2022 Supplement to the VDOT 2020 Road and Bridge Specifications

This volume contains all revisions to the 2020 Road and Bridge Specifications effective December 31, 2021.

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SECTION 101 – DEFINITIONS OF ABBREVIATIONS, ACRONYMS, AND TERMS

SS101-002020-01 **March 24, 2020**

SECTION 101 – DEFINITIONS OF ABBREVIATIONS, ACRONYMS, AND TERMS is amended as follows:

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

ATSSA	American Traffic Safety Service Association
ITS	Intelligent Transportation Systems
MASH	Manual for Assessing Safety Hardware
NFPA	National Fire Protection Association
NTPEP	National Transportation Product Evaluation Program
VAC	Virginia Administrative Code, when referencing a legal code

Section 101.01 – Abbreviations and Acronyms is amended to replace the following abbreviations:

VAC	Volts Alternating Current when used to define an amount of electrical potential.

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.

Match-Cure. A process where concrete test specimens are cured at the same temperature as the product by monitoring the concrete temperature in both the product and the test specimens and applying heat to the test specimens to match the temperature of the concrete.

SECTION 105 – CONTROL OF WORK

SS105-002020-01 **August 13, 2019**

SECTION 105 – CONTROL OF WORK is amended as follows:

Section 105.10(b) – Plans is replaced with the following:

Plans will be furnished to the Contractor electronically without charge.

Plan revisions issued while the project is under construction will be furnished to the Contractor electronically.

The Contractor shall keep one complete set of plans, standard drawings, Contract assemblies, and Specifications available on the project at all times. For maintenance projects, certain sign projects, and other projects having no field office or on which the Contractor has no office, the Contractor shall keep one complete set of plans, Contract assemblies, and Specifications with him while prosecuting the Work. In the event items of Work are required as per the Standard Drawings, the Contractor shall also keep the appropriate Standard Drawings on the project during the performance of that work.

Plans consisting of general drawings and showing such details as are necessary to give a comprehensive understanding of the work specified will be furnished by the Department. Except as otherwise shown on the plans, dimensions shown on the Plans are measured in the respective horizontal or vertical planes. Dimensions that are affected by gradients or vertical curvatures shall be adjusted as necessary by the Contractor to accommodate actual field conditions and shall be specifically denoted as "field adjusted" on the Working Drawings. Failure on the part of the Contractor to so denote field adjustments on the Working Drawings shall not relieve the Contractor of the responsibility to accommodate and incorporate such existing conditions into the finished work.

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. Proof of certification 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 107 – LEGAL RESPONSIBILITIES

SS107-002020-01 **October 2, 2020**

SECTION 107 – LEGAL RESPONSIBILITIES is amended as follows:

Section 107.14 – Equal Employment Opportunity is replaced with the following:

The Contractor shall comply with the applicable provisions of presidential executive orders and the rules, regulations, and orders of the President's Committee on Equal Employment Opportunity.
The Contractor shall maintain the following records and reports as required by the Contract EEO provisions:

- Record of all applicants for employment
- New hires by race, work classification, hourly rate, and date employed
- Minority and non-minority employees employed in each work classification
- Changes in work classifications
- Employees enrolled in approved training programs and the status of each
- Minority subcontractor or subcontractors with meaningful minority group representation
- Copies of Form C-57 submitted by subcontractors

If the Contract has a stipulation or requirement for trainees, the Contractor shall submit semi-annual training reports in accordance with the instructions shown on the forms furnished by the Department. If the Contractor fails to submit such reports in accordance with the instructions, his monthly progress estimate for payment may be delayed.

The Contractor shall cooperate with the Department in carrying out EEO obligations and in the Department's review of activities under the Contract. The Contractor shall comply with the specific EEO requirements specified herein and shall include these requirements in every subcontract of $10,000 or more with such modification of language as may be necessary to make them binding on the subcontractor.

(a) **Required contract provisions:**

1. **Required by §2.2-4201 of the Code of Virginia:** During the performance of this Contract, the Contractor agrees as follows:

    a. The Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin, except where religion, sex, or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination

clause, including the names of all contracting agencies with which the Contractor has contracts of over $10,000.

b. The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that such contractor is an equal opportunity employer. However, notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this chapter.

c. If the Contractor employs more than five employees, the Contractor shall (i) provide annual training on the Contractor's sexual harassment policy to all supervisors and employees providing services in the Commonwealth, except such supervisors or employees that are required to complete sexual harassment training provided by the Department of Human Resource Management, and (ii) post the Contractor's sexual harassment policy in (a) a conspicuous public place in each building located in the Commonwealth that the Contractor owns or leases for business purposes and (b) the Contractor's employee handbook.

The Contractor shall include the provisions of subdivisions a, b, and c in every subcontract or purchase order of over $10,000, so that such provisions shall be binding upon each subcontractor or vendor.

Nothing contained in this chapter shall be deemed to empower any agency to require any contractor to grant preferential treatment to, or discriminate against, any individual or any group because of race, color, religion, sex, or national origin on account of an imbalance that may exist with respect to the total number or percentage of persons of any race, color, religion, sex, or national origin employed by such contractor in comparison with the total number or percentage of persons of such race, color, religion, sex, or national origin in any community or in the Commonwealth.

2. **Required by Executive Order 61-2017:** The Contractor shall not discriminate, in employment practices, subcontracting practices, and delivery of goods or services, on the basis of race, sex, color, national origin, religion, sexual orientation, gender identity, age, political affiliation, disability, or veteran status. The Contractor shall include this

paragraph in every subcontract or purchase order over $10,000, so that the same provisions will be binding upon each subcontractor or vendor providing labor or materials to the Project.

(b) **EEO Officer:** The Contractor shall designate and make known to the Department an EEO Officer who can effectively administer and promote an active Contractor EEO program and who shall be assigned adequate authority and responsibility to do so.

(c) **Dissemination of Policy:**

1. Members of the Contractor's staff who are authorized to hire, supervise, promote, and discharge employees or recommend such action or are substantially involved in such action shall be made fully aware of and shall implement the Contractor's EEO policy and contractual responsibilities to provide equal employment opportunity in each grade and classification of employment. The following actions shall be taken as a minimum:

    a. Periodic meetings of supervisory and personnel office employees shall be conducted before the start of work and at least once every 6 months thereafter, at which time the Contractor's EEO policy and its implementation shall be reviewed and explained. The meetings shall be conducted by the EEO Officer or another knowledgeable company official.

    b. New supervisory or personnel office employees shall be given a thorough indoctrination by the EEO Officer or another knowledgeable company official covering all major aspects of the Contractor's EEO obligations within 30 days following their reporting for duty with the Contractor.

    c. The EEO Officer or appropriate company official shall instruct employees engaged in the direct recruitment of employees for the project relative to the methods followed by the Contractor in locating and hiring minority group employees.

2. In order to make the Contractor's EEO policy known to all employees, prospective employees, and potential sources of employees such as, but not limited to, schools, employment agencies, labor unions where appropriate, and college placement officers, the Contractor shall take the following actions:

    a. Notices and posters setting forth the Contractor's EEO policy shall be placed in areas readily accessible to employees, applicants for employment, and potential employees.

The Contractor shall furnish, erect, and maintain at least two bulletin boards having dimensions of at least 48 inches in width and 36 inches in height at locations readily accessible to all personnel concerned with the project. The boards shall be erected immediately upon initiation of the Contract work and shall be maintained until the completion of such work, at which time they shall be removed from the project. Each bulletin board shall be equipped with a removable glass or plastic cover that, when in place, will protect posters from weather or damage. The Contractor shall promptly post official notices on the bulletin boards. The costs for such work shall be included in the price bid for other Contract items.

b. The Contractor's EEO policy and the procedures to implement such policy shall be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

(d) **Recruitment:**

1. Advertisements for employment shall conform to Section 107.14(a)1.

2. Unless precluded by a valid bargaining agreement, the Contractor shall conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants, including, but not limited to, state employment agencies, schools, colleges, and minority group organizations. The Contractor shall identify sources of potential minority group employees and shall establish procedures with such sources whereby minority group applicants may be referred to him for employment consideration.

3. The Contractor shall encourage his employees to refer minority group applicants for employment by posting appropriate notices or bulletins in areas accessible to all employees. In addition, information and procedures with regard to referring minority group applicants shall be discussed with employees.

(e) **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel action of any type shall be taken without regard to race, color, religion, sex, or national origin.

1. The Contractor shall conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of personnel.

2. The Contractor shall periodically evaluate the spread of wages paid within each classification to determine whether there is evidence of discriminatory wage practices.

3. The Contractor shall periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the Contractor shall promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, corrective action shall include all affected persons.

4. The Contractor shall investigate all complaints of alleged discrimination made to him in connection with obligations under the Contract, attempt to resolve such complaints, and take appropriate corrective action. If the investigation indicates that the discrimination may affect persons other than the complainant, corrective action shall include those persons. Upon completion of each investigation, the Contractor shall inform every complainant of all avenues of appeal.

(f) **Training:**

1. The Contractor shall assist in locating, qualifying, and increasing the skills of minority group and women employees and applicants for employment.

2. Consistent with work force requirements and as permissible under federal and state regulations, the Contractor shall make full use of training programs, i.e., apprenticeship and on the job training programs for the geographical area of Contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

3. The Contractor shall advise employees and applicants for employment of available training programs and the entrance requirements for each.

4. The Contractor shall periodically review the training and promotion potential of minority group employees and shall encourage eligible employees to apply for such training and promotion.

5. If the Contract provides a pay item for trainees, training shall be in accordance with Section 518.

(g) **Unions:** If the Contractor relies in whole or in part on unions as a source of employees, best efforts shall be made to obtain the cooperation of such unions to increase opportunities for minority groups and women in

the unions and to effect referrals by such unions of minority and women employees. Actions by the Contractor, either directly or through his Contractor's Association acting as agent, shall include the following procedures:

1. In cooperation with the unions, best efforts shall be used to develop joint training programs aimed toward qualifying more minority group members and women for membership in the unions and to increase the skills of minority group employees and women so that they may qualify for higher-paying employment.

2. Best efforts shall be used to incorporate an EEO clause into union agreements to the end that unions shall be contractually bound to refer applicants without regard to race, color, religion, sex, or national origin.

3. Information shall be obtained concerning referral practices and policies of the labor union except that to the extent the information is within the exclusive possession of the union. If the labor union refuses to furnish the information to the Contractor, the Contractor shall so certify to the Department and shall set forth what efforts he made to obtain the information.

4. If a union is unable to provide the Contractor with a reasonable flow of minority and women referrals within the time limit set forth in the union agreement, the Contractor shall, through his recruitment procedures, fill the employment vacancies without regard to race, color, religion, sex, or national origin, making full efforts to obtain qualified or qualifiable minority group persons and women. If union referral practice prevents the Contractor from complying with the EEO requirements, the Contractor shall immediately notify the Department.

(h) **Subcontracting:** The Contractor shall use best efforts to use minority group subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of SWaM and DBE construction firms from the Department. If SWaM and DBE goals are established in the proposal, the Contractor shall comply with Section 107.15.

The Contractor shall use best efforts to ensure subcontractor compliance with his EEO obligations.

(i) **Records and Reports:** The Contractor shall keep such records as are necessary to determine compliance with his EEO obligations. The records shall be designed to indicate the following:

1. the number of minority and nonminority group members and females employed in each work classification on the project.

2. the progress and efforts being made in cooperation with unions to increase employment opportunities for minorities and females if unions are used as a source of the work force.

3. the progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees.

4. the progress and efforts being made in securing the services of minority group subcontractors or subcontractors with meaningful minority group and female representation among their employees.

Records shall be retained for a period of 3 years following the Completion Date of the Contract work and shall be available at reasonable times and places for inspection by authorized representatives of the Department.

Each month for the first three months after construction begins and every month of July thereafter for the duration of the project, Form C-57 shall be completed to indicate the number of minority, nonminority, and female employees currently engaged in each work classification shown on the form. The completed Form C-57 shall be submitted within 3 weeks after the reporting period. Failure to do so may result in delay of approval of the Contractor's monthly progress estimate for payment.

SECTION 200 – GENERAL

SS200-002020-03 **August 25, 2020**

SECTION 200 – GENERAL is amended as follows:

Section 200.04 – Acceptance Procedures for Aggregates is amended to replace the fourth paragraph with the following:

The No. 10 sieve shall be the dividing sieve for soils, select material, aggregate subbase material, and aggregate base material. The No. 8 sieve shall be the dividing sieve for asphalt concrete aggregates. That portion of the total aggregate retained on the sieves is defined as *coarse aggregate,* and that portion passing the sieves is defined as *fine aggregate.* Soundness tests will be performed according to the requirements of AASHTO T 104 without regard to these definitions of fine and coarse aggregate. Fine and coarse aggregates for hydraulic cement concrete are distinguishable by their conformity to the series of grading requirements specified in Sections 202 and 203, respectively, except that lightweight aggregate is specified in Section 206.

Section 200.06 – Technician and Batcher Certification is renamed **Technician Certification** is amended to replace the first paragraph with the following:

> When the Contract requires a type of technician defined by this Section, the Contractor shall use a person certified by the Department. The Department will either certify technicians upon a candidate's satisfactory completion of an examination or recognize third-party certifications as described herein. The Contractor shall ensure their technician is able to prove their certification status upon demand.

Section 200.06(e) – Concrete Batcher is deleted.

Section 200.06(h) – Concrete Field Technician is replaced with the following:

> **Concrete Field Technician:** A Concrete Field Technician provides quality control of placement operations for hydraulic cement concrete in accordance with applicable requirements. The Department will recognize ACI Concrete Field Testing Technician Grade I, Washington Area Council of Engineering Laboratories (WACEL) Concrete I, or National Institute for Certification in Engineering Technologies (NICET) Construction Materials Testing Level II for Concrete for this certification.

Section 200.06(j) – Aggregate Properties Technician is deleted.

Section 200.06(m) – Soils and Aggregate Compaction Technician is inserted as follows:

> **Soils and Aggregate Compaction Technician:** A Soils and Aggregate Compaction Technician conducts density, moisture content, and depth checks of soil placement and aggregate lifts during construction, including stabilized lifts. The Technician also monitors application rates of stabilizing chemicals used in soil and aggregate lifts in the field. The Department will recognize NICET Construction Materials Testing Level II for Soils for this certification.

Section 200.06(n) – Cold Asphalt Recycling – Plant Technician is inserted as follows:

> **Cold Asphalt Recycling – Plant Technician** samples Cold In-place Recycling (CIR) or Cold Central Plant Recycling (CCPR) material during production and is capable of conducting any tests necessary to put the CIR equipment and CCPR plant into operation.

Section 200.06(o) – Cold Asphalt Recycling – Field Technician is inserted as follows:

Cold Asphalt Recycling – Field Technician provides quality control testing and inspection of the placement of CIR and CCPR materials.

Section 200.06(p) – Full Depth Reclamation (FDR) Technician is inserted as follows:

Full Depth Reclamation (FDR) Technician provides quality control testing, inspection of the placement of FDR, samples FDR material during production, and is capable of conducting any tests necessary to put the FDR equipment into operation.

SECTION 202—FINE AGGREGATE

SS202-002020-01 **September 23, 2019**

SECTION 202—FINE AGGREGATE is revised as follows:

Section 202.02 – Materials is amended by inserting the following:

Lightweight aggregate can also be used as a fine aggregate and shall conform to Section 206.

Section 202.03(e) – Deleterious Material is replaced with the following:

Deleterious Material: The amount of deleterious material in sands shall be not more than the following:

Material	% by Weight	AASHTO Test Method
Clay lumps	0.25	T 112
Shale, mica, coated grains, soft or flaky particles	1.0	T 113
Organic material	0	T 21
Total material passing No. 200 sieve by washing[1,2]		T 11 and T 27
For use in concrete subject to abrasion	3	
For other concrete	5	

[1]In the case of stone sand, if the material passing the No. 200 sieve is dust of fracture, essentially free from clay and shale, the percentages shown for use in concrete subject to abrasion and in other concrete may be increased to 5% and 7%, respectively.

[2]In the case of blends of stone sand and natural sand, provided the natural sand contains no greater than 3% passing the No. 200 sieve for use in concrete subject to abrasion and no greater than 5% for other concrete, then the stone sand limits of 5% and 7% shall apply to the blend.

SECTION 203 – COARSE AGGREGATE

SS203-002020-01 **September 19, 2019**

SECTION 203 – COARSE AGGREGATE is amended as follows:

Section 203.02 – Materials is amended by replacing the first paragraph with the following:

> Coarse aggregate shall consist of crushed stone, crushed slag, crushed or uncrushed gravel, or lightweight aggregate. Coarse aggregate shall be clean, hard, tough, and durable pieces free from: adherent coatings and deleterious amounts of friable, thin, elongated, or laminated pieces; soluble salts; or organic materials.

Section 203.02(e) – Lightweight coarse aggregate is inserted as follows:

> **Lightweight coarse aggregate** shall conform to Section 206.

SECTION 204 – STONE FOR MASONRY, RIPRAP, POROUS BACKFILL, AND GABIONS

SS204-002020-01 **February 22, 2019**

SECTION 204 – STONE FOR MASONRY, RIPRAP, POROUS BACKFILL, AND GABIONS is amended as follows:

Section 204.02(c) – Porous backfill is replaced with the following:

> **Porous backfill** shall be No. 78 or 8 aggregate, at least Grade B. Crushed glass meeting the gradation requirements specified in Section 203.02(d) may be directly substituted for No. 78 and 8 aggregates. Lightweight aggregate conforming to Section 206 for coarse aggregate and meeting the 3/4-inch or 1/2-inch grading in AASHTO M 195 may be directly substituted for No. 78 and 8 aggregates.

SECTION 206 – LIGHTWEIGHT AGGREGATE

SS206-002020-01 **September 23, 2019**

SECTION 206 – LIGHTWEIGHT AGGREGATE is replaced by the following:

206.01 – Description

These specifications cover lightweight aggregate used in the production of hydraulic cement concrete, internally cured concrete using pre-wetted lightweight aggregate, and asphalt surface treatment.

206.02 – Detail Requirements

Lightweight aggregate shall consist of clay, shale, or slate expanded through a sintering or rotary kiln.

The requirements for normal weight aggregate and concrete shall apply to lightweight concrete when a reduced density is specified or when internally-cured concrete (where a portion of the fine aggregate is replaced with pre-wetted lightweight fine aggregate) is specified, except for the following:

(a) **Lightweight aggregate used in hydraulic cement concrete** shall conform to AASHTO M 195 and the following requirements.

1. **Grading**: Gradation for fine and coarse aggregates shall conform to AASHTO M 195. Tests to verify conformance shall be performed in accordance with AASHTO T 27.

2. **Soundness:** Soundness for fine aggregate shall conform to the freeze and thaw requirements of Table II-2. Soundness for coarse aggregate shall conform to the freeze and thaw requirements of Table II-4. Soundness shall be tested in accordance with AASHTO T 103.

3. **Void Content:** Void content requirements for fine aggregate shall not apply to lightweight aggregate.

4. **Deleterious Material:** The amount of deleterious material in fine aggregate shall conform to Section 202 for stone sand. The amount of deleterious material in coarse aggregate shall conform to Section 203.

5. **Abrasion Loss:** Abrasion loss for coarse aggregate shall conform to the Grade A requirements in Table II-5.

6. **Flat and Elongated Particles:** Coarse aggregate shall conform to Section 203.

(b) **Lightweight aggregate used for asphalt surface treatment** shall conform to AASHTO M 195 except that Sections 3, 6, and 8 will not apply. Grading shall conform to Table II-3 except that the maximum percentage by weight of material passing the No. 8 sieve shall be 16% and passing the No. 16 sieve shall be 9%.

SECTION 210 – ASPHALT MATERIALS is amended as follows:

Section 210.04(e) – Thin Hot Mix Asphalt Concrete Overlay tack coat is inserted as follows:

Thin Hot Mix Asphalt Concrete Overlay tack coat shall conform to the following:

Test on Emulsion	Method	Min	Max
Viscosity at 77° F, SSF	AASHTO T 59	20	100
Sieve Test[1], %	AASHTO T 59	—	0.05
24 hour storage stability[2], %	AASHTO T 59	—	1
Residue from distillation at 400° F[3], %	AASHTO T 59	63	
Oil portion from distillation ml of oil per 100g emulsion			2
Demulsibility, % 35 ml 0.02 N CaCl2 or 35 ml 0.8% dioctyl sodium sulfosuccinate	AASHTO T 59	60	

[1]The sieve test is waived if successful application of the material has been achieved in the field.
[2]After standing undisturbed for 24 hours, the surface shall show no white, milky colored substance, but shall be a smooth homogeneous color throughout.
[3]AASHTO T59 with modifications to include a 400° F +/- 10° F maximum temperature to be held for a period of 15 minutes.

Test on Residue From Distillation	Method	Min	Max
Elastic Recovery[1], %	AASHTO T 301	60	—
Penetration @ 77° F, 100 g, 5 sec. dmm.	AASHTO T 49	60	150

[1]With exception that the elongation is 20 cm and the test temperature is 50° F.

SECTION 211 – ASPHALT CONCRETE is amended as follows:

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:

Mix Type[1]	Equivalent Single-Axle Load (ESAL) Range (millions)	Minimum Asphalt Performance Grade (PG)[2]	Nominal Maximum Aggregate Size[3]
SM-4.75A	0 to 3	64S-16	No. 4
SM-4.75D	3 to 10	64H-16	No. 4
SM-4.75E	3 to 10	64E-22	No. 4
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

[1]SM = Surface Mixture; IM = Intermediate Mixture; BM = Base Mixture

[2]**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.

[3]**Nominal Maximum Aggregate Size** is defined as one sieve size larger than the first sieve to retain more than 10 percent aggregate.

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-12A – Standard Deviation is renamed **Aggregate Properties** and is

TABLE II-12A
Aggregate Properties

	Coarse Aggregate Properties			Fine Aggregate Properties	
	CAA		ASTM D4791		
Mix Type	1 fractured face	2 fractured faces	F & E (5:1) % by weight	SE	FAA
SM-4.75A				40% min	40% min
SM-4.75D				45% min	45% min
SM-4.75E				45% min	45% min
SM-9.0 A	85% min.	80% min.	10% max.[1]	40% min.	40% min.
SM-9.0 D	85% min.	80% min.	10% max.[1]	45% min.	45% min.
SM-9.0 E	95% min.	90% min.	10% max.[1]	45% min.	45% min.
SM-9.5 A	85% min.	80% min.	10% max.[1]	45% min.	45% min.
SM-9.5 D	85% min.	80% min.	10% max.[1]	45% min.	45% min.
SM-9.5 E	95% min.	90% min.	10% max.[1]	45% min.	45% min.
SM-12.5 A	85% min.	80% min.	10% max.[1]	45% min.	45% min.
SM-12.5 D	85% min.	80% min.	10% max.[1]	45% min.	45% min.
SM-12.5 E	95% min.	90% min.	10% max.[1]	45% min.	45% min.
IM-19.0 A	85% min.	80% min.	10% max.[1]	45% min.	45% min.
IM-19.0 D	95% min.	90% min.	10% max.[1]	45% min.	45% min.
IM-19.0 E	95% min.	90% min.	10% max.[1]	45% min.	45% min.
BM-25.0 A	80% min.	75% min.	10% max.[1]	45% min.	45% min.
BM-25.0 D	80% min.	75% min.	10% max.[1]	45% min.	45% min.

[1]10 percent measured at 5:1 on maximum to minimum dimensions

replaced with the following:

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

TABLE II-13
Asphalt Concrete Mixtures: Design Range

Mix Type	Percentage by Weight Passing Square Mesh Sieves										
	1 1/2 in	**1 in**	**¾ in**	**½ in**	**3/8 in**	**No. 4**	**No. 8**	**No. 16**	**No. 30**	**No. 50**	**No. 200**
SM-4.75 A,D,E				100[1]	95-100	90-100		30-55			6-13
SM-9.0 A,D,E				100[1]	90-100	90 max.	47-67				2-10
SM-9.5 A,D,E				100[1]	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

[1]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

Mix Type	VTM (%) Production	VFA (%) Design	VFA (%) Production	Min. VMA (%)	Fines/Asphalt Ratio	No. of Gyrations N Design
SM4.75A [2, 4]	3.0-6.0	70-75	70-80	16.5	1.0-2.0	50
SM4.75D [2, 4]	3.0-6.0	70-75	70-80	16.5	1.0-2.0	50
SM4.75E [2, 4]	3.0-6.0	70-75	70-80	16.5	1.0-2.0	50
SM-9.0A [1,2]	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.0D [1,2]	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.0E [1,2]	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.5A [1,2]	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-9.5D [1,2]	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-9.5E [1,2]	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-12.5A [1,2]	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
SM-12.5D [1,2]	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
SM-12.5E [1,2]	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
IM-19.0A [1,2]	2.0-5.0	69-76	64-83	14.0	0.6-1.3	50
IM-19.0D [1,2]	2.0-5.0	69-76	64-83	14.0	0.6-1.3	50
IM-19.0E [1,2]	2.0-5.0	69-76	64-83	14.0	0.6-1.3	50
BM-25.0A [2,3]	1.0-4.0	67-87	67-92	13.0	0.6-1.3	50
BM-25.0D [2,3]	1.0-4.0	67-87	67-92	13.0	0.6-1.3	50

[1]Asphalt content should be selected at 4.0% air voids for A & D mixes, 3.5% air voids for E mix.

[2]Fines-asphalt ratio is based on effective asphalt content.

[3]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.

[4]Asphalt content shall be selected at 5.0 percent air voids.

Section 211.03(d)8 – For surface mixes is replaced with the following:

For surface mixes, permeability test data shall be submitted in accordance with VTM 120 using either single point verification or the regression method for each surface mix having a different gradation. The specimen height shall be one inch for SM-4.75 mix types. If the average of the permeability results from the single point verification method exceeds 150 x 10^{-5} cm/sec, or if the regression method predicts a permeability exceeding 150 x 10^{-5} cm/sec at

7.5% voids, the Contractor shall redesign the mixture to produce a permeability number less than 150 x 10^{-5} cm/sec.

Section 211.04(a) – Types SM-9.0A, SM-9.0D, SM-9.0E, SM-9.5A, SM-9.5D, SM-9.5E, SM-12.5A, SM-12.5D, and SM-12.5E asphalt concrete is renamed **Types SM-4.75A, SM-4.75D, SM-4.75E, SM-9.0A, SM-9.0D, SM-9.0E, SM-9.5A, SM-9.5D, SM-9.5E, SM-12.5A, SM-12.5D, and SM-12.5E asphalt concrete** and replaced with the following:

Types SM-4.75A, SM-4.75D, SM-4.75E, SM-9.0A, SM-9.0D, SM-9.0E, SM-9.5A, SM-9.5D, SM-9.5E, SM-12.5A, SM-12.5D, and SM-12.5E asphalt concrete shall consist of crushed stone, crushed slag, or crushed gravel and fine aggregate; slag or stone screenings; or a combination thereof combined with asphalt cement. For all surface mixes, except where otherwise noted, no more than 5% of the aggregate retained on the No. 4 sieve and no more than 20% of the total aggregate may be polish-susceptible. At the discretion of the Engineer, SM-9.5AL or SM-12.5AL may be specified and polish susceptible aggregates may be used (without percentage limits). Unless Type C (curb mix) is specified by the Engineer in the Contract, SM9.0, SM-9.5, and SM-12.5 mix types are acceptable for use in the construction of asphalt curbing.

Section 211.04(e) – Type SM-9.5, SM-12.5, IM-19.0 and BM-25.0 asphalt concrete is renamed **Type SM-4.75, SM-9.5, SM-12.5, IM-19.0 and BM-25.0 asphalt concrete** and amended to replace the first paragraph with the following:

Type SM-4.75, SM-9.5, SM-12.5, IM-19.0 and BM-25.0 asphalt concrete may be designated E (polymer modified), or stabilized (S). Asphalt concrete mixtures with the E designation may not be stabilized.

Table II-15 – Process Tolerance is replaced with the following:

TABLE II-15
Process Tolerance

Tolerance on Each Laboratory Sieve and Asphalt Content: Percent Plus and Minus													
No. Tests	**Top Size[1]**	**1 ½”**	**1”**	**¾”**	**½”**	**3/8”**	**No. 4**	**No. 8**	**No. 16**	**No. 30**	**No. 50**	**No. 200**	**A.C.**
1	0.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	6.0	5.0	2.0	.60
2	0.0	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	4.3	3.6	1.4	0.43
3	0.0	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	3.3	2.8	1.1	0.33
4	0.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	2.5	1.0	0.30
5	0.0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	2.7	2.2	0.9	0.27
6	0.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	2.4	2.0	0.8	0.24
7	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.3	1.9	0.8	0.23
8	0.0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.1	1.8	0.7	0.21
12	0.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	1.7	1.4	0.6	0.17

[1]Defined as the sieve that has 100% passing as defined in Table II-13.

Section 211.09 – Adjustment System is amended by replacing the first paragraph and following table with the following:

If a lot of material does not conform to the acceptance requirements of Section 211.08, the Department will determine adjustment points as follows:

Adjustment Points for Each 1% the Gradation Is Outside the Process Tolerance Permitted In Table II-15

Sieve Size	(Applied in 0.1% increments)
1 1/2 in	1
1 in	1
3/4 in	1
1/2 in	1
3/8 in	1
No. 4	1
No. 8	1
No. 16	1
No. 30	2
No. 50	2
No. 200	3

SECTION 217 – HYDRAULIC CEMENT CONCRETE

SS217-002020-01 **September 27, 2019**

SECTION 217 – HYDRAULIC CEMENT CONCRETE is amended as follows:

Section 217.02(c) – Fine aggregate is replaced with the following:

Fine aggregate shall conform to Section 202 for Grading A or Section 206.

Section 217.02(d) – Coarse aggregate is replaced with the following:

Coarse aggregate shall conform to Sections 203 or 206 for the class of concrete being produced.

Section 217.02(m) – Lightweight aggregate is inserted as follows:

Lightweight aggregate shall conform to Section 206.

Section 217.07 – Proportioning Concrete Mixes is replaced with the following:

The Contractor is responsible for having a certified Concrete Plant Technician available during batching operations, and a certified Concrete Field Technician present during placing operations.

The Contractor shall have at least one certified Concrete Field Technician on the project for single or multiple incidental concrete placements. The Contractor shall have at least one certified Concrete Field Technician present at each site during the placement of pavements, bridge decks, bridge piers and abutments, box culverts, and any placement of 50 or more cubic yards.

The certified Concrete Field Technician shall provide control over methods used for discharging, conveying, spreading, consolidating, screeding, finishing, texturing, curing, and protecting the concrete. Deficiencies in conformance to specification requirements and good concreting practices shall be corrected by or under the direction of the certified Concrete Field Technician as soon as they begin to occur.

The concrete producer shall plan batching operations so that delays do not occur because of the absence of certified personnel.

Concrete shall be proportioned to secure the strength and durability required for the pavement or the part of the structure in which it will be used.

The Contractor shall submit concrete mixture designs conforming to the Specifications for the class of concrete specified for the Engineer's approval prior to the start of concrete mixing operations.

The Contractor shall furnish and incorporate a water-reducing and retarding admixture in bridge deck concrete and in other concrete when conditions are such that the initial set may occur prior to completion of approved finishing operations. The two admixtures shall not be used together in the same concrete batch unless tests indicate the admixtures are compatible in accordance with Section 215.02(b). If the Engineer elects to waive the requirement to have both admixtures, the Contractor may supply and incorporate only a water-reducing admixture, in lieu of having both the water-reducing and retarding admixtures normally required in the bridge deck concrete, to provide the required slump without exceeding the maximum water/cement ratio. The Contractor shall demonstrate to the Engineer that use of the admixture will not cause segregation.

Concrete shall be air entrained. The air content shall conform to Table II-17.

Except for latex hydraulic cement concrete, concrete mixtures shall be developed and verified by any one of the following three options listed below.

The mix designs as determined by the respective option below shall be valid provided there is no change in sources of aggregate, chemical admixtures, mineral admixtures, or hydraulic cement. All concrete mixtures shall contain the minimum amount of mineral admixtures or combination thereof expressed as a percent of the total cementitious materials in accordance with Section 217.02(a). All quantities of materials shall be weighed in accordance with tolerances specified in Section 217.04. The quantities of coarse and fine aggregates used in concrete production shall not deviate by more than ±5% by weight from the batch weights of the approved mix design.

When low permeability concrete is specified, two 4 X 8 inch specimens shall be molded from concrete representing the proposed mix design and tested in accordance with VTM 112 to validate conformance. For trial batches, the tested permeability value shall be considered satisfactory provided it is 500 coulombs less than the specified maximum value for the class of concrete specified.

(a) **Option 1 – Prescriptive Method:**

Mix proportions for normal, heavy weight, and lightweight concrete shall be established by the methods described in ACI 211 on an absolute volume basis for the respective aggregate size. The mix design shall conform to Table II-17 or other parts of the Contract for the class and type of concrete indicated. Aggregate properties obtained from the aggregate producer shall be used for design purposes.

Once the proposed mix design has been established, the Contractor or their concrete supplier shall produce one 3-cubic yard production verification batch using the same type of equipment intended for use in supplying concrete to the Department. The proposed mix design will be considered acceptable provided that the plastic properties of the concrete are within the Department's specification limits for the given class of concrete. Strength tests of the verification batch must equal or exceed f'_c for the intended class of concrete.

(b) **Option 2 – Trial Batch Mix Design Method:**

The minimum cementitious content requirement in Table II-17 will be waived provided that the maximum water-cementitious ratio requirement of Table II-17 is met for the respective class of concrete. The required grading for fine and coarse aggregate will be waived provided the coarse aggregate meets the nominal maximum size as required in Table II-17 for the respective class of concrete.

The Contractor shall prepare a minimum of 3 trial concrete batches with differing cementitious materials contents over a range anticipated to encompass the design strength, f'_c, plus overdesign, and water-

cementitious ratios encompassing the range permitted for the classes of concrete being evaluated. Trial batches may be produced in either small scale laboratory batches or truck batches with a minimum batch volume of 3 cubic yards each.

The plastic properties of the trial concrete batches shall meet the requirements for consistency and air content in Table II-17 and meet the additional requirements listed below:

- The concrete temperature of the trial batches, as batched and sampled, shall be a minimum of 68°F.
- Air content of the trial batches shall be within a range of -1.0 to +1.5 percentage points of the median design air content for the classes of concrete being evaluated.
- Slump of the trial batches shall be within ±1 inch of the maximum slump permitted for the class of concrete.

Three 4 X 8 inch test specimens shall be molded from each batch, cured in accordance with ASTM C31 for acceptance specimens, and then compression tested at an age of 28 days. The strength results of these tests shall be plotted on a graph to establish the relationship between the water-cementitious ratio and the compressive strength. Alternately, the relationship can be established between the cementitious content and the compressive strength. The design water-cementitious ratio, or design cementitious content, can then be derived from the graph to satisfy the required design strength plus an appropriate overdesign to be designated as f'_{cr}. The required cementitious materials content determined from these tests can be interpolated from the established graph. If desired, the design water-cementitious ratio or cementitious content can be determined from a polynomial regression analysis of the plotted strength data.

Test results from prior trial concrete batches are acceptable for use if they represent the same material sources proposed for the Department work, meet the requirements for trial concrete batches as stated above and are less than 18 months old.

The required cementitious content to satisfy the strength requirement for the respective class of concrete shall be determined in accordance with either of the two following procedures:

1. When the concrete production facility has sufficient data to establish a production standard deviation (“s”), as described in Section 217.07(d). The cementitious content required to meet the design strength requirement, f'_{cr}, then the f'_{cr} shall be based upon the following equation:

$$f'_{cr} = f'_c + 3s$$

2. When the concrete production facility does not have a production standard deviation established the cementitious content required to meet the design strength requirement, f'_{cr}, then the f'_{cr} shall be based upon the following equation:

$$f'_{cr} = f'_c + 1700 \text{ psi.}$$

Once the proposed mix design has been established, the Contractor shall produce one 3-cubic-yard production verification batch using the same type of equipment intended for use in supplying concrete to the Department. The proposed mix design will be considered acceptable if and only if the plastic properties of the concrete are within the Department's specification limits for the given class of concrete. Strength tests of the verification batch must equal or exceed f'_c for the intended class of concrete. The requirement for a production verification batch will be waived when the trial batching is performed –with truck batches.

(c) **Option 3 - Documented Field Experience Method:**

The minimum cementitious content requirement in Table II-17 will be waived provided that the maximum water-cementitious ratio requirement of Table II-17 is met for the respective class of concrete. The required grading for fine and coarse aggregate will be waived provided the coarse aggregate meets the nominal maximum size as required in Table II-17 for the respective class of concrete.

An existing concrete mixture shall be considered acceptable for use if the Contractor has a satisfactory test record of pervious field experience as described in Section 217.07(d)**,** and that the proposed concrete mixture meets the following requirements:

1. The water cementitious ratio of the proposed concrete mixture is less than or equal to the maximum water cementitious ratio specified for the respective class of concrete.

2. The documented average strength, f 'cr, equals or exceeds the design compressive strength f 'c for the respective class of concrete in accordance with the following equation: f'cr = f 'c + 3s.

3. The proposed concrete mixture contains the same aggregate sources, supplementary cementitious materials type, and admixture type as those used to establish the previous field experience test record.

4. The consistency (slump) and air content are within the specification limits for the respective class of concrete.

(d) **Documentation of Previous Field Experience or Production Standard Deviation(s)**

An acceptable test record to document previous field experience or to establish a production facility standard deviation shall represent a minimum of 30 consecutive compressive strength tests results, encompass a production period of at least 45 days and test data not more than 18 months old. A test record of less than 30 tests, but not less than 15 tests, shall be permitted provided a modification factor is applied to the production facility sample standard deviation as shown below:

Multiply Standard Deviation by Modification Factor

Number of Test	Modification Factor
15	1.16
20	1.08
25	1.03
30	1.00

The test record may be based on non-Department projects if documentation of the sources of concrete strength test results accompanies the submittal.

For latex hydraulic cement content, the dry weight ratio of cement/fine aggregate/coarse aggregate shall be 1:2.5:2. With the Engineer's approval a maximum adjustment of 10 percent may be made in aggregate weights to compensate for grading changes and variable specific gravity.

The Contractor shall adjust batch quantities during the course of the work to compensate for changes in workability caused by differences in the characteristics of aggregates and cements permitted within the specification requirements. Such adjustments shall be made only by the Contractor and shall not change the yield.

If concrete cannot be obtained with the required workability or consistency or within the maximum design water content with the materials furnished, the Contractor shall make changes to secure the desired properties subject to the limiting requirements specified in Table II-17 and the Engineer's approval. The Contractor shall use a fine aggregate having a void content of less than 50.5 percent, except when lightweight fine aggregate is used. When the void content of the fine aggregate is more than 50.5 percent and the concrete does not have the desired properties, in lieu of changing the fine aggregate, the Contractor may take one or more of the following actions:

- Use a water-reducing admixture.

- Increase the cement content.
- Change the source of coarse aggregate.
- In hot weather, add ice or otherwise reduce the temperature to increase the workability.
- Submit other recommendations to the Engineer for approval.

The Contractor shall make trial batches under the observation of the Engineer to verify that concrete of the required workability and consistency is obtained within the specified water content when any of the actions is exercised. At least one trial batch shall be made with the concrete temperature at approximately 90°F to verify that the concrete mixture has sufficient workability and consistency without exceeding the specified water content. The concrete mixture shall be redesigned when the fineness modulus of the fine aggregate changes more than 0.2 from the original design and the concrete does not have the desired properties. Costs incurred because of adjustments of concrete mixture designs and for trial batches shall be borne by the Contractor with no additional compensation being made.

Section 217.08 – Acceptance is replaced with the following:

(a) **Hydraulic cement concrete sampling:** For the purpose of acceptance testing for consistency, air content, density (unit weight), and preparation of specimens for strength testing or permeability testing, hydraulic cement concrete shall be sampled from the mixing/delivery unit in accordance with ASTM C172, except the sample shall be permitted to be taken after discharge of a minimum of two cubic feet of concrete from the delivery vehicle. The two cubic feet discharged shall not be used as part of the test sample or in the Work. The Contractor shall provide a receptacle conforming to ASTM C31 for the Department's use in obtaining the sample. Additional (but not alternate) points of sampling may be required by the Engineer when deemed necessary.

(b) **Air and Consistency Tests**: Air and consistency tests will be performed by the Department prior to discharge of concrete into the forms to ensure that specification requirements are consistently being complied with for each class of concrete supplied. If either determination yields a result that is outside of the allowable range for air content or consistency, the Engineer will use the following procedure:

1. The Engineer will immediately perform a recheck determination. If the results confirm the original test results, the load will be rejected.

2. The Contractor's representative will be immediately informed of the test results.

3. The Contractor shall notify the concrete producer of the test results through a pre-established means of communication.

The Engineer may perform any additional tests deemed necessary and reject all remaining material that fails the tests.

Entrained air content will be determined in accordance with ASTM C231 or ASTM C173. Acceptance or rejection will be based on the results obtained from these tests.

A mixture that contains the minimum amount of water consistent with the required workability shall be used. Consistency will be determined in accordance with ASTM C143. The Engineer will not allow adding cement to loads previously rejected for excessive water content or unsatisfactory consistency.

(c) **Strength Tests**: The 28-day compressive strengths (f'_c) specified in Table II-17 are the strengths used in the design calculations. The Engineer will verify design strengths by tests made during the progress of the work in accordance with ASTM C31 and ASTM C39. The use of ASTM C42 will be at the Engineer's discretion. If the 28-day design compressive strength (f'_c) test results do not conform to the strength requirements specified in Table II-17, the Contractor shall take immediate steps to adjust the mixture design. In addition, the Engineer may require removal of or corrective measures be applied to any concrete that does not meet the requirements of Table II-17. If the concrete cylinder strength, f'_{cyl}, is less than the specified compressive strength found in Table II-17, the criteria in Table II-17A shall apply. The Department will not assess a calculated penalty less than $500. However, the Contractor shall have the right to remove and replace concrete failing to meet specifications at the Contractor's cost.

Before concrete is placed, the Contractor shall provide a storage chamber at his expense for temporary storage of the Department's concrete cylinders. The Contractor shall be responsible for maintaining the chamber so that the concrete test cylinders are kept in a continuously moist condition and within a temperature range of 60°F to 80°F. The chamber shall be equipped with a continuously recording thermometer accurate to ±2°F for the duration of concrete cylinder curing. The Contractor shall provide the data from the continuously recording thermometer within time frames as approved by the Engineer. The chamber shall be located in an area where the test cylinders will not be subject to vibration and shall be of sufficient size or number to store, without crowding or wedging, the required number of test cylinders as determined by the Contractor based on his plan of operations. The Engineer will approve the location of the chamber prior to its placement.

When use of high-early-strength hydraulic cement concrete is required, it shall conform to Table II–17 except that the 28-day compressive strength requirement shall be obtained in 7 days. The Contractor may use up to 800 lbs/yd^3 of Type I, Type II or Type III cement to produce high-early-strength concrete.

(d) **Concrete Temperature** shall be measured in accordance with ASTM C1064.

(e) **Density (Unit Weight)** of freshly mixed concrete will be measured, when required by the Engineer, in accordance with ASTM C138.

(f) **Quality Assurance for Low Permeability Concrete:**

1. **General**

The Contractor shall prepare and cast test specimens on at least two trial batches using job materials, with permissible combination of cementitious materials, for testing by the Department for permeability and strength at least 5 weeks before the field application. The permeability samples shall be cylindrical specimens with a 4-inch diameter and at least 4-inches in length. Cylinders will be tested at 28 days in accordance with VTM 112. The test value shall be the result of the average values of tests on two specimens from each batch. Permeability values obtained from trial batches shall be 500 coulombs below the maximum values specified in Table II-17 to be acceptable.

2. **Acceptance Tests:**

For each set of cylinders made for compressive strength tests, two additional cylinders shall be made for the permeability test. The Department will be responsible for making and testing all permeability test specimens.

If the average permeability test result is at most the value for the specified class of concrete in Table II-17, then full payment will be made for the lot the average permeability test result represents. However, if the average permeability test result exceeds the coulomb value in Table II-17, the percent reduction in payment for that lot of concrete shall be calculated by multiplying 0.005 by each coulomb above the coulomb value in Table II-17 by the concrete item Contract unit price times the number of cubic yards or cubic meters of concrete in the lot. The reduction in price will not exceed 5 percent of the concrete item Contract unit price. The Engineer will reject any concrete with a coulomb value that exceeds the maximum required in Table II-17 by 1000 coulombs. However, bridge deck concrete

with any coulomb value exceeding the maximum required value by over 1000 coulomb may be accepted by the Engineer at 95 percent of the Contract unit price if the concrete in question has the required strength, meets the other specification requirements and the Contractor applies, at his own expense, an approved epoxy concrete overlay to the top of the entire deck. In such cases deck grooving will not be required. The Engineer will not allow the placement of epoxy overlays over latex overlays. The Contractor shall make the adjustment to the roadway grade as required by the Engineer at the Contractor's expense.

Similarly, concrete in abutments and pier caps with coulomb value exceeding the maximum required in Table II-17, by more than 1000 coulomb may be accepted at 95 percent of the Contract unit price if it has the required strength, meets the other specification requirements and the Contractor applies, at his own expense, one coat of epoxy Type EP 3B and one coat of epoxy EP 3T in conformance with Section 243.02, on top of the pier caps or abutment seats.

(g) **Bond Strength for Silica fume concrete, latex-modified concrete and very-early-strength latex-modified concrete overlays:**

The Contractor shall perform the bond strength testing in accordance with VTM 92 at a minimum age of 7 days; when scheduling the lane closure for testing, the inconvenience to the public shall be minimized. The bond strength shall be at least 150 psi; otherwise the substrate concrete shall fail at a depth of at least 0.5 inch over at least 50%of the test area. A minimum of one test result (based upon the average of three test specimen results) shall be conducted on each placement.

Table II-17A - Price Reduction or Action Taken due to f'_{cyl} not meeting the specification value f'_c listed in Table II-17 is replaced with the following:

Table II – 17A
Price Reduction or Action Taken due to f'_{cyl} not meeting the specification value f'_c listed in Table II-17

Condition[1,2]	Concrete is a Pay Item	Concrete is Not a Pay Item
f'_{cyl} is greater than or equal to 98% f'_c	A[3]	A[3]
f'_{cyl} is greater than or equal to 90% f'_c and less than 98% f'_c	B[4]	C[5]
f'_{cyl} is less than 90% f'_c	D[6]	D[6]
f'_{cyl} is not available due to the Contractor's inappropriate handling and storage of specimens in accordance with ASTM C31	D[6]	D[6]

[1] f'_c is the 28-day design compressive strength requirement found in Table II-17.

[2] f'_{cyl} is the actual average tested strength of the standard-cured concrete cylinder made and tested in accordance with ASTM C31 and ASTM C39.

[3] A = full payment

[4] B = pay reduction = [((f'_c - f'_{cyl})/f'_c) x Contract unit price for concrete per yd^3 x number of yds^3 the concrete represents] or $500, whichever is greater.

[5] C = pay reduction = [((f'_c - f'_{cyl})/f'_c) x 5 x Contractor's invoice price for concrete per yd^3 x number of yds^3 the concrete represents] or $500, whichever is greater.

[6] D = The Contractor shall submit an investigative plan stamped by a Professional Engineer holding a valid license to practice engineering in the Commonwealth of Virginia outlining how the Contractor shall demonstrate that the in-place concrete meets the structural strength requirements for the design. The Engineer will not permit any reduction in concrete strength below $0.9f'_c$ for barriers, parapets, railings, etc. The Engineer will approve the investigative plan for all other applications prior to the execution of the investigation. All costs associated with this investigation shall be borne by the Contractor. After the investigation is completed, the Contractor shall submit a report to the Engineer showing the results of the Professional Engineer's analysis, testing and conclusions as well as any recommended actions proposed by the Contractor to be taken with the concrete that did not meet the strength requirements. The Department retains all rights to determine if the action proposed with regard to the concrete in question is acceptable. If the Department concurs with the proposed action and the concrete meets the structural strength requirements of the design and remains in place, any price reduction will be taken by Method B if the concrete is a pay item or Method C if the concrete is not a pay item. If the concrete does not meet the structural requirements of the design, the concrete shall be removed and replaced at no cost to the Department.

Section 217.11 – Self-Consolidating Concrete (SCC) is replaced with the following:

When specified or designated on the Plans, SCC shall be designed as the Class of Concrete specified in Table II-17 and conform to all the requirements herein except as outlined below. Combined aggregate grading and Viscosity Modifying Admixture (VMA) may be used. The VMA shall conform to ASTM C494, Type S. Synthetic fibers from the Department's Approved List 35 may be added to control cracking. Shrinkage-reducing admixture may be added to control shrinkage if approved by the Engineer. The maximum size of aggregate shall not be larger than: 3/4-inch; 1/5 the narrowest dimension between the sides of the forms; 1/3 the slab depth; and 3/4 of the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, bundled tendons or ducts.

The Contractor shall furnish the Engineer a mix design for the SCC which is proportioned according to the project specific criteria for compressive strength, air content, slump flow, VSI, J-Ring value, and segregation factor. The maximum water-cementitious materials ratio shall be 0.45 unless otherwise approved by the Engineer. The Contractor shall use the same components in the trial batches as are to be used in the project including: coarse and fine aggregates; water; source and type of cement; supplementary cementitious materials; and admixtures, including any site-added admixtures intended to be used.

(a) **Slump flow** shall be measured in accordance with ASTM C1611, Procedure B. The slump flow shall be 26 ±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.

(b) **Visual Stability Index (VSI)** Rating in accordance with ASTM C1611 shall not exceed 1.

(c) **J-Ring Flow** as measured by ASTM C1621 shall not be more than 2 inches different from slump flow.

(d) **Stability (performed on trial batches)** of the concrete shall be determined in the laboratory prior to approval of the SCC mixture using test method ASTM C1610. Concrete mixtures shall have a maximum static segregation (segregation factor) of 15%.

(e) **Permeability (if specified) and Strength Test Specimens** shall be sampled in accordance with Section 217.08(c) and fabricated in accordance with ASTM C1758.

Section 217.12 – Low Shrinkage Class A4 Modified Concrete is replaced by the following:

Low shrinkage Class A4 modified concrete shall be either Normal or Lightweight, as specified on the Plans.

(a) **Normal weight:** The cementitious materials content shall be less than 600 pounds per cubic yard. High-early-strength hydraulic cement concrete as described in Section 217.08(b) shall not be used.

The 28 day drying shrinkage shall be less than 0.035% based on average of three specimens when tested in accordance with ASTM C157. Specimens shall be moist-cured for 7 days prior to testing for drying shrinkage. A Shrinkage Reducing Admixture (SRA) shall be used unless the 28 day drying shrinkage is < 0.035% without the admixture. A fixed amount of SRA dosage can be used without additional drying shrinkage testing if approved by the Engineer.

The Contractor, at his expense, shall prepare a minimum 3-cubic-yard trial batch of the mix at least 5 weeks before the proposed start date of production. The trial batch will be used to verify compliance with the shrinkage requirements listed herein and the minimum compressive strength, permeability, air void content, and slump listed in Table II-17. The Contractor shall prepare the trial batch with the same equipment to be used on the project. The Contractor shall obtain the services of a Departmentapproved independent laboratory to perform the trial batch testing. Test results shall be furnished to the Engineer for review and approval. The Engineer will not authorize the Contractor to proceed with production of low shrinkage Class A4 modified concrete for the work required by the Contract until the test results verify conformance with the requirements stated herein.

(b) **Lightweight:** Use lightweight concrete with lightweight aggregates in conformance with AASHTO M 195.

The maximum cementitious materials content shall be 650 lbs/yd^3. All other requirements shall conform to those listed in Table II-17 for Low Shrinkage Class A4 Modified concrete.

Maximum density of freshly mixed lightweight concrete, when tested in accordance with ASTM C138, shall be 120 lbs/ft^3, or as specified on the plans.

Section 217.13 – Latex-modified Concrete, Very-Early Strength (LMCVE), for Bridge Deck Overlays is replaced with the following:

LMCVE shall conform to the requirements of Section 217 and Table II-17 except as modified herein.

Cement shall be approximately 1/3 calcium sulfoaluminate (C4A3S) and 2/3 dicalcium silicate (C2S) or other hydraulic cement that will provide a Latex-Modified Concrete that meets the physical requirements indicated in this section.

The LMCVE shall contain a minimum 658 lbs/yd_3 of rapid hardening cement, 15% styrene butadiene latex by weight of cement, water not to exceed a water-cement ratio of 0.40, and aggregates as proposed by the Contractor for the mixture. The compressive strength minimum shall be 2500 psi at 3 hours and 3500 psi at 24 hours. Compressive strength specimens shall be cured in the molds in the same environment as the in-place LMCVE they represent. Specimens shall remain undisturbed at the site for 2 hours and shall be transported to the testing lab for testing.

Prior to placing overlay the Contractor shall calibrate the mobile concrete mixers. Once the mixers are calibrated, the mixtures shall be sampled and tested for slump and air content. The Contractor shall prepare and test specimens to demonstrate that the concrete mixture shall obtain a compressive strength of at least 2500 psi within 3 hours at the curing temperatures in which the overlay will be placed, and a compressive strength of at least 3500 psi at an age of 24 hours. All trial batching and preparatory work prior to placing LMCVE shall be at the Contractor's expense. During the placement of the overlay the Contractor shall take samples for testing for compressive strength. Permeability, slump and air content measurements will not be required, but may be performed by the Engineer.

Section 217.15 – Lightweight Concrete is inserted as follows:

Lightweight aggregate shall be proportioned for incorporation into the mix in accordance with AASHTO M 195. Prior to producing concrete for a project, the lightweight aggregate shall be in a moisture condition such that the total moisture exceeds the absorbed moisture by a minimum of one percentage point.

The air content for lightweight concrete will be measured by the Department in accordance with ASTM C173.

The fresh lightweight concrete density shall be a maximum 120 lbs/ft^3 unless noted otherwise on the Plans and determined in accordance with ASTM C138. If specified in the Contract, the equilibrium density of the hardened concrete shall be determined in accordance with ASTM C567.

When the lightweight aggregate is used to provide internal curing, when concrete will be delivered by pumping, or when otherwise required by the Engineer, the aggregate shall be pre-wetted to obtain an absorbed moisture content equal to at least the 24-hour absorption as determined by AASHTO T 84 or T 85. In lieu of testing, the Engineer may allow use of a minimum absorbed moisture content equal to the recommendation of the lightweight aggregate manufacturer or as known by the concrete supplier through previous experience to provide the desired performance.

If no previous experience is available for the field performance of the lightweight aggregate, the Contractor shall perform freeze/thaw resistance testing of the hardened concrete mixture on a trial batch in accordance with ASTM C666. The minimum durability factor shall be 90%. This information shall be provided to the Engineer for approval prior to the placement of lightweight concrete.

At least two weeks prior to the initial placement of lightweight concrete, a pre-pour meeting be held with the Contractor, Subcontractors, the concrete producer, and the lightweight aggregate supplier to discuss the production of the lightweight concrete and the placement operations. On the first day of production, the lightweight aggregate manufacturer's representative shall be at the batch plant and/or at the project site to provide technical assistance.

SECTION 223 – STEEL REINFORCEMENT

SS223-002020-01 **July 3, 2019**

SECTION 223 – STEEL REINFORCEMENT is amended as follows:

Section 223.02(a)3 – Welded wire fabric is replaced with the following:

Welded wire fabric shall conform ASTM A1064. When used in continuously reinforced hydraulic cement concrete pavement wire fabric shall be deformed, furnished in flat sheets, and shall conform to ASTM A497, high yield of 70,000 psi.

SECTION 226 – STRUCTURAL STEEL

SS226-002020-01 **September 27, 2019**

SECTION 226 – STRUCTURAL STEEL is amended as follows:

Section 226.02(c) – Anchor Bolts is replaced with the following:

Anchor bolts shall conform to AASHTO M 314 or ASTM F1554.

1. **Anchor bolts for general use** shall be Grade 36. Nuts and washers shall conform to ASTM A563 and ASTM F844 respectively. Threads shall be coarse series.

2. **High-strength anchor bolts** shall conform to ASTM F1554, Grade 55 or AASHTO M314, Grade 55, with supplemental requirements of S1. Nuts and washers shall conform to ASTM A563, Grade DH and ASTM F436 respectively.

3. **Galvanization** of steel anchor bolts, nuts, and washers shall conform to ASTM A153.

4. **Anchor bolts for railings** shall conform to (c)1 herein, and shall be hot-dipped galvanized.

Section 226.02(h) – High-Strength Bolts, Nuts, Washers, and Direct Tension Indicators is renamed **High-Strength Bolts** and replaced with the following:

High-Strength Bolts shall conform to ASTM F3125 Grade A325 Type 1, unless specified otherwise. Nuts, Washers, and Direct Tension Indicators (DTIs) shall conform to specifications appropriate for the grade and type of bolt according to the table below. All nuts shall be Heavy Hex, and all washers shall be Hardened.

High-Strength Bolts	Nuts	Washers	DTIs
ASTM F3125, Grade A325, Type 1[1]	ASTM A563, Grade DH	ASTM F436	ASTM F959
ASTM F3125, Grade A325, Type 3	ASTM A563, Grade DH3	ASTM F436	ASTM F959
ASTM F3125, Grade A490, Type 1	ASTM A563, Grade DH ASTM A194, Grade 2H	ASTM F436	ASTM F959
ASTM F3125, Grade A490, Type 3	ASTM A563, Grade DH3	ASTM F436	ASTM F959
ASTM A449, Type 1[1]	ASTM A563, Grade DH	ASTM F436	ASTM F959
ASTM A449 Type 3	ASTM A563, Grade DH3	ASTM F436	ASTM F959

[1]All bolts conforming to ASTM F3125, Grade A325, Type 1 or ASTM A449, Type 1 and their nuts, washers, and DTIs shall be galvanized.

1. Bolts, nuts, and washers conforming to ASTM F3125 Grade A490 shall not be galvanized. High-strength bolts used with unpainted weathering steel shall conform to ASTM F3125 Grade A325, Type 3; ASTM A449, Type 3; or, when specified, ASTM F3125 Grade A490, Type 3. All use of high-strength bolts conforming to ASTM A449 shall be approved, in writing, by the Engineer. ASTM A449 bolts shall conform to the rotational capacity testing requirement in ASTM F3125 Grade A325 and these Specifications.

2. The maximum hardness for bolts conforming to ASTM F3125 Grade A325 shall be 33Rc. The maximum tensile strength for such bolts shall be 150 kips per square inch for bolts 1 inch or less in diameter and 120 kips per square inch for larger bolts.

3. High-strength fasteners (plain and coated) shall pass a rotational-capacity test as detailed in VTM 135.

    a. Bolts shall be proof-load tested in accordance with ASTM F606, Method I. Full-size bolts shall be wedge tested in accordance with ASTM F606. Nuts shall be proof-load tested in accordance with ASTM F606. Galvanized bolts shall be wedge tested after galvanizing. Galvanized nuts shall be proof-load tested in accordance with ASTM F606 only after overtapping, galvanizing, and lubricating operations are completed.

    b. Galvanized bolts, nuts and washers shall be hot-dipped galvanized in accordance with ASTM A153. The Contractor may use mechanically galvanized bolts, nuts, and washers that conform to ASTM B695, Class 50 if the bolts are to be topcoated with paint.

        When galvanized nuts conforming to ASTM A563 are specified, the amount of over-tapping may be less than specified; however, all nuts in each lot shall be over-tapped by the same amount. Galvanized nuts shall be lubricated in accordance with ASTM A563 using a lubricant sufficiently tinted so as to be readily visible.

        Galvanized bolts, nuts, and washers shall have the galvanization measured for thickness. Measurements for bolts shall be taken on the wrench flats or top of the bolt head. Measurements for nuts shall be taken on the wrench flats.

        When galvanized washers are specified, hardness testing shall be performed after galvanizing. The coating shall be removed prior to testing.

c. All bolts, nuts, and washers shall be furnished with a marking that readily identifies their manufacturer. The Contractor shall provide the Engineer with an example of such marking and the manufacturer's certification for each bolt, nut, and washer supplied to the project. The Contractor shall ensure that two samples from each rotational capacity lot, each sample consisting of one bolt, nut, washer, and DTI (if used on the project), are submitted to the Department for testing, and are accompanied by all documentation.

   Documentation shall indicate the results of all tests and processes performed on the hardware, the name of the testing facility, address where the tests were performed and the date of testing. Test results of bolts and nuts shall also indicate the lot number of the product. Bolts, nuts, and washers from different rotational-capacity lots shall not be shipped in the same container. In addition, shipping containers shall be marked with the rotational-capacity test lot number of the product supplied.

Section 226.02(i) – Steel Plate is inserted as follows:

Steel plate shipped to the project site as plate shall have the direction of roll indicated on the plate to provide direction to the field for cutting along the appropriate axis when making components in the field. The plate shall be blast cleaned to either SSPC SP-6 or SP-10 finish and have an arrow painted along the direction of roll with the letters "DOR" above it using an inorganic zinc rich primer from the Department's Approved List 13.

SECTION 237 – STRUCTURE BEDDING MATERIAL AND BEARING PADS

SS237-002020-01 **July 27, 2020**

SECTION 237 – STRUCTURE BEDDING MATERIAL AND BEARING PADS is amended as follows:

Section 237.02(a) – Elastomeric Bearing Pads is amended by replacing the fourth paragraph with the following:

Material having a nominal durometer hardness of 70 and 50 shall be used for nonlaminated pads and laminated pads, respectively. Test samples shall be prepared from finished pads. Samples of each thickness will be taken from 1 full-size pad from each shipment of 300 pads or less, with 1 additional pad for each additional increment of 300 pads or fraction thereof. Samples shall comply with the following physical requirements when tested in accordance with the ASTM methods designated.

SECTION 245 – GEOSYNTHETICS AND LOW PERMEABILITY LINERS is amended as follows:

Section 245.03(a) – Geotextile Fabric for Use in Silt Fences is amended by replacing the second paragraph with the following:

The geotextile shall comply with the requirements of AASHTO M288, Table 8, Temporary Silt Fence Property Requirements, for grab strength and ultraviolet stability.

Section 245.03(c) – Geotextile Fabric for Use in Drainage Systems (Drainage Fabric) is amended by replacing the third paragraph with the following:

The geotextile shall comply with the requirements of AASHTO M288 Table 1-Geotextile Strength Property Requirements, Class 2, for grab strength.

Section 245.03(d) – Geotextile for Use in Stabilization is replaced with the following:

Geotextile for Use in Separation and Stabilization: Separation geotextiles are used as a permeable layer to separate fine-grained subgrades and aggregate base or subbase. Stabilization geotextiles are used in saturated or unstable conditions to provide the functions of separation and reinforcement.

1. **Subgrade Separation Fabric:**

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D 4751	Max. No. 70 sieve
Permittivity	ASTM D4491	Min. 0.1 sec^{-1}

The geotextile shall comply with the requirements of AASHTO M288 Table 1-Geotextile Strength Property Requirements, Class 2, for grab strength, tear strength, and puncture strength. Only nonwoven geotextiles shall be used as subgrade separation geotextiles.

2. **Subgrade Stabilization Fabric:**

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D4751	Max. No. 70 sieve
Permittivity	ASTM D4491	Min. 0.1 sec^{-1}

The geotextile shall comply with the requirements of AASHTO M 288 for strength property requirements, Table 1, Class 1, for grab strength, tear strength, and puncture strength. Geotextiles used for subgrade stabilization shall be woven or nonwoven.

3. **Embankment Stabilization Fabric Up to 6 Feet High:**

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D 4751	Max. No. 20 sieve
Seam strength	ASTM D 4632	90% specified grab strength

The geotextile shall comply with the requirements of AASHTO M288 Table 1, Class 1 for grab strength, tear strength, and puncture strength.

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 and 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 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.

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.

Physical Property	Test Method	Requirements
Grab strength @ Elongation >50%(CRE/Dry)	ASTM D4632	Min. 250 lb (min)
Seam strength	ASTM D4632	90% Specified grab strength
Puncture	ASTM D6241	Min. 150 lb
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)1 – Paving Fabric, Type I & II is replaced with the following:

Paving Fabric, Type I & II: All paving fabrics shall meet the requirements of the table below.

Property	Test Method	Type I	Type II
Mass per unit area, min (oz/yd^2)	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[1]	320[1]

[1]320 is the softening/melt point of polypropylene.

Section 245.03(i)2 – Paving Mat; Type I, II, and III is replaced with the following:

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 (lbs)	ASTM D5035 (2C-E)	280	140	45
Ultimate Elongation, max (%)	ASTM D5035 (2C-E)	5	5	5
Melting Point, min (°F)	ASTM D276	320[1]	320[1]	320[1]
Mass/Unit Area, min (oz/yd^2)	ASTM D5261	7.0	4.0	4.0

[1]320 is the softening/melt point of polypropylene, which is lower than either polyester or fiberglass.

Section 245.03(i)3 – Paving Grid: Type I, II, & III is replaced with the following:

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)[1]	ASTM D6637, Method A, modified[2]	560 x 1,120	560	280
Aperture size, min (in)	Calipered	0.5	0.5	0.5
Elongation, max (%)	ASTM D6637 Method A	3	3	3
Mass per area, min (oz/yd^2)	ASTM D5261	16	10	5.5
Melting Point, min (°F) (fabric component – if applicable)	ASTM D276	420[3]	420[3]	420[3]

[1]For Type I, machine and cross direction respectively. Strengths for Type II and III are in both directions
[2]Tensile Strength shall be converted to and reported in lbs/in.
[3]420 is the softening/melt point of fiberglass.

Section 245.03(i)4 – Composite Paving Grids: Type I, II, & III is replaced with the following:

Composite Paving Grids: Type I, II, & III: Composite paving grids shall consist of a fiberglass, polyester, or polyvinyl alcohol (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)[1]	ASTM D6637, Method A, modified[2]	560 x 1,120	560	280
Aperture size, Min (in)	Calipered	0.5	0.5	0.5
Elongation, Max (%)	ASTM D6637 Method A	5	5	10
Mass per area, Min (oz/yd^2)	ASTM D5261	16	10	5.5
Melting Point, Min (°F) (fabric component)	ASTM D276	320[3]	320[3]	320[3]

[1]For Type I, machine and cross direction respectively. Strengths for Type II and III are in both directions.
[2]Tensile Strength should be converted to and reported in lbs/in.
[3]320 is the assumed softening/melt point of PVA. See Section 318.03 for more on placement temperature.

Section 245.03(i)5 – Pavement Repair and Bridge Deck Waterproofing Strip Membrane is replaced by the following:

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 pavingfabric, a paving mat, or a paving grid and meet the requirements of the table below.

Property	Test Method	Type I
Strip Tensile Strength, min (lbs/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 180º Bend at -25 ºF	ASTM D146	No cracks in fabric or rubberized asphalt

SECTION 305 – SUBGRADE AND SHOULDERS is amended as follows:

Section 305.02 – Materials is replaced with the following:

(a) **Materials** may consist of material in place, treated material in place, or imported material. Imported material may be borrow material, select material, or other material as shown on the plans or specified in the Contract.

Materials other than regular excavation or borrow material that are shown on the Plans or specified in the Contract shall conform to the applicable requirements of these Specifications.

(b) **Geotextile** materials used for subgrade stabilization or separation shall conform to Section 245.03(d).

Section 305.03(d) – Geotextile (Subgrade Stabilization) is renamed **Geosynthetics** and replaced with the following:

Geosynthetics includes Geotextile used for subgrade separation or stabilization, and geogrid.

1. **Subsurface preparation:** Before placing the geotextile, geogrid, or combination of both, prepare the subgrade in accordance with Sections 304 and 305. Separation and stabilization geotextiles shall not be placed when weather conditions, in the judgement of the Engineer, are not suitable to allow placement of geotextiles or cover materials. These include wet or snowy conditions, rainfall, temperatures below freezing, frost, or excessively windy conditions.

2. **Geotextile or geogrid placement.** Place geogrid on top of geotextile when both are shown at the same elevation in the Plans. Place the geosynthetic in the direction of traffic. Geosynthetic shall be smooth and free of wrinkles and folds. Placement by dragging the geosynthetic across the finished surface will not be allowed. On curves, the geotextile may be folded or cut to conform to the curve. The fold or overlap shall be in the direction of traffic and held in place by pins, staples or piles of aggregate subbase or base materials. Overlap in the direction of construction. Overlap at least 24 inches at the ends and sides of adjoining sheets or sew the joints according to the Manufacturer's recommendations. Do not place longitudinal overlaps below anticipated wheel loads or joints. Hold the geosynthetic in place with pins, staples, or piles of aggregate subbase or base materials.

Replace or repair geosynthetic that is torn or punctured. Remove the damaged area and place a patch of the same type of geosynthetic overlapping 36 inches beyond the damaged area or sew a seam around the entire perimeter of the damaged area.

3. **Initial layer placement and compaction:** Place initial layer in accordance with Sections 308 and 309.

   If during placement of the geosynthetic, the equipment causes subgrade rutting in excess of 2 inches, end dump the backfill material onto the geotextile or geogrid from the edge of the geosynthetic or from previously placed cover material. Do not operate equipment directly on the geosynthetic. Spread the end-dumped pile of cover material maintaining the minimum specified lift thickness over the geosynthetic. Avoid sudden stops, starts, or turns of the construction equipment. Fill ruts from construction equipment with additional cover material. Do not blade material down to remove ruts. If rutting continues to exceed 2 inches during placement, decrease the construction equipment size, decrease the equipment weight, or increase the first lift thickness as directed by the Engineer.

   Compact in accordance with Sections 308 and 309. Do not use sheepsfoot or studded compaction equipment. Compact the cover material with pneumatic-tire or non-vibratory smooth drum rollers.

   Tracked equipment shall not be operated directly on top of geosynthetic. Rubber-tire equipment may pass over the geosynthetic if the geosynthetic is not damaged by the equipment (causing excessive rutting, 2 inches or greater); the Contractor shall specifically avoid sudden braking or sharp turning, and shall maintain low speed.

4. **Subsequent layer placement and compaction.** Place and compact subsequent layers in accordance with Sections 308 and 309.

Section 305.04 – Measurement and Payment is amended by replacing the tenth paragraph with the following:

Geotextile will be measured in square yards, complete-in-place. Overlaps and seams will not be measured for separate payment. The accepted quantity of geotextile will be paid for at the contract square yard price. This price shall include furnishing, placing, lapping, and seaming material.

Section 305.04 – Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay items are removed:

Pay Item	Pay Unit
Geotextile (Subgrade stabilization)	Square yard

The following pay items are inserted:

Pay Item	Pay Unit
Geotextile (type)	Square yard

SECTION 315 – ASPHALT CONCRETE PLACEMENT

SS315-002020-03 **December 5, 2021**

SECTION 315 – ASPHALT CONCRETE PLACEMENT is amended as follows:

Section 315.04(c) – SM-4.75 Mixtures Placement is inserted as follows:

1. The minimum placement temperature shall be 290°F regardless of WMA use.
2. The minimum ambient and base temperature shall be 50°F. The Contractor shall employ a MTV during the placement of SM-4.75 mixtures when either the ambient or base temperature is between 50°F and 60°F.

Section 315.05(b) – Conditioning Existing Surface is amended by replacing the second paragraph with the following:

When specified in the Contract, before placement of asphalt concrete, the Contractor shall seal longitudinal and transverse joints and cracks by the application of an approved crack sealing material in accordance with Section 322.

Section 315.05(d) – Compacting is amended by inserting the following after the seventh paragraph:

For SM-4.75 mixes, breakdown rolling shall be accomplished with steel wheel rollers with a minimum weight of 10 tons. SM-4.75 mixes shall receive at least three breakdown roller passes before intermediate and finish rolling.

Section 315.05(e) – Density is replaced with the following:

Density will be determined in accordance with Method A for all interstate and limited access routes, and for primary and secondary routes with an ADT of

at least 2,000 and at least 20' in width. Method B will be used for all other routes. Control Strips will not use Method A or B, but will use the methods described in Section 315.05(e)1a.

1. The Contractor shall perform roller pattern and control strip density testing on surface, intermediate, and base courses in accordance with VTM 76. The Contractor shall have a certified Asphalt Field Technician II perform all density testing.

   Density shall be determined with a thin-lift nuclear gauge conforming to VTM 81 or from the testing of plugs or cores taken from the roadway where the mixture was placed. Density test locations shall be marked and labeled in accordance with VTM 76. When acceptance testing is performed with a nuclear gauge, the Contractor shall have had the gauge calibrated within the previous 12 months by an approved calibration service. In addition, the Contractor shall maintain documentation of such calibration service for the 12-month period from the date of the calibration service. The required density of the compacted course shall not be less than 98.0 percent or more than 102.0 percent of the target control strip density.

   Nuclear density roller pattern and control strip density testing shall be performed on asphalt concrete overlays placed directly on surface treatment roadways and when overlays are placed at an application rate less than 125 pounds per square yard, based on 110 pounds per square yard per inch, on any surface. In these situations, the Engineer will not require sawed plugs or core samples and the minimum control strip densities as specified in Table III-3 will not be required. The required density of the compacted course shall not be less than 98.0 percent or more than 102.0 percent of the target control strip.

TABLE III-3
Density Requirements

Mixture Type	Min. Control Strip Density (%)[1]
SM-9.5A, 12.5A	92.5
SM-9.5D, 12.5D	92.5
SM-9.5E, 12.5E	92.5
IM-19.0A, IM-19.0D, IM-19.0E	92.2
BM-25.0A, BM-25.0D	92.2

[1]The control strip density requirement is the percentage of Theoretical Maximum Density (TMD) of the job-mix formula by SUPERPAVE mix design or as established by the Engineer based on two or more production maximum theoretical density tests.

The Engineer will divide the project into “control strips” and “test sections” for the purpose of defining areas represented by each series of tests.

a. **Control Strip:** Control strips shall be constructed in accordance with the Specifications and VTM 76.

   The term *control strip density* is defined as the average of 10 determinations selected at stratified random locations within the control strip.

   The Contractor shall construct one control strip at the beginning of work on each roadway and shoulder course and on each lift of each course. The Engineer will require the Contractor to construct an additional control strip whenever a change is made in the type or source of materials; whenever a significant change occurs in the composition of the material being placed from the same source; or when there is a failing test strip. During the evaluation of the initial control strip, the Contractor may continue paving operations, however, paving and production shall be discontinued during construction and evaluation of any additional control strips. If two consecutive control strips fail, subsequent paving operations shall not begin or shall cease until the Contractor recommends corrective actions to the Engineer and the Engineer approves the Contractor proceeding with the corrective actions. If the Contractor and the Engineer mutually agree that the required density cannot be obtained because of the condition of the existing pavement structure, the target control strip density shall be determined from the roller pattern that achieves the optimum density and this target control strip density shall be used on the remainder of the roadway that exhibits similar pavement conditions.

   Either the Engineer or the Contractor may initiate the construction of an additional control strip at any time.

   The length of the control strip shall be approximately 300 feet and the width shall not be less than 6 feet. On the first day of construction or beginning of a new course, the control strip shall be started between 500 and 1,000 feet from the beginning of the paving operation. The Contractor shall construct the control strip using the same paving, rolling equipment, procedures, and thickness as shall be used for the remainder of the course being placed.

   The Contractor’s Asphalt Field Level II Technician shall take one reading at each of 10 stratified random locations. No determination shall be made within 12 inches of the edge of any application width for surface and intermediate mixes or within 18 inches of the edge of

any application width for base mixes. The average of these 10 determinations shall be the control strip density recorded to the nearest 0.1 pound per cubic foot. The minimum control strip density shall be determined in accordance with VTM 76.

The control strip shall be considered a lot. If the control strip density conforms to the requirements in Table III-3, the Engineer will consider the control strip to be acceptable and the control strip density shall become the target control strip density.

If the Engineer determines that the control strip requirements in Table III-3 cannot be met due to in-situ pavement conditions, Method 'B' will be used for acceptance and payment and density adjustments will be waived.

Otherwise, if the density does not conform to the requirements specified in Table III-3, the tonnage placed in the control strip and any subsequent paving before construction of another control strip will be paid for in accordance with Table III-4. The Contractor shall take corrective action to comply with the density requirement specified in Table III-3.

TABLE III-4
Payment Schedule for Control Strips

% TMD	% of Payment
Greater than 96.5	95
92.2[1]/92.5[2]– 96.5	100
90.0-92.1[1]/92.4[2]	90
88.0-89.9	80
Less than 88.0	75

[1]For IM and BM mixes only.
[2]For SM mixes only.

b. **Test section (lot):** For the purposes of both contractor quality control and for determining acceptance, the Engineer will consider each day's production as a lot unless the paving length is less than 3,000 feet or more than 7,500 feet, regardless of the method of acceptance (Method A or B). When paving is less than 3,000 feet, that day's production will be combined with the previous day's production or added to the next day's production to create a lot as described below.

The standard size of a lot will be 5,000 feet (five 1,000-foot sublots) of any pass 6 feet or greater made by the paving train for the thickness of the course. If the Engineer approves, the lot size may be increased to 7,500 feet with five 1,500-foot sublots when the

Contractor's normal daily production exceeds 7,000 feet. Pavers traveling in echelon will be considered as two passes. When a partial lot occurs at the end of a day's production or upon completion of the project, the lot size will be redefined as follows:

- If the partial lot contains one or two sublots, the sublots will be added to the previous lot.

- If the partial lot contains three or four sublots, the partial lot will be redefined to be an entire lot.

The Contractor shall test each lot for density by taking a nuclear density gauge reading from two random test sites selected by the Engineer within each sublot. When saw plugs or cores are used to determine acceptance, a single test site per sublot will be selected by the Engineer. Test sites will not be located within 12 inches of the edge of any application width for surface and intermediate mixes or within 18 inches of the edge of any application width for base mixes.

The Engineer will compare the average of the sublot density measurements to the target nuclear density, or for plugs and cores, to the target percent of theoretical maximum density achieved on the control strip to determine the acceptability of the lot. The Contractor shall immediately notify the Engineer and institute corrective action if two consecutive sublots produce density results less than 98% or more than 102% of the target control strip density.

Density testing for acceptance will not be performed on areas too thin or irregular to test accurately, such as open-graded friction courses, and wedge-and-leveling courses. Areas that are difficult to compact due to subgrade support or space limitations, including but not limited to crossovers and gore areas, will be placed in accordance with Section 315.05(e)2.

For purposes of density determination, acceptance, and payment, Main Pavement is defined to include travel lanes, shoulders 6 feet or greater, turn lanes, ramps, and acceleration/deceleration lanes.

(1) Method 'A' (plugs or cores)

Any pay adjustment will only be applied to Main Pavement.

The Contractor shall perform acceptance testing for density for each sublot by obtaining one plug, defined as a sawed 4-inch by 4-inch specimen, or one 4-inch-diameter core, at a single random test site selected by the Engineer. More than one plug or core can be taken if the original sample is damaged.

The sub-lot site shall be marked as described in VTM 76. The bulk specific gravity of the plugs or cores shall be determined in accordance with VTM 6. The density of the plugs or cores shall be determined in accordance with VTM 22, except that the daily Rice values obtained by the contractor for the mix will be used for calculating percent density (instead of using the 5-day running average as noted in VTM 22).

Plugs or cores shall be taken from the pavement and bulked in the presence of the Engineer unless otherwise approved. The Department reserves the right to have the plugs or cores bulked on the project site. In the event of any uncertainty around the bulking procedures or results, the Department further reserves the right to re-bulk the samples. The Contractor will have the right to witness the re-bulking. The Contractor will be responsible for maintaining the cores until approved for disposal by the Department.

The Contractor shall number sublot test sites sequentially per lot, mark these on the pavement, fill them with the paving mixture, and compact them prior to the completion of each day of production.

The Contractor shall clean and straighten any irregular edges before filling and compacting. Liquid tack material shall be applied so it visibly covers all plug or core hole surfaces (sides, bottom, etc.). Hot mix asphalt paving mixture available on the same day of paving, or other permanent patching material as approved by the Engineer, shall be placed into the plug or core hole and compacted with a 10-pound weighted hand tool or greater compactive effort with rollers or other equipment available on-site and approved by the Engineer.

The tonnage of each lot for the pay adjustment will be based on the lot's width and length and the mixture application rate as designated in the Contract or as revised by the Engineer. Payment will be made in accordance with Table III-4A.

TABLE III-4A
Payment Schedule for Method A Lot Densities

% TMD	% of Payment
Greater than 96.5	95
92.2[1]/92.5[2] – 96.5	100
90.0 – 92.1[1]/92.4[2]	90
88.0 – 89.9	80
Less than 88.0	75

[1]For Intermediate and Base Mixes only.
[2]For Surface Mixes only.

If a minimum of 80% of each test section lot's core/plug samples is no lower than 92.5% of TMD for Surface Mixes and 92.2% of TMD for Intermediate and Base Mixes and the lot average results in 100% payment, then the Engineer will increase the unit bid price for AC mixture by 5%. BM-25.0D+0.4 and BM-25.0D+0.8 shall not be eligible for five percent pay increase.

Longitudinal joints shall also be tested for density using a nuclear density gauge at each test site in the sublot. For surface and intermediate mixes, the edge of the gauge shall be placed within 4 inches of the joint. For base mixes, the edge of the gauge shall be placed within 6 inches of the joint. The Contractor shall not place the gauge over top of the joint. The joint density value shall be recorded. The Contractor shall report to the Engineer and institute corrective action if a single longitudinal joint density reading is less than 95% of the target control strip density. The Engineer will not use the values obtained from the joint readings in payment calculation. The Contractor shall furnish the test data developed during the day's paving to the Engineer by the end of the day's operations.

(2) Method 'B' (nuclear gauge)

Any pay adjustment will only be applied to Main Pavement.

The Contractor shall test each lot for density by taking a nuclear density gauge reading from two random test sites selected by the Engineer within each sublot. Test sites will not be located within 12 inches of the edge of any application width for surface and intermediate mixes or within 18 inches of the edge of any application width for base mixes.

The Engineer will compare the average of the sublot density measurements to the target nuclear density, or for cores, to the target percent of theoretical maximum density achieved on the

control strip to determine the acceptability of the lot. Once the average density of the lot has been determined, the Engineer will not allow the Contractor to provide additional compaction to raise the average. The Contractor shall immediately institute corrective action if two consecutive sublots produce density results less than 98% or more than 102% of the target control strip density.

Longitudinal joints shall also be tested for density using a nuclear density gauge at each test site in the sublot. For surface and intermediate mixes, the edge of the gauge shall be placed within 4 inches of the joint. For base mixes, the edge of the gauge shall be placed within 6 inches of the joint. The Contractor shall not place the gauge over top of the joint. The joint density value shall be recorded. The Contractor shall report to the Engineer and institute corrective action if a single longitudinal joint density reading is less than 95 percent of the target control strip density. The Engineer will not use the values obtained from the joint readings in payment calculation. The Contractor shall furnish the test data developed during the day's paving to the Engineer by the end of the day's operations.

The tonnage of each lot for the pay adjustment will be based on the lot's width and length and the mixture application rate as designated in the Contract or as revised by the Engineer. Payment will be made in accordance with the requirements of Table III-4B.

TABLE III-4B
Payment Schedule for Method B Lot Densities

% of Target Control Strip Density	% of Payment
Greater than 102.0	95
98.0 to 102.0	100
97.0 to less than 98.0	95
96.0 to less than 97.0	90
Less than 96.0	75

(3) Verification, Sampling, and Testing (VST)

The Engineer at any time on any project may perform lot density verification testing regardless of whether Method A or B is being used for density acceptance. Lot density verification is performed by testing plugs or cores. The Contractor shall be responsible for taking plugs or cores for testing. The Engineer will perform verification testing of the plugs or cores.

On surface, intermediate, and base mixes, the Contractor shall take two plugs or cores per VST lot at locations selected by the

Engineer. If the Engineer determines the density of the plugs or cores does not conform to the requirements for the lot in question or the same payment percentage determined by the Contractor's testing for that lot, then the Contractor may request additional sampling to be invoked. The Contractor shall take one additional plug or core from the remaining sublots. Payment for that lot, based on the results of the initial two plugs or cores or referee procedure, will be in accordance with the Table III-4A for Method A on the basis of the percentage of the theoretical maximum density or Table III-4B for Method B on the basis of the percentage of the control strip bulk density achieved.

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 3,500 feet or less and at least 6 feet in width shall be compacted to a minimum density of 92.5% for surface mixes or 92.2% 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.

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[1]/92.5[2]	100
90.0-92.1[1]/92.4[2]	90
88.0-89.9	80
Less than 88.0	75

[1]The minimum TMD percentage for Intermediate and Base Mixes
[2]The minimum TMD percentage for Surface Mixes

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% 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%, 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)

% 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 or centerlines 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 before 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.

Pavement markings for rumble stripes shall be applied after the grooves have been cut. The grooves shall be thoroughly cleaned and the surface prepared before pavement marking application, in accordance with the Standard Drawings and Section 704. 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 be disposed of in accordance with Section 106.04.

Section 315.05(i) – Coating designed surface cuts is inserted as follows:

Designed Surface Cuts are roadway features installed by cutting or grinding into a road surface, for example, Rumble strips, rumble stripes, and plastic inlaid marker grooves.

Designed Surface Cuts shall be coated with liquid asphalt coating (emulsion) when the Designed Surface Cuts are being cut into an existing asphalt surface (i.e. more than one year since placement); when new Designed Surface Cuts 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 Designed Surface Cuts 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. For centerline rumble stripes and plastic inlaid marker grooves, 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 and plastic inlaid marker grooves, overspray shall not extend more than 2 inches beyond the width of the cut depressions and shall not come in contact with pavement markings.

If liquid asphalt coating (emulsion) is applied before installation of the plastic inlaid marker, then the bottom of the plunge cut shall be protected during liquid asphalt coating (emulsion) application so as to avoid inhibiting the ability of the marker epoxy to bond to the bottom of the plunge cut. If the liquid asphalt coating (emulsion) is applied after the plastic inlaid marker has been installed, then the retroreflector shall be protected during the liquid asphalt coating (emulsion) application to prevent the coating material from dirtying or damaging the retroreflector, with the protection removed after the coating has been completed.

Section 315.08 – Measurement and Payment is amended by replacing the third paragraph with the following:

Liquid Asphalt Cement, when a pay item, will be measured in tons in accordance with Section 109.01 except that transporting vehicles shall be tare weighed before each load. When used in the mixture, the weight will be

adjusted in accordance with the percentage of asphalt indicated by laboratory extractions.

Section 315.08 – Measurement and Payment is amended by deleting the sixth paragraph.

Section 315.08 – Measurement and Payment is amended by replacing the tenth paragraph with the following:

Liquid asphalt coating will be measured in square yards and will be paid for at the Contract square yard price. This price shall include cleaning Designed Surface Cuts before application of the coating, furnishing and applying coating , and protection of all retroreflectors.

Section 315.08 – Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay items are removed:

Pay Item	Pay Unit
Liquid asphalt coating (Rumble strips)	Square yard
Rumble Strip (Asphalt)	Linear foot

The following pay items are inserted:

Pay Item	Pay Unit
Liquid asphalt coating (type)	Square yard
Rumble Strip (shape, pavement type)	Linear foot

SECTION 316 – HYDRAULIC CEMENT CONCRETE PAVEMENT

SS316-002020-01 **September 2, 2020**

SECTION 316 – HYDRAULIC CEMENT CONCRETE PAVEMENT is amended as follows:

Section 316.06 – Measurement and Payment is amended by inserting the following:

Corrosion resistant reinforcing steel used in Bridge Approach Slabs will be measured in pounds and will be paid for at the Contract pound price for the class and grade of steel designated. This price shall include fabricating, shipping, furnishing, and placement in the locations shown in the Plans.

Section 316.06 – Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay items are inserted:

Pay Item	Pay Unit
Corrosion resistant reinforcing steel (class, grade) bridge approach slab	Pound

SECTION 319 – THIN HOT MIX ASPHALT CONCRETE OVERLAY

SS319-002020-01 **July 6, 2020**

SECTION 319 – THIN HOT MIX ASPHALT CONCRETE OVERLAY is inserted as follows:

319.01 – Description

This work shall consist of the production and placement of a Thin Hot-Mix Asphalt Concrete Overlay (THMACO) according to the Plans, Specifications, and as directed by the Engineer.

319.02 – Materials

(a) **Asphalt cement** shall be a performance graded asphalt (PG) 64V-28 conforming to AASHTO M 332 and Section 210 or as designated by the Engineer

(b) **RAP:** Recycled asphalt pavement material will not be permitted.

(c) **Coarse aggregate** shall conform to Section 203 or as directed by the Engineer. Water Absorption when tested according to AASHTO T 85 shall be at most 2%. Material retained on the No. 4 sieve and larger sieves shall conform to the following when tested according to ASTM D4791:

Flat & Elongated Ratio	Maximum Content
3:1	25%
5:1	10%

(d) **Fine aggregate** shall conform to Section 202, except for grading, which shall be tested according to AASHTO TP 33 (Method A) with a value of at least 45% and a sand equivalent value of at least 50 when tested according to AASHTO T 176.

(e) **Mineral filler** shall conform to Section 201.

(f) **Fiber additive** when required shall be cellulose or mineral fiber approved by the Engineer based on supplier's certification of properties and documentation of success in similar applications in hot mix asphalt.

(g) **Antistripping additive** shall be used. It may be hydrated lime or a chemical additive from the Department's Approved List 7 or a combination of both. The approved chemical additive shall be added at a rate of not less than 0.30% by weight of the total asphalt content of the mixture. The mixture shall produce a tensile strength ratio (TSR) of at least 0.80 for the design and production tests. The TSR shall be determined according to AASHTO T 283, including a freeze-thaw cycle (4-inch specimens compacted with a Marshall Hammer or 3.5 by 6-inch specimens when compacted with a gyratory compactor); except that the 16-hour curing time requirement and the 72 to 96-hour storage period will not be enforced.by the Department. Design tests shall use the same materials that are to be used in the production mix and shall be conducted in a laboratory approved by the Department.

When a chemical additive is used, it shall be added to the asphalt cement prior to the introduction of the asphalt cement into the mix. Any chemical additive or particular concentration of chemical additive found to be harmful to the asphalt material or that changes the original asphalt binder performance grade (PG) shall not be used.

(h) **Hydrated lime** shall conform to ASTM C977. Hydrated lime shall be added at a rate of at least 1% by weight of the total dry aggregate.

A separate bin or tank and feeder system shall be provided to store and accurately proportion the dry or slurried lime into the aggregate. The lime and aggregate shall be mixed by pugmill or other Department approved means to achieve a uniform lime coating of the aggregate before entering the drier. If lime is added in dry form, the aggregate shall contain at least 3% free moisture. The Department will not permit the stockpiling of lime treated aggregate.

The feeder system shall be controlled by a proportioning device, which shall be accurate to within $\pm$10 percent of the specified amount. The proportioning device shall have a convenient and accurate means of calibration. A flow indicator or sensor shall be provided with the proportioning device and interlocked with the plant controls, aggregate feed, or weigh system, such that production of the mixture shall be consistently maintained and, if there is a stoppage of the lime feed, interrupted.

The method of introducing and mixing the lime and aggregate shall be subject to approval by the Engineer before beginning production.

319.03 – MIX FORMULA

The Contractor shall submit for the Engineer's approval, a job mix formula within the following design ranges of percent passing each sieve size as noted:

Sieve Size	Percent By Weight Passing Square Mesh Sieves	Production Tolerance (Single Test)
1/2 in	100	-2
3/8 in	85-100	± 5
#4	25-40	± 4
#8	19-32	± 4
#16	15-23	± 3
#30	10-18	± 3
#50	8-13	± 3
#100	6-10	± 2
#200	4-7	± 1

Asphalt Content, %	Production Tolerance (Single Test)
5.0 – 5.5[1]	±0.2

[1]Target asphalt content shall result in a minimum film thickness of 9 microns.

In addition to the job mix submittal, the Contractor shall submit ignition furnace calibration data according to VTM 102 and aggregate property test results prepared by an approved testing laboratory for the aggregate components or aggregate blend.

Job mixes outside the above design range will be considered by the Engineer based on mix performance documented by the supplier to eliminate or minimize flushing or visual deficiencies and may include changes to gradation, asphalt content or the use of fibers. The Engineer may require limited production of less than 300 tons for verification of an acceptable mix, before the Engineer's approval of the job mix.

319.04 – SURFACE PREPARATION

Before beginning paving operations, the existing pavement surface shall be cleaned of all accumulated dust, mud, vegetation or other debris, which may affect the bond of the THMACO by the Contractor.

Pavement cracks or joints 1/4-inch or more in width shall be cleaned and filled with a sealant material conforming to Section 322.04. Quantities and payment will be according to Section 322.

Pavement markers, thermoplastic pavement marking and tape pavement markings shall be removed before beginning paving operations. Pavement irregularities greater than 1 inch in depth shall be filled with a material designated

in the Contract or approved by the Engineer. Payment for the material will be according to Section 315.

Utility structures shall be protected and referenced before paving for location and adjustment (when necessary) after paving at no cost to the Department.

319.05 – Tack Coat

Unless otherwise directed in the contract, two options for placing the tack coat are available.

(a) **Option 1:** A tack coat of asphalt emulsion conforming to Section 210(e) or other emulsion approved by the Engineer shall be applied before placement of the asphalt concrete. The tack coat shall be placed within 10 seconds of placing the THMACO unless otherwise directed by the Engineer. At no time should any part of the paving machine come into contact with the tack coat before the overlay is applied. The emulsion shall be uniformly applied with a paver spray bar, except hand spray equipment may be used in areas inaccessible to the paver spray bar as directed by the Engineer; inaccessible areas are exempt from the 10-second criterion. The emulsion asphalt shall be applied at a temperature recommended by the supplier at a starting rate of 0.25 gallons per square yard ±0.02 unless otherwise approved by the Engineer.

(b) **Option 2:** A hot-applied Non-Tracking tack coat conforming to Section 310 and listed on Approved List 50.1A shall be applied before placement of the THMACO. The tack coat shall be uniformly applied with a spray bar paver or a mechanical distributor, except hand spray equipment may be used in areas inaccessible. The tack coat shall be applied at a temperature recommended by the supplier at a residual rate of 0.14 gallons per square yard ±0.02 unless otherwise approved by the Engineer.

319.06 – Placement of Hot Mix Asphalt

The application rates of the overlay shall range from 80 pounds per square yard to 85 pounds per square yard in order to result in a 3/4-inch compacted lift thickness.

The thin lift of hot mix asphalt shall be placed by a paver designed for the placement of thin lifts as designated in the contract. The asphalt mix shall be delivered to the paver hopper at a temperature of 315°F ±15°F measured in the paver hopper. The paver shall be capable of placing the asphalt mix at a speed of 30 feet per minute. When the base temperature is 50°F or above, placement of the asphalt concrete wearing course will be permitted.

319.07 – Compaction

Two steel double drum rollers weighing no less than 10 tons shall perform compaction of the asphalt mix. No less than two passes shall be completed before the surface temperature of the asphalt has reached 185°F.

319.08 – Acceptance

The Contractor shall perform gradation and asphalt cement content tests on one sample taken in a random manner approved by the Engineer from each 500 tons of production. The material will be considered acceptable for gradation and asphalt content, if the results obtained are within the tolerance allowed from the job mix formula in the above table. Material represented by test results outside the tolerance may be removed and replaced with acceptable material by the Contractor at no additional cost to the Department at the discretion of the Engineer.

Should visual examination by the Engineer reveal that the material in any load, or portion of the paved roadway is contaminated, segregated, or flushed with asphalt cement, that load, or portion of the paved roadway may be rejected without additional sampling of the material.

319.09 – Warranty

The Contractor shall provide a one-year warranty from the date of final acceptance on all THMACO surfaces. The Department will periodically monitor the overlay surface installed throughout the warranty period for compliance and acceptability. The Contractor shall repair any area that fails before the end of the warranty period and shall do so within 14 days after Department notification unless otherwise directed by the Department. Failure of the THMACO surface is defined as the loss of adhesion of the material to the underlying layer resulting in a pothole greater than 1 square foot of area (delamination). The Engineer shall notify the Contractor of the date for the warranty inspection at the end of the warranty period and the Contractor shall be present at the inspection.

319.10 – Measurement and Payment

Thin hot mix asphalt concrete will be measured in tons and paid for at the contract unit price per ton, which shall include warranty, tack coat, surface preparation (except crack and joint sealing), all materials, additives, labor and equipment as described herein to install and complete the work.

Crack and joint sealing will be paid according to Section 322.

Payment will be made under:

Pay Item	Pay Unit
Thin Hot Mix Asphalt Concrete	Ton

SECTION 320 – BM-25.0D WITH INCREASED ASPHALT CONTENT
SS320-002020-01 **July 6, 2020**

SECTION 320 – BM-25.0D WITH INCREASED ASPHALT CONTENT is inserted as follows:

320.01 – Description

This work shall consist of supplying, testing and installing asphalt concrete base with additional asphalt binder. BM-25.0D with additional asphalt binder content (BM-25.0D+0.4 and BM-25.0D+0.8) shall conform to all of the requirements of a standard BM-25.0D in Section 211 except as provided herein.

Construction and Acceptance of one or more courses of asphalt concrete consisting of BM-25.0D+0.4 or BM-25.0D+0.8 asphalt concrete base shall be according to BM-25.0D in Section 315 and the density specified herein.

320.02 – Materials

Materials shall conform to Section 211 and 315.02.

320.03 – Job Mix Formula

The mixes shall conform to all of the requirements of a standard BM-25.0D in Section 211 except as noted herein.

An equivalent single axle load (ESAL) will be established by the Engineer and the mix types may be specified as one of the types listed in Table III-7.

TABLE III-7
Mix Design Requirements

Mix Type	Equivalent Single Axle Load (ESAL) Range (millions)	Final Asphalt Performance Grade (PG)	NMAS[1]
BM-25.0D (+0.4 and +0.8)	All ranges	64H-16	1”

[1]Nominal Maximum Aggregate Size (NMAS) is defined as one sieve size larger than the first sieve to retain more than 10 percent aggregate.

To determine the asphalt binder content for the BM-25.0D plus additional asphalt binder, an approved BM-25.0D conforming to Section 211 will be used to determine the optimum asphalt binder content and aggregate gradations. While

the optimum asphalt binder content for the BM-25.0D will be selected at 2.5% in accordance with Section 211, the initial asphalt binder content for the BM-25.0D+0.4 or BM-25.0D+0.8 will be selected using the 3.5% air voids. The additional asphalt binder (0.4% or 0.8%) will be added to the initial asphalt binder content at 3.5% air voids in order to establish the design asphalt binder content. During production the BM-25.0D+0.4 and BM-25.0D+0.8 mixes shall be controlled according to Table III-8.

TABLE III-8
Production Criteria

Mix Type	VTM Production (%)	VFA (%)	Min. VMA (%)	Fines/Asphalt Ratio	Number of Gyrations	
					N Design	N Initial
BM-25.0D+0.4	1.0 – 4.0	67 – 92	12.0	0.6 – 1.3	65	7
BM-25.0D+0.8	0.5 – 3.5	67 – 92	12.0	0.6 – 1.3	65	7

The Laboratory mixing temperature shall be 310°F to 320°F and the compaction temperature shall be 295°F to 300 °F for both testing and design.

Field correction factor. The field correction factor is determined by subtracting the bulk specific gravity of the aggregate from the effective specific gravity of the aggregate determined at the JMF asphalt binder content achieved.

TABLE III-8A
Recommended Performance Grade of Asphalt Binder

	Percentage of Reclaimed Asphalt Pavement (RAP) in Mix	
Mix Type	**%RAP < 25.0**	**25.0 ≤ %RAP ≤ 35.0**
BM-25.0D (+0.4 and +0.8)	PG 64H-22	PG 64S-22

320.04 – Testing

When asphalt binder is extracted and recovered according to AASHTO T 170, the recovered asphalt binder shall meet the required grade specified in Table III-7.

320.05 – Acceptance and Adjustment

Acceptance and adjustments shall be according to BM-25.0D in Section 211.08 and 211.09.

320.06 – Density

Density shall be determined in accordance with Section 315.05(e). The minimum density requirements for BM-25.0D+0.4 and BM-25.0D+0.8 are shown in Table III-9.

TABLE III-9
DENSITY REQUIREMENTS

Mixture Type	Minimum Control Strip Density (%)[1]
BM-25.0D+0.4	94.0
BM-25.0D+0.8	96.0

[1]The control strip density requirement is the percentage of theoretical maximum density of the job mix formula by SUPERPAVE® mix design or as established by the Engineer based on two or more production maximum theoretical density tests.

320.07 – Measurement and Payment

BM-25.0D+0.4 and BM-25.0D+0.8 will be measured in tons and paid for at the Contract ton price. This price shall include all materials and labor specified in Section 315 as modified in this Section for asphalt concrete base.

Payment will be made under:

Pay Item	Pay Unit
Asphalt Concrete Base Course Type BM-25.0D+0.4	Ton
Asphalt Concrete Base Course Type BM-25.0D+0.8	Ton

SECTION 321 – TRENCH WIDENING

SS321-002020-01 **May 26, 2020**

SECTION 321 – TRENCH WIDENING is inserted as follows:

321.01 – **Description**
This work shall consist of installing asphalt into a constructed trench to widen shoulders and travel lanes in accordance with the Plans and Specifications and as directed by the Engineer.

321.02 – Material

(a) **Materials** shall conform to Section 211.02 and 315.02.

(b) **Trench widening material** IM-19.0A shall be used for IM-19.0A(T) and IM-19.0D shall be used for IM-19.0D(T). Where BM-25.0(T) is designated, either BM-25.0A or BM-25.0D shall be used by the Contractor.

321.03 – Placement Limitations

The Contractor shall not place asphalt concrete mixtures when weather or surface conditions are such that the material cannot be properly handled, finished, or compacted. The surface upon which asphalt mixtures is to be placed shall be free of standing water, dirt, and mud and the base temperature shall conform to Section 315.04.

321.04 – Procedure

(a) **Trench Widening Route Types:** The minimum lift density as determined according to VTM 22 is based on the type of trench widening as defined below and specified in the Contract. Where trench widening is 2 feet in width compaction may be performed with small single drum walk-behind rollers or other mechanical means acceptable to the Engineer.

1. **Type 1: Paved Shoulder Only** shall be installed on routes where the widening will serve as a paved shoulder and will not be subjected to constant traffic. The painted edge line will not be on the trench widening. The minimum density requirement will not be enforced for this type of trench widening. Steel double drum rollers weighing at least 8 tons shall perform compaction of the asphalt concrete. At least five passes shall be completed.

2. **Type 2: Widened Travel Lane and Paved Shoulder** shall be installed on routes where the widening will serve as a wider travel lane and paved shoulder that will be subjected to traffic. The widening will not include removal of existing travel lane pavement, i.e., inside the edge line marking. The painted edge line will be on the trench widening. The minimum density applies to this type of trench widening.

3. **Type 3: Repaired Travel Lane and Paved Shoulder** shall be used on routes where the widening will include a portion of the existing travel lane, serve as a paved shoulder and will be subjected to traffic as a part of the travel lane. The widening will include removal of existing pavement, i.e., inside the edge line marking. The painted edge line will be on the trench widening. The minimum density applies to this type of trench widening.

(b) Trench widening routes shall be widened by trenching on one or both sides of the existing roadway and placing Trench Widening Material in accordance with the width and depth specified for that route.

Any remaining material, after final grading, shall be classified as excess material, and will be disposed of according to Section 106.04 of the Specifications or as directed by the Engineer.

The trench shall be shaped to have vertical sides with the width, depth and type specified in the Contract (2-foot minimum to 6-foot maximum width); be free of excess material; and shall be tacked against the existing pavement side before Trench Widening Material is placed.

The Contractor shall ensure that disruption to driveways, entrances, mailboxes, and intersections are minimized and that precautions are taken to ensure that roadway drainage does not pond on the roadway surface.

321.05 - Acceptance

Where density requirements apply, the Contractor is responsible for cutting cores or sawing plugs for density testing. One set of plugs or cores per course of material shall be obtained within the first 500 feet and every 2,500 feet thereafter of the trench widening route for testing by the Contractor or the Department. Core and plug locations shall be randomly selected within each section. If the density achieved is less than 91.5% of the maximum theoretical density for the Type 2 or 3 trench widening routes, payment adjustment will be made on the actual tonnage within the 500- or 2,500-foot lot according to Table III-6.

321.06- Measurement and Payment

Asphalt Concrete Type BM-25.0(T), IM-19.0A(T) or IM-19.0D(T) will be measured in tons and will be paid for at the Contract ton price. This price shall include furnishing and placing the Trench Widening Material, trenching, tack, grading and disposing of excess material.

Payment will be made under:

Pay Item	Pay Unit
Asphalt Concrete Type BM-25.0(T)	Ton
Asphalt Concrete Type IM-19.0A(T)	Ton
Asphalt Concrete Type IM-19.0D(T)	Ton

SECTION 322 – ASPHALT SURFACE PREPARATION AND OVERLAY
SS322-002020-01 September 9, 2020

SECTION 322 – ASPHALT SURFACE PREPARATION AND OVERLAY is inserted as follows:

322.01 – Description

This work shall consist of preparation of existing pavement before resurfacing, and placement of asphalt concrete overlay pavement courses on existing paved roadway surfaces. This work shall be performed in accordance with Sections 211 and 315, Sections 248 and 317 where Stone Matrix Asphalt (SMA) is specified,

and as specified herein. Where pavement planing is required it shall be performed in accordance with Section 515 and as specified herein. This work is applicable only to the routes or areas designated to be overlaid in the Contract and as authorized by the Engineer.

322.02 – Materials

(a) **Asphalt concrete** shall conform to Section 211. Stone Matrix Asphalt (SMA) shall conform to Section 248.

(b) **Asphalt for Tack Coat** shall conform to Section 210 and shall be applied in accordance with Section 310.

(c) **Type A Crack Sealant** shall be a hot-poured modified asphalt rubber with granulated crumb rubber and latex plasticizers and shall conform to ASTM D6690. The proportions of the materials, by weight, shall be up to 80% asphalt and up to 25% crumb rubber.

(d) **Type B Crack Sealant** material shall consist of PG 64H-22 and polyester fibers from the Department's Approved List 32. The Contractor shall provide the PG 64H-22 suppliers data for heating. Fibers shall not exceed 5% by weight. Fiber loading will be determined at the project site in order to minimize the need for over banding as described. The fiber loading shall be approved by the Engineer before use.

(e) **Type C Crack Sealant** material shall consist of PG 64H-22 and polyester fibers from the Department's Approved List 32 at 5% by weight. The Contractor shall provide the PG 64H-22 suppliers data for heating.

(f) **Crumb rubber** shall be 100 percent vulcanized rubber and conform to the following gradation requirements:

Sieve	Percent Passing
No. 10	100%
No. 40	0-40%

322.03 – Equipment

Equipment for furnishing and placing asphalt concrete overlay shall conform to Section 315. Equipment for furnishing and placing Stone Matrix Asphalt (SMA) shall conform to Section 317. Pavement planing equipment shall conform to Section 515.

Proper crack sealing equipment must be used for the specific material listed according to the manufacturer's recommendations for the Sealant specified. The equipment for hot applied sealant compounds shall be a melting kettle of double boiler, indirect heating type, using oil as a heat-transfer medium. The kettle shall

have an effective mechanically operated agitator, a re-circulation pump and shall be equipped with a positive thermostatic temperature control which shall be checked for calibration before beginning work. The unit shall be capable of maintaining the specified mixing temperature within 10°F. Manufacturer's recommendations for mixing and application temperatures shall be followed with the latter being measured at the nozzle of the applicator wand. Overheating or direct heating of the sealant material will not be permitted. The hoses, connectors and applicator wand shall all be insulated.

322.04 – Sealing Cracks in Asphalt Concrete Surfaces or Hydraulic Cement Concrete Pavement

Type A crack sealant materials shall be used on pavements which will not be overlaid with asphalt concrete within one year. Type B crack sealant material shall be used to fill cracks in pavements that will be overlaid with asphalt concrete within one year. Type C crack sealant shall be used when routing, cleaning, and sealing cracks in asphalt concrete surfaces that may or may not be overlaid within one year. The Contract will designate which sites are to use each material. Cracks ranging in width from 1/8 inch to 1-1/2 inches shall be sealed. Cracks that exceed 1-1/2 inches are not included for crack sealing.

The sealant shall not be placed when the ambient or pavement temperatures fall below 45°F, or when moisture is present in the crack to be sealed.

Before sealing, cracks shall be thoroughly cleaned as approved by the Engineer using an oil free hot air blasting heat lance capable of a velocity of 3000 fps at 300°F. Cracks shall be cleaned such that all dirt, debris, moisture and other foreign materials that will prevent bonding of the sealant are removed to a minimum depth of 1 inch. All foreign material (i.e., dirt, grass, rocks) shall be removed from the pavement to prevent re-contamination of the crack. Cracks shall be completely dry before sealing. Any crack not meeting the approval of the Engineer shall be re-cleaned and dried.

The sealant shall be pumped directly into the crack from the heater-melter unit at the temperature specified by the manufacturer immediately following the cleaning of each crack. Cracks shall be sealed using the methods herein as approved by the Engineer.

(a) **Type A crack sealant** shall be installed from the bottom up in a continuous manner such that the crack is completely filled level with the pavement surface, and the sealant shall overlay the crack at the pavement surface leaving a maximum “over-banded" appearance of 1-inch wide on each side of the crack. The material shall not continue to flow beyond these limits once a crack is sealed. The height of the sealant above the pavement surface shall not exceed 1/8 inch. For this method of sealing, the applicator wand shall be equipped with a shoe that will produce the extruded over-band as well as completely fill the crack.

(b) **Type B crack sealant** shall be installed from the bottom up in a continuous manner such that the crack is completely filled level with the pavement surface. The sealant may overlay the surface on each side of the by no more than 1/2 inch or leave a no “over-banded" appearance. The material shall not continue to flow beyond these limits once a crack is sealed. The height of the sealant above the pavement surface shall not exceed 1/8 inch. For this method of sealing, the applicator wand shall be equipped with a shoe that will minimize the extruded over-band as well as completely fill the crack.

(c) **Type C crack sealant:** Before sealing, the cracks shall be routed to a minimum depth of 1 inch and to a minimal width of 1/2 inch. Cracks shall be filled from the bottom up in a continuous manner such that the crack is completely filled level with the pavement surface, and the sealant shall overlay the crack at the pavement surface leaving a no “over-banded" appearance. The material shall not continue to flow beyond these limits once a crack is sealed. The height of the sealant above the pavement surface shall not exceed 1/8 inch.

Before starting each day’s operation, the applicator wand and hose shall be heated in accordance with the equipment manufacturer’s recommendations and the material in the heater-melter unit re-circulated.

The applicator wand shall be returned to the mixing unit and the sealant material re-circulated immediately upon completion of each crack sealing.

Any crack in hydraulic cement concrete pavement which cannot be filled due to the sealant draining into a large void, shall be plugged with a suitable material (i.e. backer rod) approved by the Engineer before the project, and then filled. After being plugged, recleaning of the crack may be required before filling with sealant.

The Contractor shall measure and record the temperature of the material on 2-hour intervals during the heating and application of the crack sealing material. For Type A material, the material shall never be heated over 420°F. For Type B and C material, the material shall not be heated above 375°F. Any material heated above these temperatures shall be discarded (i.e. all material in the heater-melter unit) at no expense to the Department. Additionally, if the material becomes lumpy or has poor flow at elevated temperature, then the material shall be discarded (i.e. all material in the heater-melter unit) at no expense to the Department.

Traffic shall be kept off the pavement surface until the crack sealant has cured to the point it will not track or be distorted by traffic. The Contractor shall replace, at his or her expense, any sealant that pulls out within 96 hours after opening the pavement to traffic.

322.05 – Asphalt Concrete Scratch/Leveling Course Before Resurfacing

Scratching or leveling a crack sealed, scabbed or distorted pavement surface (milled or unmilled) shall be done using the appropriate asphalt mixes in areas designated by the Engineer. Scratching and leveling shall only be applicable to the routes or areas designated to be overlaid in this contract and where the Engineer has authorized the limits. Scratching and leveling shall be completed before the overlay paving operation.

(a) **Scratch/level Type I** is a localized scratch and level of the pavement, including crack sealed, distorted or scabbed areas, making up no more than 50% of the surface area to be overlaid in each distinct paving site or location on the Contract.

(b) **Scratch/level Type II** is a widespread scratch and level of the pavement, including crack sealed, distorted or scabbed areas, making up more than 50% of the surface area to be overlaid in each distinct paving site or location on the Contract.

For surfaces that will receive a direct overlay, the Engineer will designate the limits of surface area for scratch/leveling course to be installed before beginning the work. For pavements that are milled, the Engineer will identify and designate the limits of surface area for scratch/leveling course to be placed as the work progresses in accordance with Section 105.03.

Areas designated for scratch/leveling course shall be thoroughly cleaned before applying tack coat.

A tack coat shall be applied to all exposed surfaces of the area which will receive asphalt material according to Section 310.

Asphalt concrete scratch or leveling material shall be the surface mix asphalt designated in the contract or as approved by the Engineer. SMA shall not be used as a scratch/leveling course material. Limestone mixes (L) may be used in leveling courses when approved by the Engineer.

Asphalt material shall be placed in a lift of no more than 2 inches in depth; typical lifts are approximately 1 inch in depth. Asphalt may be placed with variable depth thickness as necessary for leveling. After each lift, it shall be compacted with equipment according to Section 315.03(c) using a minimum of 3 passes of a minimum 8 ton roller. Density testing will not be required. Care shall be taken to ensure the surface of the finished repaired area conforms to the grade of the surrounding pavement.

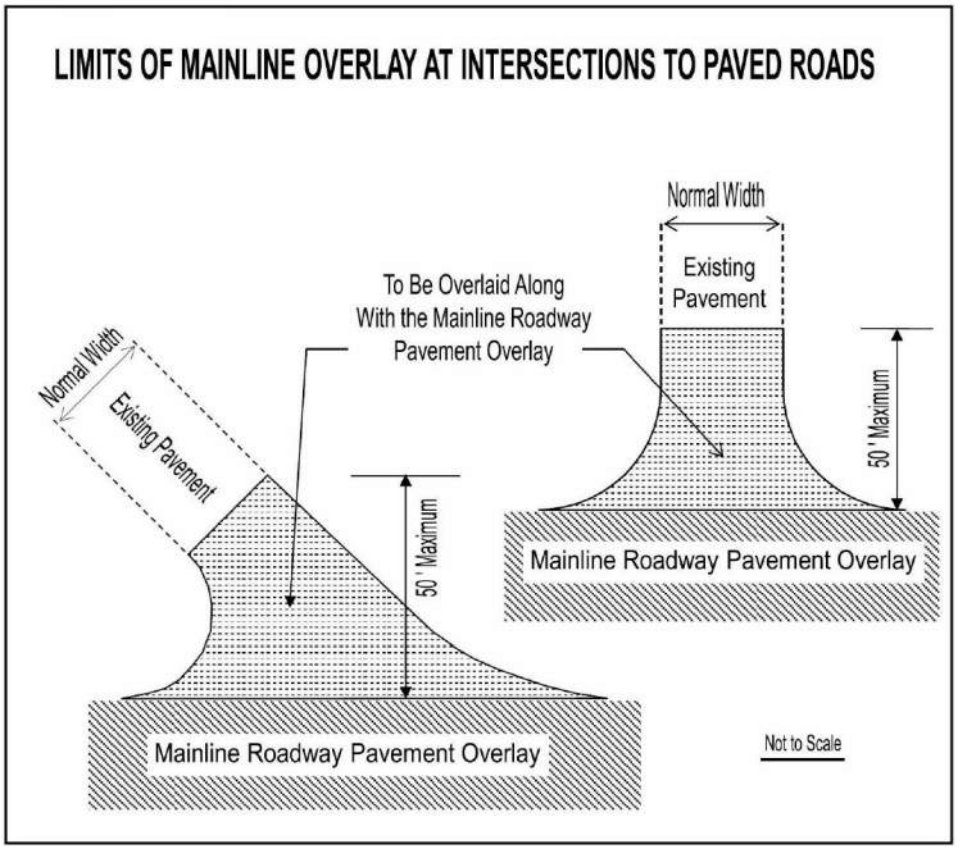
Scratching and leveling shall be completed before the overlay or resurfacing. If a scratch or level placement fails before overlay, the Contractor will be responsible for removing and replacing the failed material at no cost to the Department.

322.06 – Limits of Mainline Overlay at Intersections to Paved Roads

The Contractor shall overlay the intersecting paved road from the edge of pavement of the mainline roadway pavement overlay to a point that includes the entire radius of the intersecting paved road according to Figure III-10. This distance from the edge of pavement of the mainline roadway pavement overlay shall not exceed 50 feet measured according to Figure III-10.

On curb and gutter sections where planing is required for the mainline roadway overlay, planing shall also be required on the intersecting paved road area before these areas are overlaid.

FIGURE III-10
Limits of Mainline Overlay at Intersections to Paved Roads



Asphalt concrete overlay pavement placed on existing paved roadway surfaces that intersects the mainline roadway pavement overlay shall be constructed using a method approved by the Engineer, which shall include the cutting back to

expose the course. The approved method shall provide a smooth transition between new pavement and existing pavement. Such tie-ins shall conform to Section 315.05(c) except that all joints at tie-in locations shall be tested using a 10-foot straightedge according to Section 315.07(a).

322.07 – Placement of Asphalt Concrete Overlays

Placement of Asphalt Concrete Overlays shall conform to Section 315 and the requirements herein. Where pavement planing is required it shall be performed according to Section 515. No placement of an overlay or deck planing will be permitted on a bridge deck without the prior written approval of the District Bridge Engineer.

Limitations of operations for placing asphalt concrete overlays shall be according to Section 108.02, the Contract requirements, and as specified herein.

Before beginning paving overlay operations the Contractor shall clean accumulated dust, mud, or other debris that may adversely affect the bond of the new overlay from the existing pavement surface to the satisfaction of the Engineer. The cost for cleaning and surface preparation shall be included in the bid price for the asphalt concrete.

Sealing pavement cracks or joints and filling pavement irregularities greater than 1 inch deep using approved materials and specified procedures herein will be performed by the Engineer ahead of the Contractor's operations or included in the work performed by the Contractor. When such corrective work is performed by the Contractor, the work will be paid for as designated by the specific pay items in the Contract.

The Contractor shall remove thermoplastic and tape pavement markings and raised pavement markers before performing paving overlay operations. Thermoplastic and tape pavement markings shall be at least 90 percent eradicated so as not to interfere with bonding of pavement overlay or the transfer of the existing marking thickness up through the overlay. This work shall be performed in accordance with Sections 512 and 704 except as otherwise permitted herein.

The Contractor shall protect and reference utility structures before paving in order to locate or adjust these structures, if necessary, after paving operations are completed. The protection and referencing of utility structures shall be at no cost to the Department.

Temporary transverse pavement-wedge tie-ins shall be constructed where pavement overlay operations are temporarily halted as allowed or required herein, in Section 315, elsewhere in the Contract, or by the Engineer. Each temporary tie-in shall be no less than 3 feet in length for every inch of depth of overlaid pavement and shall consist of a mix that is suitable as a surface mix

asphalt to provide a smooth transition between the installed overlay and existing pavement or bridge deck. Such temporary tie-ins shall be constructed before the overlaid pavement is opened to traffic.

Final transverse pavement tie-ins shall be constructed to provide a smooth transition between newly overlaid pavement and existing pavements, bridge decks, and existing pavement underneath bridge overpasses. Such tie-ins shall conform to Standard Drawing ACOT-1 or Section 315.05(c) as applicable, except that all joints at tie-in locations shall be tested using a 10-foot straightedge in accordance with Section 315.07(a). When planing is necessary at tie-ins to existing pavement or bridge decks to obtain the required overlay depth specified in the Contract, the existing pavement shall be planed according to the ACOT-1 Standard or the requirements herein.

No pavement overlay shall decrease the vertical clearance under a bridge. In situations where the pavement under the overpass cannot be planed in direct proportion to the overlay to be placed, the new pavement is to be tied down to the existing pavement under the overpass at least 75 feet from the outer edges of the bridge overpass according to Standard Drawing ACOT-1.
The ACOT-1 Standard for asphalt concrete overlay transitions shall apply when there is at least 1 inch of grade change between the finished asphalt concrete overlay surface and the existing pavement surface and where any of the following conditions exist:

- Bridge decks or bridge overpasses are located within the project site to receive the overlay.

- The Contractor has to tie-in the top course of asphalt concrete overlay to an existing hydraulic cement concrete pavement surface.

- The Contractor has to tie-in the top course of the asphalt concrete overlay to an existing asphalt concrete pavement surface and planing is included in the Contract as pay item.

When tying in the top course of the asphalt concrete overlay to an existing asphalt concrete pavement surface and there is no pay item in the Contract for planing, the asphalt concrete overlay tie-in shall conform to Section 315.07(a).
Rideability pay adjustments will not apply to the first 105 feet (0.02 of a mile) measured from the line of the tie-in.

If an emergency or an unforeseen circumstance such as equipment failure or breakdown occurs during the Contractor’s operations that prevents the Contractor from squaring up the overlaid surface on adjacent lanes before a weekend, a holiday or a temporary shutdown, any additional signage, traffic control devices, or markings or markers required to protect the traveling public shall be provided at the Contractor’s expense.

The Contractor shall ensure positive drainage is provided for all overlaid surfaces according to Section 315.05(c).

(a) **Roadways with Posted Speed Limit of 55 Mph or Greater**

The Contractor shall install asphalt concrete overlays to the depths specified for the specific routes identified in the Contract. Where asphalt concrete is being overlaid by 2 inches or less on roadways carrying traffic, the Contractor shall have the option of squaring up the overlay operation at the end of each workday or squaring up all travel lanes, excluding shoulders, before the weekend. Shoulders shall be squared up within 48 hours after the weekend unless required sooner elsewhere in the Contract, and before continuing mainline paving. All lanes including shoulders must be squared up before holidays or any temporary shutdowns.

Where overlays of more than 2 inches are being placed, the Contractor must square up the overlay operation at the end of each workday. This requirement shall apply to travel lanes and shoulders.

Asphalt concrete pavement overlay operations shall be performed in only one travel lane at a time. Under no circumstance will the Contractor be allowed to overlay a portion of the width of a travel lane, ramp, or loop and leave it exposed to traffic.

Where uneven pavement joints exist either transversely or longitudinally at the edges of travel lanes due to the overlay operations, the Contractor shall provide advance warning signage and traffic control devices for the scope of the overlay operation the Contractor is performing according to the details provided in the Contract. The cost for the advance warning devices and signage shall be included in the cost of other appropriate items. Temporary pavement markings and markers required as a result of staging such operations will be measured and paid for according to Section 512 and 704*.*
Ramps, exits, and turn lanes are to be paved in such a manner that a longitudinal joint with a surface elevation of 1 inch or more between the existing pavement and the overlay (where the overlay is the higher of the two elevations) will not be left for vehicles to cross within the posted speed limits in a “run-on” situation. Ramps, exits, and turn lanes are to be paved to the extent that the joint crossed by traffic is traversed at an angle close to 90 degrees (perpendicular), or the ramp, exit and turn lane shall be squared up with the adjacent mainline lane at the time of installation.

Only approved mixes that have been verified according to Section 211.03(f) and have met the requirement for roller pattern density shall be placed on limited access roadways.

(b) **All Other Roadways**

Where asphalt concrete is being overlaid to a height of 2 inches or less on roadways carrying traffic, the Contractor shall have the option of squaring up the overlay operation at the end of each workday or squaring up all lanes including shoulders at least once every 4 consecutive workdays, excluding weekends. All lanes including shoulders must be squared up before weekends, holidays, or any temporary shutdowns.

Where overlays of more than 2 inches are being placed on roadways carrying traffic the Contractor shall square up the overlay operation at the end of each workday. This requirement shall apply to travel lanes and shoulders.

Asphalt concrete pavement overlay operations shall be performed in only one travel lane at a time. Under no circumstance will the Contractor be allowed to overlay a portion of the width of a travel lane, ramp, or loop and leave it overnight.

Where uneven pavement joints exist either transversely or longitudinally at the edges of travel lanes due to the overlay operations, the Contractor shall provide advance warning signage and traffic control devices at his expense according to the details provided in the Contract for the scope of overlay operation he is performing.

322.08 – Measurement and Payment

Crack Sealant/Filler for cracks or joints will be measured by the pound using either the Conversion Approach or the Direct Measurement Approach. For the Conversion Approach, the Engineer, or an appointed representative, shall measure the amount of material in the heater-melter unit at the beginning of the day. For the Direct Measurement approach, the Contractor shall provide the Engineer the certified weight of the heater-melter unit at the beginning and end of each day. During the day's operation, the Engineer will log all additional material added to the heater-melter unit. The Engineer will determine the pounds of material applied for payment purposes. No payment will be made for waste or unused material.

When using the Conversion Approach, the Contractor shall use a calibrated measuring rod to determine the actual quality of material in gallons and shall be converted to pounds taking consideration for the temperature of the material at the time of placement. A chart or other approved conversion method furnished by the sealant material manufacturer or supplier shall be used to perform the conversion from gallons to pounds.

Crack Sealant/Filler Type A and Type B will be measured in pounds and paid for at the Contract pound price. This price shall be full compensation for providing

the sealant and filler, complete-in-place, including cleaning and sealing the cracks and for all tools, labor, equipment, materials and incidentals related fully completing the installation.

Crack Sealant/Filler Type C will be measured in pounds and paid for at the Contract pound price. This price shall be full compensation for providing the sealant and filler, complete-in-place, including routing, cleaning, and sealing the cracks and for all tools, labor, equipment, materials and incidentals related fully completing the installation.

Asphalt Concrete, including overlay at intersections to paved roads, will be measured and paid for in accordance with Section 315.

Stone Matrix Asphalt, including overlay at intersections to paved roads, will be measured and paid for in accordance with Section 317.

When the Proposal has a Pay Item corresponding to scratching/leveling in the Schedule of Items then that Pay Item will include the work designated in the corresponding Pay Item Definition below and be paid at the price designated by the Bidder. If the Proposal has no Pay Item for scratching/leveling as described herein, that work shall meet the descriptions herein and will be measured and paid for as described herein.

Scratch/Leveling Course Type I will be measured in tons of asphalt material and paid for at the rate of two times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Scratch/Leveling Course Type II will be measured in tons of asphalt material and paid for at the rate of one and one-half times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Payment will be made under the following, when included in the “Schedule of items”:

Pay Item	Pay Unit
Crack Sealant/Filler (Type)	Pound
Scratch/Level (Type)	Tons

SECTION 323 – ASPHALT PATCHING OF EXISTING FLEXIBLE AND RIGID PAVEMENT AND SHOULDERS

SS323-002020-01 **September 9, 2020**

SECTION 323 – ASPHALT PATCHING OF EXISTING FLEXIBLE AND RIGID PAVEMENT AND SHOULDERS is inserted as follows:

323.01 – Description

This work shall consist of repairing specified sections of existing flexible, rigid or composite pavements by removing all or part of the defective materials in the sections and replacing them with asphalt mix paving material. The locations of the repairs will be specified in the Contract or directed by the Engineer.

Partial Depth Hydraulic Cement Concrete (HCC) Patching shall consist of the removal of areas of unsound HCC pavement material to a depth of no more than 50 percent of the maximum pavement thickness and replacement with asphalt concrete as specified in the Contract document and as directed by the Engineer. The pavement thickness is defined as the thickness of the HCC.

Shoulder Patching shall consist of the removal of specified areas of the full thickness of the pavement section in the shoulder only to the top of the base material (bound or un-bound) and replacement with asphalt concrete as specified in the Contract or as directed by the Engineer.

323.02 – Materials

(a) **Asphalt concrete mixtures** shall conform to Section 211.

(b) **Tack coat** shall conform to Section 310.

323.03 – Equipment

Saw cutting equipment shall be capable of sawing neat vertical faces along the patch boundaries. The use of a carbide-toothed wheel saw shall not be permitted for sawing the patch boundaries in rigid pavements. A carbide-tipped wheel saw may be used for additional saw cuts provided that a minimum 3-inch clearance from the sawed boundary is maintained.

Material in the areas identified for shoulder patching may be removed by a milling machine, backhoe, or other excavating equipment as approved by the Department.

Equipment for furnishing and placing asphalt concrete overlay shall conform to Section 315.

323.04 – Procedures

Asphalt patches shall be placed in accordance with Section 315. The existing pavement shall be removed with a minimum disturbance to the aggregate base material and the faces of the remaining pavement shall be cut to a smooth, vertical face without ragged edges.

The existing pavement shall be removed by milling, grinding, saw cutting or any other approved method to the specified depth for the full perimeter of the designated area. The Contractor shall clean this area of any debris or lose particles before applying tack. Tack coat shall be applied to surface and vertical faces of exposed asphalt concrete at a rate of 0.2 gallon per square yard. Exposed base aggregate shall be primed with tack coat at an application rate of 0.4 gallon per square yard. Where HCC is encountered on bitumen over concrete composite pavements before reaching the specified depth, the depth of the patch shall then be limited to the top elevation of the HCC. Before applying the patch, the bottom of the excavation of all patches shall be cleaned of all loose and foreign materials and stabilized by hand or mechanical tamping.

HCC pavement to be removed shall be sawed along the transverse and longitudinal boundaries, including the lane and shoulder/lane joints as shown on the Plans or as directed by the Engineer. Additional saw cuts inside the patch boundaries will be permitted to facilitate the concrete removal operation. During the removal operations, utmost care shall be exercised to minimize disturbance and damage to the reinforcing steel, and the adjacent pavement and shoulder. Before applying the patch, the bottom of the excavation of all patches shall be cleaned of all loose and foreign materials.

Manual placement will be permitted for installation of the asphalt concrete, when approved by the Engineer. Control strip and pavement profile measurements will not be required. Density shall conform to Section 315.05(e). Variation between surfaces at the run on and run off joints shall not be more than 1/4 inch when tested with a 10-foot straight edge. When the surface of the asphalt patch will also be the final riding surface, that surface shall conform to the tolerances in Section 315.07(a). The Contractor shall correct humps and depressions exceeding the specified tolerance or the defective work shall be removed and replaced with new material.
The existing pavement materials that are removed shall be hauled away from the repair site immediately, and disposed of properly by the Contractor in accordance with Section 106.04.

Minimum and maximum lift thickness for patching with Superpave asphalt concrete mixes shall be maintained during construction of the patches in conformance with the following:

SUPERPAVE ASPHALT CONCRETE LIFT THICKNESS (PATCHING)

NMAS (mm)	MINIMUM (in)	MAXIMUM (in)	RECOMMENDED (in)
9.0	0.75	1.5	1.0
9.5	1.25	2.0	1.5
12.5	1.5	2.0	1.75
19.0	2.0	3.0	2.0
25.0	2.5	4.0	3.0

Patching and surface preparation shall be completed before the overlay or resurfacing. If an Asphalt Patch fails before overlay, the Contractor will be

responsible for removing and replacing the failed patch at no cost to the Department.

323.05 – Measurement and Payment

Payment for all patching will be adjusted for density in accordance with Section 315.05(e) and Table III-6.

Partial Depth HCC Patching will be measured in square yards and will be paid for at the Contract square yard price for the mix and depth specified. This price shall be full compensation for furnishing materials and installing pavement patches complete in place. The work shall include, but not be limited to supplying materials, saw cutting, milling, grinding, removing and disposing of existing material, the cost to haul and place asphalt concrete, and all labor, equipment, tools, supervision, fuel and incidentals necessary to complete the work.

Shoulder Patching will be measured in square yards and will be paid for at the Contract square yard price for the mix and depth specified. The payment shall be full compensation for furnishing materials and installing pavement patches on the shoulder complete in place. The work shall include, but not be limited to supplying materials, saw cutting, milling, grinding, removing and disposing of existing material, the cost to haul and place asphalt concrete, and all labor, equipment, tools, supervision, fuel and incidentals necessary to complete the work.

Travel Lane Patching will be measured in tons and will be paid for at the Contract ton price for the mix specified. The payment shall be full compensation for furnishing materials and installing pavement patches in the travel lanes complete in place. The work shall include, but not be limited to supplying materials, saw cutting, milling, grinding, removing and disposing of existing material, the cost to haul and place asphalt concrete, and all labor, equipment, tools, supervision, fuel and incidentals necessary to complete the work. **Liquid asphalt tack or prime** will not be measured for separate payment and the cost to furnish and apply the liquid asphalt shall be included in the bid price for patching.

When Surface Preparation and Restoration is a Pay Item, that Pay Item will include the work designated in the corresponding Pay Item Definition below and be paid at the Contract price. Otherwise, that work shall meet the descriptions herein and will be measured and paid for as described herein.

Surface Preparation and Restoration Type I is a localized disintegration of the pavement, including distorted areas, no more than 5 inches in depth and no more than 20 square feet in surface area. Surface Preparation and Restoration Type I will be measured in tons of asphalt material and paid for at the rate of three times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include removing and disposing of unsuitable material, preparing the

area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Surface Preparation and Restoration Type II is a localized disintegration of the pavement, including distorted areas, no more than 5 inches in depth and more than 20 square feet in surface area. Surface Preparation and Restoration Type II will be measured in tons of asphalt material and paid for at the rate of four times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include removing and disposing of unsuitable material, preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Surface Preparation and Restoration Type III is a localized disintegration of the pavement more than 5 inches in depth with limits of the surface area as defined by the Engineer. Surface Preparation and Restoration Type III will be measured in tons of asphalt material and paid for at the rate of five times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include removing and disposing of unsuitable material, preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Payment will be made under:

Pay Item	Pay Unit
Partial Depth PCC Patching (Asphalt Patch Mix Type and Depth)	Square Yard
Shoulder Patching (Shoulder Mix Type and Depth)	Square Yard
Travel Lane Patching (Patch Mix Type)	Ton
Surface Preparation and Restoration (Type)	Ton

SECTION 401—STRUCTURE EXCAVATION

SS401-002020-01 **May 1, 2020**

SECTION 401 – STRUCTURE EXCAVATION is amended as follows:

Section 401.03(i) – Backfilling is amended by replacing the second and third paragraphs 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. The top surface of the backfill material shall be neatly graded.
>
> The earthen fill around the perimeter of the select material zone in abutments, wingwalls, and retaining walls shall be placed in horizontal layers not more than 6 inches in loose thickness and then compacted at ±20% of optimum moisture content to a density of at least 95% as compared to the

Theoretical Maximum Density. The Department will perform tests in accordance with VTM 10 to verify compliance with density requirements determined in accordance with VTM 1 or VTM 12. The Contractor shall place and compact the backfill in front of units in horizontal layers to the same elevation as the layers behind units until the final elevation in front is reached as the work progresses. Backfill in front of units shall be placed and compacted in horizontal layers to the same elevation as the layers behind units until the final elevation in front is reached. Backfill shall be placed in a manner to prevent wedging action against the concrete. The Contractor shall modify slopes bounding excavation for abutments, wingwalls, or retaining walls to lock in adjacent backfill material by stepping or serrating the existing soils. The Engineer will not permit jetting of the fill behind abutments, wingwalls, or retaining walls.

SECTION 405 – PRESTRESSED CONCRETE

SS405-002020-01 **June 23, 2020**

SECTION 405 – PRESTRESSED CONCRETE is amended as follows:

Section 405.02(i) **– Fully or partially embedded steel attachments to the prestressed concrete members** is renamed to **Fully or partially embedded steel attachments** and replaced with the following:

Fully or partially embedded steel attachments to the prestressed concrete members shall be stainless steel when using stainless-steel or carbon-fiber-reinforced-polymer strands. When using carbon-steel strands, these same steel attachments shall be galvanized in accordance with Section 233.

SECTION 406 – REINFORCING STEEL

SS406-002020-01 **June 22, 2020**

SECTION 406 – REINFORCING STEEL is amended as follows:

Section 406.04 – Measurement and Payment is amended to replace the second paragraph with the following:

Corrosion resistant reinforcing steel will be measured in pounds and will be paid for at the Contract pound price for the class and grade of steel designated. This price shall include fabricating, shipping, furnishing, and placement in the locations shown in the Plans.

Section 406.04 – Measurement and Payment amended by revising the Pay Item Table as follows:

The following pay items are removed:

Pay Item	Pay Unit
Reinforcing steel	Pound
Welded wire fabric	Pound
Corrosion resistant reinforcing steel, (Class)	Pound

The following pay items are inserted:

Pay Item	Pay Unit
Reinforcing steel (item)	Pound
Welded wire fabric (item)	Pound
Corrosion resistant reinforcing steel (Class, grade, item)	Pound

SECTION 407 – STEEL AND OTHER METAL STRUCTURES

SS407-002020-01 **August 29, 2019**

SECTION 407 – STEEL AND OTHER METAL STRUCTURES is amended as follows:

Section 407.04 – Fabrication Procedures is amended by replacing the seventh, eighth, and ninth paragraphs with the following:

The Contractor shall furnish a complete mill analysis showing chemical and physical results from each heat of steel for all units prior to fabrication. Before cutting, pieces of steel other than steel conforming to ASTM A709, Grade 36, that are to be cut to smaller-sized pieces shall be legibly marked with the ASTM A6 specification identification color code or the material specification designation. The identification color code of the latest system adopted under ASTM A6 shall be used to identify material. Any markings that indicate direction of roll shall be transferred to each new piece before cutting the new piece from the larger plate.

If requested by the Engineer, the Contractor shall furnish an affidavit from the fabricator certifying that the fabricator has marked and maintained the identification of steel in accordance with these specifications throughout the fabrication operation.

Section 407.06(c) – Assembly of Structural Connections Using High-Strength Bolts is amended by replacing the first paragraph with the following:

Assembly of Structural Connections Using High-Strength Bolts: Field connections shall be made with high-strength bolts 7/8-inch in diameter fabricated in accordance with ASTM F3125, Grade A325 unless otherwise specified. The Engineer will give consideration to the substitution of adequately designed welded connections if requested in writing by the Contractor.

Section 407.06(c)1 – Bolts, nuts, and washers is replaced with the following:

Bolts, nuts, and washers: Bolts, nuts, and washers shall conform to Section 226 and shall each be from one manufacturer on any one structure unless otherwise approved by the Engineer. In addition, each bolt, nut, and washer combination, when installed, shall be from the same rotational-capacity lot. Prior to installation, the Contractor shall perform a field rotational-capacity test on two nut, bolt, and washer assemblies for each diameter and length in accordance with VTM 135. Bolts fabricated in accordance with ASTM F3125, Grade A490 and galvanized bolts fabricated in accordance with ASTM F3125, Grade A325 shall not be reused. Retightening previously tightened bolts, which may have been loosened by the tightening of adjacent bolts, shall not be considered a reuse. Other bolts may be reused only if approved by the Engineer. Threads of plain (uncoated) bolts shall be oily to the touch when installed. Galvanized nuts shall be lubricated by lubricant containing a visible dye. Threads of weathered or rusted bolts shall be cleaned of loose rust, scale, and debris and relubricated. Lubricant shall be as recommended by the fastener manufacturer.

Section 407.06(c)3 – Installation is amended by replacing the second paragraph with the following:

When bolts fabricated in accordance with ASTM F3125, Grade A490 are used with steel having yield points less than 40 kips per square inch, hardened washers shall be installed under the nut and bolt head.

Section 407.06(c)3 – Installation is amended by replacing the eighth paragraph with the following:

The required minimum bolt tension is equal to 70% of specified minimum tensile strengths of bolts rounded to the nearest kip as specified in ASTM F3125 for Grades A325 and A490. *Snug tight* is defined as the tightness attained when a power wrench begins to impact solidly or when the bolts are firmly hand tightened with a spud wrench such that the complete area of the connecting surfaces are brought into firm contact with each other. Snug tightening shall progress systematically from the most rigid part of the connection to the free edges, and then the bolts of the connection shall be retightened in a similar systematic manner as necessary until all bolts are simultaneously snug tight and the connection is fully compacted.

Section 407.06(c)3b – Direct Tension Indicators (DTI) is amended by replacing the first paragraph with the following:

Direct Tension Indicators (DTI): Direct tension indicator washers shall be used for all high strength bolts, and installation shall be in accordance with Section 407.06(c)3; however, the indicator washer shall not be considered a substitute for the required hardened washer under the turned element. The indicator washer may be considered a substitute for the hardened washer required under the unturned element when bolts conforming to ASTM F3125, Grade A490 are used with steel conforming to ASTM A709, Grade 36. Direct tension-indicator washers shall not be painted or coated with any epoxy or similar material prior to installation. The normal installation shall consist of the load indicator washer being placed under the unturned bolt head or unturned nut. However, if conditions require installation under the turned bolt portion, a hardened flat washer or nut face washer shall be fitted against the tension-indicating protrusions. Tension-indicating washers shall not be substituted for the hardened washers required with short-slotted or oversized holes but may be used in conjunction with them.

Table IV-3 – Bolt Tension is replaced with the following:

TABLE IV-3
Bolt Tension

	Required Min. Bolt Tension (lb.)	
Bolt Size	**Grade A325 Bolts**	**Grade A490 Bolts**
1/2	12,000	15,000
5/8	19,000	24,000
3/4	28,000	35,000
7/8	39,000	49,000
1	51,000	64,000
1 1/8	56,000	80,000
1 1/4	71,000	102,000
1 3/8	85,000	121,000
1 1/2	103,000	148,000

SECTION 410—RAILINGS AND PARAPETS

SS410-002020-01 **January 4, 2021**

SECTION 410—RAILINGS AND PARAPETS is amended as follows:

410.04 – Measurement and Payment is amended to replace the first and second paragraphs with the following:

Railings, Parapets, and Bridge Median Barriers will be measured in linear feet along their face, including terminal walls, without deductions for breaks

or interruptions. Railings, Parapets, and Bridge Median Barriers will be paid for at the Contract linear foot price for the type specified. This price shall include constructing, fabricating, and furnishing materials shown on the Plans including, but not limited to: rails, rail posts, post bearing pads, anchor assemblies, sleeves, grounding materials, reinforcing steel, conduits, junction boxes, and concrete; and any painting and galvanizing.

SECTION 412 – WIDENING, REPAIRING, AND RECONSTRUCTING EXISTING STRUCTURES

SS412-002020-02 **April 6, 2021**

SECTION 412 – WIDENING, REPAIRING, AND RECONSTRUCTING EXISTING STRUCTURES is amended as follows:

Section 412.03(b)6 – Concrete superstructure surface repair is amended by replacing the second paragraph with the following:

The Contractor shall place 2 x 2-W1.4 x W1.4 welded wire fabric over the entire patch area where 2 inches or more of existing concrete is removed. The welded wire fabric shall be tied to reinforcing steel where possible. If reinforcing steel is not exposed or if the steel has a spacing greater than 18 inches, the welded wire fabric shall be anchored to expansion bolts at least 3/8 inch in diameter, which the Contractor shall place along the edges of the patch. The expansion bolts shall be spaced not more than 18 inches apart and shall be embedded at least 2 inches into the concrete. The minimum thickness of repair material over reinforcing steel, including expansion bolts and welded wire fabrics, shall be 2 inches unless otherwise specified.

Section 412.03(g)6a – Preconstruction testing is amended by replacing the second and third paragraphs with the following:

Test panels shall be 24 inches by 24 inches by 6 inches deep. Using the mix design specified, each crew shall gun a set of two test panels for each gunning orientation to be encountered on the project: one test panel shall contain steel reinforcement representative of that to be used on the project; the other test panel shall be used for compressive strength verification and shall not contain any steel reinforcement. Test panels shall be finished to smooth and even surface.

For shotcrete jobs of less than 200 square feet, the Contractor shall cut the test panels containing the reinforcement with a trowel or a metal template before the initial set in the presence of the Engineer to check visually for possible voids under the reinforcement. For Shotcrete jobs of more than 200 square feet, the Contractor shall cut cores from the test panels after the concrete has hardened for at least 3 days to verify good encasement of reinforcing bars. Cores shall be cut through the steel.

On all jobs, the test panels without steel reinforcement shall be used to determine the compressive strength of the applied shotcrete. The test panels shall be cured in the field in the same manner as the structure, until the cores are cut but for a minimum of 3 days. The Contractor shall cut three cores in the presence of the Engineer no earlier than 3 days and no later than 7 days after panel preparation. Cores shall be 4 inches in diameter. After the cores are drilled, the Contractor shall wipe off the surface drill water and allow the remaining surface moisture to evaporate. When the surface appears dry, but not later than 1 hour after drilling, the Contractor shall place the cores in separate plastic bags or nonabsorbent containers and seal them to prevent moisture loss. The cores will be tested by the Department at the specified age in accordance with ASTM C42.

SECTION 520 – WATER AND SANITARY SEWER FACILITIES

SS520-002020-01 **April 14, 2020**

Section 520 – Water and Sanitary Sewer Facilities is amended as follows:

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

Flowable backfill shall conform to Section 249 and 509.

Section 520.03 Procedures is amended to replace the first paragraph with the following:

The Contractor shall be responsible for anticipating and locating underground utilities and obstructions in accordance with Section 105.08. In areas where the utility owner's specifications conflict with the Contract, the utility owners' specifications shall govern

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.

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

Concrete 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 concrete not included in other pay items, and installing plugs.

Flowable Backfill will be measured and paid for in accordance with Section 509.

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

The following pay item is removed:

Pay Item	Pay Unit
Flowable Backfill	Cubic Yard

SECTION 700 – GENERAL

SS700-002020-01 **July 17, 2020**

SECTION 700 – GENERAL is amended as follows:

Section 700.03 – General Requirements is amended by replacing the second paragraph with the following:

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, Luminaires, and Traffic Signals, 6th Edition (LTS-6), 2013 with 2015 and 2019 interims*, as modified elsewhere in the Contract.

SECTION 701 – TRAFFIC SIGNS

SS701-002020-01 **October 20, 2020**

SECTION 701 – TRAFFIC SIGNS is amended as follows:

Section 701.02(a)1 – Overhead Permanent Signs is replaced with the following:

Overhead Permanent Signs (signs attached to sign structures which overhang travel lanes) shall use ASTM D4956 Type XI sheeting.

Table VII-1A – Reflective Sheeting is replaced with the following:

TABLE VII-1A
Reflective Sheeting

Background Color of Sign	Sheeting Type[1]
White	ASTM D4956 Type XI
Red	ASTM D4956 Type XI
Fluorescent Yellow	ASTM D4956 Type XI[2]
Fluorescent Yellow-Green	ASTM D4956 Type XI[3]
Green	ASTM D4956 Type XI
Black	ASTM D4956 Type XI
Purple	ASTM D4956 Type XI
Brown	ASTM D4956 Types IV, IX, or XI
Blue	ASTM D4956 Types IV, IX, or XI

[1]The following signs may use ASTM D4956 Types IV, IX, or XI, regardless of color: Pushbutton education signs (R10-series signs mounted adjacent to pedestrian pushbuttons), Signs erected on bikeways physically separated from adjacent roads, R7- or R8-series parking restriction signs located on non-limited-access highways, D10-series Reference Location Signs (mile markers) and Intermediate Reference Location Signs, and Post-mounted street name signs.

[2]The yellow portions of all signs shall be fluorescent yellow.

[3]All temporary and permanent warning signs related to school zones, pedestrians, or bicyclists (including associated supplemental plaques) shall use fluorescent yellow-green sheeting where required by the VA Supplement to the MUTCD unless otherwise specified on the Plans.

Section 701.02(b) – Sign panel rivets is replaced with the following:

Sign panel rivets shall be fabricated in accordance with Standard Drawing SPD-1.

Section 701.03(a)3 – Letters, numerals, arrows, symbols, borders, and other features of the sign message is amended to include the following:

(e) **Type L5 - Digital Printing:** Features of the sign message shall be created with transparent and opaque durable inks, using the materials, equipment, and fabrication processes recommended by the sheeting manufacturer. Digitally applied colors shall present a smooth surface, free from foreign material, and all messages and borders shall be clear and sharp. Digitally printed signs shall have at least 70% of the retroreflective minimum values shown in Section 247 for their type and color. Digitally printed signs shall meet the daytime color, nighttime color, and luminance, requirements of ASTM D4956. No variations in color or overlapping of colors will be allowed.

All digitally printed signs shall be comprised of an integrated engineered match component system from the sheeting manufacturer. The integrated engineered match component system shall consist of retroreflective sheeting, durable inks, and clear overlay film all from the same manufacturer applied to the substrate.

The digital sign fabricator shall be certified within the last 12 months by the sheeting manufacturer to produce an engineered-match component traffic control sign product. The Contractor shall provide documentation of this certification before starting digital printing sign fabrication. The submittal shall also include documentation that the manufacturer will warrant digitally printed signs fabricated by the sign fabricator in accordance with Section 247.03.

After printing, all digitally printed permanent and temporary traffic signs shall have an integrated engineered match component clear protective overlay recommended by the sheeting manufacturer applied to the entire face of the sign.

Section 701.03(f)2 – Inventory Sheet is replaced with the following:

Inventory Sheet. The Contractor shall provide an .xlsx formatted file to the Engineer, using a sign inventory template provided by the Engineer. The file shall include the information required above for the label, as well as the following:

- Route no.
- Project UPC no. (if applicable).
- Station or milepost information.
- Lane designation.
- *MUTCD*, if applicable and if denoted on the plans.
- Sign message.
- Sign width.
- Sign height.
- Sheeting Manufacturer
- Sheeting Type
- Sign fabricator company name

The cost of preparing and submitting the .xlsx formatted file shall be included with the cost of the sign panel pay items.