Quality Index (Q<sub>L</sub>) calculation of MP 401.13.50.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 615  
STEEL STRUCTURES**

**615.3-MATERIALS:**

**615.3.3-Welded Stud Shear Connectors:**

DELETE THE FIRST PARAGRAPH OF SECTION 615.3.3 AND REPLACE WITH THE FOLLOWING.

When design requires the use of welded stud shear connectors, they shall meet the requirements of Section 7 of the ANSI/AASHTO/AWS D1.5, Bridge Welding Code and be sampled and tested in accordance with MP 615.20.01.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**SUPPLEMENTAL SPECIFICATION**

**FOR**

**SECTION 712  
GUARDRAIL AND FENCE**

**712.4-GALVANIZED STEEL DEEP BEAM GUARDRAIL, FASTENERS AND ANCHOR BOLTS:**

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

Galvanized steel deep beam guardrail, fasteners and anchor bolts shall ~~conform to be~~ evaluated by NTPEP (National Transportation Product Evaluation Program). The NTPEP testing results shall meet the requirements of AASHTO M 180.; ~~The rail shall be~~ Type II, Class A.

**712.5-ZINC-ALUMINUM-MAGNESIUM ALLOY COATING GUARDRAIL, FASTENERS AND ANCHOR BOLTS:**

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

Zinc-aluminum-magnesium alloy-coating deep beam guardrail shall ~~conform to be~~ evaluated by NTPEP (National Transportation Product Evaluation Program). The NTPEP testing results shall meet the requirements of AASHTO M 180, Type V or VI, Class A.