

# 2019 Supplement to the 2016 VDOT Road and Bridge Specifications

This volume contains all revisions to the 2016 Road and Bridge Specifications effective 31 December 2018. All sections from the 2017 and 2018 Supplements are included herein, except some may have been further revised. Projects that include the 2017 or 2018 Supplements by reference must use those volumes.

# Table of Contents

Table of Contents .....	2
SECTION 101 – DEFINITIONS OF ABBREVIATIONS, ACRONYMS, AND TERMS .....	3
SECTION 102 – BIDDING REQUIREMENTS AND CONDITIONS .....	3
SECTION 105 – CONTROL OF WORK .....	3
SECTION 106 – CONTROL OF MATERIAL .....	6
SECTION 107 – LEGAL RESPONSIBILITIES .....	6
SECTION 208 – SUBBASE AND AGGREGATE BASE MATERIALS .....	12
SECTION 210 – ASPHALT MATERIALS .....	13
SECTION 211 – ASPHALT CONCRETE .....	18
SECTION 212 – JOINT MATERIALS .....	21
SECTION 217 – HYDRAULIC CEMENT CONCRETE .....	21
SECTION 223 – STEEL REINFORCEMENT .....	21
SECTION 232 – PIPE AND PIPE ARCHES .....	22
SECTION 242 – FENCES .....	23
SECTION 244 – ROADSIDE DEVELOPMENT MATERIALS .....	23
SECTION 245 – GEOSYNTHETICS AND LOW PERMEABILITY LINERS .....	25
SECTION 248 – STONE MATRIX ASPHALT CONCRETE .....	30
SECTION 302 – DRAINAGE STRUCTURES .....	30
SECTION 303—EARTHWORK .....	34
SECTION 310 – TACK COAT .....	36
SECTION 313 – ASPHALT-STABILIZED OPEN-GRADED MATERIAL .....	41
SECTION 315 – ASPHALT CONCRETE PLACEMENT .....	41
SECTION 317 – STONE MATRIX ASPHALT CONCRETE PLACEMENT .....	44
SECTION 318 – PAVEMENT INTERLAYERS .....	44
SECTION 401 – STRUCTURE EXCAVATION .....	47
SECTION 403 – BEARING PILES .....	47
SECTION 404 – HYDRAULIC CEMENT CONCRETE OPERATIONS .....	47
SECTION 405 – PRESTRESSED CONCRETE .....	48
SECTION 406 – REINFORCING STEEL .....	53
SECTION 412 - WIDENING, REPAIRING, AND RECONSTRUCTING EXISTING STRUCTURES .....	57
SECTION 413 – DISMANTLING AND REMOVING EXISTING STRUCTURES OR REMOVING PORTIONS OF EXISTING STRUCTURES .....	63
SECTION 431 – EPOXY BRIDGE DECK OVERLAYS .....	64
SECTION 505 – GUARDRAIL AND W-BEAM MEDIAN BARRIERS .....	64
SECTION 512 – MAINTAINING TRAFFIC .....	65
SECTION 516 – DEMOLITION OF BUILDINGS AND CLEARING PARCELS .....	69
SECTION 520 - WATER AND SANITARY SEWER FACILITIES .....	69
SECTION 700 – GENERAL .....	74
SECTION 704 – PAVEMENT MARKINGS AND MARKERS .....	87
SECTION 808 – FIBER OPTIC CABLE AND INTERCONNECT .....	89

**SECTION 101 – DEFINITIONS OF ABBREVIATIONS, ACRONYMS, AND TERMS**

**SS101-002016-01**

**April 21, 2017**

**Section 101.01 – Abbreviations and Acronyms** is amended to include the following:

- IEEE** Institute of Electrical and Electronics Engineers
- ISO** International Organization for Standardization
- OSHA** Occupational Safety and Hazard Administration

**Section 101.02 – Terms** is amended by replacing the below terms in bold type with the definitions which follow them:

**Tidewater, Virginia.** As defined in the Code of Virginia, § 62.1-44.15:68.

**Section 101.02 – Terms** is amended by inserting the below terms and definitions:

**Internet.** The electronic communications network that connects computer networks and organizational computer facilities around the world.

**SECTION 102 – BIDDING REQUIREMENTS AND CONDITIONS**

**SS102-002016-01**

**July 12, 2016**

**Section 102.07 – Proposal Guaranty (Bid Bond)** is amended by replacing the first paragraph with the following:

A bid in excess of \$250,000.00 will be rejected unless accompanied by a proposal guaranty, also known as a bid bond, made payable to the Commonwealth of Virginia, and executed on the Department's form (Form C-24), or on a form that contains the exact same wording as the Department's form. The amount of the proposal guaranty shall be 5 percent of the total bid. However, if the Bidder is eligible for the VirginiaWorks Self-Insured Payment & Performance Bond Program and his Bid is greater than \$250,000 but less than \$350,000, no proposal guaranty is required, but the Bidder is still subject to Section 103.07 of the Specifications.

**SECTION 105 – CONTROL OF WORK**

**SS105-002016-03**

**April 10, 2017**

**Section 105.12 – Coordination of Plans, Standard Drawings, Specifications, Supplemental Specifications, Special Provisions, and Special Provision Copied Notes** of the Specifications is replaced with the following:

The plans, Standard Drawings, Specifications, Supplemental Specifications, Special Provisions, Special Provision Copied Notes, and other Contract

Documents defined in Section 103.06 are parts of the Contract. A requirement occurring in one Contract Document shall be as binding as though occurring in all. The Contract Documents are intended to be complementary, and to include, describe and provide all items necessary for the Contractor's proper and complete performance of the Work.

In case of a discrepancy, the following order of priority will apply, with the highest governing item appearing first and the least governing item appearing last:

- (a) Special Provision Copied Notes. The Contract items, units and unit prices listed in the Contract's Schedule of Items have the same status as Special Provision Copied Notes.
- (b) Special provisions.
- (c) Plans.
- (d) Supplemental Specifications. Those present in the physical, executed Contract will govern over those published in the annual supplemental volume.
- (e) Specifications.
- (f) Standard Drawings (including all revisions issued through the date of Advertisement).

Calculated dimensions, unless obviously incorrect, will govern over scaled dimensions.

Drawings (with the exception of Standard Drawings), sketches, general notes, and other written information that are not included in Special Provisions or Special Provision Copied Notes used in No Plan and Minimum Plan Concept projects will have the same status as plans.

The Contractor shall not take advantage of any obvious or apparent ambiguity, conflict, error or omission in the plans or the Contract. If after beginning work the Contractor discovers an ambiguity, conflict, error, or omission in the Contract, he shall immediately notify the Engineer and before proceeding further with the affected work. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the Contract.

**Section 105.14(a)3 – Flagging Traffic** is replaced with the following:

**Flagging Traffic:** Flaggers shall be able to communicate to the traveling public in English while performing the job duty as a flagger at the flagger station.

Certification for flaggers will be awarded upon a candidate's satisfactory completion of an examination. Certification cards shall be carried by flaggers while performing flagging duties. Flaggers found not to be in possession of their certification card shall be removed from the flagging site and operations requiring flagging will be suspended by the Engineer until a certified flagger is on-site to perform flagging duties in accordance with the requirements herein. Flaggers performing duties improperly will have their certifications revoked.

**Section 105.17 – Inspection of Work** is amended by replacing the third paragraph with the following:

If the Engineer requests it, the Contractor shall remove or uncover such portions of the finished work as may be directed at any time before final acceptance. The Contractor shall restore such portions of the finished work to comply with the appropriate contract specification requirements. If the work exposed does not contain a defect, the uncovering or removing and replacing the covering or making good the parts removed will be paid for as extra work in accordance with Section 104.02 of the Specifications. If the uncovered work contains a defect, the cost of uncovering or removing and replacing the covering or making good the parts removed shall be borne by the Contractor whether or not the Engineer directs the Contractor to mitigate the defective work. Acceptance of substandard work does not negate the presence of the defect. For the purposes of this section, a defect shall mean any part of the Work that does not conform to the Contract.

**Section 105.19(a) – Notice of Intent to File a Claim** is amended by replacing the second paragraph with the following:

In addition, at the time of each and every occurrence that the Contractor believes to be the basis of a claim or prior to beginning the work upon which a claim and any subsequent action will be based, the Contractor shall furnish the Engineer an itemized list of materials, equipment, and labor for which additional compensation will be claimed. Only actual cost for materials, labor and equipment will be considered. The Contractor shall afford the Engineer every facility for keeping an actual cost record of the work. The Contractor and the Engineer shall compare records and bring them into agreement at the end of each day. Failure on the part of the Contractor to afford the Engineer proper facilities for keeping a record of actual costs will constitute a waiver of a claim for such extra compensation except to the extent that it is substantiated by the Department's records. The filing of such notice of intent by the Contractor and the keeping of cost records by the Engineer shall in no way establish the validity of a claim.

## SECTION 106 – CONTROL OF MATERIAL

SS106-002016-01

July 12, 2016

**Section 106.08 – Storing Materials** is amended to replace the third paragraph with the following:

Chemicals, fuels, lubricants, bitumens, paints, raw sewage, and other potential pollutant-generating materials as determined by the Engineer or defined in the VPDES *General Permit For Discharge of Stormwater from Construction Activities* shall not be stored within any flood-prone area unless no other location is available. A flood-prone area is defined as the area adjacent to the main channel of a river, stream or other waterbody that is susceptible to being inundated by water during storm events and includes, but is not limited to, the floodplain, the flood fringe, wetlands, riparian buffers or other such areas adjacent to the main channel. If stored in a flood-prone area, the material shall be stored in one or more secondary containment structures with an impervious liner and be removed entirely from the flood-prone area at least 24 hours prior to an anticipated storm event that could potentially inundate the storage area. Any storage of these materials outside of a flood-prone area that is in proximity to natural or man-made drainage conveyances where the materials could potentially reach a river, stream, or other waterbody if a release or spill were to occur, must be stored in a bermed or diked area or inside a secondary containment structure capable of preventing a release. Any spills, leaks or releases of such materials shall be addressed according to Section 107.16(b) and (e) of the Specifications. Accumulated rain water shall be pumped out of impoundment or containment areas into approved filtering devices. All proposed pollution prevention measures and practices must be identified by the Contractor in his Pollution Prevention Plan as required by the Specifications, other Contract documents and/or the VDPES *General Permit for Discharge of Stormwater from Construction Activities*.

## SECTION 107 – LEGAL RESPONSIBILITIES

SS107-002016-04

August 10, 2017

**Section 107.01 – Laws to Be Observed** is amended by inserting the following:

Where the Specifications require the Contractor to interact with government agencies other than the Department, that agency's contact information can be found at <http://www.virginiadot.org/business/const/specgovag.asp>.

**Section 107.16(a) – Environmental Stipulations** is amended by replacing the first paragraph with the following:

By signing the bid, the bidder certifies (unless the Contract is exempt under 42 USC 7606, 33 USC 1368, Executive Order 11738, and 2 CFR 1532.1140)

that any facility to be used in the performance of the Contract is not listed on the Federal System for Award Management (SAM) Exclusions Public Extract according to 2 CFR 1532.1125; and that the bidder shall promptly notify the Department prior to the award of the Contract if the bidder receives any communication from the EPA, indicating that a facility to be used for the Contract is under consideration to be listed on the Federal SAM Exclusion Public Extract.

**Section 107.16(a) – Environmental Stipulations** is amended by deleting the third paragraph.

**Section 107.16(b)2 – Air** is replaced by the following:

**Air:** The Contractor shall comply with Section 107.01 and the State Air Pollution Control Law and Rules of the State Air Pollution Control Board, including notifications required therein. Precautions shall be taken at all times to prevent particulate matter from becoming airborne according to 9 VAC 5-50-80 and 9 VAC 5-50-90.

Burning shall be performed in accordance with all applicable local laws and ordinances and under the constant surveillance of watchpersons. Care shall be taken so that the burning of materials does not destroy or damage property or cause excessive air pollution. The Contractor shall not burn rubber tires, asphalt, used crankcase oil, or other materials that produce dense smoke. Burning shall not be initiated when atmospheric conditions are such that smoke will create a hazard to the motoring public or airport operations. Provisions shall be made for flagging vehicular traffic if visibility is obstructed or impaired by smoke. At no time shall a fire be left unattended.

Asphalt mixing plants shall be designed, equipped, and operated so that the amount and quality of air pollutants emitted will conform to the rules of the State Air Pollution Control Board.

a. **VOC Emission Control Areas** - The Contractor is advised that when the project is located in a volatile organic compound (VOC) emissions control area identified in 9 VAC 5-20-206 or Table I-3 below the following limitations shall apply:

- (1) Open burning is prohibited during the months of May, June, July, August, and September.
- (2) Cutback asphalt is prohibited April through October except when use or application as a penetrating prime coat or tack is necessary. See 9 VAC 5-45-760 et seq. (Emission Standards for Asphalt Paving Operations) and 9 VAC 5-20-206 (Regulations for the Control and Abatement of Air Pollution) for further clarification.

**TABLE I-3**

<b>VOC Emissions Control Area</b>	<b>VDOT District</b>	<b>Jurisdiction</b>
Northern Virginia	NOVA	Alexandria City Arlington County Fairfax County Fairfax City Falls Church City Loudoun County Manassas City Manassas Park City Prince William County
Northern Virginia	Fredericksburg	Stafford County
Fredericksburg	Fredericksburg	Spotsylvania County Fredericksburg City
Hampton Roads	Fredericksburg	Gloucester County
Hampton Roads	Hampton Roads	Chesapeake City Hampton City Isle of Wight County James City County Newport News City Norfolk City Poquoson City Portsmouth City Suffolk City Virginia Beach City Williamsburg City York County
Richmond	Richmond	Charles City County Chesterfield County Colonial Heights City Hanover County Henrico County Hopewell City Petersburg City Prince George County Richmond City
Western Virginia	Staunton	Frederick County Winchester City
Western Virginia	Salem	Roanoke County Botetourt County Roanoke City Salem City

(3) Emission standards for asbestos incorporated in the EPA's National Emission Standards for Hazardous Air Pollutants apply to the demolition or renovation of any institutional, commercial, or industrial building, structure, facility, installation, or portion thereof that contains friable asbestos or where the Contractor's methods for such actions will produce friable asbestos.

b. The Contractor shall submit demolition notification to the EPA and the Virginia Department of Labor and Industry, in accordance with Section 107.01, a minimum of 10 business days prior to starting work on the following bridge activities:

(1) Dismantling and removing existing structures

(2) Moving an entire structure

(3) Reconstruction and repairs involving the replacement of any load-bearing component of a structure

The Contractor shall provide written notification to the Engineer a minimum of 3 full business days prior to work being performed.

**Section 107.16(e)3 – SWPPP Requirements for Support Facilities** is amended to include the following:

The Contractor shall develop and enforce a Spill Prevention Control and Countermeasure (SPCC) Plan conforming to 40 CFR 112 if the aggregated volume of Oil stored within the project limits at any one time is greater than 1320 gallons. Oil, in this context, shall be defined according to 40 CFR 112. The aggregated volume includes that of both stationary and portable storage facilities but does not include individual storage containers with less than a 55 gallon capacity. The Contractor shall include the SPCC Plan as a part of his Pollution Prevention Plan for the project.

**Section 107.16(e)4a – Inspection Requirements** is replaced with the following:

**Inspection Requirements:** The Contractor shall be responsible for conducting site inspections according to the requirements herein. Site inspections shall include erosion, sediment control, and pollution prevention practices and facilities; all areas of the site disturbed by construction activity; all on-site support facilities; and all off site support facilities within VDOT right of way or easement. The Contractor shall document such inspections by completion of Form C-107, Construction Runoff Control Inspection Form, according to the directions contained within the form. Inspections shall be conducted using one of the following schedules:

- Schedule 1 - At least once every 7 calendar days (equivalent to the once every five business days schedule in the VPDES *General Permit for Discharge of Stormwater from Construction Activities*) and within 48 hours following any measureable storm event. If a measureable storm event occurs when there are more than 48 hours between business days, the Contractor shall perform his inspection no later than the next business day. The Contractor shall install a rain gauge at a central location on the project site for the purposes of determining the occurrence of a measureable storm event. Where the project is of such a length that one rain gauge may not provide an accurate representation of the occurrence of a measurable storm event over the entire project site, the Contractor shall install as many rain gauges as necessary to accurately reflect the amount of rainfall received over all portions of the project. The Contractor shall observe all rain gauges no less than once each business day at the time prescribed in the SWPPP General Information Sheet notes in the construction plans or other contract documents to determine if a measureable storm event has occurred. The procedures for determining the occurrence of a measurable storm event are identified in the SWPPP General Information Sheet notes in the construction plans or other contract documents.
- Schedule 2 - At least each Monday and Thursday (equivalent to the once every four business days schedule in the VPDES *General Permit for Discharge of Stormwater from Construction Activities*). Where Monday or Thursday is a non-business day, the inspection may be performed on the next business day afterward. In no case shall the inspections be performed less than once every four business days. A rain gauge will not be required when using Schedule 2.

The inspection schedule (1 or 2) is to be selected prior to the beginning of land disturbance. Once an inspection schedule is selected, it shall be defined in the appropriate note in the SWPPP General Information Sheets contained in the construction plan set and shall be used for the duration of the project. A business day is defined as Monday through Friday excluding State holidays. A measurable storm event is defined as one producing 0.25 inches of rainfall or greater over a 24 hour time period.

For those areas of the site that have been temporarily stabilized or where land disturbing activities have been suspended due to continuous frozen ground conditions and stormwater discharges are unlikely, the inspection schedule may be reduced to once per month. If weather conditions (such as above freezing temperatures or rain or snow events) make stormwater discharges likely, the Contractor shall immediately resume the regular inspection schedule. Those definable areas where final stabilization has been achieved will not require further inspections provided such areas have been identified in the project's Stormwater Pollution Prevention Plan.

**Section 107.17 – Construction Safety and Health Standards** is replaced with the following:

In the performance of this Contract the Contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The Contractor, subcontractors at any tier, and their respective employees, agents and invitees, shall at all times while in or around the project site comply with all applicable laws, regulations, provisions, and policies governing safety and health under the VOSH Standards adopted under the Code of Virginia, and any laws, regulations, provisions, and policies incorporated by reference including, but not limited to, the Federal Construction Safety Act (Public Law 91-54), 29 CFR 1926, and the Occupation Safety and Health Act (Public Law 91-596), 29 CFR 1910, and subsequent publications updating these regulations.

The Contractor shall provide all safeguards, safety devices and protective equipment, and take any other needed actions as it determines, or as the Engineer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public, and to protect property in connection with the performance of the Work. The Contractor shall be responsible for maintaining and supervising all safety and health protections and programs to ensure compliance with this Section. The Contractor shall routinely inspect the project site for safety and health violations. The Contractor shall immediately abate any violations of the safety and health requirements or duties at no cost to the Department.

It is a condition of this Contract, and shall be made a condition of each subcontract, which the Contractor enters into pursuant to this Contract, that the Contractor and any subcontractor shall not permit any employees, in performance of the Contract, to work in surroundings or under conditions which are unsanitary, hazardous, or dangerous to their health or safety, as determined by the Virginia Work Area Protection Manual or under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 USC 3704).

VOSH personnel, on all Federal-aid construction contracts and related subcontracts, pursuant to 29 CFR 1926.3, the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out their duties.

The Contractor shall maintain a Jobsite Hazard Assessment in accordance with 29 CFR 1910.132 which shall be provided to the Engineer upon request and contain the following requirements, unless otherwise determined unsafe or inappropriate according to OSHA regulations:

- Hard hats shall be worn while participating in or observing all types of field work when outside of a building or outside of the cab of a vehicle, and exposed to, participating in or supervising construction.
- Respiratory protective equipment shall be worn whenever an individual is exposed to any item listed in the OSHA Standards as needing such protection unless it is shown that the employee is protected by engineering controls.
- Adequate eye protection shall be worn in the proximity of grinding, breaking of rock and/or concrete, while using brush chippers, striking metal against metal or when working in situations where the eyesight may be in jeopardy.
- A safety vest shall be worn by all exposed to vehicular traffic and construction equipment.
- Standards and guidelines of the current VWAPM shall be used when setting, reviewing, maintaining, and removing traffic controls.
- No person shall be permitted to position themselves under any raised load or between hinge points of equipment without first taking steps to support the load by the placing of a safety bar or blocking.
- Explosives shall be purchased, transported, stored, used and disposed of by a Virginia State Certified Blaster in possession of a current criminal history record check and a commercial driver's license with hazardous materials endorsement and a valid medical examiner's certificate. All Federal, State and local regulations pertaining to explosives shall be followed.
- All electrical tools shall be adequately grounded or double insulated. Ground Fault Circuit Interrupter (GFCI) protection must be installed in accordance with the National Electrical Code (NEC) and current VOSH agency. If extension cords are used, they shall be free of defects and designed for their environment and intended use.
- No person shall enter a confined space without training, permits and authorization.
- Fall protection shall be used whenever an employee is exposed to a fall 6 feet or greater.

## **SECTION 208 – SUBBASE AND AGGREGATE BASE MATERIALS**

**SS208-002016-01**

**July 7, 2016**

**Section 208.06 – Acceptance** is amended by replacing the sixth paragraph with the following:

If the liquid limit exceeds 30 or the plasticity index exceeds 6 for Type I base material or No. 19 subbase material; or the plasticity index exceeds 9 for Type II base material or subbase materials No. 20, 21, 21A, 21B, or 22 on any individual sample; that portion of the lot from which the sample was taken will be considered a separate part of the lot and the Contractor shall remove that portion from the roadway.

## SECTION 210 – ASPHALT MATERIALS

SS210-002016-03

September 6, 2018

**SECTION 210 – ASPHALT MATERIALS** is replaced with the following:

### 210.01 – Description

These specifications cover the manufacturing and material requirements for asphalt material consisting of asphalt, asphalt cement, asphalt cutback, or asphalt emulsion as defined in ASTM D8.

### 210.02 – Materials

Asphalt material shall be homogeneous and shall conform to the following:

- (a) **Rapid curing and medium curing liquid asphalts used as surface treatments** shall contain a heat-stable additive conforming to Section 211.
- (b) **Liquid asphalt material** will be tested for coating ability in accordance with AASHTO T182, with the following modifications:
  - 1. Material that can coat 95 percent of a shady dolomite will be classified Type I.
  - 2. Material that can coat 95 percent of a siliceous gravel wetted with 2 percent water by weight will be classified Type II.
- (c) **Rapid curing cutback asphalts** shall conform to AASHTO M81.
- (d) **Medium curing cutback asphalts** shall conform to AASHTO M82.
- (e) **Asphalt Binders** shall conform to AASHTO M332, Table 1. High polymer Binder shall consist of mixes incorporating a neat asphalt material with a high polymer modification (approximately 7.5%) complying with AASHTO M332 for PG 76E-28(HP) with the exception that the Multiple Stress Creep Recovery (MSCR) shall have a  $J_{nr3.2}$  maximum value of  $0.1 \text{ kPa}^{-1}$  when tested according to AASHTO T350. The minimum MSCR percent recovery at 3.2 kPa shall be 90%. The MSCR test for  $J_{nr}$  and percent recovery shall be run at 76°C. The viscosity shall be less than or equal to 3.0 Pa-s, however the Engineer may increase the viscosity limit to 5.0 Pa-s if the binder supplier and Contractor agree that the binder is suitably workable. Approved Asphalt Binders shall be on Approved list 50.

- (f) **Emulsions** shall conform to AASHTO M208, except that the penetration for CRS-1h shall be 40 to 110. Approved Emulsions shall be found on Approved List 50.1
- (g) **Polymer Modified Cationic Emulsified Asphalt** shall conform to AASHTO M316. CRS-2L shall have the same requirements as CRS-2P, except for the Penetration requirement at 77 °F which shall be a minimum 70 and maximum 140. Approved Polymer Modified Cationic Emulsions shall be found on Approved List 50.1
- (h) **Non-tracking tack** will be tested in accordance with Section 210.04. Approved Non tracking tack shall be found on Approved List 50.1a.

### **210.03 – Sampling & Testing**

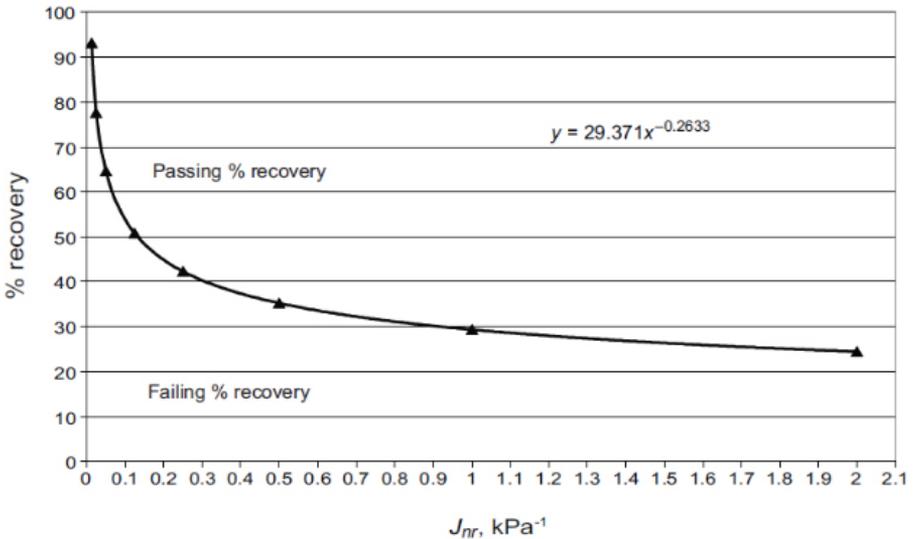
Samples shall be taken in the presence of VDOT personnel or a VDOT representative in accordance with AASHTO R-66, with the exception that asphalt emulsion samples shall be a minimum of 0.5 gallons (2 liters).

The Contractor shall ensure the standard control tests on asphaltic materials, as detailed in Section 210.04, are conducted by the Manufacturer.

### **210.04 – Tests**

#### **(a) PG Asphalt Binders:**

1. Certified Test Reports for PG Asphalt Binders shall be based upon the results of tests performed in accordance with AASHTO M332, Table 1. The manufacturer is not required to perform the Direct Tension Test, AASHTO T314.
2. For asphalt binders tested in accordance with AASHTO T 350, indication of elastic response shall be determined using the Figure below. Plot the average percent recovery at 3.2 kPa,  $J_{nr3.2}$ , versus the average nonrecoverable creep compliance at 3.2 kPa,  $J_{nr3.2}$ , measured at the same temperature. If the plotted point falls on or above the line shown in the Figure below, the indication is that the asphalt binder is modified with an acceptable elastomeric polymer. If the plotted point falls below the line on the graph, the indication is that the asphalt binder is not modified with an elastomeric polymer and the sample will fail. The percent recovery requirement will not apply to non-polymer binders (PG 64S and PG 64H).



### Nonrecoverable Creep Compliance Versus Percent Recovery.

#### (b) Cutback Asphalts:

1. Certified Test Reports for Cutback Asphalts shall be based upon the results of tests performed in accordance with AASHTO M81 and M82.
2. When used in surface treatments, the Coating Ability test shall be conducted subject to the specifications listed in Section 210.02.

#### (c) Emulsified Asphalts:

1. Certified Test Reports for Emulsified Asphalts shall be based upon the results of tests performed in accordance with AASHTO M208 or AASHTO M316, as specified below. Emulsions will be sampled and tested in accordance with AASHTO T59 except that viscosity will be tested in accordance with VTM-64. The softening point shall have a minimum value of 100°F.:
  - a. Cationic Emulsions- Table 1 (from AASHTO M208 or M316, as applicable), specifically
    - (1) Tests on Emulsions:
      - Saybolt Furol Viscosity
      - Sieve Test (if necessary)
      - Demulsibility (if applicable)

- Particle Charge Test
- Residue by Distillation

(2) Tests on residue from distillation:

- Penetration

b. **CQS-1h** (Quick Set) shall be tested the same as Cationic Emulsions, with the addition of “Quick set Emulsified Asphalt Setting Time (VTM-89).”

c. Latex Modified Cationic Emulsions

(1) CQS-1h Latex Modified (CQS-1hLM)

(a) Tests on Emulsions

- Saybolt Furol Viscosity
- Sieve Test (if necessary)
- Particle Charge Test
- Residue by Evaporation (VTM-78)

(b) Tests on residue

- Penetration
- Ring and Ball Softening Point

(2) CRS-2 Latex

(a) Tests on Emulsions

- Saybolt Furol Viscosity
- Sieve Test (if necessary)
- Particle Charge Test
- Residue by Evaporation

(b) Tests on residue by Evaporation

- Penetration
- Ring and Ball Softening Point
- Elastic Recovery
- Ductility, 25°C, 5 cm/min

2. The manufacturer is not required to perform the Flash Point, Ductility, and Ash Content tests unless the Engineer directs the Contractor to

require it. If the manufacturer elects to conduct these tests to better control production, the results shall be included on the certified test report.

**(d) Non-Tracking Tack:**

Certified Test Reports for Non-Tracking Tack shall be based upon the results of tests performed, as specified below:

1. Tests on Non-Tracking Tack:
  - Residue by Distillation or Evaporation
2. Tests on residue by distillation:
  - Ring and Ball Softening Point
  - Penetration

**210.05 – Storing and Shipping**

**(a) Shipping:**

1. Shipments of asphalt material shall be made in transporting media that are free from contamination. Tank trucks or trailers shall be equipped with an Engineer approved sampling device. The device shall have an inside diameter of 1/2 to 1 inch and a gate valve or petcock. The device shall be built into the tank or the recirculating or discharge line so that a sample can be drawn during circulation or discharge.
2. All shipping documents shall contain sufficient information such that at any point, the material may be traceable back to the original test results. If the material is mixed with other approved material for storage, the record system will be such as to assure the traceability of all the material which is being mixed.
3. All shipping documents shall be accompanied by a statement similar to “We certify that all material being shipped on this invoice/bill of lading has been tested and approved under the Virginia Asphalt Acceptance Program and that the material has been loaded under the supervision of our representative into carriers that are suitable for shipment of this material.”
4. All shipping documents shall be kept by the recipient of the material and are available for verification by VDOT personnel.

5. Only material tested and certified in accordance with the VAAP and on VDOT approved product lists shall be mixed and shipped to VDOT projects.

(b) **Storing:** Asphalt material shall be placed in storage tanks that are free from contamination. Emulsified asphalts stored longer than 30 days from the shipping date on the Bill of Lading shall be retested in accordance with Section 210.04 to verify the material still meets product specifications.

**210.06 – Payment Adjustment System**

If the asphalt material represented by any one sample does not conform to the requirements herein and the material is a pay item, the Engineer will reduce the Contract unit price for the item by 4 percent for each property that does not conform to the Specifications for the quantity represented by the sample that was used on the project. The Engineer will reject any unused material represented by the failing sample.

The Engineer will consider any failed sampled asphalt material that is not a pay item unacceptable and subject to the provisions of Section 105.18 and Section 106.10.

**SECTION 211 – ASPHALT CONCRETE**

**SS211-002016-02**

**August 3, 2017**

**Section 211.01—Description** is replaced with the following:

Asphalt concrete shall consist of a combination of mineral aggregate and asphalt material mixed mechanically in a plant specifically designed for such purpose.

An equivalent single-axle load (ESAL) will be established by the Engineer, and SUPERPAVE mix types may be specified as one of the types listed as follows:

<b>Mix Type</b>	<b>Equivalent Single-Axle Load (ESAL) Range (millions)</b>	<b>Minimum Asphalt Performance Grade (PG)<sup>1</sup></b>	<b>Aggregate Nominal Maximum Size<sup>2</sup></b>
SM-9.0A	0 to 3	64S-16	3/8 in
SM-9.0D	3 to 10	64H-16	3/8 in
SM-9.0E	Above 10	64E-22	3/8 in
SM-9.5A	0 to 3	64S-16	3/8 in
SM-9.5D	3 to 10	64H-16	3/8 in
SM-9.5E	Above 10	64E-22	3/8 in
SM-12.5A	0 to 3	64S-16	1/2 in

SM-12.5D	3 to 10	64H-16	1/2 in
SM-12.5E	Above 10	64E-22	1/2 in
IM-19.0A	Less than 10	64S-16	3/4 in
IM-19.0D	10 to 20	64H-16	3/4 in
IM-19.0E	20 and above	64E-22	3/4 in
BM-25.0A	All ranges	64S-16	1 in
BM-25.0D	Above 10	64H-16	1 in

<sup>1</sup>**Minimum Asphalt Performance Grade (PG)** is defined as the minimum binder performance grade for the job mixes as determined by AASHTO T170 or AASHTO M332.

<sup>2</sup>**Aggregate Nominal Maximum Size** is defined as one sieve size larger than the first sieve to retain more than 10 percent aggregate.

**Note:** SM = Surface Mixture; IM = Intermediate Mixture; BM = Base Mixture

Asphalt concrete shall conform to the requirements for the mix type designated on the plans or elsewhere in the Contract for use.

At the Contractor's option, an approved Warm Mix Asphalt (WMA) additive or process may be used to produce the asphalt concrete (AC) mix type designated.

**Table II-13 – Asphalt Concrete Mixtures: Design Range** is replaced with the following:

**TABLE II-13**  
**Asphalt Concrete Mixtures: Design Range**  
**Percentage by Weight Passing Square Mesh Sieves**

Mix Type	Percentage by Weight Passing Square Mesh Sieves											
	2 in	1 1/2 in	1 in	3/4 in	1/2 in	3/8 in	No. 4	No. 8	No. 30	No. 50	No. 200	
SM-9.0 A,D,E					100 <sup>1</sup>	90- 100	90 max.	47-67				2-10
SM-9.5 A,D,E					100 <sup>1</sup>	90- 100	58-80	38-67	23 max			2-10
SM-12.5 A,D,E			100	95- 100	90 max.	58-80	34-50	23 max				2-10
IM-19.0 A,D,E		100	90- 100	90 max.	--	--	28-49					2-8
BM-25.0 A,D	100	90- 100	90 max.	--	--	--	19-38					1-7
C (Curb Mix)					100	92- 100	70-75	50-60	28-36	15-20		7-9

<sup>1</sup>A production tolerance of 1% will be applied to this sieve regardless of the number of tests in the lot.

**Table II-14 – Mix Design Criteria** is replaced with the following:

**TABLE II-14**  
**Mix Design Criteria**

<b>Mix Type</b>	<b>VTM (%) Production</b>	<b>VFA (%) Design</b>	<b>VFA (%) Production</b>	<b>Min. VMA (%)</b>	<b>Fines/ Asphalt Ratio</b>	<b>No. of Gyrations N Design</b>
SM-9.0A <sup>1,2</sup>	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.0D <sup>1,2</sup>	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.0E <sup>1,2</sup>	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.5A <sup>1,2</sup>	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-9.5D <sup>1,2</sup>	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-9.5E <sup>1,2</sup>	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-12.5A <sup>1,2</sup>	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
SM-12.5D <sup>1,2</sup>	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
SM-12.5E <sup>1,2</sup>	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
IM-19.0A <sup>1,2</sup>	2.0-5.0	69-76	64-81	13.0	0.6-1.2	65
IM-19.0D <sup>1,2</sup>	2.0-5.0	69-76	64-81	13.0	0.6-1.2	65
IM-19.0E <sup>1,2</sup>	2.0-5.0	69-76	64-81	13.0	0.6-1.2	65
BM-25.0A <sup>2,3</sup>	1.0-4.0	67-87	67-92	12.0	0.6-1.3	65
BM-25.0D <sup>2,3</sup>	1.0-4.0	67-87	67-92	12.0	0.6-1.3	65

<sup>1</sup>Asphalt content should be selected at 4.0% air voids for A & D mixes, 3.5% air voids for E mix.

<sup>2</sup>Fines-asphalt ratio is based on effective asphalt content.

<sup>3</sup>Base mix shall be designed at 2.5% air voids. BM-25A shall have a minimum asphalt content of 4.4% unless otherwise approved by the Engineer. BM-25D shall have a minimum asphalt content of 4.6% unless otherwise approved by the Engineer.

**Section 211.04(e)4 – Type E(HP) asphalt mixtures** is inserted as follows:

**Type E(HP) asphalt mixtures** shall consist of mixes incorporating a neat asphalt material with a high polymer modification (approximately 7.5%) complying with AASHTO M332 for PG 76E-28(HP) with the exception that Multiple Stress Creep and Recovery (MSCR) shall have a  $J_{nr3.2}$  maximum value of 0.1 kPa<sup>-1</sup> when tested according to AASHTO T350. The minimum MSCR % recovery at 3.2 kPa shall be 90%. The MSCR test for  $J_{nr}$  and % recovery shall be run at 76°C. The viscosity shall be less than or equal to 3.0 Pa-s, however the Engineer may increase this limit to 5.0 Pa-s if the binder supplier and contractor agree that the binder is suitably workable. HP designated mixtures shall not contain more than 15% RAP material.

**Section 211.05 – Testing** is amended by deleting the eighth and ninth paragraphs.

## SECTION 212 – JOINT MATERIALS

SS212-002016-01

May 13, 2016

**Section 212.02(h) – Gaskets for pipe** is replaced with the following:

**Gaskets for pipe** and box culvert sections shall conform to the following: Rubber gaskets for ductile iron pipe and fittings shall conform to AWWA C111. Rubber gaskets for concrete and metal pipe shall conform to ASTM C443. Rubber gaskets for plastic pipe shall conform to ASTM F 477. Flexible cellular sponge or expanded rubber gaskets for metal pipe shall conform to ASTM D1056. Gaskets for box culvert sections shall conform to ASTM C1677. All gaskets shall conform to the ozone cracking resistance described in Section 237.02 of the Specifications.

## SECTION 217 – HYDRAULIC CEMENT CONCRETE

SS217-002016-01

July 2, 2018

**Section 217.11(a) Slump Flow** is replaced with the following:

**Slump flow** shall be measured in accordance with ASTM C1611, Procedure B. The slump flow shall be  $26 \pm 3$  inches, and there shall be no visible segregation of the mix in the spread. The slump flow shall be compared to the slump flow with the J-ring in accordance with ASTM C1621.

## SECTION 223 – STEEL REINFORCEMENT

SS223-002016-02

August 23, 2017

**Section 223.02(e) – Corrosion Resistant Reinforcing Steel, Class I** is replaced with the following:

Corrosion Resistant Reinforcing Steel, Class I shall conform to AASHTO M 334M/M 334-17 Type 1035 CS with a minimum chromium content of 9.2% or UNS (Unified Numbering System for Metals and Alloys) Designation: S24100.

**Section 223.02(f) – Corrosion Resistant Reinforcing Steel, Class II** is replaced with the following:

Corrosion Resistant Reinforcing Steel, Class II shall conform to AASHTO M 334M/M 334-17. UNS Designation: S32101.

**Section 223.02(g) – Corrosion Resistant Reinforcing Steel, Class III** is replaced with the following:

Corrosion Resistant Reinforcing Steel, Class III shall conform to AASHTOM 334M/M 334-17 . UNS Designations: S24000, S30400, S31603, S31653, S31803, and S32304.

## SECTION 232 – PIPE AND PIPE ARCHES

SS232-002016-02

May 22, 2017

**Section 232.02(c)1 – Corrugated steel culvert pipe and pipe arches** is replaced with the following:

**Corrugated steel culvert pipe and pipe arches** shall conform to AASHTO M36 except that helically formed pipe shall be tested in accordance with AASHTO T249 at the rate of one test per week per corrugation machine per work shift. The Contractor shall maintain records of such test for a period of 24 months. Pipe shall be fabricated from materials conforming to AASHTO M218 for galvanized pipe, AASHTO M274 for aluminum coated pipe, AASHTO M246 for polymer coated pipe and AASHTO M289 for aluminum zinc alloy coated pipe. Steel spiral rib pipe shall be of smooth wall spiral rib construction. When connecting bands or flared end sections are required, helically formed pipe shall have rerolled ends with a minimum of two annular corrugations. End sections shall be produced in accordance with AASHTO M36 from materials conforming to the applicable requirements of AASHTO M218 for use with galvanized pipe, AASHTO M274 for use with aluminum-coated or polymer coated pipe, or AASHTO M289 for use with aluminum zinc alloy-coated pipe.

Joints shall be installed as specified on the plans, in the event the joint is not specified, it shall be a leak-resistant joint.

**Section 232.02(c)4a – Steel encasement pipe** is replaced with the following:

**Steel encasement pipe** shall conform to ASTM A139 or ASTM A53 with a minimum wall thickness of 0.500 inch and shall have beveled edges suitable for welding or be threaded. The hydrostatic test for such pipe will not be required.

**Section 232.02(c)7 – Concrete-lined corrugated steel pipe** is deleted, and paragraphs 8 and 9 are renumbered to 7 and 8, respectively.

**Section 232.02(l) – Polypropylene (PP) Pipe** is replaced with the following:

**Polypropylene (PP) Pipe:** PP corrugated culvert and storm drain pipe shall conform to AASHTO M330, and shall be double wall pipe (Type S) for nominal diameters of 12 inches through 30 inches, inclusive, and shall be triple wall pipe (Type D) for nominal diameters of 36 inches through 60 inches, inclusive. The Department will not permit the use of polypropylene pipe less than 12 inches or greater than 60 inches in diameter. Fittings and joining systems shall also meet AASHTO M330.

**Section 232.02(m) – Pipe Joints** is inserted as follows:

**Pipe joints** shall meet the requirements of AASHTO PP-63 for Soil-Tight, Silt-Tight, Leak-Resistant or other special design, except that leak-resistant joints shall not require infiltration or exfiltration testing in the field, and joints shall be on VDOT Materials Division Approved List for pipe joints. Pipe Joint systems shall be submitted to the Materials Division certifying the system meets the requirements for Soil-Tight, Silt-Tight, Leak-Resistant or Special Design in order to be on the approved list.

**Section 232.02(n) – Pipe to Structure Connections and Waterstops** is inserted as follows:

Manufactured pipe connection systems for connecting pipe to drainage structures shall be submitted to the Materials Division certifying the system meets the requirements for Soil-Tight, Silt-Tight, or Leak-Resistant in order to be on the approved list. When resilient connectors for silt tight connections are specified for concrete pipe to concrete structures, the connectors shall meet the requirements of ASTM C1478. When resilient connectors for leak resistant connections are specified for flexible pipe to concrete structures, the connectors shall meet the requirements of ASTM F2510.

When waterstops are specified, they shall meet the requirements of ASTM F2510, Section 4.1 Materials and Manufacture and Section 4.2 Mechanical Devices. The waterstop shall have a 1 inch minimum keylok anchor embedded into the concrete or mortar connection on pipe sizes below 18 inch diameter and 1.5 inch for pipe 18 inches and greater in diameter. There shall be a minimum 2 inches of concrete or mortar connection around the rubber gasket to permit proper consolidation around the gasket. All waterstops shall be secured to the pipe with a take-up clamp before applying mortar.

## **SECTION 242 – FENCES**

**SS242-002016-01**

**February 1, 2017**

**Section 242.02(c)2 – Posts for temporary silt fences** is replaced with the following:

**Posts for temporary silt fences** shall be a nominal 2 by 2 inch oak, or steel having a weight of at least 1.25 pounds per linear foot.

## **SECTION 244 – ROADSIDE DEVELOPMENT MATERIALS**

**SS244-002016-01**

**July 5, 2016**

**Section 244.02(l) – Rolled Erosion Control Products** is replaced by the following:

**Rolled Erosion Control Products:**

1. **Rolled Erosion Control Products (Standard EC-2)** shall conform to Table II-22C and the following requirements. EC-2 products shall be designed for use on geotechnically stable slopes and channels as detailed herein.
  - a. **EC-2, Type 1** shall be a relative short-term single-net erosion control blanket or open weave textile. EC-2, Type 1 shall be one of the following materials: (1) an erosion control blanket composed of processed degradable natural or polymer fibers mechanically-bound together by a single degradable synthetic or natural fiber netting to form a continuous matrix; or (2) an open weave textile composed of processed degradable natural or polymer yarns or twines woven into a continuous matrix. EC-2, Type 1 shall typically have a 12-month functional longevity from the date of installation, be designed for use on up to 1V:3H slopes and channels, with shear stresses up to 1.50 pounds per square foot.
  - b. **EC-2, Type 2** shall be a relative short-term double-net erosion control blanket. The blanket shall be composed of processed natural or polymer fibers mechanically bound between two natural fiber or synthetic nettings to form a continuous matrix. EC-2, Type 2 materials shall typically have a 12-month functional longevity from the date of installation, be designed for use on up to 1V:2H slopes and channels, with shear stresses up to 1.75 pounds per square foot.
  - c. **EC-2, Type 3** shall be an extended term erosion control blanket or open weave textile. EC-2, Type 3 blankets shall be one of the following materials: 1) an erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically-bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix; or 2) an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix. EC-2, Type 3 material shall typically have a 24-month functional longevity from the date of installation, be designed for use on slopes up to 1V:1.5H and channels, with shear stresses up to 2.00 pounds per square foot.
  - d. **EC-2 Type 4** shall be a long-term erosion control blanket or open weave textile. EC-2, Type 4 blankets shall be one of the following materials: (1) an erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically-bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix; or (2) an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix. EC-2, Type 4 material shall typically have a 36-month functional longevity from the date of

installation, be designed for use on up to 1V:1H slopes and channels, with shear stresses up to 2.25 pounds per square foot.

2. **Permanent Rolled Erosion Control Products (Standard EC-3)** shall be permanent turf reinforcement mats conforming to Table II-22D and the following.
  - a. **EC-3, Type 1** shall be a non-degradable mat of sufficient thickness, strength and void space for permanent erosion protection and vegetation reinforcement on geotechnically stable slopes with gradients up to 1V:1.5H, channels with design shear stresses up to 6.0 pounds per square foot, and on other areas where design flow conditions exceed the limits of sustainability for mature natural vegetation.
  - b. **EC-3, Type 2** shall be a non-degradable mat with sufficient thickness, strength and void space for permanent erosion protection and vegetation reinforcement on geotechnically stable slopes with gradients up to 1V:1H, channels with design shear stresses up to 8.0 pounds per square foot, and other areas where design flow conditions exceed the limits of sustainability for mature natural vegetation.
  - c. **EC-3, Type 3** shall be a non-degradable mat with sufficient thickness, strength and void space for permanent erosion protection and vegetation reinforcement for use on geotechnically stable slopes up to 1V:0.5H, channels with design shear stresses up to 10.0 pounds per square foot, and other areas where design flow conditions exceed the limits of sustainability for mature natural vegetation.

## **SECTION 245 – GEOSYNTHETICS AND LOW PERMEABILITY LINERS**

**SS245-002016-05**

**February 26, 2018**

**Section 245.03 – Testing and Documentation** is amended by replacing the third paragraph with the following:

Property values in these specifications represent minimum average roll values (MARV) in the weakest principal direction unless direction is otherwise specified; permittivity values specified are minimum; AOS and panel vertical strain values are maximum; mass per unit area, UV degradation, and asphalt retention values are typical.

**Section 245.03(e) – Prefabricated Geocomposite Pavement Underdrain** is replaced with the following:

**Prefabricated Geocomposite Pavement Underdrain:** Prefabricated geocomposite pavement underdrain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility

to withstand bending and handling without damage. Prefabricated geocomposite pavement underdrain shall conform to the following:

1. **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the pavement environment and shall have a thickness of not less than 3/4 inch. Outer surfaces shall be smooth to prevent excessive wear of bonded filter fabric.

Physical Properties	Test Method	Requirements
Compressive strength panel vertical strain and core area change	ASTM D1621/ D2412/ D6364	Min. 40 psi at 20% deflection after 24 hrs at 0 deg F and at 125 deg F
Water flow rate (after 100 hr at 10 psi normal confining pressure gradient of no more than 0.1)	ASTM D4716	Min. 15 gal/min/ft width for 12-in specimen length

2. **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein.

**Section 245.03(f) – Geocomposite Wall Drains** is replaced with the following:

**Geocomposite Wall Drains:** Prefabricated geocomposite wall drain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Geocomposite wall drains shall conform to the following:

1. **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the roadway. Outer surfaces shall be smooth to prevent excessive wear of bonded filter fabric.

Physical Property	Test Method	Requirements
Compressive strength at 20% deflection	ASTM D1621/ D2412/ D6364	Min. 40 psi after 24 hrs at 0 degree F and at 125 degree F
Water flow rate (after 100 hr at 10 psi normal confining pressure and gradient of no more than 1.0)	ASTM D4716	Min. 15 gal/min/ft width (for 12-in specimen length)

2. **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over both sides of the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein, except that grab strength requirement shall meet AASHTO M288 Table 1, Class 2.

**Section 245.03(h) – Dewatering Bag** is replaced with the following:

**Dewatering Bag:** A nonwoven geotextile sewn together to form a bag that can be used in lieu of a de-watering basin for the purpose of filtering out suspended soil particles. The bag shall be capable of accommodating the water flow from the pump without leaking at the spout and seams.

<b>Physical Property</b>	<b>Test Method</b>	<b>Requirements</b>
Grab strength @	ASTM D4632	Min. 250 lb (min)
Elongation >50%(CRE/Dry)		
Seam strength	ASTM D4632	90% Specified grab strength
Puncture	ASTM D6241	Min. 150 lb
Flow rate	ASTM D4491	Min. 0.189 ft3/sec/ft2(min)
Permittivity	ASTM D4491	Min. 1.2 sec-1
UV resistance	ASTM D4355	Min. 70% at 500 hr
AOS	ASTM D4751	Max. 100 sieve

**Section 245.03(i) – Pavement Interlayer** is replaced with the following:

**Pavement Interlayer** products shall be listed on the Materials Division Approved List No. 63. All interlayer material shall be from National Transportation Product Evaluation Program (NTPEP)-compliant manufacturers, and shall be evaluated through NTPEP; tests not covered by the NTPEP Geosynthetics Work Plan shall be performed by independent, certified laboratories and submitted to the State Materials Engineer. Testing for products not covered by NTPEP shall be on a minimum 3-year cycle also. Terms defined by ASTM D4439 shall apply herein, except when they conflict with terms defined by Section 101.

For Paving Fabric, Paving Mat, Paving Grid, and Composite Paving Grid, the Contractor shall provide asphalt retention rates (ASTM D6140), material properties specified herein, and manufacturer’s recommendations for tack application to the Engineer at the preconstruction meeting. The total minimum tack coat application rate sprayed in the field shall meet the manufacturer’s recommendations, but shall be clearly totaled at the pre-construction meeting as the components of the asphalt retention rate and the additional rate based on the anticipated surface condition of pavement.

1. **Paving Fabric, Type I & II:** All paving fabrics shall meet the requirements of the table below, and have 50% retained strength after 500 hours of UV exposure when tested in accordance with ASTM D4355.

Property	Test Method	Type I	Type II
Mass per unit area, min (oz/yd <sup>2</sup> )	ASTM D5261	4.5	4.1
Grab Tensile Strength, min (lbs.)	ASTM D4632	120	101
Grab Tensile Elongation, min (%)	ASTM D4632	50	50
Melting point, min (°F)	ASTM D276	320 <sup>1</sup>	320 <sup>1</sup>

<sup>1</sup>320 is the softening/melt point of polypropylene. See Section 318.03 for more on placement temperature.

2. **Paving Mat; Type I, II, and III:** Materials used for paving mat shall be a hybrid of two or more of the following material types: fiberglass, polyester, or polypropylene. Paving mat shall meet the requirements of the table below.

Property	Test Method	Type I	Type II	Type III
Tensile Strength, min (lb/in)	ASTM D5035	280	140	45
Ultimate Elongation, max (%)	ASTM D5035	5	5	5
Melting Point, min (°F)	ASTM D276	320 <sup>1</sup>	320 <sup>1</sup>	320 <sup>1</sup>
Mass/Unit Area, min (oz/yd <sup>2</sup> )	ASTM D5261	7.0	4.0	4.0

<sup>1</sup>320 is the softening/melt point of polypropylene, which is lower than either polyester or fiberglass. See Section 318.03 for more on placement temperature.

3. **Paving Grid: Type I, II, & III:** Materials used for paving grids shall be comprised of fiberglass and shall meet the requirements of the table below. Some paving grids are self-adhesive and some require nails for installation. Tack coat required for the installation of the overlay shall be specified with the paving grid. Refer to manufacturer's recommendations for tack coat type and application rate.

Property	Test	Type I	Type II	Type III
Tensile Strength, min (lbs/in) <sup>1</sup>	ASTM D6637, Method A, modified	560 x 1,120	560	280
Aperture size, min (in)	Calipered	0.5	0.5	0.5
Elongation, max (%)	ASTM D6637	3	3	3
Mass per area, min (oz/yd <sup>2</sup> )	ASTM D5261	16	10	5.5
Melting Point, min (°F) (fabric component – if applicable)	ASTM D276	420 <sup>2</sup>	420 <sup>2</sup>	420 <sup>2</sup>

<sup>1</sup>For Type I, machine and cross direction respectively. Strengths for Type II and III are in both directions

4. **Composite Paving Grids: Type I, II, & III:** Composite paving grids shall consist of a fiberglass, polyester, or polyvinylacetate (PVA) paving grid integrated with a nonwoven geotextile and meet the requirements of the table below.

Property	Test	Type I	Type II	Type III
Tensile Strength, Min (lbs/in) <sup>1</sup>	ASTM D6637, Method A, modified	560 x 1,120	560	280
Aperture size, Min (in)	Calipered	0.5	0.5	0.5
Elongation, Max (%)	ASTM D6637	5	5	10
Mass per area, Min (oz/yd <sup>2</sup> )	ASTM D5261	16	10	5.5
Melting Point, Min (°F) (fabric component)	ASTM D276	320 <sup>2</sup>	320 <sup>2</sup>	320 <sup>2</sup>

<sup>1</sup>For Type I, machine and cross direction respectively. Strengths for Type II and III are in both directions.

<sup>2</sup>320 is the assumed softening/melt point of PVA. See Section 318.03 for more on placement temperature.

5. **Pavement Repair and Bridge Deck Waterproofing Strip Membrane: Materials used for strip membranes shall be comprised of** composite self-adhering rubberized asphalt attached to a paving fabric, a paving mat, or a paving grid and meet the requirements of the table below.

Property	Test Method	Type I
Strip Tensile Strength, min (lb/in)	ASTM D882	50
Puncture Resistance, min (lbs)	ASTM E154	200
Permeance-Perms, max	ASTM E-96 Method B	0.05
Pliability - 1/4" Mandrel 180° Bend at -25 °F	ASTM D146	No cracks in fabric or rubberized asphalt

**Section 245.03(k) – Fabric for Use in Turbidity Curtains** is inserted as follows:

**Fabric for Use in Turbidity Curtains:** This fabric shall consist of synthetic fabric coated with suitable elastomeric or polymeric compound. The coating shall have a high resistance to weathering, hydrocarbons, fresh and salt water, and temperature extremes. The curtain shall form a continuous vertical and horizontal barrier for the entire width and length of each section. Seams, if required, shall be either vulcanized welded or sewn and shall develop the full strength of the fabric.

The curtain fabric shall meet the minimum requirements noted below:

<b>Physical Properties of Turbidity Curtain Fabric</b>	
Physical Property	Requirement
Weight (oz/yd <sup>2</sup> )	
Type I	18
Type II	22
Type III	22
Grab Tensile Strength (ASTM D 4632)	300 lbs
UV Inhibitor	Required

**SECTION 248 – STONE MATRIX ASPHALT CONCRETE**

**SS248-002016-01**

**August 1, 2018**

**Table II-24 – SMA Design Range** is replaced with the following:

**TABLE II-24  
SMA Design Range**

<b>Type No. (See Note)</b>	<b>Percentage by Weight Passing Square Mesh Sieves (in)</b>							
	1	3/4	1/2	3/8	No. 4	No. 8	No. 30	No. 200
Surface Mixes								
SMA 12.5		100	83-93	80 max	22-28	16-24	15-20	9-11
SMA 9.5		100	90-100	65-75	25-32	15-25		9-11
Intermediate Mixes								
SMA 19.0	100	85-95	50-60	30-45		16-24	12-16	8-10

Note: The required PG binder will be shown in parentheses as part of the mix type on the Plans or in the Proposal, e.g., SMA 12.5 (64E-22).

**Section 248.04—Acceptance** is amended by deleting the seventh and eighth paragraphs.

**SECTION 302 – DRAINAGE STRUCTURES**

**SS302-002016-01**

**April 28, 2016**

**Section 302.03(a)2d – Joining Pipe** is replaced with the following:

**Joining pipe:** The inspector will verify the correct joint materials are used and installed correctly.

- (1) **Rigid pipe:** The Contractor’s method of joining pipe sections shall be such that the sections are aligned and firmly joined to form the joint as specified on the plans.. The joint type shall be installed as specified on the plans, in the event the joint is not specified, it shall be a leak-resistant joint.
- (2) **Flexible pipe:** Flexible pipe sections shall be aligned and firmly joined to form the joint as specified on the plans. In the event the joint is not specified, it shall be a leak-resistant joint.

**Section 302.03(a)3 – Tunneling operations** is amended by replacing the sixth paragraph with the following:

Joints will be designed by the Engineer and specified on the plans.

**Section 302.03(b) – Precast Drainage Structures** is amended by inserting the following language after the first paragraph:

Precast units, excluding concrete pipe and prestressed concrete items, conforming to the requirements herein will only be accepted under a Quality Assurance (QA) Program. The Contractor shall have the producer perform quality control functions in accordance with a Department approved QA plan. Each piece, manufactured under the QA program, in addition to the date and other required markings, shall be stamped with the letters (QC), as evidence that the required quality control procedures have been performed by the producer. Each shipping document shall be affixed with the following:

We certify that these materials have been tested and conform to VDOT Precast Concrete Products Quality Assurance Program

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Signature and Title

**Section 302.03(b)1 – Standard Precast Drainage Units** is replaced with the following:

**Standard precast drainage units** shall conform to the material requirements of AASHTO M 199 and the following:

- a. If the grade on the adjacent gutter is less than 1.5 percent, the grade on the invert of the throat section of the inlet shall be at least 1.5 percent. Precast

throats having flat inverts will be permitted in sag locations provided the total length of the required throat opening does not exceed 6 feet.

- b. Pipe openings in precast drainage units shall not exceed the outside cross-sectional dimensions of the pipes by more than a total of 8 inches regardless of the placement of the pipes, the angles of intersection, or the shapes of the pipes. Pipe openings shall be formed, neatly drilled, or neatly cut.
- c. The Contractor shall use the connection specified on the plans to connect pipe to structure. In the event the joint is not specified, it shall be a leak-resistant joint.
- d. When precast units are to be located adjacent to the subbase or base pavement course, the Contractor shall furnish units with chambers having weep holes 3 inches in diameter and hardware cloth. Weep holes shall be located to drain the subbase or base.
- e. Precast units located adjacent to cast-in-place concrete items, such as flumes, ditches, and gutters shall be connected to the adjacent unit by means of No. 4 smooth steel dowels spaced on approximately 12-inch centers throughout the contact length and extending at least 4 inches into the precast unit and the cast-in-place item. If holes to receive the dowels are provided in the precast unit, they shall be not more than 5/8 inch in diameter. The Engineer must approve other methods of providing the connection, such as keyed joints prior to fabrication.
- f. The chamber section shall be installed in the plumb position. The throat and top sections shall have positive restraints, such as adjacent concrete, pavement, or soil, on all sides to prevent displacement and shall have a positive interlock, such as dowels, with the chamber section. The throat and top sections shall be installed to conform to the normal slope of the finished grade and may be canted up to a maximum grade of 10 percent. The chamber may be built up to a maximum of 12 inches at any point to provide for complete and uniform bearing of the throat and top sections on the chamber flat slab top or other approved top section. The built-up section shall be constructed using whole concrete spacer units where feasible and partial and whole sections of concrete block or brick with high-strength grout and mortar. High-strength grout shall be used to provide the final grade adjustment and uniform bearing. The width of the built-up section shall match the wall thickness of the chamber section. The concrete block and brick shall be thoroughly bonded with mortar and the inside and outside of the built-up section shall be plastered with mortar except that the concrete spacer unit shall not be plastered.

**Section 302.03(b)2c – Joints** is replaced with the following:

**Joints:** Precast arch joints shall meet the requirements of AASHTO PP-63 and be on VDOT Materials Division Approved List No. 14 for pipe joints. The joint type shall be installed as specified on the plans, in the event the joint is not specified, it shall be a leak-resistant joint.

**Section 302.03(c) – Drop Inlets, Manholes, Junction Boxes, Spring Boxes, Intake Boxes, and Endwalls** is amended by replacing the ninth paragraph with the following:

Inlet and outlet pipe connections shall be as specified on the plans. In the event the joint is not specified, it shall be a leak-resistant joint. Pipe sections shall be flush on the inside of the structure wall and shall project outside sufficiently for proper connection with the next pipe section. When masonry connections are used, the masonry shall fit neatly and tightly around the pipe, and shall be finished on the exterior of the structure prior to backfilling, and finished on the interior of the structure after backfilling of the structure.

**Section 302.04 – Measurement and Payment** is amended by replacing the twelfth paragraph with the following:

**Cast-in-place box culverts** will be measured in cubic yards of concrete and pounds of reinforcing steel and will be paid for at the contract unit price per cubic yard of concrete and per pound of reinforcing steel. These prices shall include sheeting, shoring, dewatering, waterproofing, disposing of surplus and unsuitable material, restoring existing surfaces, the upper 6 inches of bedding material within the neat lines shown on the Standard PB-1 drawings, and all necessary work to key the bottom slab into an existing rock foundation. When not a pay item the cost of temporary stream relocation to facilitate the installation of the structure shall be included in the price for the concrete and steel. Minor Structure Excavation will be paid for in accordance with Section 303 of the Specifications.

**Section 302.04 – Measurement and Payment** is amended by replacing the fourteenth paragraph with the following:

**Precast box culverts** will be measured in linear feet along the centerline of the barrel from face of curtain wall to face of curtain wall and will be paid for at the contract unit price per linear foot, unless they are substituting for cast-in-place box culverts. In the event precast box culverts are substituted for cast-in-place box culverts, payment will be made at the contract unit price per cubic yard of concrete and per pound of reinforcing steel for the cast-in-place box culvert plan quantities. This price shall include designing, casting, reinforcing, sheeting, shoring, dewatering, installing, waterproofing, sealing joints, anchoring, disposing of surplus and unsuitable material, restoring existing surfaces, the upper 6 inches of bedding material within the neat lines shown on the Standard PB-1 drawings, fittings, and providing buffer zones and porous backfill for multiple lines. When not a pay item the cost of temporary stream relocation to

facilitate the installation of the structure shall be included in the price for the box culvert. Minor Structure Excavation will be paid for in accordance with Section 303 of the Specifications.

## SECTION 303—EARTHWORK

SS303-002016-03

October 6, 2017

**Section 303.02(c) – Geotextile materials used for embankment stabilization** is replaced with the following:

**Geotextile materials used for embankment stabilization** shall conform to Section 245.03(d).

**Section 303.02(f) – Fabric used for Turbidity Curtains** is inserted as follows:

**Fabric used for Turbidity Curtains** shall conform to Section 245.03(k).

**Section 303.03(b) – Soil Stabilization** is amended by replacing the first paragraph with the following:

**Soil Stabilization:** The Contractor shall begin soil stabilization as soon as practicable, but no later than the end of the next business day, following the day when the land-disturbing activities on any portion of the Project have permanently or temporarily ceased for an anticipated duration of greater than 14 days. The Contractor shall complete soil stabilization within seven days of reaching final grade or from when land-disturbing activities have permanently or temporarily ceased for an anticipated duration of greater than 14 days. Initiation of soil stabilization includes, but is not limited to, prepping the soil for vegetative or non-vegetative stabilization, applying mulch or other non-vegetative product to exposed soil, and seeding or planting the exposed area. The Contractor can initiate soil stabilization activities on a portion of the area to be stabilized and not on the entire area, so long as the initiation and completion of stabilization activities occurs on the entire disturbed area within the allowable timeframe for soil stabilization. Areas within 100 feet of the limits of ordinary high water or a delineated wetland are excluded from this requirement, but the work shall be continuously prosecuted until completed, and then stabilized immediately upon completion of the work in each impacted area. Soil stabilization includes: temporary and permanent seeding, riprap, aggregate, sod, mulching, and soil stabilization blankets and matting in conjunction with seeding. The applicable type of soil stabilization shall depend upon the location of areas requiring stabilization, time of year, weather conditions, and stage of construction operations.

**Section 303.03(c) – Check Dams** is amended by replacing the second paragraph with the following:

Synthetic check dams recorded in the Department's Approved List No. 58 may be substituted for Standard EC-4, Rock Check Dams, Type II, with the approval of the Engineer at no additional cost to the Department. Synthetic check dams shall be installed in accordance with the manufacturer's instructions.

**Section 303.03(e)3 – Temporary filter barriers** is deleted.

**Section 303.03(g) – Erosion Control Mulch** is amended by replacing the second paragraph with the following:

Mulch shall be applied to exposed slopes requiring mulch or to areas to be stabilized or paved within 48 hours after performance of grading operations in accordance with Section 603.03(e).

**Section 303.03(i) – Turbidity Curtain** is replaced with the following:

**Turbidity Curtain:** This work consists of installation, maintenance, and removal of a turbidity curtain, including all necessary cables, weights, and floats in accordance with this provision and in conformity with the lines, grades and details shown on the Plans or established by the Engineer. The curtain shall be provided as a temporary measure to minimize the drift of suspended material during construction of the Project.

**Type I** turbidity curtain shall be used in protected areas that are sheltered from waves; and exposed only to light winds, and to current velocities of less than one foot per second.

**Type II** turbidity curtain shall be used in areas subject to small to moderate current velocities (up to 2 knots or 3.5 feet per second) or moderate wind and wave action.

**TYPE III** turbidity curtain shall be used in areas subject to considerable current (up to 3 knots or 5 feet per second), tidal action, or where the curtain is potentially subject to wind and wave action.

In locations with currents greater than 3 knots (5 feet per second) perpendicular to the barrier, or weather conditions that cause a turbidity barrier to be ineffective, a turbidity barrier shall not be used.

Floatation shall be flexible, buoyant units contained in a floatation sleeve or collar attached to the curtain. Buoyancy provided by the floatation units shall be sufficient to support the required width of the curtain and maintain a freeboard of at least 3 inches above the water surface level, to a minimum of one foot above the bottom or a maximum ten foot depth at all stages of water levels.

Load lines shall be fabricated into the top and bottom of the curtain. The top load line shall consist of woven webbing or vinyl-sheathed steel cable and shall have a minimum break-strength of 9,800 pounds. The bottom load line shall consist of a chain incorporated into the bottom hem of the curtain of sufficient weight to serve as ballast to hold the curtain in a vertical position. Additional anchorage shall be provided if necessary to top load lines. The load lines shall have suitable devices, which develop the full breaking strength for connecting to load lines in adjacent sections.

The Contractor shall submit Working Drawings to the Engineer for review in accordance with Section 105.

The curtain shall be placed at the locations shown on the Plans and in accordance with the approved Working Drawings. The Contractor shall maintain the turbidity curtain in order to ensure the continuous protection of the waterway.

The curtain shall extend the entire depth of the watercourse whenever the watercourse is not subject to tidal action or significant wind or wave action.

In tidal or wind-and-wave action situations, the curtain shall never touch the bottom. A minimum 1-foot gap shall be established between the weighted lower end of the skirt and the bottom at the mean low water.

Turbidity curtains installed in a navigable waterway shall be marked with lighted buoys that conform to U.S. Coast Guard regulations.

When the curtain is no longer required as determined by the Engineer, the curtain and related components shall be removed in such a manner as to minimize turbidity. The curtain and related components shall become the property of the Contractor and shall be removed from the project.

**Section 303.06(e)8 – Temporary filter barriers** is deleted.

**Section 303.06(e)20 – Turbidity Curtain** is replaced with the following:

**Turbidity curtain** will be measured in linear feet from edge of the curtain along the support cable. Turbidity curtain will be paid for at the contract unit price per linear foot for the type specified. This price shall include design details, furnishing, installing, maintaining, and removal of all materials necessary to complete the work.

## **SECTION 310 – TACK COAT**

**SS310-002016-01**

**September 14, 2018**

**SECTION 310 – TACK COAT** of the Specifications is replaced with the following:

### 310.01 – Description

This work shall consist of preparing and treating an existing asphalt or concrete surface with asphalt in accordance with these specifications and in conformity with the lines shown on the plans or as established by the Engineer.

### 310.02—Materials

The Contractor shall not dilute tack coat or non-tracking tack coat materials with water.

- (a) **Tack Coat.** Asphalt tack coat shall be CQS-1h, CRS-1h, or CSS-1h conforming to Section 210. Asphalt emulsion CMS-2 conforming to Section 210 may be used during the winter months.
- (b) **Non-Tracking Tack Coat** liquefied asphalt shall be selected from the Materials Division's Approved Products List 50.1A.

### 310.03—Procedures

The existing surface shall be patched, cleaned, and rendered free from irregularities to the extent necessary to provide a reasonably smooth and uniform surface. The Contractor shall remove unstable corrugated areas, and replace with suitable patching materials when required by the Contract. The Contractor shall clean the edges of existing pavements that are to be adjacent to new pavement to permit adhesion of asphalt.

The Contractor shall uniformly apply tack coat or non-tracking tack coat material with a pressure distributor conforming to Section 314.04(b). Hand spray equipment shall not be used except in areas inaccessible by a pressure distributor.

The distributor shall be calibrated by the Contractor in the presence of the Engineer prior to initial asphalt plant mix placement to demonstrate an even and accurate spray application. Calibration will be considered acceptable when the spray rate is uniform and within 0.02 gal/yd<sup>2</sup> of the design application rate.

All tack coat and non-tracking tack coat materials stored longer than 30 days from the shipping date on the Bill of Lading shall be retested in accordance with Section 210.06 to verify the material still meets product specifications.

Tack at joints, adjacent to curbs, gutters, or other appurtenances shall be applied with a hand wand or with a spray bar at the rate of 0.2 gal/yd<sup>2</sup>. At joints, the tack applied by the hand wand or a spray bar shall be 2 feet in width with 4 to 6 inches protruding beyond the joint for the first pass. Tack for the adjacent pass

shall completely cover the vertical face of the pavement mat edge so that slight puddling of asphalt occurs at the joint, and extend a minimum of 1 foot into the lane to be paved.

Care shall be taken to prevent spattering adjacent items during the application of tack coat. The distributor shall not be cleaned or discharged into ditches or borrow pits, onto shoulders, or along the right of way.

When not in use, the Contractor shall ensure equipment is parked so that the spray bar or mechanism will not drip asphalt on the surface of the traveled way.

The tack coat or non-tracking tack coat shall be applied to the pavement surface in such a manner that it will bond the overlay and the underlying surfaces together.

The Contractor shall apply tack coat and non-tracking tack coat in accordance with the weather limitations that apply to the course being placed as well as the manufacturer's recommendations. The Engineer will verify, and reserves the right to alter, the quantity, rate of application, temperature, and areas to be treated prior to application.

The tack coat or non-tracking tack coat shall be applied in a manner to offer the least inconvenience to traffic and to permit one-way traffic without pick up or tracking of the asphalt onto adjacent non-treated areas. All traffic, including construction traffic, shall be excluded from tacked sections until the tack has cured.

Tack shall not be required atop asphalt stabilized open-graded material drainage layers.

The Contractor shall measure and report the rate of tack material applied on a daily basis using VTM-137 Method B (Tack Yield Method), on forms provided by the Engineer. On a daily basis, the Contractor shall provide the Engineer readings taken from the calibrated distributor establishing the quantity of gallons placed for that day.

The Engineer will verify the desired tack application rate is achieved using VTM-137 Method A (Tack Plate Method). This test shall be performed, at a minimum frequency of once per each roadway, within the first 500 tons of asphalt mix placed, unless otherwise approved by the Engineer.

The Engineer reserves the right to perform the tack plate method testing at a higher frequency, as determined necessary, to ensure adherence to specifications.

(a) **Tack Coat**

Equipment for heating and applying asphalt shall conform to Section 314.04(b). The maximum application temperature of liquid asphalt shall conform to Table III-1.

**TABLE III-1  
Liquid Asphalt Application Temperature**

<b>Grade</b>	<b>Max. Temperature (°F)</b>
RC-70	180
RC-250	220
RC-800	225
RC-3000	290
MC-70	180
MC-250	220
MC-800	255
MC-3000	290
AC-5	300
AC-10	300
AC-20	300
AC-40	300
RS-2	175
SS-1h	180
AE-4	150
CRS-2	175
CSS-1h	180
CMS-2	200
CRS-1h	175
CRS-1	175
CQS-1h	180

The Contractor shall apply asphalt at the rate of 0.05 to 0.10 gal/yd<sup>2</sup>.

The Contractor shall allow the tack coat to properly cure and break before placement of the hot mix asphalt course.

(b) **Non-Tracking Tack Coat**

The Contractor shall apply nontracking tack coat between May 1 and October 1. The Contractor may use tack coat as specified herein at other times.

Equipment for heating and applying asphalt shall conform to Section 314.04(b) or the non-tracking tack coat material's manufacturer's

recommendations. The maximum application temperature of liquefied asphalt shall conform to the manufacturer's requirements.

The Contractor shall apply tack material at the rate recommended by the manufacturer. This rate is typically between 0.05 to 0.10 gal/yd<sup>2</sup>.

Adjacent concrete or asphalt concrete surfaces shall show minimal visible evidence and white or yellow pavement markings shall show no visible evidence of the asphalt tack material tracking at the end of the production shift. Tracking of the tack material on pavement markings will require the Contractor to immediately restore the marking to their original pre-tack condition. The Contractor shall remove Build-up of the tacking material on existing pavement surfaces.

### (c) **Referee System**

When a new asphalt course is placed on a milled or non-milled surface, the Contractor shall take steps to ensure an adequate bond is made between the new material and the existing surface. If the Engineer suspects the Contractor is failing to apply good bond promoting procedures or adequately tacking the existing surface per the manufacturer's recommendations, the Engineer may core a minimum of five core locations to determine the shear strength of the interface.

The Engineer will determine these locations by using a stratified random selection process. The Department will test cores in the Department's laboratory in accordance with VTM-128. For the surface to be acceptable, the average results for shear strength specified herein must be met.

1. **Milled surfaces:** The average shear strength must meet or exceed 100 psi with no single core having a shear strength less than 50 psi.
2. **Un-milled surfaces:** The average shear strength must meet or exceed 50 psi with no single core having a shear strength less than 30 psi.

The Contractor shall remove and replace the area if the minimum shear strength requirements in that area are not met at no cost to the Department.

### **310.04—Measurement and Payment**

**Tack coat**, whether standard Tack Coat or Non-Tracking Tack Coat, when a pay item, will be measured in gallons and paid for at the Contract gallon price. The volume will be based on daily volume with temperature corrections in accordance with Section 109.

When not a pay item the Contractor shall include the cost in the contract unit price for other appropriate items.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Tack coat	Gallon

**SECTION 313 – ASPHALT-STABILIZED OPEN-GRADED MATERIAL**  
**SS313-002016-01** **August 7, 2017**

**Section 313.02(c) – Asphalt Cement** is replaced with the following:

**Asphalt cement** shall be PG 64H-22.

**SECTION 315 – ASPHALT CONCRETE PLACEMENT**  
**SS315-002016-02** **September 18, 2018**

**Section 315.04(a) Asphalt Concrete Produced with Warm Mix Asphalt Additives or Processes** is amended to add the following before all subparagraphs:

The Contractor shall note on the delivery ticket that the load is Warm Mix Asphalt.

**Section 315.05(c) Placing and Finishing** is modified by replacing the third paragraph with the following:

The longitudinal joint in one layer shall offset that in the layer immediately below by approximately 6 inches or more. The joint in the wearing surface shall be offset 6 inches to 12 inches from the centerline of the pavement if the roadway comprises two traffic lanes. The joint shall be offset approximately 6 inches from the lane lines if the roadway is more than two lanes in width. The longitudinal joint shall be uniform in appearance. If the offset for the longitudinal joint varies from a straight line more than 2 inches in 50 feet on tangent alignment, or from a true arc more than 2 inches in 50 feet on curved alignment, the Contractor shall seal the joint using a water-proof sealer at no cost to the Department. The Contractor shall recommend a sealant and installation procedure to the Engineer for approval before proceeding. If the offset for the longitudinal joint varies from a straight line more than 3 inches in 50 feet on tangent alignment, or from a true arc more than 3 inches in 50 feet on curved alignment, the Engineer may reject the paving. The Engineer will not require offsetting layers when adjoining lanes are paved in echelon and the rolling of both lanes occurs within 15 minutes after laydown.

**Table III-5 – Payment Schedule for Surface, Intermediate and Base Courses** is replaced with the following:

**TABLE III-5**  
**Payment Schedule for Surface, Intermediate and Base Courses**  
**(Not sufficient quantity to perform density roller pattern and control strip)**

% TMD	% of Payment
Greater than or equal to 92.2 <sup>1</sup> /92.5 <sup>2</sup>	100
90.0-92.1 <sup>1</sup> /92.4 <sup>2</sup>	90
88.0-89.9	80
Less than 88.0	75

<sup>1</sup>The minimum TMD percentage for Intermediate and Base Mixes

<sup>2</sup>The minimum TMD percentage for Surface Mixes

**Section 315.05(e)2 Surface, intermediate, and base courses** is replaced with the following:

**Surface, intermediate, and base courses** not having a sufficient quantity of material to run a roller pattern and control strip, and unique sections defined on the Plans or within the Contract that are 3500 feet or less and at least 6 feet in width shall be compacted to a minimum density of 92.5 percent for surface mixes or 92.2 percent for intermediate and base mixes as determined in accordance with VTM-22. The Contractor shall be responsible for cutting cores or sawing plugs for testing by the Department. One plug or core shall be obtained within the first 500 feet of small quantity paving and every 1000 feet thereafter for testing by the Department. Plug or core locations shall be randomly selected by the Engineer. If the density is determined to be less than the minimum, the Engineer will make payment in accordance with Table III-5

Any section in which a mixture (e.g., SM-9.0) is being placed at an application rate of less than 125 pounds per square yard (based on 110 pounds per square yard per inch) that does not have a sufficient quantity of material for a roller pattern and control strip shall be compacted by rolling a minimum of three passes with a minimum 8-ton roller. The Engineer will not require density testing.

For asphalt patching, the minimum density of 91.5 percent of the maximum theoretical density will be determined in accordance with VTM-22. The Contractor is responsible for cutting cores or sawing plugs. One set of cores or plugs shall be obtained within the first 20 tons of patching material and every 100 tons thereafter for testing by the Contractor or the Department. The Engineer will randomly select plug or core locations. If the density is less

than the 91.5 percent, payment will be made on the tonnage within the 20 or 100 ton lot in accordance with Table III-6.

**Table III-6 – Payment Schedule for Surface, Intermediate, and Base Courses (Asphalt Patching)** is inserted as follows:

**TABLE III-6**  
**Payment Schedule for Surface, Intermediate and Base Courses**  
**(Asphalt Patching)**

% TMD	% of Payment
Greater than or equal to 91.5	100
90.2-91.4	95
88.3-90.1	90
Less than or equal to 88.2	75

**Section 315.05(g) Rumble Strips** is replaced with the following:

**Rumble Strips:** This work shall consist of constructing rumble strips or rumble stripes on mainline shoulders of highways by cutting concave depressions into existing asphalt concrete surfaces as shown on the Standards Drawings and as directed by the Engineer. Rumble stripes are defined as edgeline or centerline rumble strips with permanent longitudinal pavement markings subsequently installed within the rumble strip grooves.

Rumble strips and rumble stripes shall be installed in accordance with the RS-Series Standard Drawings. The Contractor shall demonstrate to the Engineer the ability to achieve the desired surface regarding alignment, consistency, and conformity with these Specifications and the Standard Drawings prior to beginning production work on mainline shoulders or centerlines. The test site shall be approximately 25 feet longitudinally at a location mutually agreed upon by the Contractor and Engineer.

Rumble strips and rumble stripes shall be coated with liquid asphalt coating (emulsion) when the rumble strips or rumble stripes are being cut into an existing asphalt surface (i.e. more than one year since placement); when new rumble strips or rumble stripes are being cut into the pavement surface in conjunction with a surface treatment, latex emulsion, or slurry seal pavement operation; or when the proposed plant mix surface is less than one inch deep.

Liquid asphalt coating (emulsion) shall not be used when rumble strips or rumble stripes are being cut into new pavement, or being cut in conjunction with plant mix paving operations where the proposed plant mix surface is one inch or greater in depth.

When liquid asphalt coating (emulsion) is required, the Contractor shall coat the entire rumble strip area with the liquid asphalt coating (emulsion) using a

pressure distributor following the cutting and cleaning of the depressions of waste material. For rumble strips installed on the shoulder, the approximate application rate shall be 0.1 gallons per square yard. When the rumble strip is installed along the centerline, the approximate application rate shall be 0.05 gallons per square yard. The application temperature shall be between 160 degrees F and 180 degrees F. For shoulder rumble strips only, overspray shall not extend more than 2 inches beyond the width of the cut depressions and shall not come in contact with pavement markings.

Pavement markings for rumble stripes shall be applied after the grooves have been cut. The grooves shall be thoroughly cleaned and the surface prepared prior to pavement marking application, in accordance with the Standard Drawings and Section 704 of the Specifications. Overspray of pavement marking materials shall not extend more than one inch beyond the lateral position of the pavement marking line shown in the RS-Series Standard Drawings.

Rumble strips shall not be installed on shoulders of bridge decks, in acceleration or deceleration lanes, on surface drainage structures, or in other areas identified by the Engineer.

Waste material resulting from the operation shall be removed from the paved surface and shall not be disposed of where waterways may be at risk of contamination.

**Section 315.08—Measurement and Payment** is amended by replacing the fourth paragraph with the following:

**Tack coat**, when a pay item, will be measured and paid for in accordance with Section 310 of the Specifications. When not a pay item, it shall be included in the price for other appropriate pay items.

**SECTION 317 – STONE MATRIX ASPHALT CONCRETE PLACEMENT**  
**SS317-002016-01** **July 24, 2016**

**Section 317.06 – Weather Restrictions** is replaced with the following:

SMA mixture shall be placed only when the ambient and surface temperatures are 50 degrees F or above.

**SECTION 318 – PAVEMENT INTERLAYERS**  
**SS318-002016-01** **February 26, 2018**

**SECTION 318 – PAVEMENT INTERLAYERS** of the Specifications is inserted as follows:

**318.01 – Description**

This work shall consist of providing all labor, materials, and equipment; performing all operations required for Contractor project quality control; furnishing, overlapping, and placing of pavement interlayer and tack coat, if required, in the designated locations as detailed in the Contract and specified herein; and maintaining the interlayer until placement is completed and accepted.

### **318.02 – Materials**

**Pavement interlayer** shall conform to Section 245.

### **318.03 – Procedures**

#### **(a) Delivery and Storage**

For both on-site and off-site storage, the Contractor shall take all necessary precautions to maintain the integrity of the interlayer in a state equal to what existed at the time of testing and certification. This includes but is not limited to ultraviolet protection, protection against rodents, contaminant chemical abrasion, and any other harmful elements. Interlayer shall be stored in accordance with manufacturer's recommendations, and shall remain in supplier packaging until ready for use. It shall not be removed from packaging more than 7 days before the next layer of pavement structure is installed over it.

The Contractor's Quality Control Representative shall examine all interlayer for damage and defects prior to installation. Any interlayer found to be damaged or defective shall be repaired per the manufacturer's recommendations or as directed by the Engineer, or removed from the jobsite and replaced by the Contractor at no additional cost to the Department. Mechanical equipment other than that used for installation and the paving equipment shall not be permitted directly on the interlayer surface unless authorized by the Engineer.

#### **(b) Surface Preparation and Interlayer Placement**

Manufacturer's instructions shall be followed, including the following:

1. A pre-pave meeting shall be held no less than 14 days prior to paving or milling operations beginning. The pre-pave meeting may be held as part of the pre-construction meeting.
2. The layer to be covered by the interlayer shall be clean and free of debris, stable, and prepared according to the manufacturer's recommendations. Tack coat shall be applied per manufacturer's recommendations, based on asphalt retention rate and additional rate for anticipated surface condition of pavement. Tack coat shall be a PG binder from VDOT Approved List No. 50. Cracks shall be remediated as required by the Contract.

3. When the interlayer is pulled into place, the strong direction (if any) shall be placed as shown on the Plans, or according to the manufacturer's recommendations if not shown on the Plans. It shall be unrolled as smoothly as possible without dragging in accordance with the Manufacturer's recommendations.
  4. The Contractor shall use a manufacturer-certified installer for the specific products being installed, or a manufacturer's representative shall be on site during installation. The Contractor shall use mechanical or hydraulic interlayer laydown equipment or manual installation methods capable of providing proper tension per the manufacturer's recommendations. Where geosynthetic interlayers with maximum elongation of 5% or less are specified on a milled or planed surface, planing or milling shall be in accordance with Section 515 of the Specifications modified to allow a pavement macrotexture MTD (mean texture depth) of less than 6.0 millimeters. Testing for performance pavement planing shall be in accordance with Section 515.03 of the Specifications. As an alternative to performance planing or milling, a leveling course may be placed on the milled surface prior to placing the geosynthetic pavement interlayer. Tack coat shall be applied in accordance with the manufacturer's recommendations.
- (c) **Overlapping of Adjacent Interlayer Rolls:** Adjacent interlayer rolls shall be overlapped, seamed, or fastened per the manufacturer's instructions.
- (d) **Pavement Overlay Placement:** If hot mix asphalt temperatures exceed 350°F, products with polypropylene fabrics shall not be used. The Contractor shall plan and execute his laydown operation to ensure the asphalt does not melt the pavement interlayer. Warm mix asphalt concrete shall be placed at a minimum of 250°F, to ensure asphalt cement absorption into the pavement interlayers. The first lift of asphalt concrete shall be at least 1.5 inches (38mm) compacted, unless a different thickness is recommended by the manufacturer. The Engineer may remove pavement interlayer from the Contract if field conditions will not allow for this minimum thickness.

### 318.04 – Measurement and Payment

**Paving Fabric, Paving Mat, Paving Grid, Composite Paving Grid, and Strip Membrane** shall all be measured in square yards and paid for at the Contract square yard price. The quantity for payment will be measured as the actual area covered by the interlayer, complete-in-place and accepted. No separate or additional measurement will be made for overlaps or waste unless directed by the Engineer.

Payment will be made under:

Pay Item	Pay Unit
Paving Fabric (Type)	Square Yard

Paving Mat (Type)	Square Yard
Paving Grid (Type)	Square Yard
Composite Paving Grid (Type)	Square Yard
Strip Membrane	Square Yard

## SECTION 401 – STRUCTURE EXCAVATION

**SS401-002016-01**

**April 5, 2017**

**Section 401.03(i) – Backfilling** is amended by replacing the second paragraph with the following:

The Contractor shall use select backfill material behind all abutments. The Department will include a detail indicating the limits (zone) of the select backfill in the Plans. The Contractor shall compact the material in accordance with Sections 305 and 303 respectively. The top surface of the backfill material shall be neatly graded.

**Section 401.04 – Measurement and Payment** is amended by replacing the thirteenth paragraph with the following:

**Select backfill (Abutment zone)** will be measured in tons and paid for at the contract ton price. This price shall include furnishing, placing, compacting, and grading select backfill material.

## SECTION 403 – BEARING PILES

**SS403-002016-01**

**June 7, 2016**

**Section 403.07(d) – Dynamic Formula** is amended by replacing the equation with the following:

$$R_{ndr} = 1.75(E_d)^{0.5} \log_{10}(10N_b) - 100$$

where:

- $R_{ndr}$  = nominal pile resistance measured during pile driving (kips)
- $E_d$  = developed hammer energy. This is the kinetic energy in the ram at impact for a given blow. If ram velocity is not measured, it may be assumed equal to the potential energy of the ram at the height of the stroke, taken as the ram weight times the actual stroke (ft-lbs)
- $N_b$  = number of hammer blows for 1.0 in. of pile permanent set (blows/in.)

## SECTION 404 – HYDRAULIC CEMENT CONCRETE OPERATIONS

**SS404-002016-01**

**July 12, 2016**

**Section 404.02(a) – Concrete** is amended by replacing the first paragraph with the following:

**Concrete** shall conform to Section 217 of the Specifications. Aggregate used in concrete for bridge decks shall be nonpolishing. All concrete shall be tested for permeability in accordance with Section 217 of the Specifications.

## **SECTION 405 – PRESTRESSED CONCRETE**

**SS405-002016-01**

**June 21, 2018**

**SECTION 405 – PRESTRESSED CONCRETE** of the Specifications is amended as follows:

**Section 405.05(b) – Placing Strands and Wires and Applying and Transferring Pretension** is amended by replacing the last paragraph (including its subparagraphs) with the following:

The schedule for single-strand detensioning of units having deflected strands shall incorporate the following:

- Straight strands located in the upper flange of the unit shall be released first.
- Tension in the deflected strands at the ends of bed and uplift points shall be released in sequence.
- Hold-down devices for deflected strands shall be disengaged, and hold-down bolts shall be removed from units.
- The remaining straight strands of the pattern to be detensioned individually shall be released in sequence.

If it is desired to release hold-down devices prior to releasing tension in deflected strands, this may be permitted if the weight of the prestressed unit is more than twice the total of the forces required to hold strands in the low position, or if weights or other approved vertical restraints are applied directly over the hold-down points to counteract uplifting forces at least until the release of deflected strands has proceeded to such a point that the residual uplifting forces are less than 1/2 the weight of the unit.

Failure to follow these procedures may result in rejection of the units.

**Section 405.05(h) – Handling, Storing, and Erecting** is replaced with the following:

**Handling, Storing, and Erecting:** Units shall be adequately separated in storage immediately following removal from beds to make inspection of finished surfaces possible and to facilitate repair of surface blemishes.

Care shall be taken in handling and storing units to avoid damage to concrete. Concrete must have attained the minimum 28-day design compressive strength before structural units are shipped to the project site.

Piles shall not be driven until at least 7 days after the date concrete is cast and has attained the minimum design compressive strength.

Lifting and support points for all units shall be as shown on the Plans. If the Plans do not indicate lifting and support points, the Contractor shall lift and support units at locations not less than 6 inches or more than the depth of the unit from the end of the unit. The Contractor shall be responsible for the design and safety of the lifting device used. Piles shall be supported at lift points as shown on the Plans.

Requests by the Contractor to use lifting or support points other than those indicated must be accompanied by computations showing that stresses are within the allowable range using 50 percent of the dead load as an impact factor.

Units that have been damaged in handling shall be repaired to the satisfaction of the Engineer. Units that have been damaged to such an extent that they are not repairable shall be replaced at no expense to the Department.

Recesses at ends of transverse ties, holes for anchor bars, and other recesses shown on the plans shall be filled with mortar conforming to Section 218. Mortar shall be applied in one continuous operation for each span. Where waterproofing material is to be applied to tops of units in the field, longitudinal joints shall be sufficiently smoothed to prevent damage to the material. Shear keys required between adjacent units shall be constructed using the material shown on the Plans.

Struts and diaphragms between spread units may be cast separately or monolithically with the deck slab. If the Contractor casts struts and diaphragms separately from the slab, deck slab concrete shall not be placed until concrete in the struts or diaphragms has attained 80 percent concrete strength ( $f'c$ ). If the Contractor casts struts and diaphragms monolithically with the slab, each prestressed concrete beam shall be placed and restrained in such a manner that the beam will not be canted during construction of the struts, diaphragms, and slab. The Contractor's method for maintaining acceptable vertical alignment of beams shall be subject to the approval of the Engineer.

Bearing surfaces of units shall be parallel to the bottom surface of the unit or as specified on the plans. Attached bearing assemblies shall be fabricated so that their bottom bearing surfaces shall lie in truly horizontal planes in their erected position. Metal bearing plates or bottoms of precast beams that are to bear on elastomeric pads shall be coated with epoxy, Type EP-2, EP-4, or

EP-5, and then surfaced with a No. 36 to No. 46 silicon carbide or aluminum oxide grit.

Ends of beams, at ends of spans, and diaphragms shall be vertical.

Continuity diaphragms for prestressed beams shall not be cast until at least 90 days after the strands in the beams have been detensioned.

Units shall be stored on dunnage placed at the support points shown on the Plans and at least 4 inches above the ground. If support points are not provided on the Plans, the Contractor may locate the dunnage at the lifting points or bearings. If units are stacked, they shall be so arranged that the weight of upper members does not introduce shear or bending effects onto members below. The Contractor shall make all units accessible for inspection by the Engineer upon request.

Once beams, girders, or slabs have been placed on temporary supports for storage, camber measurements shall be taken at midspan, at release and at 2 week intervals thereafter up to 120 days after detensioning. These measurements shall be recorded in the morning to reduce the effects of solar radiation for each unit and shall include the date, time, weather conditions, and measurements taken.

Piles or other elements supported at more than two points shall have their camber measured at the midpoint of each supported span.

Camber shall be measured and recorded in a bound log book and made available to the Inspector.

Camber measurements that fall outside the tolerances below shall be reported in writing to the Engineer and will be cause for rejection if not corrected to the satisfaction of the Engineer. Each measurement shall include the date of casting, the date of the measurement, the time of day, the temperature and other weather conditions (as directed by the Engineer) along with the measurement.

The Contractor shall submit a camber management plan to the Engineer prior to fabrication indicating the method for controlling camber. Units shall not be loaded before the 28-day compressive strength is achieved and no earlier than 7 days. The Engineer will review the plan, and once found to be acceptable, the Contractor shall implement the plan if any of the thresholds below are exceeded:

- 75 percent of the design camber at erection on the Plans
- 75 percent of the allowable limit between adjacent beams, girders or slabs

- 3/4 inch difference between the high and low units in the same span (for slabs or box beams)

The Contractor shall implement the camber management plan for any beams, girders or slabs that will be erected 120 days or more after detensioning. Where a change in construction schedule occurs which will result in erection 120 days or more after detensioning, the Contractor shall implement the camber management plan.

When a camber management plan is implemented, camber measurements shall be taken after loading the units. Subsequent camber measurements can be taken in the loaded state. Camber shall be measured within 3 days prior to shipping in an unloaded state.

The Contractor may submit a request to delay the implementation of the camber management plan to the next scheduled camber measurement if documentation is submitted showing the camber growth is following an established camber development path that will not exceed the camber tolerance at erection under the current construction schedule. If accepted by the Engineer, the Contractor shall implement the camber management plan at the next scheduled camber measurement unless a subsequent request is made and approved by the Engineer.

No beam, girder or slab exceeding the camber tolerance at erection shall be shipped to the jobsite unless approved by the Engineer.

All field welding, such as field welding of sole plates or other metallic components, shall be performed in accordance with Section 407. Coatings shall be repaired in accordance with Sections 233 and 411 as applicable. Payment for field welding, inspection, and coating shall be included in the price bid for other items.

**Section 405.06(a) – Precast Prestressed Concrete I-Beams and T-Beams** is replaced by the following:

**Precast Prestressed Concrete I-Beams and T-Beams:**

<b>Characteristic</b>	<b>Values</b>
Depth (overall)	±1/4 inch
Width (flanges and fillets)	±1/4 inch
Width (web)	±1/4 inch
Length of beam	±1/8 inch/10 ft or 1/2 inch, whichever is greater
Exposed beam ends (deviation from square or designated skew)	Horizontal ±1/4 inch, vertical ±1/8 inch/ft of beam height
Side inserts (spacing between centers of inserts and from centers of inserts to ends of beams)	±1/2 inch

Bearing plate (spacing from centers of bearing plates to ends of beams)	±1/2 inch
Stirrup bars (projection above top of beam)	±3/4 inch
Stirrup bars (longitudinal spacing)	±1 inch
Horizontal alignment (deviation from straight line parallel to centerline of beam)	Max. 1/8 inch/10 ft
Camber differential between adjacent beams of same type and strand pattern	1/8 inch/10 ft or max. 1/2 inch(at time of erection)
Camber differential from design camber at erection on plans	+30% to -50% (at time of erection)
Center of gravity of strand group	±1/4 inch
Center of gravity of depressed strand group at end of beam	±1/4 inch
Position of hold-down points for depressed strands	±6 inches
Position of handling devices	±6 inches

**Section 405.06(b) – Precast Prestressed Concrete Box Beams and Flat Slabs** is replaced with the following:

### **Precast Prestressed Concrete Box Beams and Flat Slabs**

<b>Characteristic</b>	<b>Values</b>
Depth (top slab)	+1/2 to -1/4 inch
Depth (bottom slab)	0 to +1/2 inch
Depth (overall)	±1/4 inch
Width of web or thickness of sidewalls	±3/8 inch
Width (overall)	+1/8 to -1/4 inch
Length	±1/8 inch/10 ft or 1/2 inch, whichever is greater
Void position (longitudinal) from Plan locations	±1/2 inch ±1 inch adjacent to end block
Square ends (deviation from square)	±1/4 inch
Skew ends (deviation from designated skew)	
Skew angle equal to or less than 30°	±1/4 inch
Skew angle greater than 30°	±1/2 inch
Horizontal alignment (deviation from straight line parallel to centerline of unit)	Max. 1/8 inch/10 ft
Gap between adjacent units	Max. 1/2 inch
Tie rod tubes (spacing between centers of tubes and from centers of tubes to ends of units)	±1/4 inch
Tie rod tubes (spacing from centers of tubes to bottom of beam)	±1/4 inch

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Longitudinal begin/end position of Virginia Adjacent Member Connection blockouts	±3 inches
Camber differential between adjacent units	Max. 1/4 inch (at time of erection)
Camber differential between adjacent units with Virginia Adjacent Member Connections	Max. 1/2 inch (at time of erection)
Camber differential between high and low units in same span	Max. 3/4 inch (at time of erection)
Camber differential from design camber at erection on plans	+30% to -50 percent (at time of erection)
Side inserts (spacing between centers of inserts and from centers of inserts to ends of beams)	±1/2 inch
Stirrup bars (projection above top of beam)	±3/4 inch
Stirrup bars (longitudinal spacing)	±1 inch
Center of gravity of strand group	±1/4 inch
Center of gravity of depressed strand group at end of beam	±1/4 inch
Position of hold-down points for depressed strands	±6 inches
Position of handling devices	±6 inches

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**Section 405.07 – Measurement and Payment** is amended by replacing the first paragraph with the following:

Prestressed concrete piles will be paid for in accordance with Section 403.10.

## SECTION 406 – REINFORCING STEEL

**SS406-002016-02**

**July 7, 2016**

**Section 406.03(c) – Fabrication** is amended by replacing the first paragraph with the following:

**Fabrication:** Bent bar reinforcement shall be cold bent to the shape shown on the plans. Fabrication shall be in accordance with the ACI *Detailing Manual* – 2004 (SP-66-04).

**Section 406.03(d) – Placing and Fastening** is replaced with the following:

**Placing and Fastening:** Steel reinforcement shall be firmly held during the placing and setting of concrete. Bars, except those to be placed in vertical mats, shall be tied at every intersection where the spacing is more than 12 inches in any direction. Bars in vertical mats and in other mats where the spacing is 12 inches or less in each direction shall be tied at every intersection

or at alternate intersections provided such alternate ties will accurately maintain the position of steel reinforcement during the placing and setting of concrete. Placing reinforcing steel in concrete after concrete has been freshly placed is not permitted.

Unless otherwise specified by the Engineer, tie wires used with corrosion resistant reinforcing steel can be: plastic; solid stainless; epoxy-coated carbon (black) steel wire; or plastic-coated carbon (black) steel wire.

The minimum clear distance from the face of the concrete to any reinforcing bar shall be maintained as specified in the table below.

Location	Minimum Cover (in)		
	Normal Condition	Corrosive Environment <sup>1</sup>	Marine <sup>2</sup>
Pier caps, bridge seats and backwalls:			
Principal reinforcement	2-3/4	3-3/4	4
Stirrups and ties	2-1/4	3-1/4	3-1/2
Pier caps, bridge seats and backwalls (at open joint locations):			
Principal reinforcement	3-3/4	3-3/4	4
Stirrups and ties	3-1/4	3-1/4	3-1/2
Footings and pier columns:			
Principal reinforcement	3	4	4
Stirrups and ties	2-1/2	3-1/2	3-1/2
Cast-in-place deck slabs:			
Top reinforcement <sup>3</sup>	2-1/2	2-1/2	2-1/2
Bottom reinforcement	1-1/4	1-1/4	2
Precast and cast-in-place slab spans:			
Top reinforcement <sup>3</sup>	2-1/2	2-1/2	2-1/2
Bottom reinforcement	2	2	3
Prestressed slabs and box beams:			
Top steel	1-3/4	1-3/4	1-3/4
Stirrups and ties	1-1/8	1-1/8	1-1/8

Reinforcement concrete box culverts and rigid frames with more than 2 ft. fill over top of slab:			
Top slab – top reinforcement	1-1/2	2-1/2	3
Top slab – bottom reinforcement	1-1/2	2-1/2	3
Inside walls and bottom slab top mat	1-1/2	2-1/2	3
Outside walls and bottom slab bottom mat	1-1/2	2-1/2	3
Reinforcement concrete box culverts and rigid frames with less than 2 ft fill over top of slab:			
Top slab – top reinforcement	2-1/2	2-1/2	3
Top slab – bottom reinforcement	2	2-1/2	3
Inside walls and bottom slab top mat	1-1/2	2-1/2	3
Outside walls and bottom slab bottom mat	1-1/2	2-1/2	3
Rails, rail posts, curbs and parapets:			
Principal reinforcement	1-1/2	1-1/2	1-1/2
Stirrups, ties and spirals	1	1	1
Concrete piles cast against or permanently exposed to earth (not applicable for prestressed concrete):			
	3	3	3
Drilled shafts:			
Principal reinforcement	4	5	5
Ties and spirals	3-1/2	4-1/2	4-1/2
All other components not indicated above:			
Principal reinforcement	2-1/2	3-1/2	3-1/2
Stirrups and ties	2	3	3

<sup>1</sup>Corrosive environment affects cover where concrete surface is in permanent contact with corrosive soil.

<sup>2</sup>Marine includes all locations with direct exposure to brackish and salt water.

<sup>3</sup>Includes 1/2 inch monolithic (integral) wearing surface.

Bars that must be positioned by maintaining clearances from more than one face shall be centered so that clearances indicated by the plan dimension of bars are equalized.

Bars shall be placed so that the concrete cover as indicated on the plans will be maintained within a tolerance of 0 to +1/2 inch in the finally cast concrete.

Where anchor bolts interfere with reinforcing steel, the steel position shall be adjusted without cutting to permit placing anchors in their proper locations.

Plastic (composite) chairs may be used to support Corrosion Resistant Reinforcement (CRR) in precast concrete elements; otherwise, CRR in structures shall be supported by steel bar supports as follows, unless otherwise specified by the Engineer:

1. For Class I CRR, steel bar supports shall be: plastic-protected wire bar supports (per CRSI Class 1 – Maximum Protection) when stay-in-place forms are not used and the steel bar support will be exposed; and epoxy-coated bright basic wire bar supports (per CRSI Class 1A – Maximum Protection) when either stay-in-place forms are used or the steel bar support will not be exposed.
2. For Class II and Class III CRR, steel bar supports shall be: either stainless steel wire bar supports or plastic-protected wire bar supports (per CRSI Class 1 – Maximum Protection) when stay-in-place forms are not used and the steel bar support will be exposed; and epoxy-coated bright basic wire bar supports (per CRSI Class 1A – Maximum Protection) when either stay-in-place forms are used or the steel bar support will not be exposed.
3. Steel bar supports for CRR shall be fabricated from cold-drawn carbon steel wire conforming to the CRSI corrosion protection class listed above for their specific use, except for plastic-protected wire bar supports, which shall be epoxy-coated with plastic protection applied by dipping legs (i.e., capping legs with premolded plastic tips is prohibited).

Carbon (black) steel in structures shall be supported by bright basic wire bar supports (per CRSI Class 3 – No Protection), except when cast-in-place members are cast directly on soil or rock, such as footings and approach slabs. In these cases, precast concrete supports and plastic (composite) chairs may be used. Steel bar supports for carbon (black) steel shall be fabricated from cold-drawn carbon steel wire. Precast concrete bar supports shall have a 28-day design compressive strength of at least 4,500 pounds per square inch and shall be furnished with plastic ties or shaped to prevent slippage from beneath the reinforcing bar.

Side form spacers shall meet the same corrosion protection level as the bar supports.

Bar supports for CRR in bridge decks and slab spans shall be spaced as recommended by CRSI but not more than 4 feet apart transversely or longitudinally. The mat of steel reinforcement closest to the surface shall be

supported by bolster supports or individual chair bar supports and intermediate and upper mats can be supported by individual high chair bar supports or continuous bar supports placed between mats. When the upper mat is supported by the bottom mat (e.g., using continuous bar supports placed between mats), all the bar supports shall be spaced as recommended by CRSI but not more than 3 feet apart transversely or longitudinally. Bar supports shall be firmly stabilized so as not to displace under construction activities. Standees (a bar bent to a U-shape with 90 degree bent legs extending in opposite directions at right angles to the U-bend acting as a high chair resting on a lower mat of reinforcing bars to support an upper mat) may be used on simple slab spans provided they hold the reinforcing steel to the requirements specified herein and are firmly tied to the lower mat to prevent slippage. The use of standees will not be permitted for the top mat of steel on any continuous slab spans.

In reinforced concrete sections or elements other than bridge decks and slab spans, the specified clear distance from the face of concrete to any reinforcing bar and the specified spacing between bars shall be maintained by means of approved types of stays, ties, hangers, or other supports adhering to the CRSI corrosion protection classes and specific uses listed above. The use of pieces of gravel, stone, brick, concrete, metal pipe, or wooden blocks will not be permitted as supports or spacers for reinforcing steel. The clear distance between bars shall be at least 1 1/2 times the specified maximum size of coarse aggregate but not less than 1 1/2 inches. Before concrete is placed, the Engineer will inspect reinforcing steel and determine approval for proper position and the adequacy of the method for maintaining position.

**Section 406.03(e) – Splicing and Lapping** is amended by replacing the fourth paragraph with the following:

For corrosion resistant reinforcing bars, mechanical butt splicers shall be of the same material as the bars being spliced.

## **SECTION 412 - WIDENING, REPAIRING, AND RECONSTRUCTING EXISTING STRUCTURES**

**SS412-002016-01**

**August 9, 2018**

**412.03(a) – Preparation of Concrete Patches** is replaced with the following:

When reinforcing bars are exposed, including epoxy coated or galvanized bars, the exposed length shall be cleaned by abrasive blast cleaning. Any epoxy coating that is well-bonded to the bars after abrasive blast cleaning (i.e., unable to be pried off when being cut and pried with stout knife blade at several locations) does not have to be removed and bare areas do not have to be repaired. Care shall be taken to prevent striking reinforcing bars with hammer points. Reinforcing steel that has lost 1/4 or more of its original cross-sectional area shall be lapped with new bars of the same material type,

size, and shape, as specified on the Plans, or authorized by the Engineer in writing. Otherwise, new bars shall be mechanically connected in accordance with Section 406 except when the new bars specified on the Plans are a different material type, then the splice sleeves shall be the same material as the new bars and not coated when spliced to existing epoxy coated reinforcing bars. New bars may be welded with a 6-inch arc-welded lap on each side of the damaged portion with a single-flare V-groove weld in accordance with Section 407 if specified on the Plans or authorized by the Engineer in writing.

The Contractor shall support unsupported areas with forms or falsework.

The Contractor shall remove and dispose of excess material and debris resulting from repairs in an approved disposal area in accordance with Section 106.04.

Wherever new concrete is scheduled to be placed against existing concrete, the two concrete masses shall be connected as indicated in the Plans. Where no plan details are provided, dowels at least 3/4 inch in diameter shall be placed at no more than 2 feet 6 inches center to center over the entire joining surface and 6 to 12 inches from the edge. Dowels shall be placed perpendicular to the surface of existing concrete by drilling and grouting and shall project into both new concrete and existing concrete to a depth as great as the thickness of the concrete will allow but need not project more than 9 inches into either surface. The Contractor will not be required to install dowels if other acceptable means for connecting new concrete to existing are available. Acceptable alternative methods include lapping of reinforcing steel protruding from the existing concrete surface or use of approved mechanical splices to provide continuity between new and existing reinforcing steel.

For footings and neat work of substructures where joining planes are vertical, 3/4-inch headed expansion bolts shall be used instead of dowels. Bolts shall project at least 9 inches into new concrete and shall extend sufficiently far into existing concrete to develop their rated pullout strength but not less than 6 inches. The Contractor shall exercise care so that existing reinforcing steel is not damaged when drilling holes for expansion bolts.

Where necessary to prevent feathered edges, existing concrete shall be removed to ensure a thickness for new concrete of at least 6 inches.

All of the concrete within a span lane that is to be removed shall be removed before recasting any concrete within that span lane, unless otherwise approved by the Engineer.

No concrete repairs, including removal and recasting of superstructure and substructure concrete, shall be performed within a span lane that is under traffic unless approved by the Engineer.

For full depth deck repair or expansion joint elimination or reconstruction that is not protected by concrete traffic barrier, the work shall be limited to that amount which can be performed within the duration of the scheduled lane closure unless alternate means of temporarily protecting the opening are provided. Any method for allowing traffic to ride over a temporary construction opening shall be designed to sustain traffic loading by the Contractor, and Working Drawings conforming to Section 105.10 shall be submitted to the Engineer for approval prior to use.

Where steel plates are provided to protect damaged or patched areas from traffic, the steel plate shall be of sufficient size, thickness, and strength to temporarily support traffic. Additionally, temporary anchorages between the steel plate and deck shall be adequate to prevent movement of the plate under traffic.

The Contractor shall provide appropriate work platforms, scaffolds, under bridge access vehicles, and other equipment that is required to obtain access to areas of work. The Engineer shall be provided access to work areas to determine the extent of repairs and to inspect the work. The cost of access equipment and materials shall be included in the price bid for the appropriate items.

#### **1. Remove Existing Concrete and Replace with New**

The Contractor shall sound the surface of the concrete element to be repaired in accordance with ASTM D4580 in the presence of the Engineer. The Contractor shall then outline areas to be repaired with paint or other marker in rectangular patterns. Prior to performing repairs, obtain verification from the Engineer that marked areas are the appropriate areas requiring repair.

Sawcut edges of area to be repaired to a depth of at least 1 inch or to a depth that shall clear the top of the reinforcing steel.

Remove loose and unsound materials by the use of hand tools or pneumatic hammers weighing a nominal 35 pounds or less. Hammer weight applies to the weight of the pneumatic hammer alone. Pneumatic hammers shall be worked at an angle of 45 to 60 degrees to the plane of the concrete surface being removed.

Whenever existing reinforcing bars are exposed, concrete shall be removed to a depth of no less than one inch beyond the reinforcing bars. Existing concrete shall be removed as shown on the plan details or as directed by the Engineer, to horizontal and vertical planes only, and to sound concrete, taking care not to damage any existing reinforcing steel.

Within 24 hours prior to the placement of new concrete, exposed reinforcing steel and the faces of existing concrete shall be cleaned by abrasive blast cleaning.

The Contractor shall repair and replace damaged or corroded reinforcement as required by this section.

The Contractor shall place at least one zinc anode in the opening of each area to be patched or repaired, in accordance with Section 412.03(c) for Embedded Galvanic Anodes

Immediately prior to placing new concrete, exposed reinforcing steel and faces of existing concrete shall be cleaned of all dust and debris by blowing with oil-free compressed air or hosing with water. A fine spray of moisture shall be applied to the exposed concrete surfaces. Faces of existing concrete shall be in a saturated surface dry condition prior to placing new concrete.

Prior to placement of repair material the Contractor shall capture clear digital images or photographs of all repair areas. Images shall clearly demonstrate that the area to be repaired was prepared to the proper depth and with appropriate surface preparation. Images shall include measuring devices that clearly demonstrate the length, width, and depth of the repair area. Images shall be submitted to Engineer for inclusion in project records and will be a condition for payment.

## 2. **Deteriorated Concrete Removal Plan**

The Contractor shall notify the Engineer a minimum of 3 working days before the beginning of any concrete repairs so that the areas to be repaired can be sounded in the presence of the Engineer. To preserve structural integrity and prevent unsafe structural conditions, the Contractor shall develop a plan for the removal of deteriorated concrete in superstructure and substructure elements. The plan shall be submitted to the Engineer for review after the elements are sounded and prior to beginning the work. The plan shall specify the order and size limits of areas of deteriorated concrete that may be removed at any one time. Concrete in the newly repaired areas shall attain a minimum design compressive strength of 3000 psi before adjacent concrete is removed. The cost of preparing the plan shall be included in the price bid for the appropriate items. Unless otherwise approved by the Engineer, the plan shall include the following limitations on concrete removal:

- **Reinforced Concrete Beams** - the removal of concrete in the tension zone of a beam shall be less than 30% of the span length at any one time.

- **Prestressed Concrete Beams** - the removal of concrete in the tension zone of a beam shall be less than 30% of the span length at any one time.
  - **Caps for Column Piers** - the removal of concrete in the tension zone of a cap shall be less than 30% of the span between adjacent columns at any one time.
  - **Cap Cantilevers for Column and Hammerhead Piers** - the removal of concrete in the tension zone of a cap cantilever shall be less than 30% of the length of the cantilever at any one time.
  - **Pier Columns** - the removal of concrete in a pier column shall be less than 30% of the height of the column at any one time.
  - **Columns in Multi-Column Piers** - no more than 50% of the columns may be under repair at any given time.
3. **Self-consolidating concrete (SCC)**, used in lieu of Class A4 concrete for superstructure repairs or Class A3 concrete for substructure repairs, shall adhere to these procedures.

The Contractor shall demonstrate that he can produce satisfactory SCC that meets the Contract requirements by submitting documentation indicating the Contractor's successful experience in furnishing and placing SCC on similar size projects or structural elements, or by successfully trial batching at least 3 weeks prior to beginning placement operations. Such documentation shall list projects by date of completion, name or project reference number, client or owner, structural elements or type of unit placed, quantity of SCC furnished, names and experience of personnel, and current contact (owner or client) information for verification. The Contractor shall also demonstrate that SCC can be placed without segregation of the mix by a mock-up simulating the actual elements. The cost of the mock-up shall be included in the price bid for the appropriate items.

Formwork shall be in accordance with Section 404 and designed for the full static head of concrete.

A Concrete Technologist (such as the admixture supplier) experienced in the production of SCC or a representative of the SCC producer shall be present during placement. Concrete shall stay plastic and within the slump flow specified during placement operations. Concrete placement shall be conducted in such a manner that air is not encapsulated, segregation does not occur, and the SCC flows freely to thoroughly occupy the formwork throughout the duration of the placement.

The Contractor shall field-test SCC in accordance with Section 217.11.

Record all concrete test data and submit the test data to the Engineer.

Consolidation is typically not necessary for SCC. However, the Contractor shall have internal vibrators on site in case internal vibration is needed due to delays in placement or if the concrete has lower than expected slump flow and has to be placed to prevent the formation of a cold joint.

The Contractor shall obtain prior approval by the Engineer if it is anticipated minimal vibration (external or internal) is required for proper consolidation due to congested reinforcement or space restrictions.

Equipment for job site mixing of hydraulic cement concrete and HES concrete shall be approved by the Engineer prior to the start of the work. Concrete mixed at the job site shall be mixed in a High Performance Volumetric Mixer (HPVM) in accordance with Section 217.05(d) when the quantity of repair material is greater than 6 cubic feet.

Concrete shall be constructed in accordance with Section 404 except that surfaces shall be finished and shaped to match existing adjacent surfaces. Concrete shall be Class A4 when used for superstructure work except prestressed concrete beams, and Class A3 when used for substructure work.

**Section 412.03(e) – Concrete Substructure Surface Repairs** is replaced with the following:

**Concrete Substructure Surface Repairs** shall include repairing piers, wing blocks, abutments and other areas as designated on the Plans, removing and disposing of existing concrete, repairing or replacing existing reinforcing steel where required by the work described in this Section, preparing the contact surfaces, furnishing and placing a bond breaker when required, and furnishing and placing new reinforcing steel and concrete in accordance with the requirements herein. Exposed undamaged existing reinforcing steel shall be abrasive blast-cleaned and reused.

Limits of repair and removal of damaged concrete shall be determined in accordance with Section 412.03(a) herein. Removal of concrete shall be to a depth as required by Section 412.03(a) herein or as specified on the plans or as directed by the Engineer. Welded wire fabric shall be installed in accordance with Section 412.03(b)6 herein.

Concrete for substructure surface repair shall be Class A3 concrete or self-consolidating concrete cast within forms placed to match the original geometry of the substructure element. Finished and repaired concrete shall be flush with pre-existing concrete and no blisters or protrusions will be

accepted. Shotcrete shall not be permitted unless approved by Engineer in writing. Repair materials shall conform to Section 217 and this specification.

**Section 412.03(g) Shotcrete** is amended by replacing the first paragraph with the following:

**Shotcrete** will be permitted only when specified for repairs or approved in writing for use in lieu of conventional hydraulic cement concrete or self-consolidating concrete. Shotcrete repairs shall be performed in accordance with Sections 412.02(e), 412.03(a), 412.03(b)6, 412.03(b)7d and 412.03(e) herein.

**SECTION 413 – DISMANTLING AND REMOVING EXISTING STRUCTURES  
OR REMOVING PORTIONS OF EXISTING STRUCTURES**  
**SS413-002016-01** **August 30, 2017**

**Section 413.02(c) – Environmental and Worker Protection** is replaced with the following:

**Environmental and Worker Protection:** Heating, welding, flame cutting, grinding, chipping, needle gun cleaning, manual scraping, heat gun cleaning, drilling, straightening, and other construction operations, or demolition of Type B structures, as defined in Section 411.01, that disturbs areas coated with a hazardous material shall require environmental and worker protection.

1. **Environmental protection** shall be in accordance with Section 411.09 except the Department will allow a Certified Industrial Hygienist to perform the required duties of the SSPC QP-2 Certified Competent Person for work involving the removal of protective coating from a Type B structure where no coating operations will be conducted in the disturbed coating areas. The Department will not require the Contractor to submit and implement an environmental protection plan as specified in Sections 411.09(a) and 411.09(b) for work involving the removal of 100 square feet or less of protective coating from a Type B structure. However, the Contractor shall comply with applicable local, state, and federal codes and regulations and shall employ appropriate measures to prevent the release of hazardous materials into the environment. Determination of the total square footage of removal area shall not include the cumulative area of coating disturbance from removal of bolts. The Contractor shall dispose of hazardous materials generated from his demolition according to Sections 411.09(c) and 411.09(d).
2. **Worker health and safety protection** shall be accomplished according to Section 411.10 except the Department will allow a Certified Industrial Hygienist to perform the required duties of the SSPC QP-2 Certified Competent Person for work involving the removal of protective coating from a Type B structure where no coating operations will be conducted in

the disturbed coating areas. The Department will not require the Contractor to submit and implement a worker health and safety protection plan as specified in Sections 411.10(a) and 411.10(b) for work involving the removal of 100 square feet or less of protective coating from a Type B structure. However Contractor shall comply with other applicable codes and regulations regarding public and worker health and safety.

Except when not required by size of removal areas, the Contractor shall submit a written statement to the Engineer, complete with all revisions including notations of any areas of noncompliance and corrective actions taken, that certifies both the Environmental Protection Plan and the Worker Health and Safety Plan were fully implemented as detailed during the performance of the work covered by this specification upon completion of the project.

### **SECTION 431 – EPOXY BRIDGE DECK OVERLAYS**

**SS431-002016-01**

**May 22, 2017**

**Section 431.02(a) – Fine aggregate** is replaced with the following:

**Fine aggregate** shall conform to Section 243.

### **SECTION 505 – GUARDRAIL AND W-BEAM MEDIAN BARRIERS**

**SS505-002016-02**

**March 15, 2017**

**Section 505.03 – Procedures** is amended to replace the sixteenth paragraph with the following:

The Contractor shall submit two copies of the manufacturers' recommended installation instructions and the FHWA NCHRP 350 or MASH approval letter for the type of new or salvaged guardrail end treatments being installed on the project to the Engineer at least 2 weeks before starting guardrail end terminal installation. All end terminals shall be from manufacturers on the Materials Division's Approved Products List 12 and the VDOT NCHRP 350 or MASH approved list linked in List 12. New Type I Re-Directive Impact Attenuators and Guardrail Terminals shall be permanently identified by stamping or engraving in a location readily visible for inspection that is not susceptible to damage. The identification shall include Manufacturer, Date and Site of Manufacture, and Model Number.

**Section 505.03(d) – Adjusting existing guardrail** is amended by replacing the first paragraph with the following:

Adjusting existing guardrail beam shall consist of removing and disassembling the existing guardrail beam and offset blocks from the posts, drilling the post in accordance with the standard drawing, and reassembling

the offset blocks and guardrail beam to the height required by current Standard Drawings or Specifications. Adjusting the existing guardrail beam shall be limited to 4 inches. Adjusting guardrail beam shall be limited to steel posts and shall be in accordance with the plan details and Standard Drawings. Adjusting existing guardrail beam will not be permitted within the pay limits of end terminals. The terminal shall be completely removed and reinstalled or a new terminal installed in accordance with the Standard Drawings and the manufacturer's instructions.

Adjusting existing guardrail to meet the GR-MGS1 or GR-MGS1A Standard Drawings will not be permitted.

**Section 505.04 – Measurement and Payment** is amended by replacing the fifth paragraph with the following:

**Terminal treatment or end anchorage for beam guardrail, cable guardrail, and steel median barriers terminating on the roadway side of the ditch line** will be measured in units of each and will be paid for at the contract unit price per each.

**Section 505.04 – Measurement and Payment** is amended by inserting the following:

**Guardrail height transition (Standard)** will be measured in units of each and will be paid for at the Contract each price. This price shall include furnishing and placing posts, offset blocks, and all hardware necessary to fully install the height transition.

**Section 505.04 – Measurement and Payment** is amended by revising the Pay Item Table as follows:

The following pay items are inserted:

<b>Pay Item</b>	<b>Pay Unit</b>
Guardrail end anchorage (Standard)	Each
Guardrail height transition (Standard)	Each

## **SECTION 512 – MAINTAINING TRAFFIC**

**SS512-002016-02**

**February 7, 2017**

**Section 512.01 – Description** of the Specifications is replaced with the following:

This work shall consist of maintaining traffic and protecting workers through temporary work areas, maintaining public and private entrances and mailbox turnouts, constructing and obliterating temporary traffic Diversions, providing positive guidance to the traveling public within the limits of the work area and

over approved traffic Detours. All work shall be in accordance with the VWAPM, the MUTCD, and the Contract, as directed by the Engineer.

**Section 512.02(f) – Temporary (Construction) signs** is replaced with the following:

**Temporary (Construction) signs** for traffic control during construction, maintenance, permits, utility, and incident management activities shall have retroreflective sign sheeting in accordance with Sections 247 and 701 of the Specifications, and shall be installed in accordance with Section 701 of the Specifications.

Sign substrates for rigid temporary (construction) signs mounted on posts and temporary (construction) sign panels for overlays shall be either fabricated of aluminum at least 0.080-inches thick, conforming to Section 229.02(a) of the Specifications, or one of the following from the Traffic Engineering Division's Approved Products List: 0.4-inch-thick corrugated polypropylene; 0.4-inch-thick corrugated polyethylene plastic; or 0.079-inch-thick aluminum/plastic laminate. Sign substrates shall be smooth, flat, and free of metal burrs or splinters.

Sign substrate materials for signs mounted on drums, Type 3 barricades, and portable sign stands shall be as specified below and shall be the same material that was used when the device was tested and found to be in compliance with the requirements of National Cooperative Highway Research Program (NCHRP) Report 350, Test Level 3, or of other materials allowed in the FHWA acceptance letter. Drums, Type 3 barricades, and portable sign stands shall be from Location & Design Division's NCHRP 350/MASH Approved Products List.

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**Sign Substrates for Type 3 Barricades and Portable Sign Stands**

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Rollup sign

0.4 inch thick corrugated polypropylene or polyethylene plastic

0.079 inch thick aluminum/plastic laminate

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**Sign Substrates for Drums**

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0.4 inch thick corrugated polypropylene or polyethylene plastic

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**Section 512.03 – Procedures** is amended by replacing the seventh paragraph with the following:

The color of Automated Flagger Assistance Device trailers, arrow board trailers, portable traffic control signal trailers, Intelligent Traffic Systems (ITS) trailer equipment, and portable changeable message sign trailers and sign frames shall be either Virginia highway orange (DuPont Color No. LF74279 AT or color equivalent) or federal yellow. The back traffic facing trailer frame,

where the signal and brake lights are located, shall be fully covered with 2 inch high retroreflective sheeting conforming to Section 247.02(c) of the Specifications. The sheeting shall have alternating 11 inch wide vertical red stripes and 7 inch wide vertical white stripes.

**Section 512.03(b) – Flagger Service** is replaced with the following:

**Flagger Service:** The Contractor shall provide certified flaggers in sufficient numbers and locations as necessary for control and protection of vehicular and pedestrian traffic in accordance with the VWAPM, or as directed by the Engineer. Flaggers shall use sign paddles to regulate traffic in accordance with the VWAPM. Certified flaggers shall conform to Section 105.14.

**Section 512.03(g)2b(1) – Drums** is amended to replace the third paragraph with the following:

Drums shall be used in all unmanned work zone locations and shall also be used to delineate the locations of all non-crashworthy trailer mounted devices such as, but not limited to, ITS devices, Portable Changeable Message Sign, Highway Advisory Radio, Speed Trailers, CB Wizards, etc. as well as light towers. Drums shall be used to delineate merging tapers on limited access highways during nighttime operations and the location of Electronic Arrow Boards.

Portable Traffic Control Signals and AFAD units shall be delineated in accordance with the VWAPM.

**Section 512.03(l) – Eradicating Pavement Markings** is amended to replace the fourth paragraph with the following:

The Contractor may submit other methods of eradication for the Engineer's approval. The Contractor shall minimize roadway surface damage when performing the eradication. The Contractor shall repair the pavement if eradication of pavement markings results in damage to or deterioration of the roadway presenting unsafe conditions for motorcyclists, bicyclists, or other road users. Pavement repair, when required, shall be performed using a method approved by the Engineer.

**Section 512.04 – Measurement and Payment** is amended to replace the first paragraph with the following:

**Flagger service** will be measured in hours of operation, per flagger, as required by Section 512.03(b) and authorized or approved by the Engineer; and will be paid for at the contract unit price per hour. This price shall include paddles and safety equipment.

**Section 512.04 – Measurement and Payment** is amended to replace the fourteenth paragraph with the following:

**Temporary traffic control signal** will be paid for at the contract lump sum price for the location specified in the contract documents. This price shall include, but not be limited to, supports; span wire; tether wire; conduit; conductor cable; traffic signal heads; backplates; hanger assemblies; necessary control items; vehicle detection; uninterruptable power supply; channelizing devices; and, when approved, portable traffic control signal equipment. The price shall also include installing, maintaining, adjusting, and aligning signal equipment; when required plan development, inclusive of signal layout, signal timing, phasing, and/or sequencing; providing electrical service; utility company costs; and removing temporary signal equipment when no longer required.

**Section 512.04 – Measurement and Payment** is amended to replace the seventeenth paragraph with the following:

**Temporary (Construction) Pavement message (word) markings** will be measured in units of each and will be paid for at the contract unit price per each. This price shall include surface preparation, premarking, furnishing, installing, quality control tests, daily log, guarding devices, primer or adhesive, glass beads, reflective optics materials (when required), maintenance, and warranty.

**Temporary (Construction) Pavement symbol markings** will be measured in units of each per location for the symbol and type material specified and will be paid for at the contract unit price per each. This price shall include surface preparation, premarking, furnishing, installing, quality control tests, daily log, guarding devices, primer or adhesive, glass beads, reflective optics materials when required, maintenance, and warranty.

**Section 512.04 – Measurement and Payment** is amended to replace the nineteenth paragraph with the following:

**Eradication of existing linear pavement markings** will be measured in linear feet of a 6 inch width or portion thereof as specified herein. Widths that exceed a 6 inch increment by more than 1/2 inch will be measured as the next 6 inch increment. Measurement and payment for eradication of existing pavement markings specified herein shall be limited to linear pavement line markings. Eradication of existing pavement markings will be paid for at the contract unit price per linear foot. This price shall include removing linear pavement line markings, cleanup, and disposing of residue.

**Section 512.04 – Measurement and Payment** is amended by revising the Pay Item Table as follows:

The following pay items are removed:

<b>Pay Item</b>	<b>Pay Unit</b>
Temporary pavement message marking (Type and message)	Each
Eradication of existing pavement marking	Linear foot

The following pay items are inserted:

<b>Pay Item</b>	<b>Pay Unit</b>
Temporary pavement message marking (Size character, Type or class material)	Each
Temporary pavement symbol marking (Symbol, Type or class material)	Each
Eradication of existing linear pavement marking	Linear foot

**SECTION 516 – DEMOLITION OF BUILDINGS AND CLEARING PARCELS**  
**SS516-002016-01** **March 8, 2016**

**Section 516.02(d) – Demolition** is amended by replacing the first paragraph with the following:

The Department will issue written notification to the Contractor when buildings are ready for demolition. Demolition shall include removing and disposing of materials from buildings and appurtenances down to ground level. If the structure includes a basement, concrete slab, or any other elements which extend below the ground, exclusive of piles, then demolition shall include removing and disposing of the materials down to, and including, this portion of the structure as directed by the Engineer.

**Section 516.02(e) – Clearing Parcels** is amended by replacing the second paragraph with the following:

Clearing parcels shall include disposing of materials from abandoned, noncombustible foundations down to and including floor slabs, basement slabs, and any improvement or appurtenance designated for removal but not listed as a pay item. Foundations for buildings designated as pay items will be considered part of those buildings, and removed according to paragraph (d) above. Combustible debris and rubble, including fences, posts, or pillars shall be removed from the right of way or from within the limits of easements obtained for removing buildings that may be partially outside the right of way.

**SECTION 520 - WATER AND SANITARY SEWER FACILITIES**  
**SS520-002016-01** **February 19, 2018**

**Section 520.01 – Description** is amended to include the following:

If the utility owner's specifications conflict with the Contract, the utility owners' specifications shall govern in those areas.

**Section 520.02(c) – Casing pipe** is replaced with the following:

**Casing pipe** shall conform to Section 232.02 (c) 4.

**Section 520.02(k) – Valves** is replaced with the following:

**Valves** shall conform to AWWA C500, C504, C506, C507, C508, C509, or C515 for the types and features specified.

**Section 520.02(r) – Flowable backfill** is inserted as follows:

**Flowable backfill** shall conform to Section 249.

**Section 520.03 – Procedures** is amended to replace the fourth paragraph with the following:

The Contractor shall abandon existing water and sewer lines and appurtenances and manholes not required in the completed system as directed by the Engineer. Abandoned materials shall become the property of the Contractor, unless otherwise noted on the plans, upon satisfactory replacement with the new installation. The Contractor shall clean abandoned pipe that is not removed of debris and plug it with Class A3 concrete at open ends if the utility is less than 8 inches inside diameter. If the abandoned pipe is 8 inches inside diameter or greater, the Contractor shall clean the pipe of debris and fill it entirely with Class A3 concrete or flowable backfill conforming to Section 509.

**Section 520.03(b) – Excavation** is amended to replace the fourth paragraph with the following:

When work is not in progress for any reason, lines shall be securely closed with a water-tight cap or plug to prevent water and debris from entering the lines.

**Section 520.03(f)5 – PVC pipe** is replaced with the following:

**PVC pipe** shall be joined by gasketed bell and socket joints in accordance with AWWA C-900 and AWWA C905.

**Section 520.03(f)8 – PE pipe** is replaced with the following:

**PE pipe** shall be joined in accordance with AWWA C-901, AWWA C906, and the manufacturer's recommendation.

**Section 520.03(g) – Plugs, Caps, Tees, and Bends** is replaced with the following:

**Plugs, Caps, Tees, and Bends:** The Contractor shall anchor plugs, caps, tees, and bends with reaction backing if indicated in the Plans. Backing shall be concrete reaction blocks, metal reaction harnesses, or a combination thereof. Concrete shall be placed in accordance with Section 404 and cured in accordance with Section 316.04(j). Metal harness tie rods and clamps shall be of adequate strength to prevent movement and shall be galvanized or rustproofed by a means approved by the Engineer.

**Section 520.04(a) – Water Mains and Appurtenances** is renamed **Force Main Sanitary Sewers, Water Mains, and Appurtenances** and replaced with the following:

**Force Main Sanitary Sewers, Water Mains, and Appurtenances:** New force main sanitary sewers, water mains, and appurtenances shall be tested for leakage using the hydrostatic pressure test method in accordance with Section 4 of AWWA C600 and the following:

1. The duration of each test shall be at least 2 hours. Sections of main with concrete reaction backing shall not be tested until at least 5 days after the backing is placed. If the backing is constructed with high-early-strength concrete, the test may be performed 2 days after backing is placed.
2. Testing of tie-ins with existing mains shall be performed under the normal working pressure of the main involved. The Engineer will not allow visible leakage at these points during a period of at least 2 hours.
3. The hydrostatic test pressure shall be 150 pounds per square inch or 1.5 times the working pressure, whichever is greater, based on the elevation of the lowest point in the line or section under test and shall be corrected to the elevation of the test gage. The Contractor shall ascertain the specific working pressure of the force main sanitary sewer or water main from the utility owner. Leakage loss shall not exceed the allowable leakage ( $L$ ) as determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148,000}$$

Where:

*L* = the allowable leakage in gallons per hour

*S* = the length of pipe tested in feet

*D* = the nominal inside diameter of the pipe in inches

*P* = the average test pressure during the leakage test in pounds per square inch

**Section 520.04(b)3 – Air test** is replaced with the following:

**Air test:** In lieu of the infiltration or exfiltration test for leakage the Contractor may test the sewers by using low air pressures in accordance with ASTM F1417. The Contractor shall perform the low air pressure test in accordance with the following:

- a. The Contractor shall eliminate discernable water leaks and remove debris after backfilling and prior to air testing. Tests shall be conducted from manhole to manhole or from manhole to terminus. No personnel shall be allowed in manholes once testing has begun.
- b. The Contractor shall provide securely braced test plugs at each manhole and a suitable means of determining the depth of the ground water level above the inverts immediately before testing.
- c. The Contractor shall slowly add air to the portion of the pipe being tested until the internal air pressure is at a test pressure of 4 pounds per square inch above the invert or ground water table, whichever is greater, or until the pressure is equal to the hydraulic gradient, whichever is greater. If the test plug shows leakage, as determined by the Engineer, the Contractor shall relieve the pressure for at least 2 minutes. The Contractor shall then disconnect the hose and compressor. If the pressure decreases to 3.5 pounds per square inch, the Contractor shall record the amount of time required for the pressure to drop from 3.5 to 2.5 pounds per square inch. The minimum allowable holding times will be as specified herein. The Engineer will not accept pipes that fail to maintain minimum holding times required by ASTM F1417. Any repairs, replacement, and retesting as specified by the Engineer shall be performed at the Contractor's expense.

If low air pressure tests are used, the manholes shall be tested by exfiltration. Inflatable stoppers shall be used to plug all lines into and out of the manhole being tested. The stoppers shall be positioned in the lines far enough from

the manhole to ensure testing of those portions of the lines not air tested. The manhole shall then be filled with water to the top and a 12-hour soaking period shall be allowed prior to test measurement. The manhole shall be refilled to a mark, and at the end of 1 hour, the amount of leakage shall be measured. Leakage shall not exceed 1/2 gallon per hour. If the manhole fails to comply with the test requirements, the Contractor shall repair leaks at the Contractor's expense. The test shall then be repeated until satisfactory results are obtained.

**Section 520.04(c) – Force Main Sanitary Sewers** is deleted.

**Section 520.04(d) – Offsets of Existing Pipe** is redesignated **(c)**.

**Section 520.06 – Measurement and Payment** is amended to replace the second paragraph with the following:

**Water mains, water service lines, sanitary sewer pipe, and sanitary sewer force mains** will be measured in linear feet of pipe through all valves and fittings, complete-in-place, and will be paid for at the Contract linear foot price. This price shall include excavating when not a specific pay item for the utility in question; testing; disinfecting; backfilling; compacting; dewatering; disposing of surplus and unsuitable material; sheeting and shoring; furnishing and installing bedding material; furnishing and installing pipe; connecting to existing lines or manholes; fittings less than 16 inches in diameter; reaction blocking; concrete anchor block; watertight welds; restrained joints; abandoning or removing lines, manholes, and other appurtenances; and restoring property. Furnishing and installing Class A3 concrete or flowable backfill in abandoned 8 inch or larger lines will be measured and paid for separately. Pipe of one size, except for cast iron and ductile iron pipe, shall be combined into one contract item for the respective size of water main and sanitary sewer pipe. The salvage value of abandoned materials shall accrue to the Contractor and shall be reflected in the price bid for the respective replacement facility.

**Section 520.06 – Measurement and Payment** is amended to replace the thirteenth paragraph with the following:

**Bends, plugs or caps, reducers, solid sleeves, and branches** (tees, wyes, and crosses), only 16 inches in diameter and larger, will be measured in units of each and will be paid for at the Contract each price. This price shall include furnishing and installing pipe fittings, restrained joints, excavating, reaction blocking, testing, backfilling, sheeting and shoring, watertight welds, abandoning or removing existing lines as noted on the plans, and restoring property.

**Section 520.06 – Measurement and Payment** is amended by inserting the following after the fifteenth paragraph:

**Concrete** will be measured in cubic yards and paid for at the Contract cubic yard price. This price shall include furnishing and placing of concrete not included in other pay items, and installing plugs.

**Flowable Backfill** will be measured in cubic yards and will be paid for at the Contract cubic yard price. This price shall include furnishing and placing of backfill material and furnishing and installing plugs.

**Section 520.06 – Measurement and Payment** is amended by revising the Pay Item Table as follows:

The following pay items are inserted:

<b>Pay Item</b>	<b>Pay Unit</b>
Solid Sleeve (Size)	Each
Solid sleeve-force main (Size)	Each
Concrete (Class)	Cubic Yard
Flowable Backfill	Cubic Yard

## **SECTION 700 – GENERAL**

**SS700-002016-02**

**August 10, 2017**

**Section 700.02(a) Concrete** is replaced with the following:

**Concrete** shall be Class A3 conforming to Section 217.

**Section 700.02(c) Dissimilar metals** is replaced with the following:

**Dissimilar metals** - The contact surfaces between dissimilar metals shall be isolated with an approved durable nylon washer, gasket, or other approved isolation material to prevent corrosion, except that isolation material shall not be used in conjunction with mast arm hanger assemblies, nor shall isolation materials be used on square tube post structures.

**Section 700.02(g) Steel for structural support of light poles and traffic control devices** is replaced with the following:

**Steel for structural support of light poles and traffic control devices** shall conform to Section 226 and shall be fabricated, welded, and inspected in accordance with Section 407 unless otherwise noted.

**Section 700.02(j) Breakaway support systems** is replaced with the following:

**Breakaway support systems**, including breakaway transformer bases, shall conform to National Cooperative Highway Research Program (NCHRP) Report 350 or Manual for Assessing Safety Hardware (MASH) testing requirements. The Contractor shall provide a copy of the MASH or FHWA

certification letter for the brands and models of breakaway systems planned for use.

Breakaway couplers will not be permitted.

The following shall be used when breakaway support systems are specified on the plans:

1. **Frangible bases** shall be aluminum.
2. **Slip bases** shall be galvanized steel or other approved noncorrosive metal.

**Section 700.03 General Requirements** is replaced with the following:

Cable wiring holes in traffic control device and ITS device structures shall be deburred and rounded, or fitted with a grommet. Damaged galvanization shall be repaired in accordance with Section 233. The size of the hole shall not exceed the sum of the diameter of the cables plus 1/2-inch.

The design of traffic control device and ITS device structures and foundations shall conform to AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, 6th Edition (LTS-6), 2013 with 2015 interims*, as modified elsewhere in the Contract.

In addition, structures and foundations shall be designed as per the following:

(a) **Sign Structures:**

Overhead Sign and Dynamic Message Sign (DMS) Structures (Span, Cantilever, Butterfly, etc.) shall be fabricated from galvanized steel material as specified herein. Aluminum structures will not be allowed. Base plates for overhead sign structures shall have at least the minimum number and diameter of anchor bolts specified in the Standard Drawings. Washers are required above and below the base plate. Tubular pole shafts shall have a removable cap fastened by at least three screws.

Ground Mounted Sign Structures shall be fabricated from galvanized steel unless otherwise indicated. Square tube posts shall conform to ASTM A1011, Grade 50 except the yield strength after cold-forming shall be 60,000 psi minimum for 12 and 14 gauge posts, and 55,000 psi minimum for 10 gauge posts. Posts (inside and outside) shall be galvanized in accordance with ASTM A653, Coating Designation G-90. Square tube sign posts that are 2.5 inches or less shall have 7/16-inch ( $\pm$  1/64-inch) openings or knockouts spaced 1-inch on centers on all four sides.

- (b) **Lighting Structures** shall be of a one-piece or sectional single unit, tubular form, and shall be round or multisided. Multisided poles shall have at least eight sides. Pole shafts shall have a removable cap fastened by at least three screws.
1. **High Mast Lighting Structures** (Lengths of 55 feet or greater) shall be galvanized steel and shall have at least the minimum number and diameter of anchor bolts specified in the Standard Drawings. Aluminum structures will not be allowed. Washers are required above and below the base plate.
  2. **Conventional Lighting Structures** (Lengths less than 55 feet) shall be galvanized steel or aluminum and shall have at least the minimum number and diameter of anchor bolts specified in the Standard Drawings.
- (c) **Signal Poles and Mast Arms** shall be galvanized steel of a one-piece or sectional single unit, tubular form, and shall be round or multisided. Multisided poles shall have at least eight sides. Pole shafts and mast arms shall have a removable cap fastened by at least three screws. If field adjusting of mast arm length is required, the end cap shall snugly fit the arm after adjustment
1. **Mast Arm Signal Poles:** The mast arms shall not deflect below the horizontal plane or below the minimum vertical clearance after the Standard Drawing MP-3 maximum loads are applied.

The flange plate and pole shall have a 4 inch wiring hole centered in the pattern that is deburred and rounded or fitted with a grommet. Mast arms shall be secured to the pole with thru-bolt, nuts, and washer connections. The flange plate shall be continuously welded to gusset and side plates. Gusset and side plates shall be continuously welded to the pole and each other. The flange plate shall be parallel to the axis of the pole. Flange plates for mast arm poles with two arms shall be positioned 90 degrees to each other. The flange plate shall be designed to receive a minimum of eight 1.5-inch diameter bolts for attachment of the arm.

Foundations for mast arm signal poles shall be designed in accordance with Standard Drawing PF-8 for the specified pole length and mast arm length shown on the Plans. Foundations shall also be designed for the greater of either the mast arm loadings and placement of loads shown on the Plans, or the Standard Drawing MP-3 design loadings for that arm length.

Mast arm poles shall have a round base plate and at least the minimum number of anchor bolts specified in the Standard Drawings. Washers are required above and below the base plate.

Mast arm pole types shall be in accordance with the following table. The poles shall be designed to support the maximum design loading allowed for that pole type, in accordance with the following table and Standard Drawing MP-3. The arms shall be designed to support the maximum design loading allowed for that mast arm length depicted in Standard Drawing MP-3.

<b>Pole Type</b>	<b># of arms</b>	<b>MP-3 Maximum Allowable Loading</b>	<b>Luminaire arm</b>	<b>Pole Length(top of pole to bottom of base plate)</b>
A	1	49 ft Loading Standard	No	19
B1	1	75 ft Case 1 Loading Standard	No	19
B2	1	75 ft Case 2 Loading Standard	No	19
C	2 (mounted at 90° to each other)	70 ft Loading Standard & 60 ft Loading Standard	No	19
D	1	49 ft Loading Standard	Yes	25
E1	1	75 ft Case 1 Loading Standard	Yes	25
E2	1	75 ft Case 2 Loading Standard	Yes	25
F	2 (mounted at 90° to each other)	70 ft Loading Standard & 60 ft Loading Standard	Yes	25

Mast arms and poles shall be designed such that arm lengths greater than 49 feet in length cannot be mated to Type A or Type D poles. Mast arms shall not be attached to poles that have not been designed to support that length of mast arm.

Type D, E1, E2, and F poles, and the foundations for those poles, shall also be designed to support a maximum 18' luminaire arm supporting a 22-pound video camera with 1 square foot of wind load

area concentrated 1 foot from the end of arm, and a 35-pound luminaire with 1 square foot of wind load area located at the end of the arm.

2. **Strain Signal Poles** shall be erected on foundations designed in accordance with Standard Drawing PF-8. They shall have a round base plate designed for at least the minimum number and diameter of anchor bolts specified in Standard Drawing PF-8. Washers are required above and below the base plate. The structure and the foundation shall be designed for the loads shown on the plans. Strain signal poles shall be field drilled for the attachment of span wire and tether wire. Span wire shall be attached at least 18 inches below the top of the pole. All loads shall be assumed to be tethered and no load reduction for breaking of the tether wire shall be used in the pole design.
  3. **Pedestal Signal Poles** shall be aluminum 6061-T6 structural tubes with minimum 0.337-inch wall thickness.
- (d) **Luminaire arms** shall be manufactured of the same material (aluminum or galvanized steel) as the supporting structure.
- (e) **Camera Poles** for the support of ITS equipment shall be galvanized steel of a one-piece or sectional single unit, tubular form, and shall be round or multisided. Multisided poles shall have at least eight sides. They shall have at least four anchor bolts.
- (f) **Remove Existing Sign Panels or Sign Structures:** Removed materials shall be disposed of in accordance with Section 106.04.

All foundations shall be removed to a point at least 2 feet below finished grade. The Contractor shall fill and compact the resulting cavities, and restore the area with topsoil, grading, seed, fertilizer, or lime as necessary.

All new signs in a particular sequence giving similar directions shall be installed before existing signs are removed.

Where a sign support is located on a bridge structure, or other such structure where the foundation cannot be removed, the existing anchor bolts shall be cut flush with the top of the structure and sealed with a two-part epoxy resin to prevent the remaining bolts from corroding.

When an overhead sign structure is attached to a bridge parapet, the existing anchor bolts shall be mechanically cut flush with the surface of the parapet, removed by mechanical drilling to a depth of one-half inch below the surface of the parapet, and patched to match the color and

texture of the existing parapet surface with hydraulic cement mortar or grout in accordance with Section 410. Connection bolts to the steel beams shall be removed and voids shall be filled as directed by the Engineer.

When an existing sign structure being removed has lights or beacons, the electrical service shall be disengaged at the nearest junction box, and all conductors shall be capped and sealed in place unless service is to be reused for electrical service for a replacement structure.

When an existing sign panel is being removed in order to facilitate its replacement with a new sign panel, the existing sign panel shall be removed immediately before installing the new sign panel unless otherwise directed by the Engineer.

When an existing sign structure is being replaced with a new sign structure, then continuity of signing shall be maintained by erecting the new sign structure immediately behind the existing sign structure prior to removing the existing sign structure unless otherwise directed in the Plans or by the Engineer.

- (g) **Relocate Existing Sign Panels:** Sign panels designated for relocation shall be removed from their existing locations and reinstalled at the locations indicated in the Contract. Existing framing and bracing members shall be reused at the new sign location unless otherwise directed by the Engineer.

Sign panels shall be reinstalled immediately following removal from their existing location, unless otherwise approved by the Engineer.

Sign panels shall be attached to their new location using new attachment hardware in accordance with the Standard Drawings and the Specifications.

Any sign panels that are scratched or damaged during the relocation process shall be replaced at no additional cost to the Department.

**Section 700.04 Working Drawings** is amended to replace the last paragraph with the following:

A Professional Engineer licensed to practice engineering in the Commonwealth of Virginia shall verify that the proposed traffic control device or ITS device foundations and structures are designed in accordance with the Plans, Specifications, Standard Drawings, and the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, 6th Edition (LTS-6), 2013 with 2015 interim*, as modified elsewhere in the Contract and address site conditions, loadings shown on the plans, maximum

design loadings in the Standard Drawings and Contract, and required vertical clearances.

**Section 700.05(c) Concrete Foundations** is amended to replace the seventh paragraph with the following:

The Contractor shall furnish the foundation designs for signal poles, high-mast lighting poles, overhead sign structures, and camera poles to the Engineer for review. Such designs shall be supervised and sealed by a Professional Engineer licensed to practice engineering in the Commonwealth of Virginia. Design calculations and drawings shall indicate the cubic yard quantity of concrete required to construct the foundations. The foundations shall be designed for the structure it is supporting and for the loads the structure is being designed to support, unless indicated otherwise on the plans.

**Section 700.05(c) Concrete Foundations** is amended to replace the eleventh and twelfth paragraphs with the following:

Test bores in Bristol, Salem, Lynchburg, Staunton, and Culpeper Districts shall be performed within 5 feet of the proposed foundation's location as shown on the plans or as directed by the Engineer. Test bores in Richmond, Hampton Roads, Fredericksburg, and Northern Virginia Districts shall be performed within 10 feet of the proposed foundation's location as shown on the plans or as directed by the Engineer.

The Contractor shall place vented varmint screens in accordance with Standard Drawing VS-1 inside the bolt circle of signal mast arm pole, signal strain pole, high mast light pole, overhead sign structure, ITS device support pole, and lighting pole foundations. Vented varmint screens shall not be used for structures on transformer bases, unless the transformer base is raised above the surface of the foundation with leveling nuts.

**Section 700.05(d) Electrical Service** is amended to replace the second and third paragraph with the following:

When required on the Standard Drawings, the Plans, or as directed by the Engineer, the Contractor shall construct an electrical service work pad in front of all electrical service safety switches, breaker boxes, and pole mounted cabinets, except when an immediately adjacent paved sidewalk can fulfill this purpose. The electrical service work pad shall be at least 20 inches in width, 36 inches in length, and 4 inches in depth, and sloped to facilitate drainage away from the structure. Exposed concrete areas of electrical service work pads shall be given a Class 7 finish in accordance with Section 404 of the Specifications.

**Section 700.05(e) Poles, posts, sign structures, and ITS structures** is amended to replace the fifth paragraph with the following:

All signal poles, light poles not mounted on transformer bases, camera poles, and overhead sign structures shall be provided with handholes that are on the side opposite traffic. Handholes shall be at least 3 by 5 inches, unless otherwise specified in the Standard Drawings, and shall be provided with a weatherproof gasket and cover. Handholes shall be latchable and capable of being opened using a star wrench or other approved latching mechanism. If specified in the Contract, a lockable handhole cover shall be provided, using key requirements provided by the VDOT Regional Operations Maintenance Manager.

For structures mounted on transformer bases, the transformer bases shall have hinged access covers on the side opposite traffic, unless specified otherwise in the Standard Drawings. The Contractor shall furnish the Engineer with at least one tool or key required to open handholes and transformer base access covers for each 40 structures or fraction thereof.

**Section 700.05(f) Breakaway Support Systems** is renamed **Transformer Bases** and replaced with the following:

**Transformer Bases:** Pedestal poles that do not support electrical power service equipment shall be installed atop breakaway transformer bases. Pedestal poles that support electrical power service equipment shall be installed atop non-breakaway transformer bases. Lighting poles, except high-mast lighting poles, shall be installed on the type of transformer base (breakaway or non-breakaway) specified on the Plans.

**Section 700.05(k) Anchor Bolts** is replaced with the following:

**Anchor Bolts:** Foundations for traffic control device structures (signal poles, overhead sign, lane control, variable message signs, camera poles, and high-mast lighting structures) shall have a bolt template positioned to correctly orient the structure with respect to the structure's location and roadway alignment and to maintain the anchor bolts vertical (plumb) and level during construction.

A minimum of three nuts and two hardened washers shall be provided for each anchor bolt.

Bolt or anchor nut covers shall not be installed on any traffic control device structures, unless otherwise specified on the plans.

Anchor bolts in double-nut connections shall extend a minimum of 1/4 inch past the second top nut.

Double-nut connections installation procedures shall be completed on upright members before installing associated elements, and shall conform to the following:

1. If anchor bolts are not plumb (vertical), determine if beveled washers may be required prior to erecting the structure. Beveled washers shall be used on top of the leveling nut or under the first top nut if any face of the base plate has a slope greater than 1:20 and if any nut could not be brought in firm contact with the base plate.
2. Clean and then lubricate the exposed thread of all anchor bolts, nuts, and bearing surfaces of all leveling nuts with beeswax, the bolt manufacturer's recommended lubricant, or other lubricant as approved by the Engineer before installing the structure. Re-lubricate the exposed threads of the anchor bolts and the threads of the nuts if more than 24 hours has elapsed since earlier lubrication, or if the anchor bolts and nuts have become wet since they were first lubricated.
3. Verify that the nuts can be turned onto the bolts the full length of the threads by hand.
4. Turn the leveling nuts onto the anchor bolts and align the nuts to the required elevation shown on the shop drawings. The maximum distance between the bottom of the leveling nut and the top of the foundation shall be 1 inch.
5. Place structural hardened washers on top of the leveling nuts (one washer corresponding to each anchor bolt).
6. The post or end frame shall be plumbed or aligned as shown on the shop drawings. The maximum space between the bottom of the base plate and the top of the foundation shall be the diameter of the anchor bolt plus 1 inch. Place structural hardened washers on top of the base plate (one washer corresponding to each anchor bolt), and turn the first top nuts onto the anchor bolts.
7. Tighten first top nuts to a "snug-tight" condition in a star pattern. Snug-tight is defined as the maximum nut rotation resulting from the full effort of one person using a 12-inch long wrench or equivalent. A star tightening pattern is one in which the nuts on opposite or near-opposite sides of the bolt circle are successively tightened in a pattern resembling a star.
8. Tighten bottom leveling nuts to a snug-tight condition in a star pattern.
9. At this point, verify again if beveled washers are necessary using the step 1 criteria. If beveled washers are required, remove the structure if

necessary, add the beveled washers, and retighten first top nuts and bottom leveling nuts (in a star pattern) to a snug-tight condition.

10. Mark the reference position of each first top nut in a snug-tight condition with a suitable method on one flat surface of the nut with a corresponding reference mark on the base plate at each bolt before final tightening of the first top nuts. Then rotate the first top nuts incrementally to one half the required nut rotation specified in Table VII-1 using a star pattern. Rotate the first top nuts again, using a star pattern, to the full required nut rotation specified in Table VII-1. For example, if total rotation from snug tight is 1/6 turn (60°), rotate 30° in each cycle.

Neither lock nuts nor split washers shall be used with anchor bolts.

11. The Contractor shall inspect tightened anchor bolt connections by the use of a calibrated torque wrench in the presence of the Engineer. The torque wrench shall be used to verify that a torque at least equal to the verification torque provided in Table VII-2 has been achieved. The maximum nut rotation in step 10 shall not be exceeded. A minimum of every other bolt shall be inspected.
12. Install second top nut on each bolt to the snug tight condition.

After all prior steps are completed and all elements of the structure are fully erected, the Contractor shall perform an ultrasonic test on all anchor bolts in accordance with ASTM E114 - Ultrasonic Pulse Echo Straight Beam Testing by the Contact Method. Ultrasonic testing personnel shall be qualified in accordance with ASNT SNT-TC-1A Level II and certified by the VDOT Materials Division. Equipment shall be qualified in accordance with AWS D1.5 Section 6, Part C. Anchor bolts shall have no indications that are above 10% Full Screen Height at the prescribed scanning level. All indications shall be noted on the test report and submitted to the Engineer and the State Materials Engineer. A copy of the report, for both structures with and without indications, shall be submitted to the District Bridge Office and the Engineer.

**Table VII-1 – Nut Rotation** is replaced with the following:

**TABLE VII-1  
Nut Rotation**

Anchor Bolt Diameter, (in.)	Nut Rotation beyond Snug-Tight	
	ASTM F 1554 Grade 36 (M314)	ASTM F 1554 Grade 55 (M314)
≤1½	1/6 turn (60°)	1/3 turn (120°)
>1½	1/12 turn (30°)	1/6 turn (60°)

Nut rotation is relative to anchor bolt. Anchor bolt nut tensioning shall not exceed plus 20°.

*Unified Thread Standard (UNC)* tensioning is applicable.

**Table VII-2 – Torque Verification** is replaced with the following:

**TABLE VII-2  
Torque Verification**

Anchor Bolt Diameter, (in.)	Verification Torque	
	ASTM F 1554 - Grade 36 (M314) Tension/Torque kips/ft-lbs	ASTM F 1554 - Grade 55 (M314) Tension/Torque kips/ft-lbs
1	18 / 180	27 / 270
1 1/4	28 / 350	44 / 550
1 1/2	41 / 615	63 / 945
1 3/4	55 / 962	86 / 1,505
2	73 / 1,460	113 / 2,260
2 1/4	94 / 2,115	146 / 3,285
2 1/2	116 / 2,900	180 / 4,500
2 3/4	143 / 3,932	222 / 6,105
3	173 / 5,190	269 / 8,070
3 1/4	206 / 6,695	320 / 10,400
3 1/2	242 / 8,470	375 / 13,125
3 3/4	280 / 10,500	435 / 16,312
4	321 / 12,840	499 / 19,960

**Section 700.06 Measurement and Payment** is amended to replace the first paragraph with the following:

**Concrete foundations** will be measured units of each or cubic yards and will be paid for at the Contract each or cubic yard price of concrete as applicable for the standard, type and size designated. When paid for in cubic yards of concrete, no payment will be made for concrete in excess of the cubic yards of concrete required by the approved foundation design unless otherwise authorized by the Engineer, in which case the additional concrete will be paid for in cubic yards for the invoice material cost only. This price shall include providing foundation design and shop drawings; concrete, reinforcing steel, anchor bolts, washers, nuts, bolt circle templates, lubricant, torque, ultrasonic

test on anchor bolts, grounding electrodes (including grounding electrode clamps, grounding electrode conductors, and installation), conduits, testing grounding conductor-to-electrode continuity, excavating, backfilling, compacting, vented varmint screens, disposing of surplus and unsuitable material, and restoring disturbed areas.

**Section 700.06 Measurement and Payment** is amended to replace the ninth through the thirteenth paragraph with the following:

**Lighting poles** will be measured in units of each and will be paid for at the Contract each price for the standard and luminaire mounting height or type specified. This price shall include providing design and shop drawings; pole shafts, grounding lugs, handholes, locks (when required), caps, identification tags, base plates, vibration dampeners (when required), transformer bases, field drilling, and galvanization.

**Steel strain poles** will be measured in units of each and will be paid for at the Contract each price for the length specified. This price shall include providing design and shop drawings, pole shafts, J-hooks, grounding lugs, handholes, locks (when required), caps, fittings, identification tags, field drilling, and galvanization.

**Mast arm signal poles** will be measured in units of each and will be paid for at the Contract each price for the standard and type specified. This price shall include providing design and shop drawings, pole shafts, J-hooks, grounding lugs, handholes, locks (when required), caps, fittings, base plates, identification tags, field drilling, and galvanization.

**Mast arms** will be measured in units of each and will be paid for at the Contract each price for the length and loading case (when required) specified. This price shall include providing design and shop drawings, mast arms including mast arms caps, galvanization, fittings, nuts, bolts, washers, field drilling of wire outlet holes and rubber gaskets or grommets, field adjustment of arm lengths, and identification tags.

**Overhead sign structures** will be measured in units of each and will be paid for at the Contract each price for the location specified. This price shall include furnishing design and shop drawings, structural units and supports, field drilling and adjustment, galvanization, base plates, handholes, locks (when required), caps, grounding lugs, electrical systems including conduit, sign luminaires, luminaire supports, fittings, conductor cable, and identification tags.

**Sign posts** will be measured in linear feet and will be paid for at the Contract linear foot price for the type and size specified. This price shall include clamps, hinge assemblies, and identification tags when required.

**Section 700.06 Measurement and Payment** is amended to replace the sixteenth paragraph with the following:

**Pedestal poles** will be measured in units of each and will be paid for at the Contract each price for the standard and length specified. This price shall include caps, transformer bases, access covers, galvanization, grounding lugs, and identification tags.

**Section 700.06 Measurement and Payment** is amended to insert the following:

**Remove Existing (Type) Sign Structure** will be measured in units of each and will be paid for at the Contract each price for the type of structure specified. This price shall include removing and disposing of the existing sign structure and all supported sign panels, conduits, cables, lights, luminaires, and luminaire retrieval system attached to the structure; disengaging existing electrical service; and capping and sealing conductors. This price shall also include excavating, demolishing, and removing foundational elements to at least two feet below ground line; capping and sealing conduit with hydraulic cement mortar or grout, and epoxy resin; disposing of waste materials; backfilling with suitable materials; compacting; and restoring (grading, topsoiling and seeding). For bridge mounted overhead sign structures, this price shall also include cutting existing anchor bolts, capping and sealing, hydraulic cement mortar or grout, and epoxy resin.

**Remove Existing (Type) Sign Panel** will be measured in units of each and will be paid for at the Contract each price for the sign panel type specified. This price shall include removing and disposing of the existing sign panel, framing and bracing, luminaires, conductor cables, and attachment hardware.

**Relocate Existing (Type) Sign Panel** will be measured in units of each and will be paid for at the Contract each price for the sign panel type specified. This price shall include removing sign panel, furnishing new mounting hardware and brackets, and installing onto new structure.

**Section 700.06 Measurement and Payment** is amended by revising the Pay Item Table as follows:

The following pay items are removed:

<b>Pay Item</b>	<b>Pay Unit</b>
Lighting pole (Standard, luminaire mounting height)	Each
Signal pole (Standard, class and type)	Each
Mast arm (Length)	Each

The following pay items are inserted:

<b>Pay Item</b>	<b>Pay Unit</b>
Lighting pole (Standard, luminaire mounting height or type)	Each
Signal mast arm pole (Standard and type)	Each
Steel strain pole (Standard and length)	Each
Mast arm (Length) (loading case)	Each
Remove existing (type) sign structure	Each
Remove existing (type) sign panel	Each
Relocate existing (type) sign panel	Each

**SECTION 704 – PAVEMENT MARKINGS AND MARKERS**

**SS704-002016-02**

**February 3, 2017**

**Section 704.01 – Description** is replaced with the following:

This work shall consist of establishing the location of retroreflective pavement markings and installing pavement markings and pavement markers in accordance with the *MUTCD*, the Contract, and as directed by the Engineer.

**Section 704.02(d) – Contrast Pavement Markings** is inserted as follows:

**Contrast Pavement Markings** shall conform to Section 246 of the Specifications.

**Section 704.03(a)2 – Type B markings** is amended to replace the first paragraph with the following:

**Type B markings** shall be applied in accordance with the manufacturers' installation instructions.

**Section 704.03(a)2e – Patterned preformed tape (Class VI)** is amended to replace the third, fourth, and fifth paragraph with the following:

The Contractor shall ensure that markings are not degraded by subsequent operations. Markings that are improperly inlaid during the pavement operations shall be completely eradicated and reapplied via non-embedded surface application at the Contractor's expense.

Surface-applied Type B Class VI markings shall not be installed directly over existing markings, except that Type B Class VI markings may be installed over Type A markings that are fully dry and are at a thickness of 10 mils or less.

**Section 704.03(a)2f – Polyurea (Class VII)** is replaced with the following:

**Polyurea (Class VII)** shall be applied in accordance with the manufacturer's installation instructions. Polyurea marking material shall not be applied over existing pavement markings unless the existing marking is 90 percent worn

away or eradicated; or over Type A markings that are fully dry and are at a thickness of 10 mils or less.

Polyurea marking material shall be applied at a wet film thickness of 20 mils ( $\pm 1$  mil). Glass beads and retroreflective optics shall be applied at the rate specified in the VDOT Materials Division's Approved Products List 74 for the specific polyurea product.

**Section 704.03(b) – Pavement messages and symbols markings** is amended to replace the second paragraph with the following:

Message and symbol markings include, but shall not be limited to, those detailed in Standard Drawing PM-10.

**Section 704.04 – Measurement and Payment** is amended to replace the second paragraph with the following:

**Contrast Pavement Line Marking** will be measured in linear feet and will be paid for at the Contract unit price per linear foot for the type or class and width specified. This price shall include surface preparation, premarking, furnishing, installing, quality control tests, daily log, guarding devices, primer or adhesive, glass beads, reflective optics materials when required, and warranty.

**Pavement message markings** will be measured in units of each per location or in linear feet as applicable and will be paid for at the Contract unit price per each or linear foot. This price shall include surface preparation, premarking, furnishing, installing, quality control tests, daily log, guarding devices, primer or adhesive, glass beads, reflective optics materials when required, and warranty.

**Pavement symbol markings** will be measured in units of each per location for the symbol and type material specified and will be paid for at the Contract unit price per each. This price shall include surface preparation, premarking, furnishing, installing, quality control tests, daily log, guarding devices, primer or adhesive, glass beads, reflective optics materials when required, and warranty.

**Section 704.04 – Measurement and Payment** is amended to replace the Pay Item Table with the following:

<b>Pay Item</b>	<b>Pay Unit</b>
(Type or class) Pavement line marking (width)	Linear Foot
(Type or Class) Contrast Pavement Line Marking (width)	Linear Foot
Pavement message marking (Message)	Each or Linear Foot

Pavement symbol marking (Symbol, Type or class material) Each

(Type) Pavement marker (type pavement) Each

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**SECTION 808 – FIBER OPTIC CABLE AND INTERCONNECT**

**SS808-002016-01**

**March 29, 2018**

**Section 808.02(a)3e – Optical Fiber** is amended by replacing the first paragraph with the following:

**Optical Fiber** used in the cable shall meet or exceed the TIA-492 CAAB specification, the U.S. Department of Agriculture Rural Utilities Service (RUS) 7 CFR 1755.900 Telcordia GR-20 standards, International Electrotechnical Commission (IEC) 60793-2-50 Type B1.3, and International Telecommunication Union ITU-T G.652 requirements. Use only optical fibers meeting the following additional requirements:

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**Geometry**

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Cladding Diameter: 125 $\mu$ m,  $\pm$ 0.7  $\mu$ m

Core-to Cladding Concentricity:  $\leq$ 0.5  $\mu$ m

Zero Dispersion: 1310nm

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**Optical**

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Cabled Fiber Attenuation: 1,310 nm,  $\leq$ 0.4 dB/km; 1,550 nm,  $\leq$ 0.3 dB/km

Point Discontinuity: 1,310 nm,  $\leq$ 0.05 dB/km; 1,550 nm,  $\leq$ 0.05 dB/km

Total Dispersion: 1,625 nm  $\leq$ 23.0 ps/(nm $\cdot$ km)

Macrobend Attenuation: Turns – 100; Outer diameter (OD) of the mandrel – 60 mm,  $\pm$ 2 mm;  $\leq$ 0.05 dB at 1,550 nm

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