GENERAL SPECIAL PROVISIONS

VERSION NUMBER GSP-1813

PART I – SUMMARY LIST OF GENERAL SPECIAL PROVISIONS

The following list is a summary of all approved General Special Provisions for the 2018 Standard Specifications for Construction. This list is only intended to serve as a general guide to identify which subsections have been modified. The list is not considered part of the modification, is non-contractual, and shall not be used to interpret the language of General Special Provisions. The full text must be referenced to determine the details of the change.

The list is organized by subsection. Not all General Special Provisions are listed individually – modifications which were made to adjacent subsections for the same general reason may be combined within this list. Entries in bold text indicate the changes made in the most recent version of the General Special Provisions.

The version of the General Special Provisions is identified using a four digit number that specifies the Standard Specification year and the revision number (e.g. GSP-1805 is the is 5th General Special Provision document issued for the 2018 Standard Specifications).

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 101.02	Deleted the definition of Construction Safety Technician.	GSP-1808	10-27-2020
Subsection 101.02	Added definition for direct melt glass beads.	GSP-1806	4-28-2020
Subsection 101.02	Replaced “Columbus Day” with “Indigenous Peoples’ Day” in the definition of holidays to reflect change in state law.	GSP-1803	7-23-2019
Subsection 101.02	Deleted all references to Supplemental Specifications.	GSP-1804	10-22-2019
Subsection 103.03	Legal reference to sales tax regulations corrected.	GSP-1801	8-8-2018
Subsection 103.04(d)	Changed the requirements for railroad protective liability insurance.	GSP-1807	7-28-2020
Subsection 103.04(e)	Corrected the mailing address.	GSP-1807	7-28-2020
Subsection 105.05(a)	Deleted all references to Supplemental Specifications and modified the Contract Document Precedence to reflect the elimination of Supplemental Specifications.	GSP-1804	10-22-2019
Subsection 105.05(d)	Deleted all references to Supplemental Specifications.	GSP-1804	10-22-2019
Subsection 105.14	Corrected double numbering by re-lettering list subparts.	GSP-1801	8-8-2018
Subsection 105.16	Corrected legal reference.	GSP-1801	8-8-2018
Subsection 105.24	Corrected and relabeled subparts to fix omission of subpart (e).	GSP-1808	10-27-2020

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 105.24(e)	Deleted and replaced subsection to clarify requirements for contaminated materials and remove reference to the Construction Safety Technician.	GSP-1808	10-27-2020
Subsection 106.09(c)	Revised the stockpiling requirements for raw materials.	GSP-1804	10-22-2019
Subsection 107.12 (Table 107.12A)	**Deleted and replaced table to correct error in units.**	**GSP-1813**	**1-25-2022**
Subsection 108.09	Deleted subparts (b) and (c) and relabeled what were subparts (d) through (g) as (b) through (e)	GSP-1808	10-27-2020
Subsection 108.12 (Table 108.12A)	Replaced the liquidated damages table.	GSP-1807	7-28-2020
Subsections 203.03 and 204.03	Added a requirement to submit construction drawings when required by OSHA or VOSHA.	GSP-1803	7-23-2019
Subsection 203.12	Added requirements prohibiting use of frozen material or placement on frozen ground.	GSP-1810	4-27-2021
Subsection 210.03	Modified requirements for length of time milled surface can remain unpaved	GSP-1803	7-23-2019
Subsection 301.02	Deleted and replaced entire subsection to change requirements for PGA and RCA.	GSP-1809	1-26-2021
Subsection 301.03	Added requirements prohibiting use of frozen material or placement on frozen ground.	GSP-1810	4-27-2021
Subsection 301.03	Shifted the location of a sentence and deleted the last paragraph.	GSP-1809	1-26-2021
Subsection 406.03B	Added requirements for the Contractor to provide Hamburg Wheel-Track and FIT testing data in mix designs.	GSP-1803	7-23-2019
Subsection 406.03C (Table 406.03I)	Corrected an outdated reference and slightly modified Note 4.	GSP-1803	7-23-2019
Subsections 406.03C(e) and 406.19(c)	Changed names of subsections to better match their contents and the names of other subsections.	GSP-1801	8-8-2018
Subsection 406.05(a)(12)	Changed internet requirements to reference Subsection 631.02(a)(4).	GSP-1812	10-26-2021
Subsection 406.14	Added a requirement to use a self-propelled pneumatic tired roller for the levelling course of pavement.	GSP-1804	10-22-2019
Subsection 406.18	**Modified asphalt price adjustment procedures.**	**GSP-1813**	**1-25-2022**
Subsection 407.03	Deleted and replaced several paragraphs to correct equations and the table.	GSP-1803	7-23-2019
Subsection 407.04	Deleted and replaced the entire subsection to modify acceptance requirements.	GSP-1809	1-26-2021

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 407.05	Changed seasonal limitation date from October 15th to September 15th.	GSP-1812	10-26-2021
Subsection 407.08(b)	Deleted a sentence that allowed placement on damp surfaces.	GSP-1809	1-26-2021
Section 418	Created a new section for Asphaltic Approach Material.	GSP-1804	10-22-2019
Subsection 501.02	Added a new material subsection to the list and deleted and replaced a second material subsection to correct the name.	GSP-1811	7-27-2021
Subsection 501.03	Deleted and replaced the entire subsection to update testing and mix design requirements.	GSP-1804	10-22-2019
Subsection 501.04	Deleted and replaced paragraphs 1 through 3 to update the batching requirements.	GSP-1804	10-22-2019
Subsection 501.04(b)	Changed internet requirements to reference Subsection 631.02(a)(4).	GSP-1812	10-26-2021
Subsection 501.05(a)	Deleted and replaced subparts (2) and (3) to update the mixing and delivery requirements.	GSP-1804	10-22-2019
Subsection 506.02	Updated the name of the subsection for one of the materials and added a new material subsection to the list.	GSP-1803	7-23-2019
Subsection 506.03	Deleted and replaced multiple paragraphs to clarify requirements for fabrication drawings, the use of subcontractors for fabrication, and the level of plant certification required.	GSP-1803	7-23-2019
Subsection 506.03	Deleted and replaced multiple paragraphs to specify that fabricators must be pre-qualified.	GSP-1810	4-27-2021
Subsection 506.03(c)(1)	Deleted and replaced the subsection to provide additional details about inspectors.	GSP-1803	7-23-2019
Subsection 506.03(c)(1)	Clarified inspector certification requirements.	GSP-1810	4-27-2021
Subsections 506.03(d)(3) and 506.03(e)	Minor wording changes.	GSP-1803	7-23-2019
Subsection 506.04(c)	Deleted and replaced subsection to modify welding procedures.	GSP-1803	7-23-2019
Subsection 506.04(c)	Clarified welding procedures.	GSP-1810	4-27-2021
Subsection 506.04(e)	Created new subpart (e) regarding approval of procedures.	GSP-1810	4-27-2021
Subsection 506.05	Added a sentence stating that acceptance by VTrans does not relieve fabricator of responsibility.	GSP-1810	4-27-2021
Subsection 506.05(b)	Deleted a sentence.	GSP-1803	7-23-2019
Subsection 506.06(b)	Deleted and replaced subsection to modify inspector requirements.	GSP-1803	7-23-2019
Subsection 506.08	Added definition of main members.	GSP-1810	4-27-2021

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsections 506.10(b) and 506.10(c)	Modified AWS references.	GSP-1810	4-27-2021
Subsection 506.10(d)	Minor wording changes.	GSP-1803	7-23-2019
Subsection 506.10(d)	Added sentence prohibiting welding to tension members, corrected cross reference.	GSP-1810	4-27-2021
Subsection 506.10(e)(1)	Deleted two paragraphs.	GSP-1803	7-23-2019
Subsection 506.12(c)	Clarified that air used for cooling must be dry air.	GSP-1810	4-27-2021
Subsection 506.12(d)	Minor wording changes.	GSP-1803	7-23-2019
Subsection 506.14	Deleted and replaced subsection to clarify surface preparation requirements.	GSP-1803	7-23-2019
Subsection 506.16(c)	Clarified shipping requirements.	GSP-1810	4-27-2021
Subsection 506.18(a)	Corrected AASHTO reference.	GSP-1807	7-28-2020
Subsection 506.18(b)	Deleted and replaced subparts (2) and (3) to clarify alignment, drilling and reaming requirements.	GSP-1803	7-23-2019
Subsections 506.19(a) and 506.19(b)	Minor wording changes.	GSP-1803	7-23-2019
Subsection 506.19(c)	Added a sentence stating that standard bolts are to be Grade A 325.	GSP-1801	8-8-2018
Subsection 506.19(c)	Clarified that reaming holes is not allowed unless approved by the engineer.	GSP-1810	4-27-2021
Subsection 506.19	Relabeled existing subparts in order to correct duplicate list numbering. Also corrected internal cross references.	GSP-1801	8-8-2018
Subsections 506.19(d)(1) and 506.19(e)	Minor wording changes.	GSP-1803	7-23-2019
Subsection 506.19(d)(2)	Added requirement to provide hardened washers when required by manufacturer.	GSP-1810	4-27-2021
Subsection 506.22	Simplified and clarified language regarding payment.	GSP-1810	4-27-2021
Subsection 506.23	Deleted and replaced entire subsection to add additional coating requirements.	GSP-1803	7-23-2019
Subsection 506.23	Clarified timing of coating application and added information regarding repairs to galvanizing.	GSP-1810	4-27-2021
Subsection 506.23(e) and 506.23(f)	Inserted a new subpart (e) to cover field connections and relabeled what was subpart (e) as subpart (f).	GSP-1810	4-27-2021
Subsection 506.24(a)	Deleted and replaced several subparts to clarify measurement by weight.	GSP-1810	4-27-2021

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 506.25	Deleted and replaced entire subsection.	GSP-1803	7-23-2019
Subsection 510.02	Added a new material subsection to the list.	GSP-1811	7-27-2021
Subsection 510.02	Renamed material subsection list item to reflect changes to Section 780.	GSP-1812	10-26-2021
Subsection 510.06	Changed internet requirements to reference Subsection 631.02(a)(4).	GSP-1812	10-26-2021
Subsections 510.12(b) and 540.11(b)	Corrected internal cross references.	GSP-1801	8-8-2018
Subsection 516.02	Updated materials list item to reflect name change of Subsection 707.15	GSP-1804	10-22-2019
Subsection 516.02	Deleted metalizing from materials list.	GSP-1810	4-27-2021
Subsection 516.02	Deleted and replaced a material subsection to correct the name.	GSP-1811	7-27-2021
Subsection 516.04	Deleted reference to metalizing expansion devices.	GSP-1810	4-27-2021
Subsections 516.05 and 516.08	Changed “epoxy bonding compound” to “epoxy bonding systems”.	GSP-1811	7-27-2021
Subsection 519.02	Deleted and replaced subsection to reflect changes made in Subsection 726.11.	GSP-1804	10-22-2019
Subsection 524.02	Updated materials list to reflect name change of Subsection 707.15	GSP-1804	10-22-2019
Subsection 525.04	Deleted sentence requiring fabrication in an approved plant as that is covered in Section 506.	GSP-1810	4-27-2021
Subsections 529.03 and 529.05	Added language to cover the removal of bridge membranes.	GSP-1811	7-27-2021
Subsection 531.04	Updated reference to Section 506, deleted sentence regarding rounding of edges as that is covered in Section 506.	GSP-1810	4-27-2021
Subsection 540.02	Updated material list to reflect changes made in Subsection 726.11.	GSP-1804	10-22-2019
Subsection 540.02	Added a new material subsection to the list.	GSP-1811	7-27-2021
Subsection 540.02	Renamed material list item to reflect changes to Section 780 and added a new material to the list.	GSP-1812	10-26-2021
Subsection 540.06	Changed internet requirements to reference Subsection 631.02(a)(4).	GSP-1812	10-26-2021
Subsection 540.10	Updated internal cross reference to reflect changes made in Subsection 726.11.	GSP-1804	10-22-2019
Subsection 540.12	Corrected internal cross reference.	GSP-1801	8-8-2018
Subsection 540.14(b)	Replaced the word “prestressed” with the word “precast”.	GSP-1804	10-22-2019

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 541.02	Added a new material subsection to the list.	GSP-1811	7-27-2021
Subsection 541.04(b)	Changed internet requirements to reference Subsection 631.02(a)(4)	GSP-1812	10-26-2021
Subsection 541.07	Changed requirements related to supplying thermometers for monitoring concrete temperature.	GSP-1811	7-27-2021
Subsection 543.04	Deleted and replaced sentence to correct submittal requirements.	GSP-1803	7-23-2019
Subsection 544.02	Deleted and replaced subsection to reflect changes to Section 780.	GSP-1812	10-26-2021
Subsection 580.02	Deleted and replaced subsection to reflect changes to Section 780.	GSP-1812	10-26-2021
Subsections 580.06	Changed “epoxy bonding compound” to “epoxy bonding systems”.	GSP-1811	7-27-2021
Subsection 580.06	Added a paragraph to reflect changes to Section 780	GSP-1812	10-26-2021
Subsection 605.02	Updated materials list to reflect name change of Subsection 707.15	GSP-1804	10-22-2019
Subsection 605.02	Added a new material subsection to the list and deleted internal cross reference. Changes made to conform to new Section 720.	GSP-1801	8-8-2018
Subsection 605.02	Deleted and replaced subparts (a) through (d) to remove the word perforated from description of pipe types.	GSP-1806	4-28-2020
Section 617	Deleted and replaced entire section to clarify difference between remove and reset and remove and replace.	GSP-1808	10-27-2020
Subsection 621.02	Deleted emulsified asphalt from the material list.	GSP-1812	10-26-2021
Subsection 625.02	Deleted incorrect material reference.	GSP-1802	1-18-2019
Subsection 621.07	Updated requirements for using traffic barrier meeting MASH or NCHRP 350.	GSP-1807	7-28-2020
Subsection 630.01	Minor wording changes.	GSP-1803	7-23-2019
Subsection 630.02(b)	Deleted and replaced subsection to modify flagger apparel requirements.	GSP-1803	7-23-2019
Subsection 630.04(a)	Modified flagger training requirements.	GSP-1802	1-18-2019
Subsection 631.02(a)(4)	Updated internet speed requirements.	GSP-1812	10-26-2021
Subsection 631.06	Added additional required bituminous testing equipment.	GSP-1805	1-28-2020
Subsection 631.08	Modified requirements for grout molds.	GSP-1802	1-18-2019
Subsection 631.09	Deleted a sentence that dictated an Agency process.	GSP-1804	10-22-2019

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 641.02	Deleted and replaced several paragraphs in order to add new subparts and clarify the difference between the traffic control items.	GSP-1803	7-23-2019
Subsection 641.03	Added paragraph requiring security system for PCMS.	GSP-1802	1-18-2019
Subsection 641.07	Deleted and replaced entire subsection to clarify basis of payment.	GSP-1803	7-23-2019
Section 646	Deleted and replaced entire section.	GSP-1806	4-28-2020
Subsection 649.02	Deleted and replaced existing subsection so it would conform with the new Section 720.	GSP-1801	8-8-2018
Subsection 653.02	Added new material subsections to the list and deleted internal cross reference. Changes made to conform to new Section 720.	GSP-1801	8-8-2018
Subsection 653.03(a)	Added information for when an EPSC Plan is not included in the Contract.	GSP-1807	7-28-2020
Subsection 653.08(a)(1), 653.09(a), 653.09(b)(1) and 653.09(b)(3)	Corrected references to various geotextile requirements to conform to new Section 720.	GSP-1801	8-8-2018
Subsection 653.17	Added requirement that EPSC monitoring reports will not be paid for unless received within 7 calendar days of the event.	GSP-1810	4-27-2021
Subsection 675.02	Deleted internal cross reference.	GSP-1802	1-18-2019
Subsection 675.07(b)(2)	Deleted and replaced subsection to modify the requirements.	GSP-1803	7-23-2019
Subsection 675.07(d)	Added two new sentences to add additional requirements for fasteners.	GSP-1803	7-23-2019
Subsection 677.03	Added a sentence removing the requirement for field verification of DTI's.	GSP-1801	8-8-2018
Subsection 679.02	Deleted one material from the materials list and added two new ones to match changes in Subsection 753.04.	GSP-1802	1-18-2019
Subsection 679.05	Deleted existing first sentence and added two new paragraphs	GSP-1802	1-18-2019
Subsection 679.09	Added a sentence removing the requirement for field verification of DTI's.	GSP-1801	8-8-2018
Subsection 680.02	Changed materials list entry.	GSP-1812	10-26-2021
Subsection 680.02	Deleted a material from the materials list.	GSP-1802	1-18-2019
Subsection 680.06	Changed material requirement from peastone to drainage aggregate.	GSP-1812	10-26-2021
Section 690	Deleted and replaced reserved section to add fuel price adjustment to the book.	GSP-1806	4-28-2020

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 690.02 (Table 690.02A)	Changed fuel usage factor and threshold quantity for the Cold Mixed Recycled Bituminous Pavement work category.	GSP-1810	4-27-2021
Section 701	Deleted and replaced entire section to update requirements for hydraulic cement.	GSP-1811	7-27-2021
Subsection 702.06 (Table 702.06A)	Deleted and replaced table to correct some temperatures and add a new row.	GSP-1803	7-23-2019
Subsection 702.07	Deleted and replaced entire subsection to modify anti-stripping requirements.	GSP-1809	1-26-2021
Subsection 704.01(b)	Corrected ambiguity associated with organic impurities.	GSP-1805	1-28-2020
Subsection 704.10(a)	Added a sentence regarding anti-stripping additives.	GSP-1809	1-26-2021
Subsection 704.10(a)	Corrected AASHTO references.	GSP-1803	7-23-2019
Subsection 704.10 (Table 704.10D)	Removed special percent wear requirements for bonded wearing course aggregate.	GSP-1807	7-28-2020
Subsection 704.11	Deleted and reserved subsection.	GSP-1812	10-26-2021
Subsection 704.15	Deleted and replaced entire subsection to modify anti-stripping requirements.	GSP-1809	1-26-2021
Subsection 704.20	Added new section to provide PGA requirements.	GSP-1809	1-26-2021
Subsection 704.21	Added new section to provide RCA requirements.	GSP-1809	1-26-2021
Subsection 706.06	Deleted and reserved entire subsection.	GSP-1805	1-28-2020
Subsection 707.01(a)	Added a cross reference.	GSP-1811	7-27-2021
Subsection 707.14 (Table 707.14A)	Corrected AASHTO references.	GSP-1802	1-18-2019
Subsection 707.15	Deleted and replaced entire subsection to update requirements.	GSP-1804	10-22-2019
Subsection 707.17	Added a new subsection to provide material requirements for the new Section 418.	GSP-1804	10-22-2019
Subsection 708.03	Deleted and replaced entire subsection to provide new requirements.	GSP-1803	7-23-2019
Subsection 708.06	Deleted and reserved entire subsection.	GSP-1802	1-18-2019
Subsection 708.08 (Table 708.08C)	Added two rows to the table.	GSP-1803	7-23-2019
Subsection 708.09	Deleted and reserved entire subsection.	GSP-1806	4-28-2020
Subsection 708.11	Deleted and reserved entire subsection.	GSP-1803	7-23-2019
Subsection 708.12	Deleted and replaced entire subsection to provide new requirements.	GSP-1803	7-23-2019

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 710.03	Deleted and replaced subsection to update material requirements for corrugated polyethylene pipe.	GSP-1806	4-28-2020
Subsection 710.07	Deleted and replaced subsection to update material requirements for corrugated polypropylene pipe.	GSP-1806	4-28-2020
Subsection 711.02	Corrected internal cross reference.	GSP-1802	1-18-2019
Subsection 712.04	Deleted and reserved entire subsection.	GSP-1805	1-28-2020
Subsections 713.04 and 713.05	Corrected AASHTO references.	GSP-1802	1-18-2019
Subsection 714.01	Clarified requirements for CVN testing.	GSP-1809	1-26-2021
Subsection 714.01	Deleted definition of main members.	GSP-1810	4-27-2021
Subsection 714.05	Deleted and replaced the first sentence to provide new requirements.	GSP-1803	7-23-2019
Subsection 714.05	Changed the word “painted” to “coated”.	GSP-1809	1-26-2021
Subsection 714.06	Deleted and replaced the first sentence to provide new requirements.	GSP-1803	7-23-2019
Subsection 714.06	Revised requirements related to coating of bolts, nuts, and washers.	GSP-1811	7-27-2021
Subsection 714.10	Corrected AASHTO/AWS material reference.	GSP-1806	4-28-2020
Section 719	Deleted and replaced entire section to add detailed requirements for epoxy resin materials.	GSP-1811	7-27-2021
Section 720	Deleted and replaced entire section in order to align it with current AASHTO specifications.	GSP-1801	8-8-2018
Subsection 720.03 (Table 720.03A)	Updated the MARV value for Apparent Opening Size (mm).	GSP-1804	10-22-2019
Subsection 720.06 (Table 720.06A)	Updated the MARV value for Apparent Opening Size (mm).	GSP-1804	10-22-2019
Subsections 725.01(d) and 725.02(a)	Deleted and replaced both subparts to update requirements.	GSP-1802	1-18-2019
Subsection 725.03(b)	Deleted and replaced subpart to clarify the requirements.	GSP-1811	7-27-2021
Subsection 726.08	Clarified requirements for repairing damaged galvanizing.	GSP-1806	4-28-2020
Subsection 726.08	Clarified that repair requirements apply to zinc coatings in general, not just galvanizing.	GSP-1810	4-27-2021
Subsection 726.09	Deleted and replaced entire subsection to clarify the requirements.	GSP-1803	7-23-2019
Subsection 726.09	Clarified metalizing requirements.	GSP-1810	4-27-2021

Subsections Changed	Broad Description of Changes	Change Made In	
		Version No.	Dated
Subsection 726.11	Deleted and replaced entire subsection to update the requirements for waterproofing membrane systems.	GSP-1812	10-26-2021
Subsection 731.03	Corrected name of AASHTO reference.	GSP-1807	7-28-2020
Subsection 732.01	Added an ASTM reference.	GSP-1810	4-27-2021
Subsections 732.03 and 732.04	Deleted and replaced both subsections to modify CVN requirements.	GSP-1812	10-26-2021
Subsection 751.01(b)	Deleted and replaced subpart to clarify the requirements.	GSP-1811	7-27-2021
Subsection 753.04	Created separate requirements for steel and aluminum bracket arms.	GSP-1802	1-18-2019
Subsection 753.05	Deleted and replaced subsection to modify material requirements.	GSP-1806	4-28-2020
Section 754	Created a new section for pavement marking materials.	GSP-1803	7-23-2019
Subsection 754.01	Added requirements for optics.	GSP-1806	4-28-2020
Subsection 755.12	**Corrections to references and assorted updates.**	**GSP-1813**	**1-25-2022**
Section 780	Deleted and replaced entire section to update requirements and change material names.	GSP-1812	10-26-2021
Alphabetical Index of Pay Items	Corrected the name of item 406.38.	GSP-1803	7-23-2019
Alphabetical Index of Pay Items	Added item 418.10.	GSP-1804	10-22-2019
Alphabetical Index of Pay Items	Deleted item 646.75.	GSP-1803	7-23-2019
Alphabetical Index of Pay Items	Added item 690.50.	GSP-1806	4-28-2020

PART II – GENERAL SPECIAL PROVISIONS FOR ALL PROJECTS

DIVISION 100

GENERAL PROVISIONS

SECTION 101 – DEFINITIONS AND TERMS

101.02 DEFINITIONS is hereby modified by deleting the entry for, and definition of, "Construction Safety Technician".

101.02 DEFINITIONS is hereby modified by adding the following definition in alphabetical order:

DIRECT MELT GLASS BEADS – Glass beads derived from recycled glass by returning the glass to a molten form, removing impurities, and refining the glass into near-virgin glass beads.

101.02 DEFINITIONS, the definition for "Holidays" is hereby modified by deleting the phrase "Columbus Day" from the first column and replacing it with the phrase "Indigenous Peoples' Day".

101.02 DEFINITIONS, is hereby modified by deleting the phrase "Supplemental Specifications," from the definitions for "Contract", "Project Special Provisions", and "Specifications".

101.02 DEFINITIONS is hereby modified by deleting the entry for, and definition of, "Supplemental Specifications".

SECTION 103 – TAXES AND INSURANCE

103.03 STATE SALES TAX is hereby modified by deleting the phrase "(see *Vermont Sales and Use Tax Regulations, No. 226-2* and *226-7* and *32 V.S.A. § 9743(4)*)" and the phrase "(see *32 V.S.A. § 9741(44)*)." from the first paragraph.

103.03 STATE SALES TAX is hereby further modified by adding the following reference to the end of the first paragraph:

(see *32 V.S.A. § 9743(4), 32 V.S.A. § 9741(30), 32 V.S.A. § 9741(44),* and the *Vermont Sales and Use Tax Regulations, Reg. § 1.9741(34)-5* and *Reg. § 1.9743*).

103.04 INSURANCE REQUIREMENTS, subpart (d), is hereby modified by deleting the second paragraph, which begins with "The Contractor shall file..." and ends with "... to the Operating Railroad concerned.", and replacing it with the following:

Upon request by the Agency, the Contractor shall provide a copy of the railroad protective liability policy within 24 hours.

103.04 INSURANCE REQUIREMENTS, subpart (e), is hereby modified by deleting the phrase "*1 National Life Drive, Montpelier, Vermont 05633-5001*" from the ninth paragraph and replacing it with the phrase "*219 North Main Street, Barre, Vermont 05641*".

SECTION 105 – CONTROL OF THE WORK

105.05 COORDINATION OF CONTRACT DOCUMENTS, subpart (a), is hereby modified by deleting the phrase "Supplemental Specifications," from the first sentence.

105.05 COORDINATION OF CONTRACT DOCUMENTS, subpart (a)(1), is hereby modified by deleting subpart g. in its entirety, relabeling subpart h. as subpart g., and relabeling subpart i. as subpart h.

105.05 COORDINATION OF CONTRACT DOCUMENTS, subpart (d), is hereby modified by deleting the phrase "Supplemental Specifications," from the last sentence.

105.14 SUNDAY, NIGHT, AND HOLIDAY WORK is hereby modified by relabeling subpart (c), "Application.", as "(d) Application." and subpart (d), "Other Provisions Not Affected.", as "(e) Other Provisions Not Affected."

105.16 LOAD RESTRICTIONS, subpart (c), is hereby modified by changing the phrase "*23 V.S.A. § 1391(a)*" to read "*23 V.S.A. § 1391a*".

105.24 POLLUTION CONTROL is hereby modified by relabeling subpart (f) as subpart (e), relabeling subpart (g) as subpart (f), and relabeling subpart (h) as subpart (g).

105.24 POLLUTION CONTROL, subpart (e), is hereby modified by being deleted in its entirety and replaced with the following:

(e) Contaminated Materials and Hazardous Waste.

(1) Unanticipated Contamination. Should evidence of unanticipated contamination (such as chemical or petroleum odors or presence of non-native materials including, but not limited to, solid waste, asphalt, or ash) be discovered during construction, the Contractor shall immediately notify the Engineer. The Agency will work with the Contractor to notify regulators as necessary and to develop a plan to manage the materials, waste, or both.

(2) Generated Contamination. The Contractor shall provide documentation to the Engineer that any generated contaminated material or hazardous waste was characterized as necessary and disposed of in conformance with all applicable regulations.

The Agency may suspend work when it determines that a serious safety or environmental violation exists on the job site. The period of time work is suspended due to a serious safety or environmental violation will not be justification for an extension of time.

SECTION 106 – CONTROL OF MATERIALS

106.09 STOCKPILING, subpart (c), is hereby modified by being deleted in its entirety and replaced with the following:

(c) Raw Materials. In addition to the criteria set out above for other materials, raw material stockpiles shall be approved by the Construction Engineer and meet the following additional criteria:

(1) The various components of the finished product shall include all of the appropriate certifications, passing samples, passing tests, and any other documentation that may be required to certify that the materials are acceptable.

(2) For stockpiles of structural steel, invoices or quotes from the fabricator shall include supporting documentation such as mill invoices or quotes that show actual dimensions, quantities, and costs to the fabricator for the raw materials. The intent of this raw material payment is to reimburse the actual amount it cost the fabricator to purchase the raw materials for the specific Contract item. There will be no allowance for mark up of any type by the Contractor or fabricator. Stockpile payments will be limited to one payment per 6 months, per Contract item. There will be no raw material stockpile payment allowed for materials that do not meet the dimensions provided on the mill invoices.

(3) Any other criteria the Engineer deems necessary to allow for payment.

SECTION 107 – LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

107.12 PROTECTION AND RESTORATION OF PROPERTY, Table 107.12A, is hereby modified by being deleted in its entirety and replaced with the following:

TABLE 107.12A – MAXIMUM PEAK PARTICLE VELOCITY

Type of Structure	Frequencies < 40 Hertz	Frequencies ≥ 40 Hertz
Modern homes (drywall interior, maximum PPV limit in inches/sec.)	0.75	2.0
Older homes (plaster on wood or lath, maximum PPV limit in inches/sec.)	0.50	2.0

SECTION 108 – PROSECUTION AND PROGRESS

108.09 TEMPORARY SUSPENSION OF THE WORK is hereby modified by deleting subparts (b) and (c) in their entirety, relabeling subpart (d) as subpart (b), relabeling subpart (e) as subpart (c), relabeling subpart (f) as subpart (d), and relabeling subpart (g) as subpart (e).

108.12 FAILURE TO COMPLETE WORK ON TIME, Table 108.12A, is hereby modified by being deleted in its entirety and replaced with the following:

TABLE 108.12A – DAILY LIQUIDATED DAMAGES CHARGE PER WORKING DAY OF DELAY

Original Contract Amount		Daily Charge per Working Day of Delay
From More Than	To and Including	
$0	$300,000	$1,900
$300,000	$500,000	$2,000
$500,000	$1,000,000	$2,100
$1,000,000	$1,500,000	$2,200
$1,500,000	$3,000,000	$2,500
$3,000,000	$5,000,000	$3,000
$5,000,000	$10,000,000	$4,000
$10,000,000	$15,000,000	$5,200
$15,000,000	+	$6,200

DIVISION 200

EARTHWORKS

SECTION 203 – EXCAVATION AND EMBANKMENTS

203.03 GENERAL CONSTRUCTION REQUIREMENTS is hereby modified by adding the following as the last sentence of the ninth paragraph:

Construction Drawings shall be submitted in accordance with Section 105 whenever OSHA or VOSHA regulations require a design by a Professional Engineer.

203.12 SUBGRADE is hereby modified by adding the following as the second and third sentences of the sixth paragraph:

Frozen material shall not be used in the construction of subbase. Subbase, base, or surface material shall not be deposited on frozen subgrade, and successive layers shall not be placed on material that has frozen.

SECTION 204 – EXCAVATION FOR STRUCTURES

204.03 GENERAL CONSTRUCTION REQUIREMENTS is hereby modified by adding the following as the last sentence of the third paragraph:

Construction Drawings shall be submitted in accordance with Section 105 whenever OSHA or VOSHA regulations require a design by a Professional Engineer.

SECTION 210 – COLD PLANING

210.03 GENERAL CONSTRUCTION REQUIREMENTS, subpart (b) is hereby modified by being deleted in its entirety and replaced with the following:

(b) The Contractor shall repave any coarse-milled areas within 14 Calendar Days and any fine-milled areas within 28 Calendar Days of milling, or when directed by the Engineer. Should the area remain unpaved for a period longer than specified herein, without the approval of the Engineer, no payment whatsoever will be made for the milled areas left exposed in excess of the 14 or 28 Calendar Day periods. If the Contractor lays down temporary pavement to avoid the above non-payment for milling, temporary pavement and subsequent milling shall be at the Contractor's expense.

DIVISION 300

SUBBASE AND BASE COURSES

SECTION 301 – SUBBASE

301.02 MATERIALS is hereby modified by being deleted in its entirety and replaced with the following:

301.02 MATERIALS. Materials shall meet the requirements of the following subsections:

Coarse Aggregate for Concrete.....704.02
Gravel for Subbase.....704.04
Crushed Gravel for Subbase 704.05
Dense Graded Crushed Stone for Subbase 704.06
Processed Glass Aggregate.....704.20
Recycled Concrete Aggregate.....704.21

At the option of the Contractor, unless otherwise specified in the Contract, processed glass aggregate (PGA) meeting the requirements of Subsection 704.20 or recycled concrete aggregate (RCA) meeting the requirements of Subsection 704.21 may be used to partially replace natural aggregate in materials specified to meet the requirements of Subsection 704.04, Subsection 704.05, and Subsection 704.06.

PGA subbase blends shall not contain more than 20% by weight of PGA. RCA subbase blends shall not contain more than 25% by weight of RCA. In no case shall PGA and RCA be combined in subbase. The final blend shall conform to the specified gradation for the subbase material. The blending process shall be complete to ensure that as thorough a distribution and as uniform a mixture as practicable has been obtained. In-place blending of PGA with other materials will not be permitted.

When specified for use on the project or as directed by the Engineer, Subbase, RAP shall include milled grindings which have been screened or crushed by the Contractor such that 100% pass the 1-1/2 inch (37.5 mm) sieve prior to blending.

The grindings shall be blended in equal proportions (50% by weight) with material meeting the requirements of Subbase of Crushed Gravel, Fine Graded as specified in Table 704.05B.

301.03 GENERAL CONSTRUCTION REQUIREMENTS is hereby modified by adding the following as the fourth paragraph:

Frozen material shall not be used in the construction of subbase. Subbase material shall not be deposited on frozen subgrade, and successive layers shall not be placed on material that has frozen.

301.03 GENERAL CONSTRUCTION REQUIREMENTS is hereby modified by adding "Care will be taken to prevent excessive moisture contents in subbase materials prior to compaction." as the last sentence of the sixth paragraph.

301.03 GENERAL CONSTRUCTION REQUIREMENTS is hereby further modified by deleting "Care will be taken to prevent excessive moisture contents in subbase materials prior to compaction." from the seventh paragraph.

301.03 GENERAL CONSTRUCTION REQUIREMENTS is hereby further modified by deleting the last paragraph. The deleted text begins with "If roadway shoulders are to remain unpaved…" and ends with "…in accordance with Subsection 402.03."

DIVISION 400

SURFACE COURSES AND PAVEMENT

SECTION 406 – BITUMINOUS CONCRETE PAVEMENT

406.03B COMPOSITION OF MIXTURE – SUPERPAVE, subpart (c), is hereby modified by adding ", unless otherwise noted in this section." to the end of the sentence which begins with "For Superpave bituminous concrete pavement mixes, *AASHTO R 35*…".

406.03B COMPOSITION OF MIXTURE – SUPERPAVE, subpart (c), is hereby further modified by deleting the word "four" from the sentence which currently reads "The four principal parts of the Superpave Mix Design Method are:" and replacing it with the word "five".

406.03B COMPOSITION OF MIXTURE – SUPERPAVE, subpart (c), is hereby further modified by deleting subpart (4) in its entirety and replacing it with the following:

(4) Evaluate moisture sensitivity and rutting susceptibility using *AASHTO T 324*. Test specimens for Hamburg Wheel-Track (HWT) testing shall be 150 mm (6.0 inches) in diameter with a 60 ± 1 mm (2.36 ± 0.04 inch) thickness and shall be short term conditioned in accordance with Section 7.2 of *AASHTO R 30*. HWT specimens shall be tested at 45 ± 1° C (113 ± 1.8° F), with the machine pre-set to end the test once a maximum rut depth of 12.5 mm (0.50 inches) is reached. If the difference in the rut depth between the two pairs of specimens is 6 mm (0.24 inches) or more, and/or only one pair of specimens has a final rut depth of 12.5 mm (0.50 inches), the test results will be deemed invalid and not acceptable for mix design qualification. Slab specimens shall not be used.

(5) Determine cracking susceptibility using *AASHTO TP 124*. Test specimens for the FIT shall be fabricated in a Superpave Gyratory Compactor and short term conditioned in accordance with Section 7.2 of *AASHTO R 30*. Specimens that are fabricated to a height of 50 mm (2.0 inches), in lieu of fabricating 160 mm (6.30 inch) or 115 mm (4.50 inch) specimens as part of the test specimen preparation procedures outlined in *AASHTO TP 124*, will be allowed.

406.03C REQUIREMENTS FOR BOTH MARSHALL AND SUPERPAVE BITUMINOUS MIXTURES is hereby modified by changing the name of subpart (e) from "Pay Factor Determination." to "Air Voids Pay Factor (PF_{AV}) Determination."

406.03C REQUIREMENTS FOR BOTH MARSHALL AND SUPERPAVE BITUMINOUS MIXTURES, Table 406.03I, is hereby modified by deleting the phrase "*ASTM D 5821*" and replacing it with the phrase "*AASHTO T 335*" in the third column of the fifth row.

406.03C REQUIREMENTS FOR BOTH MARSHALL AND SUPERPAVE BITUMINOUS MIXTURES, Table 406.03I, Note 4, is hereby modified by deleting the word "more" and replacing it with the word "less".

406.05 BITUMINOUS MIXING PLANT AND TESTING, subpart (a)(12), is hereby modified by deleting the fifth paragraph, which begins with "Private telephone service…" and ends with "…using an online speed test.", in its entirety and replacing it with the following:

> Dedicated private telephone and internet services shall be provided to the laboratory in accordance with Subsection 631.02(a)(4), except that approval by the Engineer is not required.

406.14 COMPACTION is hereby modified by adding "Leveling courses shall be compacted using a self-propelled pneumatic tired roller for intermediate rolling, unless otherwise permitted in writing by the Engineer." as the second sentence.

406.18 ASPHALT PRICE ADJUSTMENT, subpart (b)(3), is hereby modified by being deleted in its entirety and replaced with the following:

(3) QEA and ACEA for Emulsified Asphalt. The *QEA* is determined per the requirements of Subsection 404.11. The amount of Asphalt Price Adjustment will be based upon the asphalt content of the emulsified asphalt used, which is calculated by multiplying the *QEA* used by the asphalt content fraction for that emulsified asphalt type.

The Asphalt Content of Emulsified Asphalt (*ACEA*) factor will be determined in the following order:

a. The *ACEA* factor will be the minimum residual asphalt content required by the applicable emulsified asphalt specification.

b. If the minimum residual asphalt content is not specified, the *ACEA* factor will be determined from Table 406.18A.

TABLE 406.18A – ASPHALT CONTENT OF EMULSIFIED ASPHALTS

Emulsified Asphalt Type	*ACEA* Factor
CSS-1h	0.57
MS-1	0.55
RS-1	0.55
RS-1h	0.55
CRS-1h	0.55
CRS-1p	0.63
CSS-1h Fog	0.28

c. If the emulsion type used in the work is not listed in Table 406.18A, the *ACEA* factor will be determined by averaging Agency test results.

406.18 ASPHALT PRICE ADJUSTMENT, subpart (c), is hereby modified by deleting the phrase "(from Table 406.18A)".

406.19 METHOD OF MEASUREMENT is hereby modified by changing the name of subpart (c) from "Longitudinal Joint Pay Factor." to "Longitudinal Joint Pay Adjustment."

SECTION 407 – BONDED WEARING COURSE

407.03 COMPOSITION OF MIXTURE is hereby modified by deleting the portion of the Subsection beginning with "PG Binder percentage shall be based on a minimum film thickness of 10.0 microns..." and ending with Table 407.03B, and replacing the deleted text and table with the following:

The asphalt cement content shall be based on a minimum asphalt film thickness of 0.394 mils (10.0 microns). The minimum asphalt cement content shall be calculated according to the following formulas and the factors in Table 407.03B.

For English units: $W = 0.0052 \times A_s \times T \times G_b$

For metric units: $W = 0.001 \times A_s \times T \times G_b$

and, for consistent units: $P_{bmin} = \frac{W}{1+W} \times 100$

where:

W = Intermediate variable

A_s = Total aggregate surface area* (square feet per pound or square meters per kilogram of aggregate)

T = Minimum asphalt film thickness (mils or microns)

G_b = Specific gravity of asphalt cement

P_{bmin} = Minimum asphalt cement content (percent by mass)

* The total aggregate surface area is calculated by multiplying the percent passing each sieve (as a decimal, e.g. 30% = 0.30) in the JMF by the corresponding factor in Table 407.03B and summing the resultant values.

TABLE 407.03B – AGGREGATE SURFACE AREA FACTORS

Sieve Designation	Surface Area Factors					
	Type A		Type B		Type C	
	SF/lb	SM/kg	SF/lb	SM/kg	SF/lb	SM/kg
3/4 inch (19.0 mm)	--	--	--	--	2.0	0.41
1/2 inch (12.5 mm)	--	--	2.0	0.41	0	0
3/8 inch (9.50 mm)	2.0	0.41	0	0	0	0
No. 4 (4.75 mm)	2.0	0.41	2.0	0.41	2.0	0.41
No. 8 (2.36 mm)	4.0	0.82	4.0	0.82	4.0	0.82
No. 16 (1.18 mm)	8.00	1.64	8.00	1.64	8.00	1.64
No. 30 (0.600 mm)	14.0	2.87	14.0	2.87	14.0	2.87
No. 50 (0.300 mm)	30.0	6.14	30.0	6.14	30.0	6.14
No. 100 (0.150 mm)	60.00	12.29	60.00	12.29	60.00	12.29
No. 200 (0.075 mm)	160.0	32.77	160.0	32.77	160.0	32.77

407.04 QUALITY ACCEPTANCE is hereby modified by being deleted in its entirety and replaced with the following:

407.04 REQUIREMENTS FOR BONDED WEARING COURSE MIXTURES.

(a) Control of Mixture. The plant shall be operated so that no intentional deviations are made from the job-mix formula. The production of the actual mixture shall not vary from the job-mix formula by more than tolerances specified in Table 407.03A.

The Contractor shall provide quality control adequate to produce work of acceptable quality. The Contractor shall perform quality control sampling, testing, and inspection during all phases of the work at a rate sufficient to ensure that the work conforms to the Contract requirements.

(b) Control of Production. If any acceptance sample test conducted at the production facility is outside of the production tolerances or other design criteria as defined herein, immediate adjustments shall be made by the Contractor. Following the first failing acceptance sample test result, the mix will again be sampled and tested for compliance with these specifications. Production shall cease if a second consecutive failing acceptance sample test result occurs. In this event, additional adjustments shall be made and tested by the Contractor on a trial basis until the deficiency is corrected. With the permission of the Engineer, the plant may continue production, pending results of these tests, but if the Engineer deems that it is in the best interest of the project, the Engineer may at any time order plant production stopped.

(c) Acceptance. Bonded Wearing Course acceptance samples obtained from the production facility or project site will be tested to ensure the requirements specified in Table 407.03A are being met. Any acceptance sample test result that is outside of the production tolerances specified in Table 407.03A will be considered non-conforming. Polymer-modified emulsified asphalt will be tested at the rate of once per day of production and in accordance with the requirements specified in *AASHTO M 316* and Table 407.02A.

407.05 WEATHER AND SEASONAL LIMITATIONS is hereby modified by deleting the phrase "October 15th" from the third paragraph and replacing it with the phrase "September 15th".

407.08 CONSTRUCTION REQUIREMENTS, subpart (b), is hereby modified by deleting the sentence "A damp surface is acceptable if favorable weather conditions are expected during paving operations."

SECTION 418 – ASPHALTIC APPROACH MATERIAL

SECTION 418 – ASPHALTIC APPROACH MATERIAL is hereby made a new section of the specifications as follows:

SECTION 418 – ASPHALTIC APPROACH MATERIAL

418.01 DESCRIPTION. This work shall consist of furnishing and installing asphaltic approach material at the transition between bituminous concrete pavement and Portland cement concrete, steel or other materials.

418.02 MATERIALS. Materials shall meet the requirements of the following Subsections:

Asphalt Plug Joint Binder 707.17

418.03 INSTALLATION. Asphaltic approach material shall be installed at the locations(s) and to the depth and configuration shown in the Plans and as directed by the Engineer.

418.04 METHOD OF MEASUREMENT. The quantity of Asphaltic Approach Material to be measured for payment will be the number of square feet used in the complete and accepted work.

418.05 BASIS OF PAYMENT. The accepted quantity of Asphaltic Approach Material will be paid for at the Contract unit price per square foot. Payment will be full compensation for detailing, furnishing, handling, transporting, and placing the material specified, including surface preparation, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Tack, prime, or seal coats of bituminous material required for the installation of asphaltic approach material will not be paid for separately, but will be considered incidental to the Contract unit price for Asphaltic Approach Material.

Removal of any existing asphaltic, bituminous or Portland cement concrete materials to allow for the installation of asphaltic approach material will not be paid for separately, but will be considered incidental to the Contract unit price for Asphaltic Approach Material.

Payment will be made under:

Pay Item	Pay Unit
418.10 Asphaltic Approach Material	Square Foot

DIVISION 500

STRUCTURES

SECTION 501 – PERFORMANCE BASED STRUCTURAL CONCRETE

501.02 MATERIALS is hereby modified by inserting the following entry into the material subsection list in numerical order:

Portland-Limestone Cement 701.06

501.02 MATERIALS is hereby further modified by deleting the entry in the subsection list for "Epoxy Bonding Compound.....719.02" and replacing it with the following:

Epoxy Bonding Systems.....719.02

501.03 CLASSIFICATION AND PROPORTIONING is hereby modified by being deleted in its entirety and replaced with the following:

501.03 CLASSIFICATION AND PROPORTIONING. The following classes of concrete, shown in Table 501.03A, are included in these Specifications and shall be used as shown on the Plans.

TABLE 501.03A – PERFORMANCE-BASED CONCRETE CLASSES AND PROPERTIES

Class of Concrete [1]	28-Day Compressive Strength (psi) [2]	Target W/CM Ratio [3]	VSI	Slump/Spread Target and Range (in.)	Max. Slump (in.)	Air Content Limits [4]	Free Shrinkage [5]	Max. 56-Day Surface Resistivity [6]
PCD	4,000	TBD	--	TBD ± 1.5 [7]	9	5.5% – 8.5%	0.032%	Low
PCS	3,500	TBD	--	TBD ± 2.5 [7]	9	5.5% – 8.5%	0.042%	Low
SCC	4,000	TBD	≤ 1	TBD [8]	--	6.5% – 8.5%	--	Low

[1] PCD = Performance Concrete, Deck

PCS = Performance Concrete, Substructure

SCC = Self Consolidating Concrete

[2] The listed 28-day compressive strength is the minimum strength required to meet the design intent.

[3] The target W/CM ratio is to be determined by the contractor. During production the W/CM ratio shall be within + 0.05 of the target W/CM ratio. At no time may the W/CM ratio exceed 0.500, nor the total water content exceed 280 lbs/yd^3. For Class SCC, the maximum W/CM ratio shall be determined by the Contractor.

[4] See Subsection 501.03(b)(2).

[5] The Contractor shall determine the free shrinkage in accordance with Subsection 501.03(c)(3).

[6] The Contractor shall determine the surface resistivity in accordance with Subsection 501.03(c)(4).

[7] The Contractor shall determine a slump target that will allow enough workability to be placed and finished per Contract requirements. The slump shall be maintained within the specified range for the placement. The mix shall not exhibit segregation. If the mix does exhibit segregation or exceeds the maximum slump, the load shall be rejected and subsequent loads shall be tested by the Contractor until the mix meets the allowable limits.

[8] The Contractor shall determine the spread target and limits in accordance with Subsection 501.03(b)(1). The spread shall be maintained within the determined spread limits for the placement. The mix shall not exhibit segregation. If the mix does exhibit segregation or exceeds the upper spread limit, the load shall be rejected and subsequent loads shall be tested by the Contractor until the mix meets the allowable limits. The Engineer may perform a J-ring test at the time of placement if blocking is a concern.

If a nominal maximum aggregate size is not specified, the Contractor shall determine the nominal maximum aggregate size using guidance from *ACI 211.1* to do so. In no case will the maximum aggregate size exceed 1/5 of the narrowest dimension between sides of the forms, 1/3 the depth of slabs, nor 3/4 of the minimum clear spacing between individual reinforcing bars, bundles of bars, or pre-tensioning strands unless approved by the Engineer.

The Contractor may use industry methods to develop gradations not specified in Section 704 in order to create better optimized gradations to satisfy the required concrete performance characteristics. If the Contractor is using a combined gradation, they shall provide the method or methods of how they will monitor gradation, the limits of the gradation ranges, and the frequency of monitoring.

Lightweight fine aggregate may be used up to 30% by volume replacement for normal weight sand. The gradation of the lightweight fine aggregate shall conform to the requirements of *AASHTO M 195*. The lightweight fine aggregate shall be conditioned for enough time to fully saturate the material.

The stockpile shall be constructed so that it contains uniform moisture content throughout the pile. The stockpile will be allowed to drain 12 to 15 hours immediately prior to use, unless an alternate procedure is approved by the Structural Concrete Engineer. The Contractor shall state the method, duration and procedure used to confirm that the material is at or above its saturated surface dry (SSD) value, by weight, throughout the pile.

The mix may contain a shrinkage compensating admixture conforming to the requirements of *AASHTO M 194 M/M 194* or *ASTM C 494/C 494 M*.

The use of chlorides or admixtures containing chlorides is prohibited. All admixtures will be considered incidental to the work and included in the Contract Unit Price of the concrete.

The concrete shall have air content by volume as specified. The entrained air shall be obtained using an approved admixture.

The concrete materials may be proportioned using the absolute volumes method in accordance with the specified requirements. The volumetric proportioning method such as that outlined in *ACI 211.1*. or other approved volumetric proportioning methods, shall be employed in the mix design.

A minimum of 30 Calendar Days prior to placement of the trial pour (or prior to the pre-placement meeting, if the trial pour is waived by the Engineer), the Contractor shall submit for approval the mix design for the class of concrete specified. The mix designs shall be submitted to the Structural Concrete Engineer at the Agency's Materials Section Central Laboratory. No class of concrete shall be placed on a project, including the trial pour, until the mix design is approved.

(a) The mix design must contain the following information:

(1) Class of concrete.

(2) Type of mix, conventional or self-consolidating concrete (SCC).

(3) Specify if saturated surface dry or dry weights.

(4) Aggregates – Types, sources, specific gravities, and absorption values.

(5) Specified 28-day design compressive strength, psi.

(6) Cementitious content and the amount of each, pounds per cubic yard.

(7) Air content lower limit and upper limit, percent.

(8) Specified surface resistivity value.

(9) Slump range for conventional concrete, inches.

(10) Determined spread lower limit and upper limit for SCC.

(11) Water/cementitious materials (W/CM) ratio target value.

(12) Volumetric quantities of each material in the mix design.

(13) Design unit weight of the mix.

(14) Chemical Admixtures – Types, brand names, and dosages.

Concrete test mix or mixes shall be used to obtain the test results where applicable. All wet testing shall be done by personnel with current ACI Concrete Field Testing Technician Grade I certifications. All other tests shall be performed by an independent Laboratory that is accredited in the particular test method, or as allowed by the Engineer.

(b) The following preliminary mix qualification tests shall be performed:

(1) The contractor shall determine the lower and upper spread limit for SCC concrete. The J-Ring Test and the Spread Test will be conducted at both the lower and upper spread limits.

The J-Ring Test will be conducted per the requirements of *ASTM C 1621/C 1621 M*, and the Spread Test will be conducted per the requirements of *ASTM C 1611/C 1611 M.*

The J-Ring test results shall be compared to the Spread Test results at both the upper and lower limits. The difference between the two tests at both the upper and lower limit shall not be greater than 2 inches. At both the upper and lower limits, the Visual Stability Index (VSI) shall not be greater than 1.

(2) The contractor shall provide test results that establish the quality of the entrained air void structure and the freeze-thaw durability of the concrete. Sampling shall be performed in accordance with *AASHTO R 60* on a trial batch of concrete that is a minimum of 3 cubic yards, and which meets the following requirements:

a. For all concrete, the air content shall be no more than 1.5% above the lower limit established in Table 501.03A.

b. For conventional concrete, the slump shall not exceed 5 inches.

c. For SCC concrete, the spread shall not be more than 5 inches greater than the minimum spread determined as specified in Subsection 501.03(b)(1), nor shall the spread exceed the maximum spread determined as specified in Subsection 501.03(b)(1).

Conventional concrete shall be tested for slump (*AASHTO T 119 M/T 119*), air content (*AASHTO T 152*), concrete temperature (*ASTM C 1064/C 1064 M*), and characterization of the air-void system of freshly mixed concrete by the sequential pressure method (*AASHTO TP 118*). The Contractor shall make a minimum of 2 concrete cylinders per *AASHTO T 23*.

SCC concrete shall be tested for spread (*ASTM C 1611/C 1611 M*, Procedure B), air content (*AASHTO T 152*), concrete temperature (*ASTM C 1064/C 1064 M*), and characterization of the air-void system of freshly mixed concrete by the sequential pressure method (*AASHTO TP 118*). The Contractor shall make a minimum of 2 concrete cylinders per *AASHTO T 23.*

The cylinders shall be cured for a minimum of 5 Calendar Days prior to being tested according to the requirements of *ASTM C 457*. The wet test results shall be included with the *ASTM C 457* results.

The tests required in Subsection 501.03(b)(2) will be used by the Agency to evaluate the quality of the entrained air void structure of the concrete. These test results will be used for informational purposes only and will not be used to determine the acceptability of the mix design.

(c) The additional mix qualification test results specified below shall accompany the mix design. Testing should be done on the same test batch where applicable.

(1) The concrete used to determine the additional mix qualification properties shall meet the following requirements:

a. For all concrete, the air content shall be not be more than 1.5% above the lower limit.

b. For conventional concrete, the slump shall be between 5 inches and 9 inches, and the W/CM ratio shall be 0.05 above the target.

c. For SCC concrete, the spread shall be within 5 inches of the maximum spread limit, and the W/CM ratio shall be the maximum W/CM ratio, as determined by the contractor.

(2) The compressive strength of the concrete shall be measured based on the requirements of *AASHTO T 22* for 7, 14, and 28-Calendar Day standard cured cylinders.

(3) The free shrinkage rate of the concrete shall be tested per the requirements of *AASHTO T 160*. The test specimen shall be a prism of 4 inch square cross section. Procedure 11.1.2 of *AASHTO T 160* shall be followed for storage and measurements, and all specified test age results shall be submitted. Specimen testing may be terminated after 28 Calendar Days of drying. Testing shall be performed by an independent Laboratory accredited in the specific test method.

(4) The surface resistivity of the test mix shall be measured at 28 and 56 Calendar Days based on the requirements of *AASHTO T 358*. Results shall be categorized as Low, Very Low, or Negligible in accordance with *AASHTO T 358*, Table 1.

(d) The Alkali-Silica Reactivity (ASR) of each type of aggregate shall be measured separately based on the requirements of *AASHTO T 303*. If one or more of the aggregates exceeds 0.10% expansion, then the aggregate shall be tested again according to the requirements of *ASTM C 1567*.

The Contractor may elect to go directly to *ASTM C 1567* testing if they suspect that the aggregate may exceed the 0.10% expansion if tested by *AASHTO T 303*. Testing shall be performed by an independent Laboratory accredited in the specific test method.

(e) After the mix design furnished by the Contractor has been reviewed and approved by the Structural Concrete Engineer, no new materials shall be incorporated. In no case shall concrete from more than one mix design be permitted to be used during the same pour without prior written approval of the Engineer.

Mix design approvals will be valid for a 12-month period. The approved mix design will be allowed a two consecutive year re-approval if no material proportioning or material sources have changed from the previous year's approved mix design and the mix design is submitted with updated aggregate properties and volumes adjusted accordingly. The aggregate properties shall be tested within 60 Calendar Days of the mix design submission. The properties to be tested include, but are not limited to, specific gravity, unit weight, and absorption. The mix design shall be accompanied by the previously completed and accepted test mix data and any applicable updated test information.

501.04 BATCHING is hereby modified by deleting paragraphs one, two and three in their entirety and replacing them with the following:

501.04 BATCHING. Measuring and batching of materials shall be done at an approved batch plant. Batch plants shall have an inspection completed prior to the first concrete placement on an Agency project if it has been longer than 12 calendar months from the last inspection. Request for inspection and required documentation must be received by the Materials Testing and Certification Section a minimum of 21 Calendar Days prior to the date of the requested inspection.

All deficiencies shall be corrected and verified a minimum of 5 Calendar Days prior to the first concrete placement for any Agency project. The batch plant shall meet the requirements of *AASHTO M 157*, except as modified in these Specifications, and shall always be maintained in good repair. The batch plant shall be subject to periodic inspections by Authorized Representatives of the Agency. The batch plant shall have approved methods of storing, measuring, and dispensing approved mineral admixtures.

All concrete batch plants offered for Agency approval shall be equipped for semi-automatic batching and proportioning of all cementitious material, aggregates, water, and for the automatic insertion of admixtures. The plants shall be equipped to automatically and accurately record, report, and print batch weight tickets in English units the quantity of all aggregates, cementitious material, and the water incorporated into each batch and shall identify and record the addition of the required admixtures. All materials added to the concrete batch after initial batching shall be added to the printed batch weight ticket prior to delivery.

501.04 BATCHING, subpart (b), is hereby modified by deleting "Dedicated private telephone and internet services shall be provided to the laboratory. The internet connection shall have a minimum download capacity of 3 Mbps (megabits per second) without utilizing compression algorithms and the bandwidth speed shall be verified using an online speed test." from the third paragraph and replacing it with the following:

Dedicated private telephone and internet services shall be provided to the laboratory in accordance with Subsection 631.02(a)(4), except that approval by the Engineer is not required.

501.05 MIXING AND DELIVERY, subparts (a)(2) and (a)(3), are hereby modified by being deleted in their entirety and replaced with the following:

(2) Authorization by Field Inspection personnel must be obtained prior to the addition of water or admixtures at the project site. If water is added in excess of the specified maximum W/CM ratio, the concrete shall not be used.

(3) Each load of concrete delivered at the job site shall be accompanied by a State of Vermont Batch Slip signed by the authorized Agency representative, if present, at the plant. If an Agency representative is not present at the time of batching, a batch weight ticket meeting the requirements of Subsection 501.04 shall accompany the delivery vehicle.

SECTION 506 – STRUCTURAL STEEL

506.02 MATERIALS is hereby modified by deleting the entry in the subsection list for "Approved Structural Coating Systems.....708.03" and replacing it with the following:

Structural Steel Coating Systems.....708.03

506.02 MATERIALS is hereby modified by inserting the following entry into the subsection list in numerical order:

Grease Rustproofing Compound.....708.04

506.03 GENERAL FABRICATION REQUIREMENTS is hereby modified by deleting paragraphs three, four, five, six, seven, eight, and nine in their entirety and replacing them with the following:

Structural steel furnished under this section shall be fabricated in a plant having an AISC Certified Bridge Fabricator – Advanced (ABR), or Intermediate (IBR) Certification, and in a plant listed as a Category 1 Fabricator on the VTrans Pre-Qualified Fabricator list prior to Contract Execution. Structural steel components (such as bridge rail, bridge joints, bridge bearings, and overhead sign structures) which are fabricated under this section may be fabricated in a plant that does not have an ABR or IBR Certification, provided that the fabrication plant has either an AISC Certified Bridge Fabricator – Simple (SBR) Certification or an AISC Bridge Component QMS Certification, and is listed as a Category 2 Fabricator on the VTrans Pre-Qualified Fabricator list prior to Contract execution.

Minor steel components, including, but not limited to, downspouts, scuppers, and pedestrian hand railings may be fabricated in a plant that does not have an AISC Certification, provided that the fabrication plant is approved in writing by the Structural Steel Fabrication Engineer prior to Contract execution. All plants without certification shall have an organization, operation, and equipment capable of producing a product equal to a certified plant. These plants will be reviewed on a case-by-case basis.

Structural steel that is to be painted or metalized under this section shall be coated in a plant having an AISC Sophisticated Paint Endorsement – Enclosed or SSPC-QP 3 – Enclosed Shop certification and which is listed as a Category 3 Fabricator for the applicable coating on the VTrans Pre-Qualified Fabricator list prior to Contract execution. Structural steel that is to be galvanized or powder coated under this section shall also be listed as a Category 3 Fabricator for the applicable coating on the VTrans Pre-Qualified Fabricator list prior to Contract execution.

The VTrans Pre-Qualified Fabricator list can found on the Structures Website. It is the responsibility of the Fabricator to verify that they are on the Pre-Qualified Fabricator list prior to bidding on work. It shall be known that being listed on the Pre-Qualified Fabricator list does not waive any certification requirements that are required for performing the intended work. Any Fabricator who has been Pre-Qualified but does not perform any work for VTrans for a period of 5 years, will be automatically removed from the list without notice. It is the fabricator's responsibility to re-apply if desired to get back on the Pre-Qualified list.

When certified fabrication or coating plants are required, the plant shall maintain certified status throughout the duration of the work under the Contract.

VTrans reserves the right for the Structural Steel Fabrication Engineer to give written notification to any fabricator (regardless of certification level or status) restricting the types of items that they are approved to fabricate, up to and including restricting all structural steel fabrication for the Agency. Causes for such restrictions shall include concerns of quality, production, accountability, or any other cause that is deemed justifiable by the Agency.

The fabricator shall demonstrate full capability for fabricating materials meeting the requirements of the Contract. Failure to meet Contract requirements will result in rejection of the material being fabricated and the termination of the ability to fabricate material for the State.

Prior to performing any work under this section, the fabricator must have received approval for all fabrication drawings, welding procedures and any special Contract requirements and have notified the Agency's Structural Steel Fabrication Engineer in writing at least 10 working days in advance of fabrication. The Contractor shall bear full responsibility and costs for all materials ordered, raw materials stockpiled, or for work performed prior to approval of the fabrication drawings or written authorization from the Structures Engineer.

Excepted as noted in this subsection, all work shall be performed by the fabricator indicated on the approved fabrication drawings, unless otherwise authorized in writing by the Structural Steel Fabrication Engineer. For coatings, if the fabricator intends to use a Subcontractor, it shall be clearly outlined on the fabrication drawings to be submitted for review. At a minimum, the provided information shall include the Subcontractor's name and address; the name, phone number and e-mail address of the quality control (QC) contact; and an acknowledgement of the VTrans quality assurance (QA) inspection requirements which apply to the Subcontractor.

If the fabricator wishes to request the use of a Subcontractor for material processing (e.g. cutting, drilling, bending, rolling, punching, machining, etc.), they shall include this information on the shop drawings that are submitted for review or they shall submit a set of the previously approved shop drawings to the Agency for review, with the requested changes and required information clearly marked and indicated (e.g. by making all additional notes red). At a minimum, the submittal shall include the Subcontractor's name and address; the name, phone number and e-mail address of the quality control (QC) contact; an acknowledgement of the VTrans quality assurance (QA) inspection requirements which apply to the Subcontractor; and clear information on the extent and limits of work to be performed by the Subcontractor.

Requests will be evaluated on a case-by-case basis and may be rejected by the Agency for any reason. Use of a Subcontractor does not relieve the fabricator of any responsibilities or quality control requirements specified by the Contract.

All steel fabrication plants must satisfy the following minimum requirements:

506.03 GENERAL FABRICATION REQUIREMENTS, subpart (c), is hereby modified by deleting subpart (1) in its entirety and replacing it with the following:

(1) Inspectors. Quality control inspectors shall be onsite full time during any hot work (e.g. burning, heating, welding, etc.), as well during as any operations that may affect the quality of the coating system.

a. Fabrication Inspectors. The fabricator's representative responsible for fabrication inspection, testing and quality matters shall be qualified and certified in accordance with the provisions of *AWS QC 1*.

b. Coating Inspectors. The fabricator's coatings quality control manager shall possess a minimum classification as a NACE Coating Inspector Level 2 – Certified, SSPC Bridge Coatings Inspector (BCI) Level 2, or SSPC Protective Coatings Inspector (PCI) Level 2. The coatings quality control inspector shall possess a minimum classification as a NACE Coating Inspector Level 1 – Certified, SSPC Bridge Coatings Inspector (BCI) Level 1, or SSPC Protective Coatings Inspector (PCI) Level 1.

506.03 GENERAL FABRICATION REQUIREMENTS, subpart (d)(3), is hereby modified by deleting the last sentence, which begins with "The Engineer reserves the right..." and replacing it with "The Structural Steel Fabrication Engineer reserves the right to reject inadequate office facilities and require suitable alternatives."

506.03 GENERAL FABRICATION REQUIREMENTS, subpart (e), is hereby modified by adding the word "Execution" as the last word of the subsection.

506.04 DRAWINGS AND PROCEDURES, subpart (c), is hereby modified by being deleted in its entirety and replaced it with the following:

(c) Welding Procedures. Detailed welding procedures shall be prepared in accordance with the provisions of the applicable AWS/ANSI/AASHTO code revisions and submitted in accordance with the following:

(1) All procedures shall be prequalified. Procedure qualification test records shall be submitted along with each procedure. Heat input values during welding shall be shown for each procedure (except for SMAW procedures). All weld procedure sheets shall identify the project name, number, structure, and procedure qualification record and/or fillet weld soundness test.

(2) Procedure qualification test records and welding procedure specifications shall be presented in a format similar to example forms as shown in *AWS D1.5* and *AWS D1.1* as applicable.

(3) Details of welded joints shall conform to the standard joint details per *AWS D1.5* (or *AWS D1.1* as applicable) unless otherwise approved by the Structural Steel Fabrication Engineer.

506.04 DRAWINGS AND PROCEDURES is hereby modified by adding the following new subpart:

(e) Approval of Procedures. All weld procedures, heat corrective procedures, coatings procedures, and any other procedures that are required to be submitted for approval, and are being used in production, shall bear a VTrans approved or approved as noted stamp.

506.05 QUALITY ACCEPTANCE is hereby modified by adding the following as the second sentence of the first paragraph:

Acceptance of materials, test results or completed fabricated items by the QAI/VTrans Structural Steel Fabrication Engineer does not relieve the fabricator of any responsibility to meet Contract requirements and specifications.

506.05 QUALITY ACCEPTANCE, subpart (b), is hereby modified by deleting the sentence "The QAI will have the authority to reject any material or work that does not conform to the Contract requirements." in its entirety.

506.06 QUALITY CONTROL, subpart (b), is hereby modified by being deleted in its entirety and replaced with the following:

(b) Qualifications of Inspectors. Inspectors shall meet the requirements of Subsection 506.03(c).

506.08 BASE METAL REQUIREMENTS is hereby modified by deleting the fourth, fifth, and sixth paragraphs and replacing them with the following:

Main members are defined as compression members, tension members, and members subject to reversals of stress, including stringers, girders, cover plates, rigid frames, floor beams, gusset plates, and curved girder cross frames. Other members may be indicated in the Contract as main members.

Material for main members shall be ordered and prepared so that the direction of rolling is parallel to the stress in the member, in accordance with the requirements of *AASHTO LRFD Bridge Construction Specifications,* Article 11.4.3.1. Charpy V-Notch (CVN) testing shall be as required in Subsection 714.01.

Members identified as "fracture critical" shall be subject to additional base metal requirements as specified in Subsection 506.11.

506.10 WELDING, subpart (b), is hereby modified by deleting the phrase ", Section 5" from the first sentence of the first paragraph.

506.10 WELDING, subpart (c), is hereby modified by deleting the phrase ", Section 5" from the first sentence of the first paragraph and by deleting the phrase ", Section 6" from the second sentence of the first paragraph.

506.10 WELDING, subpart (d), is hereby modified by adding the word "VTrans" immediately before the phrase "prequalified welder list." in the first paragraph, and by adding the word "VTrans" immediately before the phrase "*Field Welding Manual*" in the second paragraph.

506.10 WELDING, subpart (d), is hereby further modified by deleting "as defined in Subsection 714.01" from the first sentence of the fourth paragraph and replacing it with "as defined in Subsection 506.08".

506.10 WELDING, subpart (d), is hereby further modified by adding "Welding to tension members or tension components of members will not be allowed." as the second sentence of the fourth paragraph.

506.10 WELDING, subpart (e)(1), is hereby modified by deleting the third and fourth paragraphs in their entirety. The deleted text begins with "Process and procedure qualification record tests..." and ends with "... similar to those provided in *AWS D1.5*."

506.12 ASSEMBLY, subpart (c), is hereby modified by deleting the word "Air" from the fourth sentence of the second paragraph and replacing it with the phrase "Dry air".

506.12 ASSEMBLY, subpart (d), is hereby modified by adding "," (a comma) immediately following the phrase "All sharp corners".

506.12 ASSEMBLY, subpart (d), is hereby further modified by adding the word "minimum" immediately before the phrase "1/16 inch radius".

506.14 SURFACE PREPARATION is hereby modified by being deleted in its entirety and replaced it with the following:

506.14 SURFACE PREPARATION. All materials shall be blast-cleaned to the specified grade as defined by the *SSPC Painting Manual* and supplemented by reference to *SSPC-VIS 1*. Further preparation shall conform to the following:

(a) Surfaces to Remain Uncoated. Surfaces shall be blast-cleaned at least equivalent to Preparation Grade *SSPC-SP 10.* This work may be performed either before or after fabrication. The final surface appearance after fabrication shall be clean and free from any contaminants or blemishes so as to allow the metal to weather uniformly.

(b) Surfaces to be Coated. Prior to application of any coating, all material to be coated shall be cleaned and prepared in accordance with the appropriate Contract Specifications.

506.16 MARKING, STORING, AND SHIPPING, subpart (c), is hereby modified by deleting the second paragraph in its entirety and replacing it with the following:

> The fabricator shall not ship any material, either to the project or to another manufacturer or subcontractor, without the Agency's approval. The Agency's Quality Assurance Inspector will place a seal of approval on all material (or on the bill of lading) that has been accepted for shipment and will accept the loading, positioning, and anchorage of all material being shipped. If the Quality Assurance Inspector is not available, the Structural Steel Fabrication Engineer shall be contacted for approval to ship.

506.18 ERECTION, subpart (a), is hereby modified by deleting the phrase "*AASHTO/NSBA S10.1*, Appendices E and F" and replacing it with the phrase "*AASHTO/NSBA S10.1*, Appendices B and C".

506.18 ERECTION, subpart (b), is hereby modified by deleting subparts (2) and (3) in their entirety and replacing them with the following:

(2) Drift pins shall be used to align and center the connections of main and secondary members. Only light drifting will be permitted. Any member subjected to drifting that results in distortion of the member or elongation of the holes will be rejected. Cylindrical erection pins, the same size as the hole, shall be used at least in the extreme corners of all main member connections.

Main members shall be match marked by the Fabricator and should fit together easily.

Main members shall not be reamed larger than the hole size indicated on the approved Fabrication Drawings without written authorization from the Project Manager. Secondary members may be subjected to limited field reaming with the written approval of the Engineer. Assembled parts that have been approved for field drilling or reaming shall be disassembled to remove any burrs, shavings, oils, or lubricants.

Pins used for hinged connections and bearings shall be inserted with care and aligned so the members take full and even bearing. Nuts shall be adequately tightened and locked in position either by upsetting the threads or tack welding the nut to the bolt.

(3) Errors in shop fabrication that prevent proper assembly shall be reported immediately to the Engineer. The Engineer shall approve any corrective action prior to it occurring.

506.19 BOLTING AND CONNECTIONS, subpart (a), is hereby modified by adding the phrase "Structural Steel Fabrication" immediately before the word "Engineer" in the last sentence of subpart (a).

506.19 BOLTING AND CONNECTIONS, subpart (b), is hereby modified by deleting the sentence which reads "Faying surfaces of bolted connections shall meet the Class B slip coefficient value of not less than 0.50 as specified by AASHTO." and replacing it with "Unless otherwise specified in the Contract Documents, faying surfaces of bolted connections shall have a Class B slip coefficient value of not less than 0.50 as specified by AASHTO."

506.19 BOLTING AND CONNECTIONS, subpart (c)(3), is hereby modified by being deleted in its entirety and replaced with the following:

(3) Oversized and irregular hole conditions caused from field drilling or reaming (reaming shall not be allowed unless approved in writing by the Engineer)

506.19 BOLTING AND CONNECTIONS, subpart (c), is hereby modified by adding the sentence "Unless otherwise indicated on the plans, *ASTM F 3125/F 3125 M* Grade A 325 hex head bolts shall be used." immediately following the sentence "Bolts shall be tightened to develop a tension not less than 5% more than the minimum bolt tension specified in Table 506.19A."

506.19 BOLTING AND CONNECTIONS is hereby modified by relabeling subpart (d), "Acceptance of Bolt Tensioning." as "(e) Acceptance of Bolt Tensioning."

506.19 BOLTING AND CONNECTIONS is hereby further modified by adding a new subpart "(d) Bolt Tensioning Methods." The new subpart (d) will be composed of text that is currently located in subpart (c). The new subpart (d) will begin with the phrase "Bolts shall be tensioned by the Contractor in the presence of the Engineer…" and will contain all text and tables up to and including Note 4 of Table 506.19B.

All references to "Column 3 of Table 506.19B" within the text identified above shall be replaced with the phrase "Column 4 of Table 506.19B".

506.19 BOLTING AND CONNECTIONS, subpart (d)(1), is hereby modified by adding the sentence "This method shall only be used when required by the Contract." immediately following the sentence "This method shall be employed when installing button-headed or dome-headed high-strength bolts."

506.19 BOLTING AND CONNECTIONS, subpart (d)(2), is hereby modified by adding "Additional hardened washers shall be provided if required by the DTI manufacturer for their specific product." as the second sentence of the second paragraph.

506.19 BOLTING AND CONNECTIONS, subpart (e), is hereby modified by deleting the phrase "or stick out not more than three threads" from the last sentence of the ninth paragraph.

506.22 FIELD CLEANING is hereby modified by being deleted in its entirety and replaced with the following:

506.22 FIELD CLEANING. When assembly of the fabricated structural components is complete, any rust, scale, dirt, grease, or other foreign material shall be removed from the metal components. The cost of such necessary cleaning will not be paid for directly but will be considered incidental to the Section 506 items in the Contract.

506.23 UNCOATED STEEL is hereby modified by being deleted in its entirety and replaced with the following:

506.23 STEEL SURFACES AND COATINGS. All welding and anticipated hot work shall be completed prior to applying any coatings on a given item unless approved in writing by the Structural Steel Fabrication Engineer.

(a) Uncoated Steel. Care must be taken to keep chemicals and oils from contacting the exposed surfaces of unpainted steel during storage, erection, and construction of the deck.

(1) Staining of Masonry. The Contractor shall protect all concrete and masonry from staining due to oxide formation on the steel.

(2) Cleaning of Steel. After all concrete has been placed, the outside surface of the fascia beams and bottom surface of their lower flanges shall be cleaned of all foreign material to a uniform appearance. The Engineer may require the exposed surfaces to be blast cleaned to Preparation Grade *SSPC-SP 10*. The use of acids for cleaning is prohibited.

(b) Galvanized Steel. All steel surfaces to be galvanized shall be coated in accordance with Subsection 726.08 and the following:

(1) Certifications as described in *ASTM A 123*, Section 10 for the completed products shall be furnished to the QA Inspector (or the Structural Steel Fabrication Engineer, if there is no QA Inspector assigned to the project) prior to shipment from the galvanizer's plant. Certifications shall include a report of all test results and measurements.

(2) Repairs to coating shall conform to Subsection 726.08 and shall be brush applied unless approved otherwise by the Engineer.

(c) Metalized Steel. All steel surfaces to be metalized per Contract Plans shall be metalized and seal coated in accordance with Subsection 726.09.

(d) Painted Steel. When the Contract Plans specify shop painted structural steel, the work shall be performed in accordance with the requirements of this Subsection.

(1) Materials. The fabricator shall provide a three coat paint system meeting the requirements of Subsection 708.03.

Shop applied systems may have isolated areas where the coatings were damaged during shipping or erection and will have areas around faying surfaces that may need field applied primer, intermediate, and top coatings. Thus, any coating system that is used in the shop shall be acceptable for the field conditions that are expected to be encountered.

(2) Submittals. The fabricator shall submit a complete package, in accordance with Subsection 105.03 for Construction Drawings, which includes the following information. The submittals shall be made sufficiently in advance of coating work to allow for review, resubmittals, and approval.

a. Surface Preparation/Painting Plan. The surface preparation/painting plan shall include the specified methods of surface preparation and type(s) of equipment to be utilized for removal of rust, mill scale, or foreign matter. The plan shall identify the solvents proposed for solvent cleaning, together with the solvent Safety Data Sheets (SDS). If any detergents, additives, or inhibitors are incorporated into the water used for any coating work operations, the plan shall include the names of the materials and their SDS.

The plan shall also include the methods of coating application, including any required stripe coats, and all equipment to be utilized.

The plan shall also identify all applicable QC/QA Hold Points. Specific inspection items throughout these specifications are designated as Hold Points. These Hold Points are for the QA Inspector to perform inspections. QA inspections will be performed only after a proper QC inspection by the fabricator. Permission to proceed beyond a Hold Point without a QA inspection will be granted solely at the discretion of the Structural Steel Fabrication Engineer, and only on a case-by-case basis. If re-work is necessary, as determined by a QA inspection, it shall be accomplished and a new Hold Point for the re-work shall be observed as defined above.

b. Abrasives. The fabricator shall submit the type of abrasives to be used for abrasive blast cleaning and their SDS. For expendable abrasives, the Contractor shall provide certification from the abrasive supplier that the abrasive meets the requirements of *SSPC-AB 1*. For steel grit abrasives, the certification shall indicate that the abrasive meets the requirements of *SSPC-AB 3*.

c. Coating System Information. The fabricator shall submit the latest version of the product manufacturer's application and thinning instructions, SDS, and product data sheets for each and every coating, thinner, sealer, and grease rustproofing compound. Specific attention shall be drawn to storage temperatures and the temperatures of the material, surface, and ambient air at the time of application. Recommended minimum ambient weather conditions during curing shall also be included A letter or written instructions from the coating manufacturer shall be provided indicating the length of time that each coat must be protected from cold or inclement weather (e.g. exposure to rain) during the drying/curing period.

When the Agency accepts the submittals, the fabricator will receive written notification. The fabricator shall not construe Agency acceptance of the submittals to imply approval of any particular method or sequence for conducting the work, or for addressing health and safety concerns. Acceptance of the submittals does not relieve the fabricator from the responsibility to conduct the work according to the requirements of Federal, State, or local regulations, this Specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The fabricator remains solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

(3) Quality Control (QC) Inspections. The fabricator shall perform first line, in progress QC inspections. The personnel performing any QC tests shall be trained in coatings inspection and the use of the testing instruments. Documentation of training shall be provided upon request. Painters shall perform wet film thickness measurements, with the Quality Control Inspector conducting random spot checks of the wet film. Reports for all quality control testing and observations shall be completed and provided to the QA Inspector on a daily basis.

a. Fabricator QC inspections shall include, but are not limited to, the following:

1. Ambient conditions.

2. Compressed air cleanliness.

3. Surface preparation and surface profile (solvent cleaning, abrasive blast cleaning, etc.).

4. Coating application (materials verification, mixing, thinning, induction/ sweat-in time, and wet/dry film thickness).

5. Recoat times and cleanliness between coats.

6. Coating continuity and coverage (freedom from runs, sags, overspray, dry spray, pinholes, shadow-through, skips, misses, etc.).

7. Records of fabricator QC inspections shall document any applicable product batch numbers.

b. The following equipment shall be provided by the fabricator as necessary to perform QC inspections:

1. Psychrometer or comparable equipment for the measurement of dew point and relative humidity, together with all necessary tables or psychrometric charts.

2. Surface temperature Digital Spot Thermometer.

3 *SSPC-VIS 1 - Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning* and *SSPC-VIS 3 - Visual Standard for Power and Hand-Tool Cleaned Steel*, as applicable.

4. Commercially available putty knife of a minimum thickness of 40 mils and a width between 1 and 3 inches.

5. Replica tape and spring micrometer.

6. Wet film thickness gauge.

7. Blotter paper for compressed air cleanliness checks.

8. Type 2 electronic dry film thickness gauge per *SSPC-PA 2 Measurement of Dry Coating Thickness with Magnetic Gauges.*

9. Calibration standards for dry film thickness gauge.

10. Light meter for measuring light intensity during surface preparation, painting, and inspection activities.

11. Printed copies of all applicable ASTM and SSPC Standards used for the work.

12. *SSPC Manual of Good Painting Practice, Volume 1*.

The instruments shall be calibrated within 12 months of the date of Project usage or according to the equipment manufacturer's recommendations and the fabricator's QC Program if they require a shorter duration.

(4) Quality Assurance (QA) Observations. The QA Inspector will conduct QA observations of any or all phases of the work. The presence or activity of QA Inspector observations in no way relieves the fabricator of the responsibility to provide all necessary daily QC inspections and to comply with all requirements of this specification.

The Structural Steel Fabrication Engineer has the right to reject any work that was performed without adequate provision for QA observations.

(5) Inspection Access and Lighting. The fabricator shall provide artificial lighting in areas where natural light is inadequate, to allow proper cleaning, inspection, and painting. Illumination for inspection shall be at least 30 foot-candles.

(6) Surface Preparation and Painting Equipment. All cleaning and painting equipment shall include gauges capable of accurately measuring fluid and air pressures and shall have valves capable of regulating the flow of air, water, or paint as recommended by the equipment manufacturer. The equipment shall be maintained in proper working order.

Hand tools, power tools, abrasive blast cleaning equipment, brushes, rollers, and spray equipment shall be of suitable size and capacity to perform the work required. All power tools shall be equipped with vacuums and High Efficiency Particulate Air (HEPA) filtration. Appropriate filters, traps, and dryers shall be provided for the compressed air used for abrasive blast cleaning and conventional spray application. Paint pots shall be equipped with air operated continuous agitation devices unless prohibited by the coating manufacturer. The air discharge from power tools and air motors shall be directed away from steel surfaces; if this is not possible a filtering device shall be appropriately placed.

(7) Ambient Conditions. Surfaces to be painted after cleaning shall remain free of moisture and other contaminants. The fabricator shall control operations to ensure that dust, dirt, or moisture does not come in contact with surfaces cleaned or painted that day. The following ambient conditions shall be met:

a. The surface and ambient temperatures shall be at least 5°F above the dew point during final surface preparation operations.

b. The surface and ambient temperatures shall be a minimum of 40°F, at least 5°F above dew point, and the maximum relative humidity shall be less than or equal to 85% during the application and cure/dry time of each coat of the paint system. If the manufacturer's published literature is more restrictive it shall be followed for specific temperature, dew point, and humidity conditions during the application cure/dry of each coat. The cure/dry time shall be measured as the time following application when the ambient conditions are within the ranges above.

The fabricator shall monitor and document temperature, dew point, and relative humidity at the beginning of each Work Day and every 4 hours during surface preparation and coating application, in the specific areas where the work is being performed. The frequency of monitoring shall increase if weather conditions are changing. If the weather conditions are forecast to be borderline relative to the limits established by the manufacturer, monitoring shall continue at a minimum of 4 hour intervals throughout the curing/drying period. The Structural Steel Fabrication Engineer has the right to reject any work that was performed under unfavorable weather conditions. Rejected work shall be removed, re-cleaned, and repainted at the fabricator's expense.

(8) Compressed Air Cleanliness. Prior to using compressed air for abrasive blast cleaning, blowing down the surfaces, and painting with conventional spray, the fabricator shall verify that the compressed air is free of moisture and oil contamination in accordance with the requirements of *ASTM D 4285*. The tests shall be conducted at least one time each shift for each compressor system in operation. If air contamination is evident, the fabricator shall change filters, clean traps, add moisture separators or filters, or make other adjustments as necessary to achieve clean, dry air. The fabricator shall also examine the work performed since the last acceptable test for evidence of defects or contamination caused by the compressed air. Affected work shall be repaired at the fabricator's expense.

(9) Surface Preparation and Profile (Hold Point).

a. Surface Preparation. All steel surfaces to be painted shall be prepared by dry abrasive blast cleaning to meet the requirements of *SSPC-SP 10*.

b. Abrasives. Abrasive blast cleaning shall be performed using either expendable abrasives (other than silica sand), or recyclable steel grit abrasives. Expendable abrasives shall be used one time and disposed of. The fabricator shall verify that recycled abrasives are free of oil contamination by conducting oil content tests in accordance with *SSPC-AB 2* on a daily basis.

c. Surface Profile. The abrasives used for blast cleaning shall have a gradation such that the abrasive will produce a uniform surface profile of 1.5 to 3.5 mils. If the profile requirements of the coating manufacturer are more restrictive, the fabricator shall advise the Structural Steel Fabrication Engineer and comply with the more restrictive requirements. For recycled abrasives, an appropriate operating mix shall be maintained in order to control the profile within these limits.

The surface profile produced by the fabricator's surface preparation procedures shall be determined by replica tape and spring micrometer at the beginning of the work, and each day that the surface preparation is performed. Areas having unacceptable measurements shall be further tested to determine the limits of the deficient area. The replica tape shall be attached to the daily report.

When unacceptable profiles are produced, work shall be suspended. The fabricator shall make the necessary adjustments to ensure that the correct surface profile is achieved on all surfaces. The fabricator shall not resume work until the new profile is verified by the QA observations and they confirm that the profile is acceptable.

d. Surface Condition Prior To Painting. Prepared surfaces shall meet the specified degrees of cleaning immediately prior to painting, and shall be painted before rusting appears on the surface. If rust appears or bare steel remains unpainted for more than 8 hours, the affected area shall be prepared again at the expense of the fabricator.

All surface preparation cleaning residue on steel surfaces shall be removed prior to painting.

The quality of surface preparation and cleaning of surface dust and debris must be accepted by the QA Inspector prior to painting. The Structural Steel Fabrication Engineer has the right to reject any work that was performed without adequate provision for QA observations to accept the degree of cleaning. Rejected coating work shall be removed and replaced at the fabricator's expense.

(10) General Paint Requirements. Paint storage, mixing, and application shall be accomplished according to these Specifications and as specified in the paint manufacturer's written instructions and product data sheets for the paint system used. In the event of a conflict between these specifications and the coating manufacturer's instructions and data sheets, the fabricator shall advise the Structural Steel Fabrication Engineer and comply with the most restrictive requirements.

a. Paint Storage and Mixing. All paint shall be stored according to the manufacturer's published instructions, including handling, minimum and maximum temperatures, and warming as required prior to mixing. All coatings shall be supplied in sealed containers bearing the manufacturer's name, product designation, batch number, and mixing/thinning instructions. Leaking containers shall not be used. The paint shall be stored in a secure fireproof location.

Mixing shall be performed according to the manufacturer's instructions. Thinning shall be performed using thinner provided by the manufacturer, and only to the extent allowed by the manufacturer's written instructions. In no case shall thinning be permitted that would cause the coating to exceed the local Volatile Organic Compound (VOC) emission restrictions. For multiple component paints, only complete kits shall be mixed and used. Partial mixing is not allowed.

The ingredients in the containers of paint shall be thoroughly mixed by mechanical power mixers according to the manufacturer's instructions, in the original containers before use or mixing with other containers of paint. The paint shall be mixed in a manner that will break up all lumps, completely disperse pigment, and result in a uniform composition. Paint shall be carefully examined after mixing for uniformity and to verify that no unmixed pigment remains on the bottom of the container.

Excessive skinning or partial hardening due to improper or prolonged storage will be cause for rejection of the paint, even though it may have been previously inspected and accepted. Manufacturer recommended induction/sweat-in times and temperature of mixed coatings shall be observed.

Multiple component coatings shall be discarded after the expiration of the pot life. Single component paint shall not remain in spray pots, paint buckets, etc. overnight and shall be stored in a covered container and remixed before use.

b. Paint Application. Unless prohibited by the coating manufacturer's written instructions, paint may be applied by spray methods, rollers, or brushes. If applied with conventional or airless spray methods, paint shall be applied in a uniform layer with overlapping at the edges of the spray pattern.

The painters shall monitor the wet film thickness of each coat during application. The wet film thickness shall be calculated based on the specified dry film thickness using the solids by volume of the material and the amount of thinner added.

When brushes or rollers are used to apply the coating, additional applications may be required to achieve the specified thickness per layer.

c. Re-coating and Film Continuity (Hold Point for Each Coat). Paint shall be considered dry for re-coating according to the re-coat time/temperature/humidity criteria provided in the manufacturer's instructions and when an additional coat can be applied without the development of film irregularities such as lifting, wrinkling, or loss of adhesion of the under coat.

d. Stripe Coats. Unless indicated otherwise in the Contract, the Contractor shall apply an additional stripe coat to edges, crevices, welds, and similar surface irregularities for the prime coat and intermediate coat. The stripe coat shall be applied by brush or roller, as per manufacturer's recommendations, such that the coating is thoroughly worked into or on the irregular surfaces, and shall extend onto the surrounding steel a minimum of 1 inch in all directions. The purpose of the stripe coat is to build additional thickness and to assure complete coverage of these areas.

The stripe coat shall not be applied as part of the application of the full coat. The stripe coat shall be applied and dried separately according to the manufacturer's recommended drying times. Also, the color of the stripe coat shall contrast with the colors used for the full coats immediately preceding and succeeding the stripe coat.

e. Coating Sequence. For locations painted under this specification, coatings shall be applied as follows:

1. Prime Coat. The full prime coat shall be applied first to protect the steel. Once the full prime coat has dried, the prime stripe coat shall be applied.

2. Intermediate Coat. After the prime stripe coat has dried, an intermediate stripe coat shall be applied and allowed to dry, followed by the full intermediate coat.

3. Top Coat. After the full intermediate coat has dried, the full top coat shall be applied.

f. Coating of Faying Surfaces. All faying surfaces (including surfaces in contact with the hardware) in bolted connections shall receive the prime coat only prior to final assembly unless specified otherwise in the Plans. The remaining coats of paint in the connection areas shall be applied after the final assembly and tension has been completed and accepted.

(11) Coating Thickness. The dry film thicknesses of the full coats shall be as follows, as measured in accordance with *SSPC-PA 2*. If the manufacturer's upper or lower thickness limit is more restrictive, it shall be followed instead.

1. The prime coat of organic zinc-rich primer shall be between 3.5 and 5.0 mils dry film thickness.

2. The intermediate coat of epoxy or urethane shall be between 3.0 and 6.0 mils dry film thickness.

3. The finish coat of aliphatic urethane shall be between 2.5 and 4.0 mils dry film thickness. Finish coat color shall be according to Contract Documents.

(12) Amine Blush. Amine blush is a residue that can form on newly applied epoxy coating films under certain conditions. Amine blush often appears as a yellowish milky and/or a blotchy residue on the coating surface and is a deterrent to the adhesion of subsequently applied coating layers. If amine blush is detected, the Contractor shall provide the Engineer with written procedures from the coating manufacturer for complete removal prior to the application of additional coating layers.

Painting shall be done in a neat and workmanlike manner. Each coat of paint shall be applied as a continuous film of uniform thickness free of defects including, but not limited to, runs, sags, overspray, dry spray, pinholes, voids, skips, misses, and shadow-through. Defects such as runs and sags shall be brushed out immediately during application.

(13) Repair of Damage to New Coating System. The Contractor shall repair all damage to the newly installed coating system, at no cost to the Agency. If the damage extends to the substrate, the damaged areas shall be prepared to meet *SSPC-SP 3*.

The surrounding coating at each repair location shall be feathered for a minimum distance of 1-1/2 inches to achieve a smooth transition between the prepared areas and the existing coating.

If the bare steel is exposed, all coats shall be applied to the prepared area. If only the intermediate and finish coats are damaged, the intermediate and finish coats shall be applied. If only the finish coat is damaged, the finish coat shall be applied.

All Hold Points and specifications are applicable to the repair of damaged areas and areas concealed by containment.

(e) Field Connections.

(1) Waiver of Certifications. For applications of shop painting and field assembly, the Contractor may request that the Engineer waive the requirements for NACE certification and SSPC-QP 1 certification for the necessary field painting of the bolted connection areas. Requests will be reviewed on a case-by-case basis and will only be considered on projects with limited amounts of required field painting such as diaphragm and cross frame connections. If the Engineer grants the request, all other requirements for certifications, inspections, quality control, supplying inspection equipment, hold points, etc. will remain in effect.

(2) Surface Cleaning for Hardware. The requirements of this part shall apply when the Contract requires installation of bolts that are to be painted. This work shall occur after bolt tensioning has been completed. All exposed oils, lubricants, and wax on the bolts, nuts, washers, and surrounding surfaces to be painted shall be completely removed by solvent cleaning. This also includes any foreign material that has come out of the DTIs during the tensioning process. Light hand wire brushing or scrubbing with bristle brushes is allowed. Use of power tools is not allowed.

For galvanized hardware, the Contractor shall remove the colored lubricant from the nuts. The galvanizer may be able to provide information to the Contractor on the most effective solvent cleaner to remove the colored lubricant (common examples include methyl-ethyl-ketone (MEK), foaming glass cleaners containing ammonia, and foaming alkaline-type household cleaners). It is not necessary to remove 100% of the dye, and it is acceptable for some staining to remain after cleaning. A white cloth wipe test with no color transfer can be used to confirm that all lubricant and non-absorbed dye has been removed, leaving only the residual stain on the surface. The final cleanliness shall be acceptable to the Engineer.

(f) Grease Coating. When the Contract Plans specify that any steel surfaces are to be grease coated, all work shall be performed in accordance with Subsection 708.04.

Grease rustproofing compound shall be uniformly applied in a single coat by brush or spray at an approximate rate of 20 ft^2/gal to the steel as specified. This shall occur after all concrete form work has been removed, and after the final coat of paint, including repairs, has fully cured. A fully cured condition has occurred when a thumbnail driven into the coating surface does not leave an impression and when a thumb firmly pushed against the surface and twisted does not disturb the coating.

Surfaces adjacent to areas being grease coated shall be protected against over-spray. Non-metallic and stainless steel surfaces shall not be coated.

506.24 METHOD OF MEASUREMENT, subpart (a), is hereby modified by deleting subparts (4), (5), (6), (7), and (8) and replacing them with the following:

(4) All welding shall be considered as incidental work to the fabrication, and no measurement will be made for the weight of weld metal used.

(5) The weight of permanent shop and field bolts, nuts, direct tension indicators, and washers incorporated into the structure and temporary erection bolts, nuts, and washers shall be incidental to the Structural Steel item and no measurement will be made for weight of the bolts, nuts, direct tension indicators, and washers.

506.25 BASIS OF PAYMENT is hereby modified by being deleted in its entirety and replaced with the following:

506.25 BASIS OF PAYMENT. The accepted quantity of Structural Steel will be paid for at the Contract Unit Price per pound for the items specified in the Contract. Payment will be full compensation for furnishing, detailing, handling, transporting, and placing the materials specified, including nondestructive testing of welds; for preparing the surface of new steel to be painted, galvanized, metalized, or to remain unpainted; for necessary field cleaning; and for painting, metalizing, sealing, galvanizing, or grease coating of surfaces, unless otherwise paid for. Payment will also be full compensation for furnishing and implementing the erection plan, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment for Structural Steel on a lump sum basis will be full compensation for performing all work specified and for furnishing all labor, materials, tools, equipment, erection plans, and incidentals necessary to complete the work.

The Engineer may authorize progress payments in the following manner:

(a) A maximum of 15% of the estimated quantity may be paid when the Fabrication Drawings are approved for fabrication.

(b) A maximum of 75% of the estimated quantity may be paid when the steel has been entirely completed and accepted per the approved Fabrication Drawings, stored in a location and manor accepted by the Structural Steel Fabrication Engineer, and all applicable material certifications have been approved.

(c) A maximum of 90% of the estimated quantity may be paid when the steel has been erected, falsework removed, and painting of connections, and “touch-up” completed where required.

(d) After completion and acceptance of all work under this Section, including extended weights being received and checked, 100% of the quantity will be paid.

All nondestructive testing and required quality control activities will be considered incidental to fabrication, and no separate payment will be made.

Payment will be made under:

Pay Item	Pay Unit
506.50 Structural Steel, Rolled Beam	Pound
506.55 Structural Steel, Plate Girder	Pound
506.56 Structural Steel, Curved Plate Girder	Pound
506.57 Structural Steel, Truss	Pound
506.60 Structural Steel	Pound
506.75 Structural Steel	Lump Sum

SECTION 510 – PRESTRESSED CONCRETE

510.02 MATERIALS is hereby modified by inserting the following entry into the material subsection list in numerical order:

Portland-Limestone Cement 701.06

510.02 MATERIALS is hereby further modified by deleting the entry in the subsection list for "Overhead and Vertical Concrete Repair Material.....780.02" and replacing it with the following:

Concrete Repair Material, Type I .....780.01(a)

510.06 INSPECTION is hereby modified by deleting the second paragraph, which begins with "The inspector shall be provided…" and ends with "…the production area as practicable.", in its entirety and replacing it with the following:

The Inspector shall be provided with a minimum office space of 100 square feet with the least dimension of 6 feet. A desk surface with minimum of two drawers, as well as dedicated private telephone and internet services, shall be provided to the laboratory. The phone and internet service shall be provided in accordance with Subsection 631.02(a)(4), except that approval by the Engineer is not required. Any variances shall be approved by the Structural Concrete Engineer. This office space shall be located on the premises as close to the production area as practicable.

510.12 GROUT, subpart (b), is hereby modified by deleting the phrase "requirements of Subsection 707.03(c)(1) and Subsection 707.03(c)(3)." from the fifth paragraph and replacing it with the phrase "requirements of Subsection 707.03(a)(1) and Subsection 707.03(a)(3)."

SECTION 516 – EXPANSION DEVICES

516.02 MATERIALS is hereby modified by deleting the entry for "Asphalt Plug Bridge Joint.....707.15" from the subsection list and replacing it with the following:

Asphaltic Plug Joints for Bridges 707.15

516.02 MATERIALS is hereby further modified by deleting the entry in the subsection list for "Epoxy Bonding Compound.....719.02" and replacing it with the following:

Epoxy Bonding Systems.....719.02

516.02 MATERIALS is hereby modified by deleting the entry for "Metalizing .....726.09" from the material list.

516.04 FABRICATION is hereby modified by deleting the phrase "or metalized" from the third paragraph.

516.05 INSTALLATION is hereby modified by deleting the last two sentences of the third paragraph, which begin with "Prior to the placement..." and end with "... with the manufacturer's recommendations." and replacing them with the following:

Prior to the placement of the concrete, all steel surfaces that will be embedded in concrete shall be coated with an epoxy bonding system. Application of the epoxy bonding system shall be done in accordance with the manufacturer's recommendations.

516.08 BASIS OF PAYMENT is hereby modified by deleting the phrase "epoxy bonding compound" from the second sentence of the first paragraph and replacing it with "epoxy bonding system."

SECTION 519 – SHEET MEMBRANE WATERPROOFING

519.02 MATERIALS is hereby modified by being deleted in its entirety and replaced with the following:

519.02 MATERIALS. Materials shall meet the requirements of the following Subsections:

Waterproofing Membrane System, Type I .....726.11(a)
Waterproofing Membrane System, Type II.....726.11(b)

Spray applied membranes shall be a Waterproofing Membrane System, Type I, and torch applied membranes shall be a Waterproofing Membrane System, Type II.

SECTION 524 – JOINT SEALER

524.02 MATERIALS is hereby modified by deleting the entry for "Asphalt Plug Bridge Joint.....707.15" from the material list and replacing it with the following:

Asphaltic Plug Joints for Bridges 707.15

SECTION 525 – BRIDGE RAILINGS

525.04 FABRICATION, subpart (a), is hereby modified by deleting the second sentence, which reads "Railing shall be fabricated in a plant approved by the Structures Engineer." in its entirety.

SECTION 529 – REMOVAL OF STRUCTURES AND BRIDGE PAVEMENT

529.03 REMOVAL OF BRIDGE PAVEMENTS is hereby modified by being deleted in its entirety and replaced with the following:

529.03 REMOVAL OF BRIDGE PAVEMENTS. The removal of pavement on bridges shall include the removal of bituminous concrete material, and, when a new waterproofing membrane is included in the Contract or as directed by the Engineer, the removal of sealants or membranes. When not otherwise specified, sealants or membranes shall remain in place.

If removal is by milling, work shall be done in accordance with the requirements of Section 210. Removal methods shall be subject to the approval of the Engineer and shall be such as to prevent any damage to the remaining surface.

Any necessary deck repair will be paid for as shown on the Plans, except damage caused by Contractor's negligence shall be repaired at the Contractor's expense.

529.05 METHOD OF MEASUREMENT is hereby modified by adding ", sealants, and membranes" immediately after the phrase "bituminous pavements" in the first sentence of the first paragraph.

SECTION 531 – BRIDGE BEARING DEVICES

531.04 FABRICATION, subpart (a), is hereby modified by deleting the first paragraph, which begins with "Material furnished under this Section..." and ends with "... must satisfy the requirements of Subsection 506.03." in its entirety and replacing it with the following:

> General. Material furnished under this section shall conform to all applicable provisions of Section 506.

531.04 FABRICATION, subpart (a), is hereby further modified by deleting the third paragraph, which reads "All corners and edges of steel plates shall be ground to a 1/16 inch radius." in its entirety.

SECTION 540 – PRECAST CONCRETE

540.02 MATERIALS is hereby modified by inserting the following entry into the material subsection list in numerical order:

Portland-Limestone Cement 701.06

540.02 MATERIALS is hereby further modified by deleting the entry for "Sheet Membrane Waterproofing, Preformed Sheet.....726.11" from the subsection list and replacing it with the following:

Waterproofing Membrane System, Type III.....726.11(c)

540.02 MATERIALS is hereby further modified by deleting the entry in the subsection list for "Overhead and Vertical Concrete Repair Material.....780.02" and replacing it with the following:

Concrete Repair Material, Type I .....780.01(a)

540.02 MATERIALS is hereby modified by inserting the following entry into the material subsection list in numerical order:

Concrete Repair Material, Type II .....780.01(b)

540.06 INSPECTION is hereby modified by deleting the second paragraph, which begins with "The inspector shall be provided…" and ends with "…the production area as practicable.", in its entirety and replacing it with the following:

The Inspector shall be provided with a minimum office space of 100 square feet with the least dimension of 6 feet. A desk surface with minimum of two drawers, as well as dedicated private telephone and internet services, shall be provided to the laboratory. The phone and internet service shall be provided in accordance with Subsection 631.02(a)(4), except that approval by the Engineer is not required. Any variances shall be approved by the Structural Concrete Engineer. This office space shall be located on the premises as close to the production area as practicable.

540.10 INSTALLATION, subpart (c), is hereby modified by deleting the phrase "requirements of Subsection 726.11." from the fifth paragraph and replacing it with the phrase "requirements of Subsection 726.11(c)."

540.11 GROUT, subpart (b), is hereby modified by deleting the phrase "requirements of Subsection 707.03(c)(1) and Subsection 707.03(c)(3)." from the fifth paragraph and replacing it with the phrase "requirements of Subsection 707.03(a)(1) and Subsection 707.03(a)(3)."

540.12 POST-TENSIONING is hereby modified by deleting the phrase "requirements of Subsection 510.12(b)." from the second paragraph and replacing it with the phrase "requirements of Subsection 540.11(b)."

540.14 BASIS OF PAYMENT, subpart (b), is hereby modified by deleting the word "prestressed" and replacing it with the word "precast".

SECTION 541 – STRUCTURAL CONCRETE

541.02 MATERIALS is hereby modified by inserting the following entry into the material subsection list in numerical order:

Portland-Limestone Cement 701.06

541.04 BATCHING, subpart (b), is hereby modified by deleting "Dedicated private telephone and internet services shall be provided to the laboratory. The internet connection shall have a minimum download capacity of 3 Mbps without utilizing compression algorithms and the bandwidth speed shall be verified using an online speed test." from the third paragraph and replacing it with the following:

> Dedicated private telephone and internet services shall be provided to the laboratory in accordance with Subsection 631.02(a)(4), except that approval by the Engineer is not required.

541.07 WEATHER AND TEMPERATURE LIMITATIONS – PROTECTION OF CONCRETE, subpart (b)(7), is hereby modified by deleting the fourth paragraph, which begins with "A thermometer shall be employed..." and ends with "... concrete and enclosure temperatures at varying locations." in its entirety and replacing it with the following:

> A thermometer shall be employed that can display the current ambient temperature with a maximum gradation of 1°F. The Inspector will use the thermometer to take periodic temperature measurements of the enclosure at varying locations.
>
> The Contractor shall provide a hand-held infrared thermometer capable of taking no-contact measurements that is accurate within plus or minus 2% of the reading. The thermometer's accuracy shall be certified once every 12 months, with the certificate provided with each thermometer.

SECTION 543 – CONTRACTOR-FABRICATED PRECAST CONCRETE STRUCTURE

543.04 SUBMITTALS is hereby modified by deleting the first paragraph, which begins with "As soon as practical after award..." and ends with "...submitted as separate submittals", in its entirety and replacing it with the following:

As soon as practical after award of the Contract, all required information shall be prepared and submitted. Fabrication Drawings and erection plans shall be submitted as separate submittals.

SECTION 544 – PREFABRICATED BRIDGE UNIT SUPERSTRUCTURE

544.02 MATERIALS is hereby modified by being deleted in its entirety and replaced with the following:

544.02 MATERIALS. Materials shall meet the material requirements specified in Subsection 501.02, Subsection 506.02, Subsection 507.02, Subsection 508.02, and the following subsections:

Concrete Repair Material, Type I .....780.01(a)
Concrete Repair Material, Type II .....780.01(b)
Concrete Repair Material, Type III.....780.01(c)

SECTION 580 – STRUCTURAL CONCRETE REPAIR

580.02 MATERIALS is hereby modified by being deleted in its entirety and replaced with the following:

580.02 MATERIALS. Materials shall meet the requirements of the following subsections:

Concrete Repair Material, Type I .....780.01(a)
Concrete Repair Material, Type II .....780.01(b)
Concrete Repair Material, Type III.....780.01(c)
Concrete Repair Material, Type IV .....780.01(d)

Coarse Aggregate for Concrete shall meet the requirements of Table 704.02A.

High Performance Concrete shall meet the applicable requirements of Subsection 501.02 through Subsection 501.19 and Concrete (Class AA, Class A, and Class B) shall meet the applicable requirements of Subsection 541.02 through Subsection 541.19. Where further references in this specification are made to concrete, they shall mean that class or corresponding class of concrete described in the governing concrete specifications.

580.06 PLACING CONCRETE, subpart (a), is hereby modified by deleting the phrase "When Epoxy Bonding Compound" from the first sentence of the first paragraph and replacing it with "When an epoxy bonding system".

580.06 PLACING CONCRETE, subpart (b), is hereby modified by adding the following as a new second paragraph:

Rapid Setting Concrete Repair Material shall be in accordance with Subsection 780.01(a). Overhead and Vertical Concrete Repair Material shall be in accordance with Subsection 780.01(b). Rapid Setting Concrete Repair Material with Coarse Aggregate shall be in accordance with Subsection 780.01(c). Polymer Concrete Repair Material shall be in accordance with Subsection 780.01(d).

DIVISION 600

INCIDENTAL CONSTRUCTION

SECTION 605 – UNDERDRAINS

605.02 MATERIALS is hereby modified by adding the following entry into the subsection list in numerical order:

Geotextile for Underdrain Trench Lining.....720.05

605.02 MATERIALS is hereby further modified by deleting the sentence "Geotextile shall meet the requirements of Table 720.01A for Geotextile for Underdrain Trench Lining."

605.02 MATERIALS is hereby further modified by deleting subparts (a), (b), (c), and (d) in their entirety and replacing them with the following:

(a) Corrugated steel

(b) Corrugated aluminum alloy

(c) Corrugated polyethylene

(d) PVC plastic

SECTION 617 – MAILBOXES

SECTION 617 – MAILBOXES is hereby modified by being deleted in its entirety and replaced with the following:

SECTION 617 – MAILBOXES

617.01 DESCRIPTION. This work shall consist of the removal and relocation of existing mailbox installations to permanent locations, or the removal of existing mailbox installations and replacement with new installations in permanent locations. The work shall include the replacement of any non-conforming mailboxes, supports, or attachment hardware.

617.02 MATERIALS. Materials shall meet the requirements of the following subsections:

Timber Preservative, Type IV.....726.01
Wood Posts .....750.01(c)

Brackets and platforms shall be made of galvanized steel sheets. Holes shall be neatly punched or drilled.

Fasteners shall be galvanized in accordance with Subsection 726.08 and meet the requirements of *ASTM A 307*.

New mailboxes must meet the approval of the U.S. Postal Service.

617.03 GENERAL. Mailbox installations designated to be removed and reset shall be carefully removed and reinstalled as shown on the Plans. Any minor components (such as hardware, brackets, or lettering) of the existing installation that are missing, damaged, or become damaged during construction shall be replaced with new materials. Materials not reused shall remain the property of the owner.

Mailbox installations designated to be replaced shall be carefully removed. The removed materials shall remain the property of the owner. New mailbox installations shall be constructed and installed as shown on the Plans.

It is the Contractor's responsibility to ensure that each completed relocation has the approval of the mail carrier.

617.04 RELOCATION. Posts may be set in holes or they may be driven if the posts or any attached anti-twist devices are not damaged. The installed posts shall be plumb and placed to the depth shown on the Plans. The space around the posts set in holes shall be backfilled with suitable granular material in 6 inch layers. The backfill material shall be thoroughly tamped.

Mailboxes shall be attached to the posts using either the existing mountings and hardware, or the mountings and hardware shown on the Plans. All fasteners shall be drawn sufficiently tight to ensure that the mailboxes do not pivot or otherwise move.

Existing nameplates shall be attached to any new mailboxes. Names and rural box numbers lettered on existing mailboxes shall be copied onto new mailboxes using good commercial-quality stick-on letters acceptable to the Engineer.

617.05 METHOD OF MEASUREMENT. The quantity of Remove and Reset Mailbox to be measured for payment will be the number of each type (Single or Multiple Support) relocated in the complete and accepted work, as determined by the Engineer.

The quantity of Remove and Replace Mailbox to be measured for payment will be the number of each type (Single or Multiple Support) replaced in the complete and accepted work, as determined by the Engineer.

617.06 BASIS OF PAYMENT. The accepted quantity of Remove and Reset Mailbox of the type specified will be paid for at the Contract unit price for each. Payment will be full compensation for removing the existing mailbox installation, reinstalling the mailbox installation in its permanent location, replacing minor broken or missing components (such as hardware, brackets, or lettering, but excluding posts and the mailbox itself), excavating as necessary, backfill, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

If any major components (such as posts or the mailbox itself) of mailbox installations designated to be reset are missing, damaged, or become damaged during construction, the entire installation will be paid for as Remove and Replace Mailbox.

The accepted quantity of Remove and Replace Mailbox of the type specified will be paid for at the Contract unit price for each. Payment will be full compensation for removing the existing mailbox installation, furnishing all new materials, including mailboxes, supports, brackets, hardware, and lettering, installing the mailbox installation in its permanent location, excavating as necessary, backfill, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Any temporary relocation of mailboxes due to project construction will not be paid under this section. The costs of this temporary work will be considered incidental to other Contract items.

Pay Item	Pay Unit
617.10 Remove and Reset Mailbox, Single Support	Each
617.12 Remove and Reset Mailbox, Multiple Support	Each
617.15 Remove and Replace Mailbox, Single Support	Each
617.17 Remove and Replace Mailbox, Multiple Support	Each

SECTION 621 – TRAFFIC BARRIERS

621.02 MATERIALS is hereby modified by deleting the entry for "Emulsified Asphalt .....702.04" from the subsection list.

621.07 TEMPORARY TRAFFIC BARRIER is hereby modified by deleting the third, fourth, and fifth sentences of the first paragraph. The deleted text begins with "The type of temporary traffic barrier shall be..." and ends with "...determined as described in the *MASH* publication."

621.07 TEMPORARY TRAFFIC BARRIER is hereby further modified by adding the following as a new second paragraph.

Temporary Traffic Barrier, and corresponding connections, manufactured prior to January 1, 2020 shall meet Test Level 3 criteria in accordance with *NCHRP Report 350* or *MASH*. Temporary Traffic Barrier, and corresponding connections, manufactured on or after January 1, 2020 shall meet Test Level 3 criteria in accordance with *MASH*. The Contractor shall provide the name of the Temporary Traffic Barrier and current FHWA eligibility letter for the Temporary Traffic Barrier to the Engineer prior to installation. If Temporary Traffic Barrier meeting *NCHRP Report 350* is used, the Contractor shall submit an affidavit certifying that it was manufactured prior to January 1, 2020.

SECTION 625 – SLEEVES FOR UTILITIES

625.02 MATERIALS is hereby modified by deleting the entry for "Asphalt Plug Bridge Joint.....707.15" from the subsection list and replacing it with the following:

Asphaltic Plug Joints for Bridges 707.15

625.02 MATERIALS is hereby further modified by deleting the entry for "Well Casing.....741.01" from the subsection list.

SECTION 630 – UNIFORMED TRAFFIC OFFICERS AND FLAGGERS

630.01 DESCRIPTION is hereby modified by deleting the last sentence, which begins with "Flaggers and UTOs shall conform to..." and replacing it with "Flaggers and UTOs shall conform to the requirements of the Contract Documents and the current edition of the *MUTCD* and its latest revisions."

630.02 GENERAL, subpart (b), is hereby modified by being deleted in its entirety and replaced with the following:

(b) Safety Apparel. Traffic control personnel shall wear safety apparel in accordance with the most current edition of the *MUTCD* and its latest revisions. Traffic control personnel deemed to have unsuitable safety apparel by the Engineer shall be considered ineffective and shall be removed.

When operating during nighttime hours, between sunset and sunrise, traffic control personnel shall wear safety apparel meeting or exceeding performance Class 3 requirements of *ANSI/ISEA 107*, including Class E pants or gaiters.

630.04 FLAGGERS is hereby modified by deleting subpart (a) in its entirety and replacing it with the following:

(a) Requirements. The Contractor shall verify that Flaggers meet the following requirements. Flaggers shall have successfully completed a 4-hour training course taught by a certified instructor within the last 24 months and shall carry proof of training at all times when on the Project. Certified instructors shall have successfully completed one of the following courses:

(1) Associated General Contractors of VT Traffic Control Technician/Flagger Trainer Course

(2) American Traffic Safety Services Association Flagger Instructor Training Course

(3) National Safety Council Flagger Instructor Course

SECTION 631 – FIELD OFFICE

631.02 FIELD OFFICES, subpart (a)(4), is hereby modified by deleting the first paragraph, which begins with "Field Offices shall have…" and ends with "…the Field Office for both services.", in its entirety and replacing it with the following:

> Field Offices shall have independent telephone and internet services such that both can be used simultaneously without impacting functionality. The Contractor shall provide the Engineer with a list of all internet services available at the proposed Field Office location and the Engineer will select the service to be provided. In all cases, internet service shall have a minimum download speed of 4 Mbps and a minimum upload speed of 1 Mbps. The specified internet speeds shall be achieved without using compression algorithms. Jacks for connection to internet and telephone services shall be located at each end of the Field Office for both services.

631.06 TESTING EQUIPMENT, BITUMINOUS is hereby modified by adding the following as the fourth and fifth entries in the list of equipment, immediately following "1 Shovel, round-pointed with D-handle":

1 Metal shovel, square-head, 5.5 inch minimum width, with long handle

1 Metal spatula, of an appropriate size to clean shovels

631.06 TESTING EQUIPMENT, BITUMINOUS is hereby further modified by adding the following two paragraphs, immediately following "1 Relative humidity pen":

The Contractor shall provide a non-petroleum asphalt release agent for cleaning the bituminous testing equipment.

The Contractor shall provide 7.5 inch x 7.5 inch x 7.5 inch sampling containers meeting the requirements of *AASHTO R 97*. The number of containers provided shall be sufficient for the quantity of bituminous concrete material installed and the sampling frequency identified in the *Materials Sampling Manual*.

631.08 TESTING EQUIPMENT, GROUT is hereby modified by deleting "1 Set of specimen molds meeting the requirements of *AASHTO T 106 M/T 106*" and replacing it with the following:

Specimen molds meeting the requirements of *AASHTO T 106 M/T 106*. The number of molds shall be sufficient to perform both the acceptance testing required for the contract item and any necessary control of work testing. Each specimen mold shall be capable of producing 3 individual cubes.

631.09 METHOD OF MEASUREMENT is hereby modified by deleting the sentence "Upon entering the cost of the submitted bill into the next biweekly estimate, the Engineer will forward the original paid bill to the Construction Office to be retained with the Project records and will place a copy of the paid bill into the field office records." in its entirety.

SECTION 641 – TRAFFIC CONTROL

641.02 GENERAL CONSTRUCTION REQUIREMENTS is hereby modified by deleting paragraphs four, five, six and seven in their entirety and replacing them with the following:

(a) Traffic Control. When the Contract includes the Traffic Control Pay Item, the Plans will contain an Agency-designed traffic control plan. The Contractor may implement the Agency-designed plan or submit an alternate traffic control plan for the Project. When the Contractor will implement an Agency-designed traffic control plan, written certification shall be submitted to the Engineer indicating that traffic control will be performed in accordance with the Agency design. An alternate plan may be for the entire traffic control plan of the Project or for revisions to various phases of the Agency's design in the Plans, including the specific location of the lanes where the traffic will be maintained. Any alternate plan submitted shall conform to the latest edition of the *MUTCD*.

For an alternate traffic control plan, Construction Drawings shall be submitted in accordance with Section 105. The submitted alternative plan shall include complete construction details, including all aspects of traffic control, to the same extent provided in the Agency design. The Contractor shall allow the Agency 30 Calendar Days to Review the proposed plan for Conformance before it is to be implemented.

(b) Traffic Control, All-Inclusive. When the Contract includes the Traffic Control, All-Inclusive Pay Item, the Contractor shall design and submit a site-specific traffic control plan in accordance with Section 105. The submitted site-specific plan shall include, for each phase of construction requiring a significant change in temporary traffic control, a narrative description of the proposed temporary traffic control for each phase, including pedestrian accommodations where appropriate, and the major work activities to be completed in each phase.

The submitted site-specific plan shall also include a layout for each phase of construction showing existing lane configurations, existing traffic control devices (signs, signals, and pavement markings), driveways, ramps, and highway intersections, and the location of all proposed temporary traffic control devices, Flaggers, and UTOs. All pertinent dimensions, such as taper lengths, sign spacing, temporary lane widths, and distances from existing traffic control devices shall be labeled.

641.03 TRAFFIC CONTROL DEVICES is hereby modified by adding the following as the thirteenth paragraph, immediately following the phrase "each consisting of a maximum of three lines of eight characters.":

Each PCMS unit shall be tamper-resistant. The control cabinet shall be locked when not in use. Each PCMS shall also have a security system that will only allow access if a code or password is entered. The default code or password shall be changed upon deployment of the PCMS by the Contractor. PCMS boards featuring remote access shall also be password protected.

641.07 BASIS OF PAYMENT is hereby modified by being deleted in its entirety and replaced with the following:

641.07 BASIS OF PAYMENT.

(a) Traffic Control and Traffic Control, All-Inclusive. The accepted quantity of Traffic Control and Traffic Control, All-Inclusive will be paid for at the Contract lump sum price. Payment will be full compensation for designing, preparing, implementing, inspecting, maintaining, and removing the applicable traffic control plan and specified traffic control devices, and for furnishing all labor (including traffic patrol vehicle operators, if used by the Contractor), tools, materials, equipment, and incidentals necessary to complete the work.

Partial payments for Traffic Control and Traffic Control, All-Inclusive will be made as follows:

(1) The first 15% of the Contract lump sum price will be paid upon receipt of written certification from the Contractor that traffic control will be performed in accordance with the Agency-designed traffic control plan, or upon approval of the Contractor's traffic control plan.

(2) The remaining 85% of quantity payments will be paid on a prorated basis for the estimated duration of the Contract work remaining.

(b) Portable Changeable Message Sign and Portable Arrow Board. The accepted quantities of Portable Changeable Message Sign and Portable Arrow Board will be paid for at the Contract Unit Price for each. There will be no payment for any spare units, as they shall be considered incidental to the unit(s) being utilized and paid for through the Contract.

Partial payment for Portable Changeable Message Sign and Portable Arrow Board will be made as follows:

(1) The first 50% of quantity payments will be made upon the erection of complete Portable Changeable Message Sign(s) and Portable Arrow Board(s) as specified in Subsection 641.06.

(2) The remaining 50% of quantity payments will be paid on a prorated basis for the estimated duration of the Contract work remaining.

The accepted quantities of Portable Changeable Message Sign Rental and Portable Arrow Board Rental will be paid for at the Contract Unit Price per day. The minimum quantity for payment shall be five days.

Payment for the accepted quantities of Portable Changeable Message Sign, Portable Arrow Board, Portable Changeable Message Sign Rental, and Portable Arrow Board Rental shall be full compensation for furnishing, operating, maintaining, transporting, and installing the unit specified, for removing the unit when it is no longer needed, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

When both Pay Items are in the Contract, a Portable Changeable Message Sign used as a Portable Arrow Board will be paid for at the Contract price for a Portable Arrow Board.

Payment will be made under:

Pay Item	Pay Unit
641.10 Traffic Control	Lump Sum
641.11 Traffic Control, All-Inclusive	Lump Sum
641.15 Portable Changeable Message Sign	Each
641.16 Portable Arrow Board	Each
641.17 Portable Changeable Message Sign Rental	Day
641.18 Portable Arrow Board Rental	Day

SECTION 646 – RETROREFLECTIVE PAVEMENT MARKINGS

SECTION 646 – RETROREFLECTIVE PAVEMENT MARKINGS is hereby modified by being deleted in its entirety and replaced with the following:

SECTION 646 – RETROREFLECTIVE PAVEMENT MARKINGS

646.01 DESCRIPTION. This work shall consist of furnishing and placing retroreflective markings, including temporary markings, and necessary signing on roadway pavement and other surfaces.

646.02 MATERIALS. Materials shall meet the requirements of the following Subsections:

Polyurea Pavement Markings	708.08(a)
Epoxy Paint	708.08(b)
Waterborne Paint	708.08(c)
Thermoplastic Pavement Markings, Type A	708.10(a)
Thermoplastic Pavement Markings, Type B	708.10(b)
Line Striping Targets	708.12(a)
Pavement Marking Mask	708.12(b)
Optics, Type I	754.01(a)
Optics, Type II	754.01(b)
Optics, Type III	754.01(c)

Pavement Marking Tape, Type A ..... 754.03(a)
Pavement Marking Tape, Type B ..... 754.03(b)
Pavement Marking Tape, Type C ..... 754.03(c)

Pavement marking materials furnished shall be the ones shown on the Plans or listed in these Specifications as being acceptable for the Project. The Contractor may submit alternate materials for approval in accordance with Subsection 646.15.

646.03 CLASSIFICATION.

(a) Optics. Glass beads or composite material incorporated into Waterborne Paint and Liquid Durable Pavement Markings that provide different levels of reflectivity.

(b) Waterborne Paint. Liquid waterborne based paint binder used in permanent and temporary applications.

(c) Liquid Durable Pavement Markings. Liquid based binder markings that include Epoxy Paint, Polyurea Paint, and Extruded Thermoplastic.

(d) Preformed Durable Pavement Markings. Preformed durable pavement markings include Preformed Thermoplastic and Pavement Marking Tape, Type A and Pavement Marking Tape, Type B.

(e) Temporary Pavement Markings. Temporary pavement markings include Pavement Marking Tape, Type C, Pavement Marking Mask, Line Striping Targets, and Paint.

646.04 GENERAL APPLICATION OF MARKINGS.

(a) Placement of Markings. Roadway surfaces shall be clean and dry at the time of application of pavement markings. The Engineer will inspect the pavement to determine if conditions are suitable for the placement of markings. The Engineer will check the pavement for cleanliness, moisture content, and temperature; and will check ambient air conditions. The Engineer will make the final determination as to the suitability of Project conditions for the application of pavement markings. Where required, the Contractor shall clean the surface to be marked to the satisfaction of the Engineer to provide for an acceptable bond between the marking and the pavement or surface.

Weather conditions must be adequate to allow the placement and curing of the pavement marking material without violating the manufacturer's requirements.

All markings shall be applied in a neat and professional manner. The lines shall be sharp and clear with no feathered edging or fogging, and precautions shall be taken to prevent tracking by tires of the marking equipment. Adequate quantities of the material shall be applied to assure constant thickness of marking material. Glass beads shall be delivered at a velocity that is at least 60% of ground speed for the application device. Markings shall be applied parallel to the roadway centerline or as shown on the Plans with no unsightly deviations.

After application, markings shall be protected from crossing vehicles for a time at least equivalent to the drying time of the marking material used, according to manufacturer's recommendations. Markings shall be protected from the moment of application until they are sufficiently dry to bear traffic without damage to the marking, tracking, or adhering to vehicle tires.

Any pavement marking materials spilled or tracked on the roadway surfaces shall be removed by the Contractor to the satisfaction of the Engineer and at no additional cost to the Agency. The method of removal shall be acceptable to the Engineer and not injurious to the roadway or other surfaces.

All temporary pavement markings, including line striping targets when used, shall be applied so that at the end of each working day, all centerlines, edge-line, island markings, gore markings, lane lines, special markings, etc. are in place on all paved surfaces where traffic will be maintained. During paving and milling, work shall be scheduled so that the pavement markings are complete immediately after the paving and milling operations cease for the day.

When line striping targets (LSTs) are not shown on the Plans but are used as a short-term substitute for other temporary pavement markings, they shall be placed as directed by the Engineer and will be paid for as the equivalent quantity of temporary pavement marking for which the LSTs are substituted. However, if the Engineer determines it is necessary to replace those temporary LSTs with either more LSTs or the actual temporary pavement markings designated for that particular location, no further payment for the temporary pavement markings at that particular location will be made.

At all times, the Contractor shall have on hand on the Project all necessary materials, equipment, and labor to place any and all necessary interim pavement markings, including temporary line striping targets, required by the Plans or as directed by the Engineer. The markings shall be paid for under the appropriate Contract items.

All permanent markings shall be placed within 14 calendar days of paving the wearing surface. Temporary pavement markings shall be removed concurrent with the placement of permanent pavement markings.

Failure on the part of the Contractor to comply with the provisions of this part of the specifications may be grounds for suspension of biweekly estimate payments for the Contract in accordance with Subsection 105.01(b), until the required work is performed to the satisfaction of the Engineer.

(b) Weather Limitations.

(1) At the time of application of painted markings, the temperature of the surface to be painted shall be a minimum of 50°F and the ambient air temperature shall be 50°F and rising. Ambient hygrometric conditions required for drying within a 20-minute period shall exist or painting shall be suspended.

At the time of application of durable pavement markings, the pavement surface and ambient air temperatures shall be as per the manufacturer's published specified application temperatures, and the dew point shall be 5°F or more below the ambient air temperature. If the manufacturer's published recommendations are unavailable, the pavement surface and ambient air temperatures shall both be a minimum of 50°F. Durable pavement markings shall be installed in the same calendar year that the wearing course of pavement is placed.

(2) If weather conditions do not permit the application of durable markings prior to November 15th, paint will be applied in accordance with this section and Section 754.

(3) When it is in the public interest, the Engineer may authorize the application of pavement markings under conditions that vary from these limitations or the manufacturer's published recommendations.

(c) Layout and Control. Once the wearing course has been placed, the Engineer will establish the layout for the permanent centerline traffic markings, including passing zones, breaks for town highways and side roads, and any other items required for the centerline markings. The Contractor shall be responsible for laying out all non-centerline markings. The pattern of painted, durable, or temporary markings shall be as follows, unless otherwise shown in the Contract or directed by the Engineer.

(1) Centerline Markings. Centerline markings shall be positioned at the geometric center of the roads or as shown in the Plans. Solid (barrier) lines and dashed lines shall start and end at points shown on the Plans or as directed by the Engineer. A dashed line shall consist of 10 foot ± 6 inch line segments, and 30 foot ± 6 inch spaces. The spacing between a double barrier line and between a barrier line and a dashed line shall be the same width as the lines. The width of centerlines shall be as shown on the Plans, ± 1/4 inch.

(2) Edge Line Markings. Edge line markings shall be applied along both edges of the road, as shown on the Plans or as directed by the Engineer. Edge lines shall be discontinued through intersections of paved public side roads, unless otherwise shown on the Plans. The width of edge lines shall be as shown on the Plans, ± 1/4 inch.

(3) Dotted Line. Dotted lines shall be positioned as shown on the Plans or as directed by the Engineer. A dotted line shall consist of 3 foot ± 2 inch line segments, and 9 foot ± 2 inch spaces, unless otherwise specified in the Contract documents. The width of dotted lines shall be as shown on the Plans, ± 1/4 inch.

(4) Control. The Contractor shall provide the necessary horizontal and longitudinal control to keep all longitudinal lines within 2 inches of their designated locations.

In addition, on tangents, the Contractor shall not allow longitudinal lines to vary from either side of a straight line by more than 1 inch in 100 feet.

(5) Gaps and Overlaps. When applying durable diagonal pavement markings that are to be enclosed within durable long line borders, the Contractor shall apply the diagonals in such a manner as to allow a maximum of a single overlap and no gaps between the diagonals and the long lines.

(d) Application Equipment. The pavement marking equipment shall meet the approval of the Engineer and shall be maintained in working condition at all times. The pavement marking equipment shall be of standard commercial manufacture of the type capable of satisfactorily applying the designated material at required application temperatures and rates, and in accordance with the manufacturer's recommended application practices.

For long line markings, each machine shall be capable of applying two separate stripes, either solid or dashed, at the same time. Each applicator shall be equipped with satisfactory cutoffs that will apply broken, dashed, or dotted lines automatically.

Each applicator shall have a mechanical bead dispenser that will operate simultaneously with the applicator and distribute the beads in a uniform pattern at the rate specified over the entire surface area of the marking. The bead placement device shall maximize bead embedment in the marking material. Each applicator shall also be equipped with line guides suitable to the Engineer.

Equipment for application shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. Equipment shall include adequate process controls to regulate the application of marking materials and maintain required temperatures, pressures, and delivery speed of components in the pavement marking.

The pavement marking equipment shall be operated in accordance with recommendations of the equipment manufacturer, unless otherwise directed by the Engineer. Operating speeds shall be such as to provide uniformity and the specified wet or dry film thicknesses.

The application equipment shall be so constructed as to ensure continuous uniformity in the dimensions of stripes. The applicator shall provide a means for cleanly cutting off stripe ends squarely and shall provide a method of applying dashed and dotted lines. The equipment shall be capable of applying varying widths of traffic markings.

Pavement marking vehicles shall operate in the lane for traffic moving in the same direction; they shall not encroach into the lane for opposing traffic flow. Exceptions to this requirement shall be approved in writing by the Engineer.

Equipment to be used for determining temperature, moisture, and material thickness including, but not limited to, a thermometer and a micrometer are specified in Subsection 631.06.

(e) Documentation Requirements. The Contractor shall provide to the Agency a written daily installation report of the application for all projects 2 miles or greater in length. The report shall include the following:

(1) Date of installation report.

(2) Date and beginning and ending time of application.

(3) Striping Contractor.

(4) The highway number, highway name and town name with the beginning and ending reference points.

(5) Approved mix design number.

(6) Designation of the marking being applied (LEL – Left Edge Line, REL – Right Edge Line, CL – Centerline, LL – Lane Line).

(7) Width of marking applied.

(8) Vendor and product (binder and optics).

(9) Lot numbers of products used.

(10) Specific weight of binder lots used in pounds per gallon.

(11) Weight in pounds and/or volume in gallons of binder used by color.

(12) Weight in pounds of reflective glass beads/elements used.

(13) Number of optic drops.

(14) Optic types per each drop.

(15) Pavement surface temperature (°F).

(16) Air temperature (°F).

(17) Dew point (°F).

(18) Humidity (percent).

(19) Dates of retroreflectivity testing.

(20) Reflectometer model.

(21) Reflectometer factory calibration date.

(22) Retroreflectivity testing values.

(23) Retroreflectivity testing locations.

646.05 PAVEMENT MARKING MIX DESIGN. The Contractor shall submit a pavement marking mix design for liquid durable pavement markings. Any change to the mix design will need to be resubmitted and reviewed for conformance in accordance with the requirements of Section 105. The mix design shall include:

(a) Application.

(1) Pavement type (e.g. Superpave Type IVS, Bonded Wearing Course Type C)

(2) Whether the markings are to be surface applied or recessed

(b) Binder.

(1) Liquid durable type

(2) Product name

(3) Thickness in mils

(4) Color

(c) Optics.

(1) Optic types

(2) Product names

(3) Optic drops

a. Number of optic drops

b. Drop rates

c. Composition of optic drops

(d) Minimum Retroreflectivity Values.

The Contractor shall submit a Letter of Intent a minimum of 14 calendar days prior to the start of production identifying the approved mix designs intended to be used for that particular Contract. Letters of Intent shall be submitted electronically. The Letter of Intent shall include the Contract name and number, pay item numbers, and mix design number. Usage of the mix design on Agency projects will not be authorized without the Letter of Intent being approved by the Engineer.

646.06 WATERBORNE PAINT PAVEMENT MARKINGS.

(a) Application Requirements. Waterborne paint application shall be in accordance with the manufacturer's recommendations. The material shall be applied in a smooth uniform coat, free from excessively thick or thin film placement.

Liquid tanks on paint application equipment shall be equipped with mechanical agitators. Beads shall be conditioned to provide a smooth uniform rate of release. All materials shall be maintained in the condition recommended by the marking manufacturer prior to and at the time of marking.

(1) Mil Thickness. The markings shall be applied at a rate to create a uniform wet film in-place minimum thickness as follows, unless otherwise specified in the Contract:

a. 20 mils for pavement constructed under the same Contract as the markings.

b. 15 mils for all other pavement surfaces.

(2) Retroreflectivity. Optics, Type I shall be uniformly applied across the width of the line at a rate of 8.0 pounds per gallon of paint. The Contractor shall provide the Engineer with the optic drop on rates of all optic materials and daily binder application rates.

646.07 EPOXY PAINT.

(a) Application Requirements. Epoxy paint application shall be in accordance with the manufacturer's recommendations. Mixing of the epoxy reagents shall be complete prior to the placement of the marking. Failure of the epoxy to set to a hard condition shall be grounds for rejection.

(1) Mil Thickness. The markings shall be applied at a rate to create a uniform wet film in-place minimum thickness as follows, unless otherwise specified in the Contract:

a. 25 mils for bonded wearing course constructed under the same Contract as the markings.

b. 18 mils for all other pavement surfaces.

(2) Retroreflectivity.

a. Surface Applied Application. Initial dry retroreflectivity minimums for surface applied epoxy shall be 300 millicandelas per square meter per lux ($mcd/m^2/lx$) for yellow markings and 400 $mcd/m^2/lx$ for white markings. For surface applied markings, optics shall be applied in either one or two drops. Optics, Type I and/or Optics, Type II reflective media shall be applied at a minimum rate of 12 pounds per gallon.

b. Recessed Application. Initial dry retroreflectivity minimums for recessed epoxy shall be 400 mcd/m^2/lx for yellow markings and 600 mcd/m^2/lx for white markings per *ASTM E 1710*. The wet average initial retroreflectivity of the markings shall be 300 mcd/m^2/lx for yellow and 375 mcd/m^2/lx for white per *ASTM E 2177*.

For recessed markings, optics shall be applied in two drops. The first drop shall include Optics, Type III and be applied at a minimum rate of 5 pounds per 100 square feet. The second drop shall be Optics, Type II and be applied at a minimum rate of 8 pounds per gallon.

646.08 POLYUREA.

(a) Application Requirements. Polyurea paint application shall be in accordance with the manufacturer's recommendations. Mixing of the polyurea reagents shall be complete prior to the placement of the marking. Failure of the polyurea to set to a hard condition shall be grounds for rejection.

(1) Mil Thickness. Polyurea paint shall be applied at a rate to create a uniform wet film in-place minimum thickness as follows, unless otherwise specified in the Contract:

a. 25 mils for bonded wearing course constructed under the same Contract as the markings.

b. 18 mils for all other pavement surfaces.

(2) Retroreflectivity.

a. Surface Applied Application. Initial dry retroreflectivity minimums for surface-applied polyurea shall be 300 mcd/m^2/lx for yellow markings and 400 mcd/m^2/lx for white markings.

For surface applied markings, optics shall be applied in either one or two drops. Optics, Type I and/or Optics, Type II reflective media shall be applied at a minimum rate of 10 pounds per gallon.

b. Recessed Application. Initial dry retroreflectivity minimums for recessed polyurea shall be 400 mcd/m^2/lx for yellow markings and 600 mcd/m^2/lx for white markings per *ASTM E 1710*. The wet average initial retroreflectivity of the markings shall be 300 mcd/m^2/lx for yellow and 375 mcd/m^2/lx for white per *ASTM E 2177*.

For recessed markings, optics shall be applied in two drops. The first drop shall include Optics, Type III and be applied at a minimum rate of 5 pounds per 100 square feet. The second drop shall be Optics, Type II and be applied at a minimum rate of 8 pounds per gallon.

646.09 EXTRUDED THERMOPLASTIC. Extruded thermoplastic markings shall be Thermoplastic Pavement Markings, Type A meeting the requirements of Subsection 708.10. The thermoplastic pavement marking compound shall be extruded onto the pavement surface in a molten state. The temperature of the material shall not exceed the manufacturer's recommended heating temperature or rate of temperature increase. The surface shall be properly prepared for receipt of the marking material, including surface roughness, cleanliness, and moisture levels. The surface shall be primed when the manufacturer's recommendations require priming.

Following an application of glass beads to the marking surface, and upon cooling to normal pavement temperatures, the resultant marking shall be an adherent retroreflective stripe of the specified thickness and width that is capable of resisting deformation by traffic.

(a) Thermoplastic Application Equipment. Thermoplastic application equipment shall be approved by the Engineer prior to the start of work.

Thermoplastic material shall be applied to the pavement surface by the extrusion method, wherein the bottom of the extrusion shoe is the pavement and the top and other three sides are contained by, or are part of, suitable equipment for maintaining the temperature and controlling the flow of material. The fourth side contains the extrusion opening.

The ribbon extrusion method will not be permitted for the application of extruded thermoplastic material.

The equipment used for the placement of extruded thermoplastic pavement markings shall be of two general types:

(1) Mobile Applicator Equipment. The mobile applicator shall be defined as truck-mounted equipment designed to apply thermoplastic by the extrusion method. The unit shall be equipped to apply the thermoplastic material at temperatures exceeding 400°F, and at the widths and thicknesses specified herein. The mobile unit shall be capable of operating continuously and/or installing a minimum of 3.8 miles of longitudinal markings in an eight-hour day.

The mobile unit shall be equipped with extrusion shoes and shall be capable of simultaneously marking edge lines and/or two centerline stripes. The extrusion shoes shall be closed, heat-jacketed or suitably insulated units, and shall hold the molten thermoplastic at a temperature between 400°F and 435°F.

The mobile unit shall be capable of extruding a line from 4 inches to 8 inches wide. Material temperature gauges shall be affixed, adjacent to or incorporated in the extrusion shoe, in such a manner as to be visible and capable of monitoring the composition temperature throughout the marking operation.

The mobile unit shall be equipped with an electronic and programmable line pattern control system, or mechanical system, to be capable of applying dashed, dotted, or solid lines in any sequence and through any extrusion shoe in any cycle length.

(2) Portable Applicator Equipment. The portable applicator shall be defined as hand-operated equipment specifically designed for placing thermoplastic installations such as crosswalks, stop bars, legends, arrows, and short lengths of lane lines, edge lines, and centerlines. The portable applicator shall be capable of applying thermoplastic markings by the extrusion method.

It is intended that the portable applicator will be loaded with hot thermoplastic composition from the melting kettles or that the material will be melted by an integral "melting stack" when so equipped. The portable applicator shall be equipped with all the necessary components, including a material storage reservoir, bead dispenser, extrusion shoe and heating accessories.

The portable applicator shall be capable of holding the molten thermoplastic at a temperature of between 400°F and 435°F, and of extruding a line from 4 inches to 8 inches wide in 2-inch increments.

Material temperature gauges shall be affixed, adjacent to or incorporated in the extrusion shoe, in such a manner as to be visible and capable of monitoring the composition temperature throughout the marking operation. If a machine, as manufactured, cannot be equipped with gauges at the extrusion shoe, the Engineer may approve an alternate method of monitoring the composition temperature at the point of deposition.

(b) Application Requirements. Bituminous concrete primer shall be applied to pavements older than two years at the application rates and procedures recommended by the thermoplastic material manufacturer. Primer shall be applied under such conditions, at such rates and thicknesses, and of a type as is recommended by the thermoplastic material manufacturer.

(1) Mil Thickness. All extruded markings shall be applied at the specified width and at a uniform hot film in-place minimum thickness of 105 mils.

(2) Retroreflectivity.

a. Surface Applied Application. Initial dry retroreflectivity minimums for surface-applied extruded thermoplastic shall be 300 mcd/m^2/lx for yellow markings and 400 mcd/m^2/lx for white markings.

For surface applied markings, optics shall be applied in either one or two drops. Optics, Type I and/or Optics, Type II reflective media shall be applied at a minimum rate of 8 pounds per square foot.

b. Recessed Application. Initial dry retroreflectivity minimums for extruded thermoplastic shall be 400 mcd/m^2/lx for yellow markings and 600 mcd/m^2/lx for white markings per *ASTM E 1710*. The wet average initial retroreflectivity of the markings shall be 300 mcd/m^2/lx for yellow and 375 mcd/m^2/lx for white per *ASTM E 2177*.

For recessed markings, optics shall be applied in two drops. The first drop shall include Optics, Type III and be applied at a minimum rate of 5 pounds per 100 square feet. The second drop shall be Optics, Type II and be applied at a minimum rate of 8 pounds per gallon.

c. Intermix. Optics, Type I meeting the requirements of *AASHTO M 247*, Type I, shall be incorporated into the intermix of the thermoplastic composition at a rate of between 30% and 40% by weight of the combined material.

646.10 PREFORMED THERMOPLASTIC. Preformed thermoplastic markings shall be Thermoplastic Pavement Markings, Type B meeting the requirements of Subsection 708.10.

646.11 PAVEMENT MARKING TAPE.

(a) Pavement Marking Tape, Type A. Pavement Marking Tape, Type A, when used as a final durable marking, shall be applied in a recess as defined in Subsection 646.13, and shall be applied in accordance with the manufacturer's requirements.

(b) Pavement Marking Tape, Type B. Pavement Marking Tape, Type B, when used as a final durable marking, shall be applied in a recess as defined in Subsection 646.13, and shall be applied in accordance with the manufacturer's requirements.

646.12 TEMPORARY PAVEMENT MARKINGS. Temporary pavement markings are classified as temporary pavement marking tape (removable), pavement marking mask, line striping targets (LSTs), and waterborne paint. All temporary pavement markings shall be maintained at all times at no additional cost.

Temporary markings on the wearing course of pavement shall be Temporary Pavement Marking Tape or Line Striping Targets. Paint will not be permitted for use as a temporary marking on the wearing course of pavement. Unless otherwise indicated in the Contract, the Contractor may choose any temporary pavement marking types on all pavement surfaces except for the wearing course.

(a) Pavement Marking Tape, Type C. This tape for pavement markings is classified as temporary and is removable and shall be installed in accordance with the manufacturer's requirements.

(b) Pavement Marking Mask. Black or other compatible pavement color pavement marking mask is classified as removable. It shall be installed in accordance with the manufacturer's requirements.

(c) Line Striping Targets. Line striping targets are intended to be substitutes for pavement markings for not longer than 14 Calendar Days. Line striping targets shall be maintained and replaced as needed or as directed by the Engineer, until replaced by another temporary pavement marking or permanent pavement marking. Line striping targets shall be used only in conjunction with "Unsafe to Pass" signs.

Line striping targets of the color shown on the Plans or directed by the Engineer shall be installed as described below or as directed by the Engineer.

For solid longitudinal pavement markings, line striping targets shall be placed at 10-foot intervals. For double centerline markings, line striping targets shall be paired. For dashed pavement markings, line striping targets shall be placed in groups of three spaced at 5 feet, with the groups separated by 30-foot spaces, or as determined by the Engineer.

Line striping targets shall not be used to delineate passing zones on two-lane non-divided highways.

Line striping targets shall be installed in accordance with the manufacturer's requirements. Line striping targets shall not be nailed to the surface.

Line striping targets in conjunction with "Unsafe to Pass" signs shall be used on wearing courses of pavement prior to applying durable markings. Permanent markings shall be placed within 14 Calendar Days of the date the segment of wearing course pavement is placed.

"Unsafe to Pass" signs shall be erected prior to traffic traveling through the work zone. The signs shall be erected on each side of the road 1000 feet into the Project limits, and subsequent signs placed at 2 mile intervals.

(d) Waterborne Paint. Temporary waterborne paint applied on the base or intermediate courses of pavement shall have a minimum thickness of 8 mils. Optics, Type I shall be applied at a rate of 3 pounds per gallon of paint.

All paint used for temporary markings shall be held to the same alignment and horizontal control standards as specified in Subsection 646.04.

646.13 OTHER RELATED MARKINGS.

(a) Pavement Marking Recess. Recessed pavement markings shall be installed as specified for permanent markings. The recess shall be a uniform depth across the width of the marking. The recess shall be controlled such that the depth meets the requirements of Table 646.13A.

TABLE 646.13A – PAVEMENT MARKING RECESS DEPTH

Marking Material	Recess Depth (mils)
Thermoplastic	140 – 160
Polyurea	90 –110
Epoxy	90 –110
Permanent tape	As recommended by the manufacturer

The bottom of the recess shall have a smooth, flat finished surface. The use of gang-stacked diamond cutting blades or polycrystalline diamond (PCD) is required for asphalt pavement surfaces. The spacers between blade or PCD cuts shall be such that there will be less than a 10 mil rise in the finished groove between the blades.

Recesses shall be clean, dry, and free of laitance, oil, dirt, grease, paint, or any other foreign contaminants prior to application of the pavement markings. The Contractor shall re-clean grooves, as necessary, prior to application of any primer or permanent markings. Depth plates shall be provided by the Contractor to assure that desired groove depth is achieved.

(b) Painted Curbs and Islands. Where a painted curb or painted island is called for, the existing curb or island shall be blast cleaned or wire brushed to remove scale, dirt, grass, etc. to the satisfaction of the Engineer, prior to painting. This cleaning work will not be paid for directly, but will be considered incidental to the Contract Item Painted Curb or Painted Island.

Paint shall be applied at a rate of 100 to 115 square feet per gallon with glass beads applied at a rate of 6 pounds per gallon. All paint shall be applied within the manufacturer's allowable application temperatures.

Waterborne paint shall be applied by a method in which the liquid material is applied to the curb or island surface and the glass beads are immediately applied to the material and firmly embedded therein, and which shall provide a retroreflective marking, with a night visibility satisfactory to the Engineer. The material shall have a minimum wet film thickness of 15 mils, unless otherwise specified, and be applied in a smooth, uniform coat, free from thin areas or excessively thick films.

Optics, Type I shall be applied uniformly over the entire painted surface area at the specified rate.

646.14 SUBSTITUTION OF MARKING MATERIALS. If the durable markings cannot be placed under suitable environmental conditions, paint shall be applied as specified in Subsection 646.06 at no cost to the Agency. Where it can be determined that through no fault of the Contractor the durable markings cannot be applied under suitable environmental conditions, paint may be applied for durable marking of the types indicated on the Plans where appropriate and as directed by the Engineer.

Regardless of the circumstance under which paint is applied after an unsuitable environmental condition determination, durable markings of the types indicated on the Plans shall be applied as soon as suitable environmental conditions permit during the following spring. These durable markings shall be measured and paid for in accordance with Subsection 646.17 and Subsection 646.18.

646.15 ALTERNATE MARKING MATERIALS. If the Contractor wishes to use pavement markings or markers that are not specified in this Section, the Contractor shall submit samples, technical data, installation instructions and, if applicable, removal instructions to the Engineer for approval at least 30 Calendar Days before the date the markings or markers are to be placed.

The Engineer, after consultation with the Materials Manager, will approve or disapprove the use of the submitted products within the 30 Calendar Day period. The Contractor should be prepared to place approved markings on the proper date, even if the submittal is disapproved.

646.16 REMOVAL OF EXISTING PAVEMENT MARKINGS. Existing markings shall be obliterated in such a manner and by such means that a minimum of pavement scars are left and all the existing markings are removed, e.g. by grinding a square or rectangle on the pavement to remove a letter or arrow, or grinding a large rectangle to remove a word so that the outline of the letter, symbol, or word is not ground into the pavement and therefore still legible even though the marking has been removed. Painting over existing markings is not an acceptable method of removal.

The work shall be completed to the satisfaction of the Engineer. Masking of lines in intermediate duration activities shall be completed according to the Plans or as directed by the Engineer.

646.17 METHOD OF MEASUREMENT. The quantity of pavement marking edge lines and centerlines of the types and sizes specified to be measured for payment will be the number of linear feet applied in the complete and accepted work, as measured along the centerline of the pavement stripe. The number of linear feet of open spaces in a dashed or dotted line will not be measured for payment. Temporary pavement markings shall be installed on the pavement and removed in accordance with Subsection 646.04.

The quantity of Waterborne Paint Pavement Markings of the types and sizes specified per Subsection 646.14 through no fault of the Contractor and applied on the Project to be measured for payment will be the quantity determined per the measure for the Durable Pavement Marking specified, multiplied by a factor of 1.5 to determine the accepted quantity for payment.

The quantity of Stop Bar of the type specified to be measured for payment will be the number of linear feet applied in the complete and accepted work, as measured along the centerline of the pavement stripe. The quantity of Letter or Symbol of the type specified to be measured for payment will be the number of each unit applied in the complete and accepted work.

A unit will consist of one letter or one symbol. For example, the six-letter word “SCHOOL” would be measured as six units and a handicapped symbol would be measured as one unit. For arrow symbols, each arrow symbol and associated stem shall be paid as one unit.

The quantity of Crosswalk Marking of the type specified to be measured for payment will be the number of linear feet applied from curb-to-curb in the complete and accepted work, as measured along the center of the crosswalk.

The quantity of Railroad Crossing Symbol of the type specified to be measured for payment will be the number of each unit applied in the complete and accepted work. A unit will consist of three "stop bars," two "Rs," and one "X" for one traffic lane in one direction of travel.

The quantity of Line Striping Targets to be measured for payment will be the number of individual targets installed on the pavement and removed in accordance with Subsection 646.04.

The quantity of Painted Curb to be measured for payment will be the number of linear feet applied in the complete and accepted work, as measured along the centerline of the pavement stripe.

The quantity of Painted Island to be measured for payment will be the number of square feet of the top of an island painted in the complete and accepted work.

The quantity of Removal of Existing Pavement Markings to be measured for payment will be the number of square feet of markings removed or total area in square feet of symbol or letter removed in the complete and accepted work, as determined by the Engineer.

The quantity of Pavement Marking Mask to be measured for payment will be the number of square feet of existing marking masked in the complete and accepted work.

646.18 BASIS OF PAYMENT. The accepted quantity of Pavement Marking edge lines and centerlines of the types and sizes specified will be paid for at the Contract Unit Prices per linear foot.

The accepted quantity of Waterborne Paint Pavement Markings of the types and sizes specified per Subsection 646.06 and measured for payment will be paid for at the corresponding Contract Unit Prices for Temporary Pavement Markings.

The accepted quantity of Stop Bar of the type specified will be paid for at the Contract Unit Price per linear foot.

The accepted quantity of Letter or Symbol of the type specified will be paid for at the Contract Unit Price per each unit.

The accepted quantity of Crosswalk Marking of the type specified will be paid for at the Contract Unit Price per linear foot.

The accepted quantity of Railroad Crossing Symbol of the type specified will be paid for at the Contract Unit Price per each unit.

The accepted quantity of Painted Curb will be paid for at the Contract Unit Price per linear foot.

The accepted quantity of Painted Island will be paid for at the Contract Unit Price per square foot.

Payment will be full compensation for furnishing, transporting, handling, assembling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

The Contract Unit Price for recessed pavement marking items will also include all labor, equipment, tools, and incidentals necessary for the placement of the recess and any necessary cleaning, drying, or conditioning of the recess prior to placement of the marking.

The Contract Unit Price for liquid pavement marking items shall include all costs associated with Optics, Type I; Optics, Type II; and Optics, Type III. Reflective media will not be paid for directly, but will be considered incidental to the pavement marking items in the Contract.

The Contract Unit Price for temporary pavement markings, including tape, paint, and line striping targets, as specified in Subsection 646.12 shall include all costs for maintaining marking capability for interim pavement markings, and all costs for removal.

The accepted quantity of Line Striping Targets will be paid for at the Contract Unit Price for each. Payment will be full compensation for furnishing; transporting; handling; installing and removing the LSTs; installing and removing "Unsafe to Pass" signs, posts, and sleeves; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Line Striping Targets replaced at the direction of the Engineer within the first 14 Calendar Days shall be paid for at the Contract Unit Price for each. If Line Striping Targets remain in place on the roadway for longer than 14 Calendar Days, no payment will be made for the Contract Item Line Striping Targets.

The accepted quantity of Removal of Existing Pavement Markings will be paid for at the Contract Unit Price per square foot. Payment will be full compensation for removing the markings and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

The accepted quantity of Pavement Marking Mask will be paid for at the Contract Unit Price per square foot. Payment will be full compensation for obliterating existing markings with a masking material, for removing the masking material when it is no longer required as directed by the Engineer, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

The Contractor is responsible for supplying necessary materials and equipment recommended by the manufacturer to determine the surface moisture condition of the pavement. The costs for supplying this material and equipment are paid for under the appropriate Contract Item specified in Section 631.

Payment will be made under:

Waterborne Paint Pavement Markings:

Pay Item		Pay Unit
646.200 to 646.209	4 Inch White Line	Linear Foot
646.2100 to 646.2119	4 Inch Yellow Line	Linear Foot
646.2140 to 646.2149	6 Inch White Line	Linear Foot
646.2150 to 646.2159	6 Inch Yellow Line	Linear Foot
646.220 to 646.229	8 Inch White Line	Linear Foot
646.230 to 646.239	8 Inch Yellow Line	Linear Foot
646.240 to 646.249	12 Inch White Line	Linear Foot
646.250 to 646.259	12 Inch Yellow Line	Linear Foot
646.260 to 646.269	24 Inch Stop Bar	Linear Foot
646.300 to 646.309	Letter or Symbol	Each
646.310 to 646.319	Crosswalk Marking	Linear Foot
646.320 to 646.329	Railroad Crossing Symbol	Each

Durable Pavement Markings:

Pay Item		Pay Unit
646.400 to 646.409	Durable 4 Inch White Line	Linear Foot
646.410 to 646.419	Durable 4 Inch Yellow Line	Linear Foot
646.420 to 646.429	Durable 6 Inch White Line	Linear Foot
646.430 to 646.439	Durable 6 Inch Yellow Line	Linear Foot
646.440 to 646.449	Durable 8 Inch White Line	Linear Foot
646.450 to 646.459	Durable 8 Inch Yellow Line	Linear Foot
646.460 to 646.469	Durable 12 Inch White Line	Linear Foot
646.470 to 646.479	Durable 12 Inch Yellow Line	Linear Foot
646.480 to 646.489	Durable 24 Inch Stop Bar	Linear Foot
646.490 to 646.499	Durable Letter or Symbol	Each
646.500 to 646.509	Durable Crosswalk Marking	Linear Foot
646.510 to 646.519	Durable Railroad Crossing Symbol	Each

Temporary Pavement Markings:

Pay Item		Pay Unit
646.600 to 646.605	Temporary 4 Inch White Line	Linear Foot
646.610 to 646.615	Temporary 4 Inch Yellow Line	Linear Foot
646.620 to 646.625	Temporary 6 Inch White Line	Linear Foot
646.630 to 646.635	Temporary 6 Inch Yellow Line	Linear Foot
646.640 to 646.645	Temporary 8 Inch White Line	Linear Foot

646.650 to 646.655 Temporary 8 Inch Yellow Line..... Linear Foot
646.660 to 646.665 Temporary 12 Inch White Line ..... Linear Foot
646.670 to 646.675 Temporary 12 Inch Yellow Line ..... Linear Foot
646.680 to 646.685 Temporary 24 Inch Stop Bar..... Linear Foot
646.690 to 646.695 Temporary Letter or Symbol..... Each
646.700 to 646.705 Temporary Crosswalk Marking..... Linear Foot
646.710 to 646.715 Temporary Railroad Crossing Symbol..... Each
646.76 Line Striping Targets..... Each

Other Related Markings:

Pay Item	Pay Unit
646.81 Painted Curb	Linear Foot
646.82 Painted Island	Square Foot

Marking Removal:

Pay Item	Pay Unit
646.85 Removal of Existing Pavement Markings	Square Foot
646.86 Pavement Marking Mask.....	Square Foot

SECTION 649 – GEOTEXTILE FABRIC

649.02 MATERIALS is hereby modified by being deleted in its entirety and replaced with the following:

649.02 MATERIALS. Materials shall meet the requirements of the following Subsections:

Geotextile for Roadbed Separator.....720.02
Geotextile Under Railroad Ballast.....720.03
Geotextile Under Stone Fill 720.04
Geotextile for Underdrain Trench Lining.....720.05
Geotextile for Filter Curtain.....720.06

Geotextiles shall conform to the following:

(a) Where sewn seams are used, the Contractor shall furnish the manufacturer's wide strip tensile test results as part of the certification. The results must verify that the seam meets or exceeds the specified average minimum roll values for the grab tensile strength of the geotextiles, or wide strip tensile strength for reinforcement applications.

(b) Field seams, where used, shall be in accordance with the manufacturer's recommendations.

SECTION 653 – EROSION PREVENTION AND SEDIMENT CONTROL

653.02 MATERIALS is hereby modified by inserting the following entries into the subsection list in numerical order:

Geotextile Under Stone Fill 720.04
Geotextile for Silt Fence 720.07

653.02 MATERIALS is hereby further modified by deleting the phrase "Geotextile Under Stone Fill shall be in accordance with Section 720 and Table 720.01A. Geotextile for Silt Fence shall be in accordance with Section 720 and Table 720.01A."

653.03 EPSC PLAN, subpart (a), is hereby modified by inserting the following as the third sentence of the first paragraph:

> When an EPSC Plan is not included in the Contract, the Contractor shall meet the requirements of the VTrans *Erosion Prevention and Sediment Control Plan Contractor Checklist (Non-Jurisdictional Projects)*.

653.08 RUNOFF CONTROL MEASURES is hereby modified by deleting the first paragraph of Subsection 653.08(a)(1) in its entirety and replacing it with the following:

> Check Dam, Type I. Check Dam, Type I shall be placed in channels and on Geotextile Under Stone Fill meeting the requirements of Subsection 720.04.

653.08 RUNOFF CONTROL MEASURES is hereby further modified by deleting Subsection 653.08(b)(1) and Subsection 653.08(b)(2) in their entirety and replacing them with the following:

(1) Silt Fence, Type I. Silt Fence, Type I shall be constructed of posts and Geotextile for Silt Fence meeting the requirements of Subsection 720.07.

(2) Silt Fence, Type II. Silt Fence, Type II shall be constructed of posts, Geotextile for Silt Fence meeting the requirements of Subsection 720.07, and woven wire reinforcement.

653.09 TREATMENT MEASURES is hereby modified by deleting the second paragraph of Subsection 653.09(a), beginning with "Stabilized Construction Entrances shall be constructed of stone...", in its entirety and replacing it with the following:

> Stabilized Construction Entrances shall be constructed of stone meeting the requirements of Subsection 704.17 and shall be placed on top of Geotextile Under Stone Fill meeting the requirements of Subsection 720.04.

653.09 TREATMENT MEASURES is hereby further modified by deleting the third paragraph of Subsection 653.09(b)(1), beginning with "Stake and fabric devices...", in its entirety and replacing it with the following:

> Stake and fabric devices shall be constructed of Geotextile for Silt Fence meeting the requirements of Subsection 720.07 and stakes approved by the Engineer.

653.09 TREATMENT MEASURES is hereby further modified by deleting the second paragraph of Subsection 653.09(b)(3), beginning with "Inlet Protection Device, Type III shall be constructed of Aggregate...", in its entirety and replacing it with the following:

> Inlet Protection Device, Type III shall be constructed of Aggregate for Erosion Prevention and Sediment Control and shall be placed on top of Geotextile Under Stone Fill meeting the requirements of Subsection 720.04.

653.17 BASIS OF PAYMENT is hereby modified by deleting the last sentence of the second paragraph and replacing it with the following:

Payment will not be made unless a report for the monitoring is submitted to the Engineer within 7 calendar days of the date of the inspection. Payment will not be made until the report has been accepted by the Engineer.

SECTION 675 – TRAFFIC SIGNS

675.02 MATERIALS is hereby modified by deleting the entry for "Paint for Traffic Signs.....708.06" from the material list.

675.07 TRAFFIC SIGNS, subpart (b), is hereby modified by deleting subpart (2) in its entirety and replacing it with the following:

> (2) Flat Sheet Aluminum. Fabrication of the flat aluminum sheets, including cutting to size, shall be completed prior to degreasing, etching, or treating, and application of the retroreflective sheeting. Flat sheet aluminum may be sheared, blanked, sawed, or milled. No flame cutting will be permitted. Field drilling or punching of holes will be allowed as needed.

675.07 TRAFFIC SIGNS is hereby further modified by adding the following as the second and third sentences of subpart (d), immediately after the sentence beginning "Signs shall be mounted as tightly to the posts, frame, or...":

> For permanent installations of Type A signs to frames or posts, a nylon-insert locking nut and two washers shall be used. For all sign types, if bolts are used for mounting, the installed bolt shall be at least flush with the nut.

SECTION 677 – OVERHEAD TRAFFIC SIGN SUPPORTS

677.03 GENERAL is hereby modified by adding the sentence "Field verification testing for Direct Tension Indicators is not required." immediately following the sentence "High-Strength Bolts, Nuts, and Washers shall be tensioned in accordance with Subsection 506.19."

SECTION 678 – TRAFFIC CONTROL SIGNALS

678.09 ERECTION OF POSTS AND POLES is hereby modified by adding the sentence "Field verification testing for Direct Tension Indicators is not required." immediately following the sentence "High-Strength Bolts, Nuts, and Washers shall be tensioned in accordance with Subsection 506.19."

SECTION 679 – STREET LIGHTING

679.02 MATERIALS is hereby modified by deleting the entry for "Bracket Arms.....753.04" from the subsection list.

679.02 MATERIALS is hereby further modified by inserting the following entries into the subsection list in numerical order:

Bracket Arms, Aluminum.....753.04(a)
Bracket Arms, Steel.....753.04(b)

679.05 BRACKET ARMS is hereby modified by deleting the first sentence of the Subsection and replacing it with the following:

Bracket arms shall be free of defects and burrs. Bracket arms shall be able to withstand a vertical load of 100 pounds and a horizontal load of 50 pounds without fracture or permanent deformation and shall be installed as shown in the Contract Documents.

Bracket arms installed on aluminum posts shall be in accordance with Subsection 753.04(a). Bracket arms installed on steel or wood posts shall be in accordance with Subsection 753.04(b).

SECTION 680 – TRAVEL INFORMATION SIGNS

680.02 MATERIALS is hereby modified by deleting the entry in the subsection list for "Aggregate for Bituminous Surface Treatment.....704.11" and replacing it with the following:

Drainage Aggregate 704.16

680.02 MATERIALS is hereby further modified by deleting the entry for "Paint for Traffic Signs.....708.06" from the subsection list.

680.06 INFORMATION PLAZAS is hereby modified by deleting the word "peastone" from the last sentence of the second paragraph and replacing it with the phrase "drainage aggregate".

SECTION 690 – FUEL PRICE ADJUSTMENT

SECTION 690 – THIS SECTION RESERVED is hereby modified by being deleted in its entirety and replaced with the following:

SECTION 690 – FUEL PRICE ADJUSTMENT

690.01 DESCRIPTION. This Specification contains price adjustment provisions for fuel used by the Contractor during construction. For the purposes of this Specification, it is assumed that all fuel used is diesel fuel. This price adjustment clause will provide for either additional compensation to the Contractor, or a payment to the Agency, based upon changes in the retail price of fuel between the time of bidding and the time when the work was performed.

690.02 GENERAL REQUIREMENTS AND CONDITIONS. Fuel Price Adjustment (FPA) will be performed in accordance with the following requirements and conditions:

(a) Fuel price adjustment will only be performed as specified herein for Pay Items listed in Table 690.02A or identified in the Project Special Provisions. No other adjustments will be allowed.

TABLE 690.02A – FUEL USAGE FACTORS AND THRESHOLD QUANTITIES

Work Category	Eligible Pay Item Numbers	Fuel Usage Factor (F_{FU})	Threshold Quantity
Earth Excavation	203.15, 203.17, 203.20, 203.25, 203.27, 204.20, 204.25, 208.30	0.319 gal/CY	40,000 CY
Aggregates Paid for by the Cubic Yard	203.35, 204.30, 301.15, 301.25, 301.26, 301.35, 401.10	0.558 gal/CY	25,000 CY
Aggregates Paid for by the Ton	301.28, 402.12, 629.54	0.413 gal/ton	30,000 tons
Cold Mixed Recycled Bituminous Pavement	415.20	0.140 gal/SY	95,000 SY
Bituminous Concrete Pavement	406.25, 406.27, 406.35, 406.36	2.827 gal/ton	5,000 tons
Bonded Wearing Course	407.15	0.115 gal/SY	115,000 SY

(b) It shall be understood by the Contractor that a price adjustment increase may cause the Agency to decrease the quantities of the Pay Items subject to adjustment under these provisions. Provisions providing for decreased quantities and item cancellation in this paragraph are separate and take precedence, notwithstanding any other provisions of the Contract.

(c) No price adjustment will be computed for work performed after the Contract completion date, as modified by Change Order, if applicable.

(d) Fuel price adjustment will only be computed for a Pay Item if all of the following criteria are met:

(1) The Pay Item is included in the original awarded Contract. Items added by Change Order will not be subject to FPA.

(2) The Pay Item is listed in Table 690.02A, or is identified as being subject to FPA in the Project Special Provisions.

(3) The original awarded Contract bid quantity for the Pay Item (being the total bid quantity across all Projects in the Contract) equals or exceeds the threshold quantity specified in Table 690.02A. Pay Items which have a Contract bid quantity that is less than the threshold quantity will not be subject to FPA, even if the quantity of the item is later increased by Change Order.

(e) Any increase in the total Contract amount due to FPA will not be justification for an extension of time under Subsection 108.11.

(f) In such cases that estimated quantities are used to determine estimated FPA throughout the duration of the Contract, reconciliation of those estimated adjustments will be made upon the determination of actual final quantities and final adjustments to the total final quantity made by prorating those estimated adjustments over the applicable fuel price adjustment periods previously paid. Reconciliation of any FPA will only be performed in those instances where the actual final quantity differs by more than five percent from the total estimated quantity. Payments owed to either the Contractor or VTrans will not be subject to any applicable interest claims.

690.03 PRICE ADJUSTMENT PROCEDURES.

(a) Prior to advertising for bids, an Index Price (IP) per gallon of diesel fuel will be established by the Agency using the retail price reported by the Energy Information Administration (EIA) for the New England Region. The index price will be set monthly using the first EIA posting falling either on or after the first Calendar Day of that month. This price is specified elsewhere in the Contract and will be the basis from which fuel price adjustments are computed.

(b) For the duration of the Contract, the Posted Price (PP) for diesel fuel will be established monthly by the Agency. The posted prices will be established in the same manner as the index price and may be found on the Agency website.

(c) The index price, posted prices, fuel usage factors and the quantity of the item will be used to determine the amount of adjustment required. The posted price used to calculate the adjustment will be the price for the month in which the work was performed.

690.04 METHOD OF MEASUREMENT. Payment for Price Adjustment, Fuel will be based upon the quantity of fuel incorporated in the work, as determined by the fuel usage factors given in Table 690.02A, and will be computed as follows:

(a) Calculate the ratio of the posted price to the index price using the following equation.

$$R = \frac{PP_F}{IP_F}$$

where:

R = Ratio of the posted price to the index price

PP_F = Posted price of fuel for the month the work was performed (dollars/gallon)

IP_F = Index price of fuel (dollars/gallon)

(b) Calculate the quantity of fuel price adjustment using the appropriate equation below.

For R ≤ 0.95

$$PA_F = F_{FU} \times Q \times [PP_F - (0.95 \times IP_F)]$$

For 0.95 < R < 1.05

$$PA_F = 0$$

For R ≥ 1.05

$$PA_F = F_{FU} \times Q \times [PP_F - (1.05 \times IP_F)]$$

where:

R = Ratio of the posted price to the index price

PA_F = Price Adjustment, Fuel (lump units)

F_{FU} = Fuel usage factor (gallon/unit)

Q = Quantity of the item placed in the month (varying units)

PP_F = Posted price of fuel for the month the work was performed (dollars/gallon)

IP_F = Index price of fuel (dollars/gallon)

If multiple items are eligible for price adjustment, the price adjustment for each individual item will be calculated and the resulting values summed to generate one price adjustment for the month.

690.05 BASIS OF PAYMENT. The Contract bid prices for the applicable Pay Items will be paid under the Contract. Payment for Price Adjustment, Fuel will be debited or credited against the Contract price (lump unit) for Price Adjustment, Fuel.

Payment will be made under:

Pay Item	Pay Unit
690.50 Price Adjustment, Fuel (N.A.B.I.)	Lump Unit

DIVISION 700

MATERIALS

SECTION 701– HYDRAULIC CEMENT

SECTION 701 – HYDRAULIC CEMENT is hereby modified by being deleted in its entirety and replaced with the following:

SECTION 701 – HYDRAULIC CEMENT

701.01 GENERAL REQUIREMENTS. Hydraulic cement shall meet the following general requirements.

The Contractor shall provide suitable means for storing and protecting the cement against dampness. Cement which, for any reason, has become partially set or which contains lumps or is caked shall be rejected.

Storage of Hydraulic Cement shall be by the brand, type, and mill. Cements of different brands and types or from different mills shall not be mixed.

701.02 PORTLAND CEMENT. Portland Cement shall conform to the requirements of *AASHTO M 85*, Type II and *ASTM C 150/C 150 M*, Type II, unless otherwise shown on the Plans or directed by the Engineer.

701.04 HIGH EARLY-STRENGTH PORTLAND CEMENT. High Early-Strength Portland Cement shall conform to the requirements of *AASHTO M 85*, Type III and *ASTM C 150/C 150 M*, Type III.

701.05 PORTLAND-POZZOLAN CEMENT. Portland-Pozzolan Cement shall conform to the requirements of *AASHTO M 240 M/M 240* and *ASTM C 595/C 595 M*, Type IP, except that the pozzolan constituent shall not be less than 20% of the total mass (weight) of the Portland-pozzolan cement.

701.06 PORTLAND-LIMESTONE CEMENT. Portland-Limestone Cement shall conform to the requirements of *AASHTO M 240/M240 M* and *ASTM C 595/C 595 M*, Type IL.

701.07 PORTLAND BLAST-FURNACE SLAG CEMENT. Portland Blast-Furnace Slag Cement shall conform to the requirements of *AASHTO M 240 M/M 240* and *ASTM C 595/C 595 M*, Type IS, except that for concrete mixes complying with Table 541.03A, the slag constituent shall not be less than 25% of the total mass (weight) of the Portland Blast-Furnace Slag Cement.

701.08 TERNARY BLENDED CEMENT. Ternary Blended Cement shall conform to the requirements of *AASHTO M 240 M/M 240* and *ASTM C 595/C 595 M*, Type IT.

SECTION 702 – BITUMINOUS MATERIALS

702.06 APPLICATION TEMPERATURE RANGES is hereby modified by deleting Table 702.06A in its entirety and replacing it with the following:

TABLE 702.06A – EMULSIFIED ASPHALT APPLICATION TEMPERATURE RANGES

Emulsified Asphalt Type	Temperature Range (°F)		Temperature Range (°C)	
	Spray	Mix	Spray	Mix
	Min. – Max.	Min. – Max.	Min. – Max.	Min. – Max.
RS-1	70 – 170	--	21 – 77	--
RS-2, CRS-1	120 – 160	--	49 – 71	--
CRS-2	140 – 175	--	60 – 79	--
RS-1h, CRS-1h	70 – 170	--	21 – 77	--
SS-1h, CSS-1h	75 – 130	50 – 130	24 – 54	10 – 54
MS-2h, CMS-2h	--	75 – 140	--	24 – 60

702.07 ANTI-STRIP ADDITIVES is hereby modified by being deleted in its entirety and replaced with the following:

702.07 ANTI-STRIP ADDITIVES. Anti-strip additives shall be capable of improving the bonding properties of the performance-graded asphalt binder to the aggregates in the presence of moisture and shall also be capable of reducing film stripping.

(a) General. The anti-strip additive used in performance-graded asphalt cement shall be heat stable for all temperature ranges prescribed for such performance-graded asphalt cement. The anti-strip additive shall not alter the material properties nor change the grade of the performance-graded asphalt cement. The anti-strip additive shall be capable of thorough dispersion in the asphalt cement and be capable of remaining in the asphalt cement, in storage, and at temperatures specified for the mix, without losing its effectiveness. The percentage of anti-strip additive included in the mixture shall be as recommended by the anti-strip additive manufacturer.

(b) Performance Requirements. Bituminous concrete mixtures containing anti-strip additive shall demonstrate no loss of adhesion of the performance-graded asphalt cement to the aggregate when tested in accordance with *ASTM D 3625*.

SECTION 704 – AGGREGATES

704.01 FINE AGGREGATE FOR CONCRETE, subpart (b), is hereby modified by being deleted in its entirety and replaced with the following:

(b) Organic Impurities. Fine aggregate for concrete shall have an Organic Plate Number of two or less as determined in accordance with *AASHTO T 21*.

704.10 AGGREGATE FOR BITUMINOUS CONCRETE PAVEMENT, subpart (a), is hereby modified by inserting "If granite or quartzite aggregates are used, the requirements specified in Subsection 704.15 shall apply." as the second sentence of the first paragraph.

704.10 AGGREGATE FOR BITUMINOUS CONCRETE PAVEMENT, subpart (a), is hereby further modified by deleting the reference to "*ASTM C 295/C 295 M (Modified)*" from the end of the sentence that begins with "Manufactured sand may be substituted for..." and replacing it with "*AASHTO T 304*".

704.10 AGGREGATE FOR BITUMINOUS CONCRETE PAVEMENT, subpart (a)(3), is hereby modified by deleting the reference to "*ASTM D 5821*" from the end of the sentence that begins with "When crushed gravel is used as coarse aggregate in Marshall bituminous..." and replacing it with "*AASHTO T 335*".

704.10 AGGREGATE FOR BITUMINOUS CONCRETE PAVEMENT, subpart (a)(3)a., is hereby modified by deleting "Measurement is made using test method *ASTM D 5821, Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate*." and replacing it with "Measurement is made using test method *AASHTO T 335*."

704.10 AGGREGATE FOR BITUMINOUS CONCRETE PAVEMENT, Table 704.10D, is hereby modified by deleting the fifth row, which contains information on percent of wear, in its entirety.

704.11 AGGREGATE FOR BITUMINOUS SURFACE TREATMENT is hereby modified by being deleted in its entirety and replaced with the following:

704.11 THIS SUBSECTION RESERVED.

704.15 QUARTZITE OR GRANITE AGGREGATE USED IN PAVEMENTS is hereby modified by being deleted in its entirety and replaced with the following:

704.15 QUARTZITE OR GRANITE AGGREGATE USED IN PAVEMENTS. The Agency has identified the potential for loss of adhesion between performance-graded asphalt cement and granite and quartzite aggregates used in the production of bituminous concrete pavement.

(a) General. Loss of adhesion between performance-graded asphalt cement and aggregate is commonly referred to as "stripping." Anti-strip additives meeting the requirements of Subsection 702.07 may be used to reduce the potential for loss of adhesion between performance-graded binder and aggregate.

(b) Testing Procedures. Bituminous concrete mixtures containing monomineralic (a rock consisting essentially of one mineral) quartzite or granite aggregates shall demonstrate no loss of adhesion of the performance-graded asphalt cement to the aggregate when tested in accordance with *ASTM D 3625*. *ASTM D 3625* test results shall be submitted with any bituminous concrete mix design that utilizes monomineralic quartzite or granite aggregate sources in accordance with the latest bituminous concrete mix design submittal policy.

(c) Production Testing Procedures. To identify any change in stripping potential between the asphalt cement and the monomineralic quartzite or granite aggregate, any bituminous concrete mixture containing monomineralic quartzite or granite aggregate shall be tested in accordance with *ASTM D 3625* by the Contactor each week it is being produced. These weekly tests will be observed by Agency staff to verify that the mix does not exhibit stripping.

704.20 PROCESSED GLASS AGGREGATE is hereby made a new subsection of the specifications as follows:

704.20 PROCESSED GLASS AGGREGATE. Materials used to produce processed glass aggregate (PGA) shall consist of recycled glass food or beverage containers. PGA materials listed on the Agency's *Approved Products List* shall meet the following requirements:

(a) Grading. PGA shall be a crushed and screened material meeting the grading requirements of Section 5.2 and 5.5 of *AASHTO M 318*.

(b) Deleterious Content. Small amounts (less than 5% total) of china dishes, ceramics, plate (window or mirror) glass, or other glass products will be allowed in PGA. The PGA material shall not contain more than trace amounts of screw tops, plastic cap rings, or other contaminants. Amounts of contaminants greater than 1% by weight shall be grounds for rejection of the entire PGA batch.

(c) Hazardous Materials. Glass cullet shall be free of TV or other cathode ray tubes, fluorescent lightbulbs, and shall not meet the definition of hazardous waste as defined by the *Resource Conservation and Recovery Act* (*RCRA*), State, or local jurisdiction. Glass containers containing, or having contained, toxic or hazardous materials will not be allowed, and, when present, shall be grounds for rejecting the entire stockpile of PGA or PGA blends.

(d) Process Control. PGA materials shall be subjected to process control testing. Process control tests shall be performed at a minimum frequency of one test per 2,500 cubic yards of material produced by a stable process and shall demonstrate conformance with the requirements of Subsection 704.20(a), Subsection 704.20(b), and Subsection 704.20(c). A copy of each test result shall be made available to the Engineer upon request.

704.21 RECYCLED CONCRETE AGGREGATE is hereby made a new subsection of the specifications as follows:

704.21 RECYCLED CONCRETE AGGREGATE. Recycled concrete aggregate (RCA) shall consist of recycled concrete that has been crushed. RCA materials listed on the Agency's *Approved Products List* shall meet the requirements of *AASHTO M 319* and the following exceptions:

(a) Grading. RCA shall be crushed to aggregate dimensions of 6 inches or less.

(b) Deleterious Content. Small amounts of brick, block or mortar may be present in the RCA at a level not to exceed a total of 5% by weight. The RCA material shall not contain more than trace amounts of wire, steel or plastic that were associated with the original placement of the concrete, bituminous material, or unreacted cementitious materials. No additional wire, steel or plastic may be added to the RCA. No discernable amounts of oils, fats, soaps, surfactants, or organic contaminants shall be present in the RCA.

(c) Hazardous Materials. The recycled concrete aggregate shall not meet the definition of hazardous waste as defined by the *Resource Conservation and Recovery Act* (*RCRA*), State, or local jurisdiction. Concrete structures used to contain hazardous materials will not be allowed, and, when present, shall be grounds for rejection of the entire stockpile of RCA or RCA blends.

(d) Process Control. RCA materials shall be subjected to process control testing. Process control tests shall be performed at a minimum frequency of one test per 2,500 cubic yards of material produced by a stable process and shall demonstrate conformance with the requirements of Subsection 704.21(a), Subsection 704.21(b), and Subsection 704.21(c). A copy of each test result shall be made available to the Engineer upon request.

SECTION 706 – STONE FOR MASONRY, RIPRAP, AND OTHER PURPOSES

706.06 ROCK FILL FOR GABIONS is hereby modified by being deleted in its entirety and replaced with the following:

706.06 THIS SUBSECTION RESERVED.

SECTION 707 – JOINT MATERIALS

707.01 MORTAR, TYPE I, subpart (a), is hereby modified by adding "or Subsection 701.06." to the end of the first sentence.

707.14 PREFORMED JOINT FILLER, Table 707.14A, is hereby modified by deleting the reference to "*AASHTO T 42 /*" from the third column.

707.15 ASPHALTIC PLUG JOINTS FOR BRIDGES is hereby modified being deleted in its entirety and replaced with the following:

707.15 ASPHALTIC PLUG JOINTS FOR BRIDGES. Asphaltic Plug Joints for Bridges shall be single and/or multiple layer systems consisting of asphaltic binder, aggregate, closed cell foam expansion joint filler, and steel bridging plate, as applicable. Asphaltic Plug Joints shall be in accordance with *ASTM D 6297* and shall be one of the products listed on the Agency's *Approved Products List*.

707.17 ASPHALTIC PLUG JOINT BINDER is hereby made a new subsection of the specifications as follows:

707.17 ASPHALTIC PLUG JOINT BINDER. Asphaltic Plug Joint Binder shall be a thermoplastic polymeric-modified asphalt in accordance with *ASTM D 6297* and shall be one of the products listed on the Agency's *Approved Products List*.

SECTION 708 – PAINTS, STAINS, AND TRAFFIC MARKING MATERIALS

708.03 APROVED STRUCTURAL COATING SYSTEMS is hereby modified by being deleted in its entirety and replaced with the following:

708.03 STRUCTURAL STEEL COATING SYSTEMS. Acceptable structural steel coating systems shall be one of the systems listed on the Agency's *Approved Products List*, listed on the *NEPCOAT Qualified Products List B,* and shall meet the following requirements:

(a) System. The structural steel coating system shall be a three-coat system with a prime, intermediate, and top coat. Components of different systems shall not be intermixed.

(b) Color. Individual coats shall have contrasting colors. The finish color of the top coat shall be green, black, or brown as specified in the Contract Documents, and shall conform to *SAE AMS-STD 595* for the respective chip number as specified in Table 708.03A.

TABLE 708.03A – COLORS FOR STRUCTURAL COATING SYSTEMS

Color	Chip Number
Green	14062
Black	27038
Brown	20059

Damage to structural steel coating systems shall be repaired with a compatible structural steel coating system as specified herein.

708.06 PAINT FOR TRAFFIC SIGNS is hereby modified by being deleted in its entirety and replaced with the following:

708.06 THIS SUBSECTION RESERVED.

708.08 PAINT FOR PAVEMENT MARKINGS is hereby modified by adding the following two rows to Table 708.08C, immediately after the row for "Close cup flash point".

Viscosity	*ASTM D 562*	78 Krebs min./ 95 Krebs max.	78 Krebs min./ 95 Krebs max.
Dry Time	*ASTM D 711*	10 minutes max	10 minutes max.

708.09 OPTICS is hereby modified by being deleted in its entirety and replaced with the following:

708.09 THIS SUBSECTION RESERVED.

SUBSECTION 708.11 PAVEMENT MARKING TAPE is hereby modified by being deleted in its entirety and replaced with the following:

708.11 THIS SUBSECTION RESERVED

708.12 TEMPORARY DELINEATION SYSTEMS is hereby modified by being deleted in its entirety and replaced with the following:

708.12 TEMPORARY DELINEATION SYSTEMS.

(a) Line Striping Targets. Acceptable Line Striping Targets shall be one of the Line Striping Targets on the Agency's *Approved Products List*.

(b) Pavement Marking Mask. Acceptable Pavement Marking Mask shall be one of the Masking Marking Tapes on the Agency's *Approved Products List*.

SECTION 710 – CULVERTS, STORM DRAINS, AND SEWER PIPES, NONMETAL

710.03 CORRUGATED POLYETHYLENE PIPE is hereby modified by being deleted in its entirety and replaced with the following:

710.03 CORRUGATED POLYETHYLENE PIPE. CPEP shall be evaluated in accordance with the NTPEP HDPE pipe work plan and in compliance with the NTPEP audit program for thermoplastic pipe. CPEP shall be one of the products listed on the Agency's *Approved Products List* for the respective material specification.

(a) Corrugated Polyethylene Pipe, Unlined.

(1) Small Diameter. CPEP, Unlined, with a nominal diameter of 3 inches to 10 inches, inclusive, shall be in accordance with *AASHTO M 252*, Type C.

(2) Large Diameter. CPEP, Unlined, with a nominal diameter of 12 inches to 60 inches, inclusive, shall be in accordance with *AASHTO M 294*, Type C.

(b) Corrugated Polyethylene Pipe, Smooth Lined.

(1) Small Diameter. CPEP, Smooth Lined, with a nominal diameter of 3 inches to 10 inches, inclusive, shall be in accordance with *AASHTO M 252*, Type S.

(2) Large Diameter. CPEP, Smooth Lined, with a nominal diameter of 12 inches to 60 inches, inclusive, shall be in accordance with *AASHTO M 294*, Type S.

(c) Corrugated Polyethylene Pipe, Perforated. CPEP, Perforated shall be in accordance with *AASHTO M 252*, Type CP or Type SP.

Large diameter CPEP may be virgin, recycled materials, or a blend of both in accordance with *AASHTO M 294*.

710.07 CORRUGATED POLYPROPYLENE PIPE is hereby modified by being deleted in its entirety and replaced with the following:

710.07 CORRUGATED POLYPROPYLENE PIPE. CPPP shall be evaluated in accordance with the NTPEP polypropylene pipe work plan and in compliance with the NTPEP audit program for thermoplastic pipe. CPPP shall be one of the products listed on the Agency's *Approved Products List* for the respective material specification.

(a) Corrugated Polypropylene Pipe, Unlined. CPPP, Unlined shall be in accordance with *AASHTO M 330*, Type C.

(b) Corrugated Polypropylene Pipe, Smooth Lined. CPPP, Smooth Lined shall be in accordance with *AASHTO M 330*, Type S.

SECTION 711 – CULVERTS, STORM DRAINS, AND SEWER PIPES, METAL

711.02 CORRUGATED ALUMINUM ALLOY PIPE, PIPE ARCHES, AND UNDERDRAINS, subpart (a)(2)c., is hereby modified by deleting the phrase "requirements of Subsection 711.01(a)(2)c." and replacing it with the phrase "requirements of Subsection 711.01(a)(1)c."

SECTION 712 – CRIBBING MATERIALS

712.04 GABION BASKETS is hereby modified by being deleted in its entirety and replaced with the following:

712.04 THIS SUBSECTION RESERVED.

SECTION 713 – REINFORCING STEEL, STRAND, AND WELDED WIRE REINFORCEMENT

713.04 COLD DRAWN STEEL WIRE is hereby modified by deleting the reference to "*AASHTO M 32 M/M 32*"and replacing it with "*AASHTO M 336 M/M 336*".

713.05 WELDED WIRE REINFORCEMENT is hereby modified by deleting the phrase "*AASHTO M 55 M/M 55* or *AASHTO M 221 M/M 221*" and replacing it with "*AASHTO M 336 M/M 336*".

SECTION 714 – STRUCTURAL STEEL

714.01 GENERAL REQUIREMENTS is hereby modified by deleting the second sentence of the first paragraph, which begins with "All main load carrying members..." and ends with "...fracture critical steel, for Zone 2." and replacing it with "All main load carrying members and components of rolled or welded sections subject to tensile stress or the reversal of stresses, as well as any other members or components identified in the Contract as requiring CVN testing, shall meet the longitudinal Charpy V-Notch impact requirements specified in *AASHTO M 270 M/M 270*, Supplementary Requirement tables for non-fracture critical steel and fracture critical steel, for Zone 2."

714.01 GENERAL REQUIREMENTS is hereby further modified by deleting the second paragraph in its entirety. The deleted text begins with "Main members are..." and ends with "...as main load carrying members."

714.05 HIGH-STRENGTH BOLTS, NUTS, AND WASHERS is hereby modified by deleting the first sentence in its entirety and replacing it with the following:

High-strength bolts shall conform to the requirements of *ASTM F 3125/F 3125 M*, Grade A 325, including rotational capacity testing, for each lot of fasteners.

714.05 HIGH-STRENGTH BOLTS, NUTS, AND WASHERS is hereby further modified by deleting the word "painted" from the first sentence of the second paragraph and replacing it with the word "coated".

714.06 HEAT-TREATED STEEL STRUCTURAL BOLTS is hereby modified by deleting the first sentence of the first paragraph in its entirety and replacing it with the following:

Heat-treated steel structural bolts shall conform to the requirements of *ASTM F 3125/F 3125 M,* Grade A 490, including rotational capacity testing, for each lot of fasteners.

714.06 HEAT-TREATED STEEL STRUCTURAL BOLTS is hereby further modified by deleting the second sentence of the second paragraph in its entirety and replacing it with the following:

The combination of bolt, nut, and washer shall be coated in accordance with *ASTM F 3125/F 3125 M*.

714.10 WELDED STUD SHEAR CONNECTORS is hereby modified by deleting the phrase "*ANSI/AWS D1.5*, and *ASTM A 29/A 29 M*." and replacing it with the phrase "and *AASHTO/AWS D1.5*."

SECTION 719 – EPOXY RESIN MATERIALS

SECTION 719 – EPOXY RESIN MATERIALS is hereby modified by being deleted in its entirety and replaced with the following:

SECTION 719 – EPOXY RESIN MATERIALS

719.02 EPOXY BONDING SYSTEMS. Epoxy Bonding Systems shall be a Grade and Class adhesive conforming to the requirements of *AASHTO M 235/M 235 M*. Systems shall be evaluated in accordance with the NTPEP Epoxy and Resin Based Adhesive Bonding Systems workplan, be one of the products listed on the Agency's *Approved Products List,* and meet the following requirements:

(a) Epoxy Bonding System, Type IV. Type IV systems shall conform to the requirements of *AASHTO M 235/M 235 M* for Type IV adhesives. Type IV systems shall be for use in load-bearing applications for bonding hardened concrete to hardened concrete and other materials and as a binder for epoxy mortars and concretes.

(b) Epoxy Bonding System, Type V. Type V systems shall conform to the requirements of *AASHTO M 235/M 235 M* for Type V adhesives and shall bond freshly mixed concrete to steel. Type V systems shall be for use in load-bearing applications for bonding freshly mixed concrete to hardened concrete and freshly mixed concrete to steel.

(c) Epoxy Bonding System, Type VI. Type VI systems shall conform to the requirements of *AASHTO M 235/M 235 M* for type VI adhesives. Type VI systems shall be for bonding and sealing segmental precast elements, as in segment-by-segment erection and for span-by-span erection when temporary post tensioning is applied.

Elongation at break will not be required.

SECTION 720 – GEOTEXTILES

SECTION 720 – GEOTEXTILES is hereby modified by being deleted in its entirety and replaced with the following:

SECTION 720 – GEOTEXTILES

720.01 GENERAL. Geotextiles shall be evaluated in accordance with the NTPEP geotextiles work plan and in compliance with the NTPEP audit program for geotextiles. Geotextiles shall be one of the products listed on the Agency's *Approved Products List* for the respective material specification.

720.02 GEOTEXTILE FOR ROADBED SEPARATOR. Geotextile for Roadbed Separator shall conform to *AASHTO M 288,* Table 1, Class 1 for Geotextile Strength Property Requirements, and shall conform to *AASHTO M 288,* Table 3 for Separation Geotextile Property Requirements.

720.03 GEOTEXTILE UNDER RAILROAD BALLAST. Minimum Average Roll Values (MARV) for Geotextile Under Railroad Ballast shall be as required in Table 720.03A.

TABLE 720.03A – MARV FOR GEOTEXTILE UNDER RAILROAD BALLAST

Geotextile Property	Test Method	MARV
Elongation Criteria at Failure [1]	*ASTM D 4632/ D4632 M*	≥ 50%
Grab Strength (lbs)	*ASTM D 4632/ D4632 M*	225
Tear Strength (lbs)	*ASTM D 4533/ D 4533 M*	115
Puncture Strength (lbs)	*ASTM D 6241*	850
Permittivity (s^{-1})	*ASTM D 4491/ D 4491 M*	0.70
Apparent Opening Size (mm)	*ASTM D 4751*	0.212 max. (No. 70 Sieve)
UV Resistance (% Strength Retained)	*ASTM D 4355/ D 4355 M*	70% at 500 hours of exposure
Structure	--	Nonwoven only

[1] Elongation corresponds to Maximum Grab Tensile Strength as measured in accordance with the requirements of *ASTM D 4632/D 4632 M.*

720.04 GEOTEXTILE UNDER STONE FILL. Geotextile Under Stone Fill shall conform to *AASHTO M 288,* Table 1, Class 1 for Geotextile Strength Property Requirements, and shall conform to *AASHTO M 288,* Table 5 for Stabilization Geotextile Property Requirements. Geotextile structure shall not be slit film.

720.05 GEOTEXTILE FOR UNDERDRAIN TRENCH LINING. Geotextile for Underdrain Trench Lining shall conform to *AASHTO M 288*, Table 1, Class 3 for Geotextile Strength Property Requirements, with a minimum elongation of 20%. Geotextile for Underdrain Trench Lining shall conform to *AASHTO M 288*, Table 2 (> 50% of in situ soil passing the No. 200 (0.075 mm) sieve) for Subsurface Drainage Geotextile Requirements. Geotextile structure shall be nonwoven and shall not be slit film.

720.06 GEOTEXTILE FOR FILTER CURTAIN. Minimum Average Roll Values (MARV) for Geotextile for Filter Curtain shall be as required in Table 720.06A.

TABLE 720.06A – MARV FOR GEOTEXTILE FOR FILTER CURTAIN

Geotextile Property	Test Method	MARV
Elongation Criteria at Failure [1]	*ASTM D 4632/ D4632 M*	20% max.
Grab Strength (lbs)	*ASTM D 4632/ D4632 M*	200
Tear Strength (lbs)	*ASTM D 4533/ D 4533 M*	50
Puncture Strength (lbs)	*ASTM D 6241*	430
Permittivity (s^{-1})	*ASTM D 4491/ D 4491 M*	0.28
Apparent Opening Size (mm)	*ASTM D 4751*	0.212 max. (No. 70 Sieve)
UV Resistance (% Strength Retained)	*ASTM D 4355/ D 4355 M*	70% at 500 hours of exposure
Structure	--	Woven only

[1] Elongation corresponds to Maximum Grab Tensile Strength as measured in accordance with the requirements of *ASTM D 4632/D 4632 M*.

720.07 GEOTEXTILE FOR SILT FENCE. Geotextile for Silt Fence shall conform to *AASHTO M 288*, Table 8 for Temporary Silt Fence Property Requirements. Geotextile structure shall be woven.

SECTION 725 – CONCRETE CURING MATERIALS AND ADMIXTURES

725.01 CONCRETE CURING MATERIALS, subpart (d), is hereby modified by being deleted in its entirety and replaced with the following:

(d) Liquid Membrane-Forming Compounds. Liquid membrane-forming compounds shall be one of the products listed on the Agency's *Approved Products List* and shall meet the following requirements:

(1) Liquid membrane-forming compounds shall be evaluated in accordance with the NTPEP concrete curing compounds work plan.

(2) Liquid membrane-forming compounds shall conform to the requirements of *ASTM C 309*, Type 1-D or Type 2, Class B.

(3) Liquid membrane-forming compounds shall not be allowed to freeze.

725.02 CHEMICAL ADMIXTURES, subpart (b), is hereby modified by being deleted in its entirety and replaced with the following:

(b) Silica Fume. Silica fume shall conform to the requirements of *AASHTO M 307* and be one of the products listed on the Agency's *Approved Products List.* Silica fume shall be delivered in containers clearly labeled with the manufacturer's name, mass (weight) of the silica fume, if densified or undensified, and if wet or dry.

725.03 MINERAL ADMIXTURES, subpart (b), is hereby modified by being deleted in its entirety and replaced with the following:

(a) General Requirements. Non-bulk quantities of chemical admixtures shall be delivered in the manufacturer's original containers marked with the manufacturer's name and product name. Bulk quantities shall be accompanied by a delivery slip indicating both the manufacturer's name and the product name. Chemical admixtures shall be one of the products listed on the Agency's *Approved Products List* for the respective material specification, shall be evaluated in accordance with the NTPEP concrete admixtures work plan, and shall meet the requirements of the respective material specification below.

SECTION 726 – PROTECTIVE COATINGS AND WATERPROOFING MATERIALS

726.08 GALVANIZING is hereby modified by deleting the second sentence, which begins with "Galvanizing that has been damaged...", in its entirety.

726.08 GALVANIZING is hereby further modified by adding the following as a new second paragraph:

Zinc coating that has been damaged shall be repaired in accordance with the requirements of *ASTM A 780/A 780 M,* Annex A2. The paint used in the repair shall be organic rich, containing a minimum of 92% zinc by mass (weight) in the dry film. The paint shall be applied per the manufacturer's recommendations to a thickness equivalent to the surrounding zinc coating.

726.09 METALIZING is hereby modified by being deleted in its entirety and replaced with the following:

726.09 METALIZING. Surfaces to be metalized shall be prepared and coated in accordance with the requirements of *AASHTO/NSBA S8.2/SSPC-PA 18, Specification for Application of Thermal Spray Coating Systems to Steel Bridges*, and the following:

(a) The coating shall be zinc with a minimum purity of 99.9%.

(b) All surfaces to be thermal sprayed shall be blast-cleaned to white metal immediately prior to metalizing. The final surface appearance shall be equivalent to Preparation Grade *SSPC-SP 5* supplemented by *SSPC-VIS 1*. All surfaces shall also have a uniform surface profile of 3.5 to 5.5 mils. If the profile requirements of the coating manufacturer are more restrictive, the Fabricator shall advise the Structural Steel Fabrication Engineer and comply with the more restrictive requirements.

The surface profile produced by the Fabricator's surface preparation procedures shall be determined by replica tape and spring micrometer (*ASTM D 4417*, Method C), for each nozzle used at the beginning of the work, and each shift that the surface preparation is performed. The replica tape shall be attached to the daily inspection records. Areas having unacceptable measurements shall be further tested to determine the limits of the deficient area and subsequently corrected to meet specification requirements. Additional profile measurements required by *SSPC-PA 18* shall be performed according to the requirements of *ASTM D 4417*, Method B or Method C.

(c) Thermal Spray Coating (TSC) shall be applied within six hours of completing blast cleaning. If this time is exceeded, or rust appears on the surface, the steel surface shall be properly prepared again. TSC shall be applied in the thickness range of 8 to 12 mils to all exterior surfaces. Internal surface (e.g. pot bearings) shall have a coating with a minimum thickness of 2 mils.

(d) Exterior surfaces (except faying surfaces) shall be sealed with an approved sealant conforming to the sealant manufacturer's recommendations for the TSC applied. The sealant name, manufacturer, and product data sheets shall be included with the submittal for the metalizing procedure. Unless otherwise specified in the Contract, a top coat will not be applied over the seal coat, and therefore the seal coat shall be UV-resistant. The dry film thickness of the sealant shall be 1 to 2 mils. The sealant shall be applied within 8 hours of completing the TSC application.

(e) In addition to the requirements above, the following shall also apply:

(1) QA witnessing of Job Reference Standard(s) is required, when applicable

(2) Companion coupons shall be used in lieu of destructive testing on the work piece, except when a test failure occurs. If more than one thermal spray equipment setup is to be used in production, the frequency requirements apply to each one.

(3) Bend tests shall be performed for each thermal spray unit. The tests shall meet the requirements of *AWS C2.23*.

(f) Inaccessible areas, as well as metalizing that has been damaged in the field, shall be repaired in accordance with the requirements of Subsection 726.08. The repair coating shall be brush applied.

726.11 WATERPROOFING MEMBRANE SYSTEMS is hereby modified by being deleted in its entirety and replaced with the following:

726.11 WATERPROOFING MEMBRANE SYSTEMS. Waterproofing Membrane Systems shall be one of the products listed on the Agency's *Approved Products List* and shall meet the following requirements for the respective material specification.

(a) Waterproofing Membrane System, Type I. Waterproofing Membrane System, Type I shall be a Type I cold applied elastomeric system in accordance with *ASTM D 6153*.

(b) Waterproofing Membrane System, Type II. Waterproofing Membrane System, Type II shall be a Type II hot applied elastomeric system in accordance with *ASTM D 6153*.

(c) Waterproofing Membrane System, Type III. Waterproofing Membrane System, Type III shall be preformed sheet system for below-grade applications and shall meet the following requirements:

(1) Permeability. Permeability shall meet the requirements of *ASTM D6153*, Table 1.

(2) Adhesion. The system shall adhere to vertical surfaces.

SECTION 731 – BEARING PADS FOR STRUCTURES

731.03 ELASTOMERIC MATERIAL is hereby modified by deleting the word "*Design*" from the first sentence and replacing it with the word "*Construction*".

SECTION 732 – RAILING MATERIALS

732.01 METAL HAND RAILING is hereby modified by adding "or *ASTM A 500/A 500 M*, Grade B." to the end of the first sentence.

732.03 GALVANIZED BOX BEAM BRIDGE RAILING is hereby modified by being deleted in its entirety and replaced with the following:

732.03 GALVANIZED BOX BEAM BRIDGE RAILING.

(a) Structural Steel Tubing. Tubing for posts, rails, and rail splices shall conform to the requirements of *ASTM A 500/A 500 M,* Grade B, except as modified below:

(1) The manufacturer shall test both welded and formed tubular material for the physical properties specified. Results of all tests shall be submitted with material certifications.

(2) Welds shall be sound, free from defects, and have no repairs. Transverse mill welds will not be permitted.

(3) Longitudinally-welded tubing shall have a tensile strength of 58,000 psi when tested in accordance with the requirements of *ASTM E 8/E 8 M*.

(4) A traceable identification number shall be placed on each piece of material in a form that can be read after the galvanizing process. Quantities of the same item made from the same heat numbers are allowed to be packaged together with a single identification.

(5) Posts and rails shall be CVN tested in accordance with *AASHTO T 243*, Frequency H testing. Full size 3/8 inch × 3/8 inch specimens shall be used whenever thickness permits. Sub-size specimens may be used when material thickness is less than 3/8 inch. The average energy absorbed by a sub-sized specimen shall be prorated for the actual thickness of the specimen. The average energy absorbed by a full-size specimen shall be not less than 15 foot-pounds force at 0°F.

(b) Structural Carbon Steel (Non-Tubular).

(1) Structural carbon steel for posts, baseplates, and rail splices shall meet the requirements of *ASTM A 572/A 572 M*, Grade 50 or *AASHTO M 270 M/M 270*, Grade 345 (Grade 50). Posts and baseplates shall be CVN tested in accordance with *AASHTO T 243*, Frequency H testing. Full size 3/8 inch × 3/8 inch specimens shall be used whenever thickness permits. Sub-size specimens may be used when material thickness is less than 3/8 inch. The average energy absorbed by a sub-sized specimen shall be prorated for the actual thickness of the specimen. The average energy absorbed by a full-size specimen shall be not less than 15 foot-pounds force at 40°F.

(2) Structural carbon steel for anchor plates shall conform to the requirements of *AASHTO M 270 M/M 270*, Grade 250 (Grade 36) or *ASTM A 36/A 36 M*.

(3) Structural carbon steel for angles shall conform to the requirements of *AASHTO M 270 M/M 270*, Grade 345 (Grade 50) or *ASTM A 572/A 572 M, Grade 50*.

(c) Bolts, Nuts, and Washers. Bolts, nuts, and washers for railing and rail-to-post connections shall conform to the requirements of Subsection 714.04. Lock washers shall be high-carbon heat-treated spring steel conforming to the requirements of *ASME D18.2*.

(d) Anchor Bolts, Nuts, and Washers. Anchor bolts, nuts, and washers shall conform to the requirements of Subsection 714.07.

732.04 STEEL BEAM BRIDGE RAILING is hereby modified by being deleted in its entirety and replaced with the following:

732.04 STEEL BEAM BRIDGE RAILING.

(a) Beam Guardrail. Beam guardrail for bridge railing shall conform to the requirements of Subsection 728.02. The beam guardrail shall be Class B type.

(b) Steel Tubing. Tubular steel backing material for steel beam bridge railing shall conform to the requirements of *ASTM A 500/A 500 M,* Grade B. Splice material shall conform to Subsection 732.04(c).

(c) Steel Posts and Components. Posts, baseplates, offset blocks, brackets, washers, and other steel components shall be structural carbon steel conforming to the requirements of the following Standards: *AASHTO M 270 M/M 270,* Grade 345W (Grade 50W), *or ASTM A 588/A 588 M, or ASTM A 572/A 572 M,* Grade 345 (Grade 50), or *AASHTO M 270 M/M 270,* Grade 345 (Grade 50). Posts, baseplates, and post mounting brackets or components shall be CVN tested for impact properties in accordance with AASHTO T 243, Frequency H testing. Full size 3/8 inch × 3/8 inch specimens shall be used whenever thickness permits. Sub-size specimens may be used when material thickness is less than 3/8 inch. The average energy absorbed by a sub-sized specimen shall be prorated for the actual thickness of the specimen. The average energy absorbed by a full-size specimen shall be not less than 15 foot-pounds force at 40°F.

(d) Steel Pipe. Steel pipe for anchor bolt sleeves shall conform to the requirements of Subsection 740.05.

(e) Anchor Bolts, Nuts, and Washers. Anchor bolts, nuts, and washers shall conform to the requirements of Subsection 714.07.

SECTION 751 – DELINEATORS

751.01 DELINEATOR POSTS, subpart (b), is hereby modified by being deleted in its entirety and replaced with the following:

(b) Flexible Delineators. Flexible delineators shall be one of the products listed on the Agency's *Approved Products List* and meet the following requirements:

(1) Shall be in accordance with the *MUTCD* for Tubular Markers for use on high-speed highways or nighttime use.

(2) Shall be *MASH* compliant with self-certification from the manufacturer.

(3) Shall be surface mounted.

SECTION 753 – HIGHWAY ILLUMINATION

753.04 BRACKET ARMS is hereby modified by being deleted in its entirety and replaced with the following:

753.04 BRACKET ARMS.

(a) Bracket Arms, Aluminum. Single member bracket arms and the main member of truss-type arms shall be fabricated from seamless aluminum tube conforming to the requirements of *ASTM B 221/B 221 M,* Alloy 6063-T6 or Alloy 6061-T6. Other members of truss-type arms shall conform to the requirements of *ASTM B 221/B 221 M,* Alloy 6063-T6. All screws, nuts, bolts and other hardware for mounting bracket arms to the light pole shall be stainless steel, unless otherwise specified.

(b) Bracket Arms, Steel. Components of single member and truss-type bracket arms shall be fabricated from standard steel pipe meeting the requirements of *ASTM A 53/A 53 M* or *ASTM A 501/A 501 M*.

753.05 LUMINAIRES is hereby modified by being deleted in its entirety and replaced with the following:

753.05 LUMINAIRES. All luminaires shall be 120 V and shall be one of the products listed on the Agency's *Approved Products List*.

SECTION 754 – PAVEMENT MARKING MATERIALS

SECTION 754 – PAVEMENT MARKING MATERIALS is hereby made a new section of the specifications as follows:

SECTION 754 – PAVEMENT MARKING MATERIALS

754.01 OPTICS. Optics shall be beads or elements incorporated into pavement markings so as to produce reflectorized pavement markings. Optics shall be one of the products listed on the Agency's *Approved Product List* for the respective material specification and shall meet the following requirements.

(a) Optics, Type I. Optics, Type I shall be standard optics consisting of glass beads free from carbon residue. Optics, Type I shall conform to the requirements of *AASHTO M* 247, Type 1, except as modified below.

(1) Roundness. Roundness shall be a minimum of 80% true spheres, as determined in accordance with *ASTM D 1155*.

(2) Moisture Resistance. Optics shall be moisture resistant in accordance with *AASHTO M 247*.

(3) Chemical Resistance. Optics shall be resistant to hydrochloric acid, water, calcium chloride, and sodium sulfide in accordance with Section 4.3.6 to Section 4.3.9 of *Federal Specification TT-B-1325D.*

(b) Optics, Type II. Optics, Type II shall be premium optics consisting of virgin glass beads or a mixture of virgin glass beads and direct melt glass beads, with a maximum of 50% direct melt glass beads. All glass beads shall be free from carbon residue. Optics, Type II shall conform to the requirements of *AASHTO M 247* except as modified below.

(1) Gradation. Optics shall have a maximum size of 1.45 mm and minimum size of 0.18 mm as determined in accordance with *ASTM D 1214*.

(2) Roundness. Roundness shall be a minimum of 80% true spheres, as determined in accordance with *ASTM D 1155*.

(3) Refractive Index.

a. Refractive index shall be 1.5 to 1.7, inclusive, as determined in accordance with *AASHTO T 346*, or;

b. Refractive index shall be above 1.7 with all beads above the No. 18 (1.00 mm) sieve having an average hardness of C70.5 as determined in accordance with the Rockwell C scale method, with a minimum sampling of 100 glass beads.

(4) Moisture Resistance. Optics shall be moisture resistant in accordance with *AASHTO M 247*.

(5) Chemical Resistance. Optics shall be resistant to hydrochloric acid, water, calcium chloride, and sodium sulfide in accordance with Section 4.3.6 to Section 4.3.9 of *Federal Specification TT-B-1325D.*

(c) Optics, Type III. Optics, Type III shall be wet reflective optics consisting of a composite material. Pavement markings containing Optics, Type III shall demonstrate retroreflective properties in accordance with Section 646, for the respective pavement marking material type.

754.02 THIS SUBSECTION RESERVED.

754.03 PAVEMENT MARKING TAPE. Pavement marking tape is a white or yellow preformed retroreflective tape. Pavement marking tape shall be evaluated in accordance with the applicable NTPEP pavement marking materials work plan, with a minimum of one year of data for permanent tape and a full data set for temporary tape, listed on the Agency's *Approved Product List* for the respective material specification, and meet the following requirements.

(a) Pavement Marking Tape, Type A. Pavement Marking Tape, Type A shall be a high performance and extended service life pavement marking tape in accordance with *ASTM D 4505*. The tape shall have continuous wetting properties and meet the following requirements.

(1) Skid Resistance. Skid resistance shall be Skid Resistance Level A in accordance with *ASTM D 4505*.

(2) Adhesive. Adhesive shall be Class I, II, or III in accordance with *ASTM D 4505*.

(3) Durability. Initial durability shall be 10 and three-year durability shall be a minimum of 7 as determined in accordance with *ASTM D 913*.

(4) Retroreflectivity.

a. Dry. Initial dry retroreflectivity shall be Reflectivity Level I in accordance with *ASTM D4505*. Three-year retroreflectivity shall be a minimum of 150 mcd/m^2/lx for white and 100 mcd/m^2/lx for yellow as determined in accordance with *ASTM E 1710*.

b. Wet. Initial wet retroreflectivity shall be a minimum of 250 mcd/m^2/lx for white and 200 mcd/m^2/lx for yellow. Three-year wetness retroreflectivity shall be a minimum of 150 mcd/m^2/lx for white and 75 mcd/m^2/lx for yellow as determined in accordance with *ASTM E 2177*.

c. Wet Continuous. Wet continuous retroreflectivity shall be a minimum of 150 mcd/m^2/lx for white and 100 mcd/m^2/lx for yellow in accordance with *ASTM E 2832*.

(b) Pavement Marking Tape, Type B. Pavement Marking Tape, Type B shall be a standard performance pavement marking tape in accordance with *ASTM D 4505*.

(1) Skid Resistance. Skid resistance shall be Skid Resistance Level A in accordance with *ASTM D 4505*.

(2) Adhesive. Adhesive shall be Class I, II, or III in accordance with *ASTM D 4505*.

(3) Durability. Initial durability shall be 10 and three-year durability shall be a minimum of 7 as determined in accordance with *ASTM D 913*.

(4) Retroreflectivity. Initial dry retroreflectivity shall be Level II in accordance with *ASTM D 4505*.

(c) Pavement Marking Tape, Type C. Pavement Marking Tape, Type C shall be a temporary pavement marking tape in accordance with *ASTM D 4592* and the following requirements.

(1) Retroreflectivity. Initial wet retroreflectivity shall be a minimum of 250 mcd/m^2/lx for white and 200 mcd/m^2/lx for yellow.

SECTION 755 – LANDSCAPING MATERIALS

755.12 PLANT MATERIALS, subparts (a) and (b), are hereby modified by being deleted in their entirety and replaced with the following:

(a) Quality of Plant Material. All plants shall be first-class representatives of their normal species or varieties, unless otherwise specified.

All plant materials shall be nursery grown stock that have been transplanted or root-trimmed two or more times, according to the kind and size of plants. They shall have average or normal, well-developed branches, together with vigorous root systems. Plant materials shall be free of insects, disease, sun scald, injuries, abrasions of the bark, knots, dead or dry wood, broken terminal growth, or other objectionable disfigurements. Thin, weak plants shall not be acceptable. Plant materials shall display the appearance of normal health and vigor in strict accordance with these specifications.

Each shipment shall be accompanied by a description of all the included plant materials or an itemized bill of lading.

The plant supplier shall certify that all plant materials were grown in a hardiness zone that is the same or colder than the project site's hardiness zone as established by the current *U.S. Department of Agriculture Plant Hardiness Zone Map*. The certification shall be identified in such a manner as to be directly traceable to the individual shipment. Plants that are not certified to have been grown under the designated hardiness zone conditions will not be accepted.

(b) Plant Names. All scientific and common plant names of the items specified shall be names accepted by the *Integrated Taxonomic Information System.* All plant materials delivered shall be true to name and legibly tagged with the names and sizes of materials.

Should it be necessary to substitute a plant or plants of a different variety than the plant material specified, it will be necessary for the Contractor to secure written approval from the Engineer for the proposed substitution prior to digging the plants. An approved substitute plant shall be of a value at least equal to the specified plant for which the substitution is being made and then only when sufficient evidence is shown that the plant specified cannot be obtained.

755.12 PLANT MATERIALS is hereby modified by changing the name of subpart (e) from "Balled and Burlapped Plants (B&B)." to "Balled and Burlapped (B&B) Plants."

755.12 PLANT MATERIALS, subpart (e), is hereby modified by deleting "," (a comma) after the word "possible" in the first sentence of the first paragraph.

755.12 PLANT MATERIALS, subpart (e), is hereby further modified by inserting the word "square" after the word "per" in the first sentence of the second paragraph.

755.12 PLANT MATERIALS, subpart (f), is hereby modified by being deleted in its entirety.

SECTION 780 – CONCRETE REPAIR MATERIALS

SECTION 780 – CONCRETE REPAIR MATERIALS is hereby modified by being deleted in its entirety and replaced with the following:

SECTION 780 – REPAIR MATERIALS

780.01 CONCRETE REPAIR MATERIALS. Concrete Repair Material shall be a prepackaged material and shall be one of the products listed on the Agency's *Approved Products List.*

(a) Concrete Repair Material, Type I. Concrete Repair Material, Type I shall be evaluated in accordance with the NTPEP Rapid Set Concrete Patching Materials work plan, be a neat (having less than 5% aggregate retained on the 3/8 inch (9.50 mm) sieve) overhead and vertical repair material, and meet the following requirements:

(1) Compressive Strength. The neat material shall have a minimum 7-day compressive strength of 2,000 psi and a minimum 28-day compressive strength of 4,000 psi as determined in accordance with *AASHTO T 106 M/T 106*.

(2) Bond Strength by Direct Tension. The material shall have a minimum bond strength of 150 psi as determined in accordance with *ASTM C 1583/C 1583 M* at 28 days, or sooner.

(3) Freeze-Thaw Durability. The material shall have a minimum durability factor of 80, after 300 cycles, as determined in accordance with *AASHTO T 161*, Procedure A.

(4) Length Change. The material shall meet the performance requirements of *ASTM C 928/ C 928 M* as determined in accordance with *AASHTO T 160*.

(5) Chloride Ion Penetration. The material shall exhibit a chloride ion penetrability of "low", or less, as determined in accordance with *AASHTO T 277* or *AASHTO T 358*.

(b) Concrete Repair Material, Type II. Concrete Repair Material, Type II shall be evaluated in accordance with the NTPEP Rapid Set Concrete Patching Materials work plan, be a horizontal rapid setting repair material, and meet the requirements of Subsection 780.01(a) except as modified below:

(1) Compressive Strength. The neat material shall have a minimum 3-hour compressive strength of 1,200 psi and a minimum 7-day compressive strength of 5,000 psi as determined in accordance with *AASHTO T 106 M/T 106*.

(c) Concrete Repair Material, Type III. Concrete Repair Material, Type III shall be evaluated in accordance with the NTPEP Rapid Set Concrete Patching Materials work plan, be a horizontal rapid setting repair material, and meet the requirements of Subsection 780.01(a) except as modified below:

(1) Compressive Strength. The neat material shall have a minimum 3-hour compressive strength of 1,200 psi, a minimum 1-day compressive strength of 2,900 psi, and a minimum 7-day compressive strength of 5,000 psi as determined in accordance with *AASHTO T 22*.

(2) Aggregate. The material shall contain greater than 5% coarse aggregate (aggregate contained on the 3/8 inch (9.50 mm) sieve). Coarse aggregate may be contained in the prepackage material (extended), or material of the type and quantity specified by the manufacturer may be added to the prepackaged material (extendable).

(d) Concrete Repair Material, Type IV. Concrete Repair Material, Type IV shall be an overhead, vertical, or horizontal polymer repair material meeting the following requirements:

(1) Compressive Strength. The neat material shall have a minimum 3-hour compressive strength of 1,200 psi and a minimum 7-day compressive strength of 5,000 psi as determined in accordance with *ASTM C 579*.

(2) Bond Strength by Direct Tension. The material shall have a minimum bond strength of 150 psi as determined in accordance with *ASTM C 1583/C 1583 M* at 28 days, or sooner.

(3) Linear Shrinkage. The material shall have a maximum linear shrinkage of 0.15% as determined in accordance with *ASTM C 531*.

(4) Chloride Ion Penetration. The material shall exhibit a chloride ion penetrability of "Low", or less, as determined in accordance with *AASHTO T 277*.

ALPHABETICAL INDEX OF PAY ITEMS

The index entry “406.38 Hand-Placed Bituminous Concrete Pavement, Drives..... Square Yard” is hereby modified by deleting the word “Pavement” and replacing it with the word “Material”.

The index is hereby modified by adding an entry for “418.10 Asphaltic Approach Material..... Square Foot”.

The index entry for “646.75 Raised Pavement Markers, Type II..... Each” is hereby modified by being deleted in its entirety.

The index is hereby modified by adding an entry for “690.50 Price Adjustment, Fuel (N.A.B.I.)..... Lump Unit”.