S T A T E **O F** **T E N N E S S E E**

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March 1, 2006

Supplemental Specifications - Section 600

of the

Standard Specifications for Road and Bridge Construction

March 1, 2006

Subsection 602.05 (d) Paragraph one, **Change** 1125°F to 1100°F, **Change** 600°C to 593°C, **Change** the acronym, **ASSHTO** to **AASHTO**

Subsection 602.05 (d) Paragraph one, eighth sentence, and in the table below paragraph one, **Delete** the following:

Grades 70W, 100 and 100W, and **Replace** with Grades HPS70W, and HPS100W

Subsection 602.05 (d) Paragraph one, eighth sentence **Delete** "only under rigidly controlled procedures" and **Replace** with the following:

"as set forth in the **AASHTO** Guide Specification for Highway Bridge Fabrication with High Performance Steel", current edition and the **AASHTO** "Bridge Welding Code", current edition.

Subsection 602.05 (d) Paragraph two, first sentence, **Add** "or either"

"temperature indicating crayons, liquids, or either contact or non-contact…"

Subsection 602.05 (e) 3 First paragraph, **Delete** the first sentence and **Replace** with the following

"The heat-curving operation shall be conducted in such a manner that the temperature of the steel does not exceed 1200°F (649°C) for Grades 36, 50, 50W and HPS50W; and 1100°F (593°C) for Grades HPS70W and HPS100W as measured by temperature-indicating crayons or other suitable means."

Section 602.17 Delete all references to **AASHTO M 253 (ASTM A 490**) bolts unless otherwise noted on the plans.

Subsection 602.17 (D) Delete the first sentence and replace with the following

"The following provisions apply when high strength bolts are installed in the field or shop."

Table 602.17 A-BOLT TENSION, page 352 Delete the table conversion values for kilograms

Replace with (Newton) values

TABLE 602.17A-BOLT TENSION
Minimum Bolt Tension (1)
in Pounds (Newton)

Bolt Size in inches(mm)	**AASHTO M 164** (**ASTM A 325**) Bolts	**AASHTO M 253** (**ASTM A 490**) Bolts
1/2(13 mm)	12,000(53,379)	15,000(66,723)
5/8(16 mm)	19,000(84,516)	24,000(106,757)
3/4(19 mm)	28,000(124,550)	35,000(155,688)
7/8(22 mm)	39,000(173,481)	49,000(217,963)
1(25 mm)	51,000(226,859)	64,000(284,686)
1-1/8(28 mm)	56,000(249,100)	80,000(355,858)
1-1/4(32 mm)	71,000(315,824)	102,000(453,719)
1-3/8(35 mm)	85,000(378,099)	121,000(538,235)
1-1/2(38 mm)	103,000(458,167)	148,000(658,337)

Subsection 602.17(E) 1 b7 Change "bolt diameter", and "(kips) number", in the table

"(in) 1-1/6 to 1-1/2", "(kips) 42 to 45"

Subsection 602.17(E) 2(a) 2. Change "16mm" to "1.6mm"

Subsection 602.17(E) 2 (b) 5. Change some information in table

1/2 rotation: **Change** "≥ 8 x" to, "≤ 8 x bolt dia."

2/3 rotation: **Change** "≥ 8 x" to, "> 8 x but < 12 x bolt dia."

Subsection 602.17(E) 2 (b) 6. (**Change** some information in table)

Bolt Length (measured in Step 1	4 x bolt dia. or less	> 4 bolt ≤ 8 x bolt dia.	> 8 x bolt dia.
Required Rotation	2/3	1	1-1/3

Subsection 602.19-Welds. Include the following as revisions to the **AASHTO/AWS** "Bridge Welding Code"

Delete 6.1.3.4(1) and 6.1.3.4(2)

Subsection 602.19-Welds. First paragraph, page 363; **Add** the word "joint";

"Complete joint penetration groove welds…"

Subsection 602.26 (b); Replace the "**THICKNESS IN INCHES (MILLIMETERS)"** Table with the following

MINIMUM COLD-BENDING RADII				
Thickness Inches (t)	Up to 3/4	Over 3/4 to 1, incl.	Over 1 to 2, incl.	Over 2
36	1.5t	1.5t	1.5t	2.0t
50	1.5t	1.5t	2.0t	2.5t
50W	1.5t	1.5t	2.0t	2.5t
HPS70W	1.5t	1.5t	2.5t	3.0t
100	1.75t	2.25t	4.5t	5.5t
100W	1.75t	2.25t	4.5t	5.5t

Subsection 602.26 (b) Second paragraph, after the Table, **Change** "HPS100W" to "HPS70W"

and **Change** "1125°F" to "1100°C", and "607°C" to "593°C"

Subsection 602.29 First paragraph, last sentence, **Change** "56°C" to "38°C"

Subsection 602.29 Third paragraph, last sentence, **Change** the last sentence to read as follows

"The holding temperature for stress relieving **ASTM** A709 Grade HPS70W HPS100W steels shall not exceed 1100°F (593°C)."

Subsection 602.29 Fourth paragraph, first sentence, **Delete** "Section 4.4" after the wording; and **Replace** with "paragraph 3.9", **Delete** AWS D1.1 and **Replace** with **AASHTO/AWS** D1.5 "Bridge Welding Codes"

Subsection 602.35 Fifth paragraph, **Delete** reference to "Table 602.35"

Subsection 602.35 (b), **Delete** this section

Section 602.39- Add the following as the last paragraph

Shear Stud Connectors - After the beams have been erected, the contractor shall be required to attach the shear stud connectors in compliance with OSHA standards. The studs shall be installed in the locations shown in the plans. The contractor will be required to install and test shear studs in accordance with the latest version of AASHTO/AWS D1.5M/D1.5, Chapter 7 Stud Welding. The surface receiving the studs shall be cleaned by shot blasting or grinding to a bright metal surface immediately prior to welding. All studs shall be welded using automatically timed stud welding equipment only. At the beginning of each day or shift each individual welder/operator and equipment must complete the Production Control/ Pre-production testing as stated in section 7.7.1. Only individuals who repeatedly demonstrate satisfactory installation shall be allowed to install the shear studs. The contractor is responsible for the quality of all welds.

The Department shall inspect and randomly test the welds before any reinforcing steel is placed.

Subsection 602.41 Last sentence, **Add** the wording "Plans and"

"in accordance with **Subsection 105.02**, Plans and Working Drawings."

602.41 Replace entire subsection with the following:

602.41-Temporary Supports. Temporary supports for steel beam erection shall be properly designed, constructed and maintained to support the loads to which they will be subjected. The Contractor shall prepare and submit to the Engineer construction drawings for temporary supports and working drawings for changes in any existing structure necessary for safely maintaining traffic, in accordance with Subsection 105.02, Plans and Working Drawings.

Subsection 602.42 Add " and stamped" after "prepared" in the first sentence.

Subsection 602.43 (a) Change the third sentence to read as follows:

"In no case shall the maximum temperature of the **ASTM** A 709 Grade HPS100W, and the HPS70Wsteels exceed 1100°F (593°C)."

Subsection 602.43 (a) Add the following to the end of the first paragraph;

"or infrared thermometers (conductor or non-conductor)

Subsection 602.43 (b) Add the wording "HPS70W, and HPS100W," after the word "Grade"

Subsection 602.47 (d) Delete the second sentence of the second paragraph, and **replace** with the following;

"When the contractor has approval to drill holes for setting anchor bolts, the bolts shall be set accurately, and fixed by completely filling the holes with grout meeting the requirements of **Subsection 918.21**."

Subsection 602.49 (d) Add metric equivalents in (kg)

Weight per 100
Bolts, pounds (kg)
19.7 (8.9)
31.7 (14.4)
52.4 (23.8)
80.4 (36.5)
116.7 (52.9)
165.1 (74.9)
212.0 (96.2)
280.0 (127.0)
340.0 (154.2)

(e) Add metric equivalents in (kg/m)

Pounds per Linear Foot (kg/m)
0.20 (0.30)
0.25 (0.37)
0.35 (0.52)
0.55 (0.82)
0.80 (1.19)
1.10 (1.64)
1.50 (2.23)
2.00 (2.98)

Subsection 602.50 (a) Change the name of section (a) to read as follows

(a) Structural Steel – Per Pound (Kilogram)

Section 603, Second paragraph, **Revise** the first sentence by adding the following:

"Effective Lettings after January 01, 2007," All contractors or subcontractors…

Subsection 604.02 Revise entire subsection as follows:

604.02-Materials. Materials used in this construction shall meet the requirements of the following sections or Subsections of Division III, Materials, of these Specifications.

Material	**Section or Subsection**
Water	**918.01**
Hydraulic cement[1]	**901.01**
Fine Aggregate, (all Classes of concrete)	**903.01**
Coarse Aggregate	
For Class A Concrete: Size No. 57	**903.03**
For Class D Concrete: Size No. 57	**903.03**
For Class L Concrete	**903.19**
Fly Ash	**918.31**
Ground Granulated Blast Furnace Slag	**918.32**
Cement Concrete Curing Materials	**913**
Air-Entraining Admixtures	**918.09**
Steel Bar Reinforcement	**907.01**
Welded Steel Wire Fabric	**907.03**
Waterstops	**918.11**
Joint Filler, Preformed Type	**905.01**
Structural Steel	**908.01**

[1]Type I, Type I-SM or Type I cement with either fly ash and/or ground granulated blast furnace slag as a partial cement replacement shall be used unless otherwise specified or permitted. When Type I cement with either fly ash and/or ground granulated blast furnace slag as a partial cement replacement is used, the requirements of **Subsection 604.03** shall apply.

Applied Texture Finish	**918.30**
Steel Castings	**908.05**
Elastomeric Bearing Pads	**908.12**
Bronze Bearing Plates, Plain	**908.09**
Bronze Bearing Plates, Self-Lubricating	**908.10**
Paints	**910**
Chemical Additives for Concrete	**918.09**
Gray Iron Castings	**908.07**
Permanent Steel Bridge Deck Forms	**908.03**
Precast Prestressed Bridge Deck Panels	**918.29**
Precast Concrete Box Culverts	**914.08**

Fly ash or ground granulated blast furnace slag of different classes or sources used as partial replacement for Portland cement in concrete mixes will not be permitted. FlyAsh or Ground Granulated Blast Furnace Slag shall only be permitted as a partial cement replacement in Type I Portland Cement. A maximum of 20% fly ash shall be permitted as a partial hydraulic cement replacement in Type I-SM cement only in Class A concrete.

Concrete with fly ash as a partial cement replacement shall not be produced until the concrete supplier furnishes the following information to the Engineer:

1. Copies of the results of all tests performed by the fly ash producer within the previous 30 days, on shipments to the concrete supplier showing:

   Fineness (percent retained on the No. 325(45μm) sieve)
   LOI (loss on ignition)
   Specific gravity
   Soundness (autoclave expansion)
   Moisture content
   Pozzuolanic activity, 7 day cement

2. A notarized certification from the fly ash producer stating that the fly ash meets the Departments specifications.

Concrete with ground granulated blast furnace slag as a partial cement replacement shall not be produced until the concrete supplier furnishes the following information to the Engineer:

1. Copies of the results of all tests performed by the ground granulated blast furnace slag producer within the previous 30 days on shipments to the concrete supplier showing:

   Fineness (percent retained on the No. 325(45μm) sieve.
   Air content of slag mortar
   Individual sample slag activity index (percent)
   Specific gravity
   Sulfide sulfur(s) (percent)
   Sulfate ion reported as SO_3 (percent)
   Total alkalies ($Na_2O+0.658K_2O$)
   Compressive strength (28 day)

2. A notarized certification from the ground granulated blast furnace slag producer stating that the slag meets the Departments specifications.

Unless otherwise indicated on the plans, the Contractor may substitute precast reinforced box sections meeting the requirements of Subsection 914.08, AASHTO specifications for all fill heights for cast in place concrete box sections. The Contractor is only required to notify the project engineer and the Division of Structures that he intends to utilize sections fabricated to the appropriate AASHTO Materials Specifications or the other pre-approved sections contained in the Division of Structures Standard Drawings for Precast Boxes. Should he elect to construct precast boxes of a different design, the Contractor shall submit shop drawings of the proposed precast box section and design calculations to the Structures Division for approval prior to construction. As a minimum, the shop drawings shall include a plan and elevation view of the box culvert showing all precast sections, a typical precast box section showing dimensions and reinforcing, and notes and details required for construction. After securing the necessary approval, the Contractor shall furnish the Structures Division a permanent, 100 μm(4 mil) mylar reproducible of the design for their file. The Contractor will be paid for the precast box based on the price bid for the quantity of the items in the cast in place structure it replaces. The precast reinforced box sections shall be manufactured in accordance with Departmental procedures

Subsection 604.03 Remove and Replace entire subsection with the following:

604.03-Classification Proportioning and Quality Assurance of Concrete.

(a) Classification and Proportioning and Quality Assurance

Min. 28 Day Comp.Strength PSI (MPa)	Min. lbs. (kg) Cement per C.Y. (C.M..)	Maximum Water/Cem. lb/lb (kg/kg)	Air Content % (Design± production tolerance)	Slump in. (mm)
	CLASS A CONCRETE			
3,000 (20.7)	564 (335)	0.45	6 ± 2	3 ± 1[1] (75 ± 25)
	CLASS D CONCRETE[2&3]			
4,000 (27.6)	620 (368)	0.40	6[3]	8 max[4] (200 max.)
	CLASS L CONCRETE[5&3]			
4,000 (27.6)	620 (368)	0.40	6[3]	8 max[4] (200 max.)
	CLASS S (SEAL) CONCRETE[6]			
3,000 (20.7)	682 (405)	0.47	6 ± 2	6±2 (150 ± 50)

The proportioning of the concrete shall be based on a predetermined minimum cement content, and the water-cement ratio shall not exceed the maximum shown in the above table. Below this limit, the quantity of water shall be adjusted to meet the slump requirements. The fine aggregate shall not exceed 44% by volume calculation of the total aggregate with the exception of slip formed Class A concrete incorporated into parapets and median barriers. For slip formed parapet and median barriers exclusively, the percentages of fine and coarse aggregate in an approved concrete mix design may be adjusted ± 2%, such that the maximum percent by volume of fine aggregate does not exceed 46%. Mixture adjustments shall be documented in the field book and daily concrete report. Adjusted mix shall comply with all performance criteria specified in **Section 604**.

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[1] For slip forming, the slump shall range from 0 to 3 inches.

[2] Class D concrete shall be used in all bridge decks except box and slab type structures unless otherwise noted on the plans.

[3] Class D and Class L concrete shall be designed at 6% air content, acceptance range for pumping is 6.0-8.5%, acceptance range for other placement methods is 5.0-8.5%. Sampling will be at the truck chute.

[4] Water reducing admixtures are acceptable, however, the maximum water/cement ratio shall not be exceeded in order to achieve the required slump.

[5] The unit weight of air dried Class L Concrete (lightweight concrete) shall not exceed 115 lbs./c.f. (185 kgs/0.1 m^2) as determined by ASTM C 567.

[6] The Use of Fly Ash as a cement replacement will be allowed in Class S (Seal) concrete.

Chemical Admixtures shall be included in the concrete mixture as specified in the following table based on the ambient air temperature and expected weather conditions.

Class of Concrete	Temperature less than 85°F (30°C) and falling	Temperature 85°F (30°C) or greater and rising
A	Type A or F	Type D or G or A and B
D	Type A or F	Type A or F and B or G
L	Type F	Type F and B or G
S	Type D or G or A and B	Type D or G or A and B

If a Type A, F, or G water reducer is used, then the allowable slump shall be maximum of 8 in. (200 mm).

Admixtures to be incorporated into the concrete shall all be from the same manufacturer, shall be compatible, and shall be incorporated into the concrete in accordance with the manufacturer's recommendations.

The fine aggregate in all Class L Concrete shall be natural sand conforming to the requirements of **Subsection 903.01.**

Fine aggregate manufactured from limestone or other polishing aggregates will not be permitted in concrete to be used as a riding surface in traffic lanes.

The Contractor shall submit the proposed concrete design to the Engineer for approval. The design shall be determined using saturated surface dry aggregate weights and shall be determined by the use of trial batches meeting the requirements of these specifications. The concrete design shall be prepared by a TDOT certified Class 3 concrete technician or approved independent testing laboratory under the direction of a registered civil Engineer licensed by the STATE OF TENNESSEE. The concrete plant technician or the civil Engineer shall certify that the information contained on the design is correct and is the result of information gained from the trial batches. The concrete design shall produce an average compressive strength to indicate that the specified 28 day strength can be obtained in the field. All strength determinations shall be made on equipment meeting the requirements of and in the manner prescribed by AASHTO T 22. It is the contractor’s responsibility to provide concrete of the design strength specified in all applicable special provisions, plans, and/or standard specifications. Trial batches for design shall be built no more than 90 days prior to the design submittal. All cost of concrete design, preparation and submittal shall be the responsibility of the Contractor.

The proposed concrete design submittal shall contain as a minimum, the following:

Source of all aggregates
Brand and type of cement
Source and class of fly ash (if used)
Source and grade of ground granulated blast furnace slag (if used)
Specific gravity of cement

Specific gravity of the fly ash (if used)
Specific gravity of the ground granulated blast furnace slag (if used)
Admixtures (if used)
Gradations of aggregates
Specific gravity of aggregates (saturated surface dry)
Air content (if air entrainment is used)
Percentage of fine aggregate of the total aggregate (by volume)
Slump
Weight per c.y. (m^3)
Yield
Temperature of plastic concrete
Water/cement ratio lb/lb (kg/kg)
7 day compressive strength [minimum of 3 x 6-in. x12in. (150mm x 300mm) cylinders]
14 day compressive strength (minimum of 3-6 in.x 12 in. (150 mm x 300 mm) cylinders
28 day compressive strength (minimum of 3-6 in.x 12 in. (150mm x 300mm) cylinders
Weight of each material required to produce a c.y. (m^3) of concrete

In lieu of the above mix design submittal, the Contractor may submit for approval an existing design approved by the Department within the current calendar year. The approval of this concrete design submittal will not relieve the Contractor of the responsibility of providing concrete meeting the requirements of these specifications. A temporary mix design may be issued if the 7 day compressive strengths exceed the required 28 day strengths.

Any request for a change in source of materials or admixtures from the original mix design must be made in writing to the Regional Materials and Tests Engineer explaining the necessity for the change and must be accompanied by a new mix design in accordance with the above provisions. The Contractor shall place no concrete until the new design is approved.

Concrete with fly ash or ground granulated blast furnace slag as a partial cement replacement will not be used in concrete when high early strength is specified. When the Contractor elects to replace a portion of hydraulic cement with fly ash or ground granulated blast furnace slag, the following requirements must be verified prior to producing any concrete:

1. Fly ash or ground granulated blast furnace slag shall be stored in silos separate from each other and separate from the hydraulic cement.
2. The fly ash or ground granulated blast furnace slag is to be added to the concrete by methods and equipment approved by the Engineer, capable of uniformly distributing the materials throughout the mix.
3. The fly ash or ground granulated blast furnace slag may be weighed cumulatively in the weigh hopper with the cement, provided the cement is added first. The temperature of the fly ash or the ground granulated blast furnace slag is not to exceed 160° F(71° C) at the time of introduction to the mix.

Design of Portland cement concrete with Type I cement modified by the addition of fly ash and/or ground granulated blast furnace slag. The following table indicates the maximum cement replacement rates(by weight) and minimum substitution ratios(by weight) for the type of modifier specified:

Modifier	**Cement Replacement Rate** (Maximum)% (by weight)	**Minimum Modifier Cement Substitution Ratio** (by weight)
Ground Granulated Blast Furnace Slag (grade 100 or 120)	35.0	1:1
Class F Fly Ash	20.0	1:1
Class C Fly Ash	25.0	1:1

Ternary cementitious mixtures (mixtures with Portland cement, ground granulated blast furnace slag, and fly ash) will be allowed for Class A Concrete provided that the minimum Portland cement content is 50%. The maximum amount of fly ash substitution in a ternary cementitious mixture will be 20%. Type I-SM cement will be allowed with ternary cementitious mixtures. When a Type I-SM cement is used, no additional slag shall be used as a partial replacement for the hydraulic cement.

(b) Quality Control and Acceptance of Concrete

It shall be the responsibility of the Contractor to determine and measure the batch quantities of all ingredients (including all water and any specified or approved admixtures) for all concrete produced for the project and to mix, deliver and place the concrete so that the concrete meets the requirements of these specifications. The minimum size of a batch shall be 2.5 c.y. (2.0 m3). The Contractor shall have a TDOT Class 2 or higher certified technician at the concrete plant during all batching operations with the primary responsibility of process control, which includes all sampling, testing and inspection of the aggregate and concrete.

The Contractor shall have a TDOT or ACI certified Class 1 or higher technician for all sampling, testing and inspection for process control of the concrete at the placement site. A technician shall be present at each placement site during all concrete placement. The technician at both the plant and job site shall be authorized to promptly correct any deficiencies in quality control within approved design parameters. All necessary equipment required for process control shall be furnished by the Contractor and shall be at the plant and at the placement site at all times during concrete and placement.

Process control shall include, but not be limited to, the following test and inspections:

1. Test to determine aggregate gradations (AASHTO T 27 with AASHTO T 11 when required).
2. Frequent inspections of the stockpile to ascertain that stockpiles are being maintained in an uncontaminated and un-segregated manner. A current aggregate quality report shall be kept at the plant.
3. Calibration of weighing systems, water meters and admixture dispensing systems prior to starting production.
4. Assurance of accurate weighing of the aggregates and cement, the proper metering of water and admixtures and the quality of water.

5. Assurance that mixing equipment is in proper working condition and the proper mixing speeds and revolutions are controlled as required by the specifications and the Materials and Tests Circular Letter File book.
6. Adjustment of mix proportions due to moisture content of both coarse and fine aggregates (moisture determination to be in accordance with AASHTO T 255).
7. Slump (AASHTO T 119) and Air Test (AASHTO T 152 - AASHTO T 196 required for concrete containing light weight aggregate).
8. Yield test (AASHTO T 121) (When yield varies more than ±2% from that shown on the design. All batching operations shall cease until the problem has been identified and corrected or a new concrete design has been obtained.
9. Quality control cylinders and early break cylinders (7-14 day, etc) for compression tests in accordance with AASHTO T 22.
10. Tests for concrete and ambient air temperatures.
11. A report furnished daily to the Engineer showing all pertinent information (Date, Contract and Project, Item number(s), batch weights, moisture corrections, admixtures, slump, air content, temperatures, etc.). A sample daily report will be given to the Contractor as an example.
12. A concrete delivery ticket must accompany each load to the placement site. The ticket shall at a minimum include the following:

    Date
    Contract number
    County
    Class of concrete
    Concrete design number
    Number of cubic yards
    Load number
    Truck number
    Maximum water allowed by design
    Total water added at the plant
    Maximum water allowed to be added on the project
    Actual water added on project
    Number of revolutions at mixing speed at plant
    Number of revolutions at mixing speed at project
    Time loaded
    Time discharged
    Actual and target batch weights of each component including each aggregate, chemical admixture, and cementitious material used.

The Contractor shall develop for approval of the Engineer and maintain at the plant written procedures for sampling, testing and inspection of the concrete. The Contractor shall keep a record of all tests and inspections performed at the plant site and placement site and this documentation, together with a certification by the Contractor that the concrete incorporated in the work meets the requirements of the specifications, shall be delivered to the Engineer upon completion of the project for inclusion in the project records. Records shall be kept current and shall be made available to the Engineer for review at any time.

It shall be the responsibility of the Contractor to properly make, cure and transport all early break cylinders (7-14 day, etc.) in accordance with AASHTO T 23 and delivered to the Regional laboratory or other established satellite laboratories for tests.

The Department or their representative shall be responsible for performing all acceptance tests. A TDOT Level 1 Certified or ACI Certified Technician shall sample, test air content and slump, and prepare 28 day cylinders for acceptance. The Department shall also be responsible for properly curing and transporting all acceptance cylinders in accordance with AASHTO T 23.

All independent assurance sampling and testing shall be performed by the Department. All sampling and testing for acceptance and independent assurance shall be at the frequencies established in TDOT Procedures. The time and location for obtaining all acceptance and assurance samples will be determined by the Department.

It shall be the responsibility of the Contractor to provide cylinder molds, a wheelbarrow, and provide a level site to perform testing and for initial curing. The Contractor shall also provide a secure storage shed/building for temporary storage of concrete acceptance cylinders in accordance with **Subsection 722.09** of these Specifications.

An approved concrete design is required for non-critical items involving small quantities of concrete but these non-critical items may be accepted at a reduced testing frequency in accordance with TDOT Procedures. This is to be used for sidewalks, curbs and gutters, building foundations, slope paving, ditch paving, guardrail anchorages, small culvert headwalls 30 in. (750 mm) diameter or less, fence posts, catch basins, manhole bases and inlets, small sign bases and steel strain pole footings.

A qualified plant technician shall be at the ready-mix plant during all batching operations. A field technician is not required to be at the placement site during all small quantity placing operations but is required to perform one complete set of tests during the life of the project. A delivery ticket must accompany each load delivered to the job site.

Pre-approved, pre-packaged concrete mixtures may be used for the applications listed above provided the quantity does not exceed 2 c.y.(1.5 m^3) per day. No design will be required.

Batch weights shall be corrected to compensate for any surface moisture on the aggregate at the time of use. The Contractor may elect to withhold some of the water from the mix at the plant. If a portion of the water is withheld at the plant, additional water may be added at the work site provided the design water/cement ratio of the mix is not exceeded. Water added at the placement site for Class D and Class L concrete shall not exceed one (1) gallon per cubic yard. The total amount of water in the mix shall not exceed the maximum in the approved mix design. Any additional slump shall be achieved using a water reducing admixture. When the addition of water to the mix is made in the field, 30 additional revolutions at mixing speed are required.

(c) High Early Strength

When high early strength concrete is required, in the plans for structural or pavement repairs, or other type work, the use of Type I or Type III cement will be optional with the Contractor. If Type I cement is used, a minimum cement content of 714 lbs/c.y. (424 kgs/m^3) will be required. If Type III cement is used, a minimum cement content of 620 lbs./c.y.(368 kgs/m^3) will be required. High early strength concrete, meeting these requirements, may be substituted at the option of the Contractor for Class A concrete when approved in writing by the Engineer.

When the Contractor elects to use high early strength concrete, the source and gradation of fine and coarse aggregates shall be the same as that specified for the concrete for which the high

early strength concrete is substituted. No additional compensation will be made if the Contractor elects to substitute high early strength concrete for Class A concrete. The unit price for the class of concrete for which the substitution is made shall be full compensation for the concrete.

Subsection 604.04 Page 404, Last paragraph, last sentence

The fogger will be designed to provide a maximum VMD (volume mean diameter) of 15 (microns), and a throw distance of 60 ft. (18m).

Subsection 604.08 (4) Third sentence, **Change** "35mm" to, "#36"

Subsection 604.08 page 412 Fifth paragraph, third sentence, **Change** the word "Uncoated" to "Coated"

Section 604, All sections, after **Subsection 604.11** referencing 604 Subsections are off by one subsection. Therefore **change** them by one, see the example below.

Example: **Change "Subsection 614.12(b)"** to **"Subsection 604.11(b)"**

"Subsection 604.23" to **"Subsection 604.22"**

Subsection 604.13 Revise entire subsection to the following:

The requirements for mixing concrete shall be as prescribed in **Subsection 501.10** for major structures. However, when the concrete is mixed and transported in truck mixers, the time elapsing from when the water is added to the mix until the concrete is deposited in place at the site of the work shall not exceed 90 minutes. When the ambient air temperature exceeds 90° F(32° C), the elapsed time above shall be reduced to 60 minutes for concrete placed in bridge decks. Retempering concrete by adding water or by other means will not be permitted; however, a portion of the mixing water or chemical admixtures may be withheld from transit mixers and added at the work site if all requirements of the approved mix design are met. Water added at the placement site for Class D and Class L concrete shall not exceed one (1) gallon per cubic yard. The total amount of water in the mix shall not exceed the maximum in the approved mix design. Any additional slump shall be achieved using a water reducing admixture. In the event water or chemical admixtures are added at the placement site, the concrete shall be mixed a minimum of 30 revolutions at mixing speed after additions are made. Concrete that is not within the specified slump limits, air content limits, temperature limits or time limits at time of placement shall not be used.

For items of construction specified in **Subsection 604.11(b)**, concrete mixing may be performed by mobile volumetric measuring and mixing equipment as prescribed in **Subsection 604.04** of these Specifications.

When concrete placed in the items of construction specified in **Subsection 604.11(b)** does not exceed 25 c.y.(20 m^3) per day, it may be accepted on the basis of field testing for air, slump, and occasional strength tests with only random plant inspections as deemed necessary by the Engineer for control.

When this basis of acceptance is used, the ready-mix plant furnishing the concrete shall have been inspected and approved for use as provided in **Subsection 604.04**. In addition, the delivery ticket accompanying each load of concrete shall show the class of concrete, the quantity of

cement, aggregates, water, and additives used in the batch, and the time of batching. Materials used in the concrete shall be tested and approved.

Subsection 604.15 Delete the seventh paragraph, "If the acceptance cylinders…"

Subsection 604.16 (a) Delete the twelfth paragraph of this section, "If data collected during…"

Subsection 604.16 page 420 Second and third paragraph, **Replace** with the following:

In hot weather mitigation it will be necessary to apply a certified dry fog with a maximum VMD of 15 (microns) with a throw distance of 60 (ft.) above the concrete surface during the placement and finishing operations. The contractor shall furnish a certification to the project supervisor verifying the VMD.

In addition, immediately before the concrete is placed, the forms and reinforcing steel shall be cooled to 90° F (32° C) or less by using a fine spray of water, leaving no puddles or pockets of water. Trucks shall be sprinkled or kept in the shade when not being unloaded so as to contribute to reducing the temperature of the concrete.

Subsection 604.16 (d) Last sentence, **Change "**m^3" to "$8m^3$"

Subsection 604.16 (e) Second paragraph, second sentence, **change** "8 m" to "6 m",

Subsection 604.19. Add the following as the last sentence**:**

"Refer also to Article 107.02 regarding restrictions on loading during bridge construction"

Subsection 604.21 (d) Remove and Replace entire subsection with the following:

(d)Applied Texture Finish.

Surface preparation prior to the textured finish shall include a Class 1 Ordinary Surface Finish in accordance with Subsection 604.22(a). The concrete shall be in place a minimum of 28 days to allow for ample cure time and weathering of curing compounds prior to application of the textured finish. All surfaces shall be pressure washed just prior to application. Surfaces to be coated shall be free from efflorescence, flaking, coating, rust, dirt, oil and other foreign substances. Coatings shall be applied only to surfaces that are free of surface moisture as determined by sight and touch. Surfaces that are not to receive a Coated Finish are to be shielded and masked. Cracks over 1/8 in.(3 mm) wide are to be veed out and filled with an approved product from the TDOT QPL 13-Section B.5.Structural Materials and Components. The surface preparation shall be approved by the Engineer immediately prior to the beginning of the work.

The textured finish shall be applied in the number of coats as recommended by the manufacturer and as posted on the Departments Qualified Products List to achieve a total application rate of one (1) gallon per 45 (±5) s.f. (0.9 ± 0.1 liter per m^2). If a two coat system is used, the base coat shall be similar in color to mountain gray, **Federal Specification No. 36440,** when the final coat is White, **Federal Specification No. 37886.** When the final coat is similar in color to mountain gray, **Federal Specification No. 36440** a base coat of white, **Federal Specification No. 37886** shall be used**.** The contractor/subcontractor shall give advance notice to the Engineer of the date(s) and time(s) the texture coating is to be applied. The textured finish shall be applied with rollers or brushes so as to provide a consistent and uniform coverage. As an alternative, the Contractor may elect to spray the textured finish if he furnishes a containment system meeting the approval of the Engineer. Regardless of the method of application, drippings

and/or overspray from the texturing process shall be prohibited or otherwise contained in a manner that will not contaminate the environment.

The contractor/subcontractor shall submit to the Engineer certification of the following:

Brand name,
Production batch or lot number,
Qualified Products List Evaluation Number
Manufacturers recommended rate of application,
Materials Safety Data Sheet,
Materials Data Sheet,
Shipping date.
A color sample shall be submitted to the Engineer for approval.

Subsection 604.21 Third paragraph, sentence next to last, **Change** "**Federal Color Standard 594b",** to "**Federal Color Standard 595b"**

Subsection 604.27, Revise the first sentence under the Pavement Roughness Index Table to the following:

"In addition, all areas of pavement roughness index using a 0.1 in. (2.5 mm) blanking band represented by high points having deviations in excess of 0.4 in (10 mm) for any 25 ft. (7.6 m) section per each wheel path shall be corrected."

604.28-Loading and Opening to Traffic. Add the following as the last sentence:

"Refer also to Article 107.02 regarding restrictions on loading during bridge construction"

Subsection 604.31-Basis of Payment. Revise entire subsection to the following**:**

604.31-Basis of Payment. The accepted quantities will be paid for at the respective contract unit price per c.y.(m^3) for Class A Concrete, Class D Concrete, Class L Concrete and Class S Concrete; per lb.(kg) for Steel Bar Reinforcement and Epoxy Coated Reinforcing Steel; and per s.y.(m^2) for Scarifying bridge deck surface and Applied Texture Finish; complete in place.

The concrete fillet above fabricated bridge girders will be paid as bridge deck concrete with the quantities based on the fillet required for a conventional deck forming system. Increases in the aforementioned fillet depth to solely accommodate the Contractor's chosen deck forming system (e.g. precast deck panels) will not to be measured and paid for directly. All costs of this increase will be included in other items bid.

The accepted quantities of leveling concrete shall be paid for at 40% of the price bid for the concrete that is to go into the footing.

Any deduction in monies due to the Contractor for failure to comply with the surface rideability requirements set forth in **Subsection 604.28** shall be make on a lump sum basis.

When field conditions result in the construction of a different type of box culvert or box bridge from that established on the Plans (box type to slab type or vice versa) the respective bid price per c.y.(m^2) for Class A concrete shall be increased by 15% for constructing a slab type in lieu of box type and decreased by 13% for constructing box type in lieu of slab type. No adjustment of Steel Bar Reinforcement unit bid price is to be made for the change in box culvert or box bridge type.

Where concrete does not meet the specified strength but is allowed to be included in the permanent construction as set out in Subsection 604.20, Defective Concrete, or tardy acceptance cylinders and/or cores fail to meet the strengths specified in Subsection 604.15, the following equation shall be used to determine percent payment of contract bid price.

PP = 100-(3*Ds)
PP = Percent Payment
Ds = Percent Below Specified Strength
Ds = [(Specified Strength-Actual Strength)/Specified Strength]*100

Defective concrete greater than 25 percent below specified strength may remain in place at no cost to the Department if approved by the Department of Structures or the contractor may remove and replace.

*Payment to be based on unit price of item as bid, i.e., volume [c.y.(m^3)], length [ft.(m)], each, or other designated bid units. Payment of the above listed percentages includes cost of incidental items such as reinforcing steel when included in the price bid for the Item.

Subsection 606.04 (c) First sentence, **Change** "3(1)" to "1(3)"

Subsection 606.21 Second sentence, **Change** "o1ne" to "one"

Subsection 607.02-Materials. Remove and Replace entire subsection with the following:

607.02-Materials. Materials used in this work shall meet the following requirements:

Material	**Subsection**
Concrete Pipe, Reinforced	**914.02**
Corrugated Metal Pipe Culverts, Pipe Arches and Underdrains	**915.02**
Joint Mortar	**905.02**
Rubber Gaskets	**905.03**
Polyvinyl Chloride Pipe (PVC)	**914.09**
High Density Polyethylene Plastic Pipe	**914.10**

Where Pipe Culverts (Cross Drains & Median Drains) are specified they shall be in accordance with the following:

(a) Pipe Culverts (Cross Drains & Median Drains) 15 through 36 in. (375 through 900 mm) shall be one of the following:

(1) Class III, IV, or V Concrete pipe meeting the requirements of either **Subsection 914.02** or AASHTO M 86.
(2) Metal pipe meeting the requirements of **Subsection 915.02**.
(3) High Density Polyethylene pipe meeting the requirements of **Subsection 914.10**.

(4) Polyvinyl Chloride pipe meeting the requirements of **Subsection 914.09**.

(b) Pipe Culverts (Cross Drains & Median Drains) larger than 36 in. through 48 in. (900 through 1200 mm) shall be one of the following:

(1) Class III, IV, or V Concrete pipe meeting the requirements of either **Subsection 914.02**.
(2) Metal pipe meeting the requirements of **Subsection 915.02**.
(3) High Density Polyethylene pipe meeting the requirements of **Subsection 914.10**.

(c) Pipe Culverts (Cross Drains & Median Drains) larger than 48 in. (1200 mm) shall be one of the following:

(1) Class III, IV, or V Concrete pipe meeting the requirements of Subsection 914.02.
(2) Metal pipe meeting the requirements of **Subsection 915.02**.

Where Pipe Culverts (Side Drains) are specified they shall be in accordance with the following:

(a) Pipe Culverts(Side Drains) 15 through 36 in.(375 through 900 mm) shall be one of the following:

1. Class III, IV, or V Concrete pipe meeting the requirements of either Subsection 914.02 or AASHTO M 86.
2. Metal pipe meeting the requirements of Subsection 915.02.
3. High Density Polyethylene pipe meeting the requirements of Subsection 914.10.
4. PVC pipe meeting the requirements of **Subsection 914.09**

(b) Pipe Culverts(Side Drains) larger than 36 in.(900 mm) shall be one of the following:

(1) Class III, IV, or V Concrete pipe meeting the requirements of **Subsection 914.02**.
(2) Metal pipe meeting the requirements of **Subsection 915.02**.

Where Pipe Culverts (Storm Drains) are specified they shall be in accordance with the following:

(a) Pipe Culverts (Storm Drains) 15 through 36 in. (375 through 900 mm) shall be one of the following:
(1) Class III, IV, or V Concrete pipe meeting the requirements of either **Subsection 914.02** or AASHTO M 86.
(2) High Density Polyethylene pipe meeting the requirements of **Subsection 914.10.**
(3) PVC pipe meeting the requirements of **Subsection 914.09**.

(b) Pipe Culverts (Storm Drains) larger than 36 in. through 48 in. (900 through 1200 mm) shall be one of the following:
   (1) Class III, IV, or V Concrete pipe meeting the requirements of either **Subsection 914.02**.
   (2) High Density Polyethylene pipe meeting the requirements of **Subsection 914.10**.

(c) Pipe Culverts (Storm Drains) larger than 48 in. (1200 mm) shall be Class III, IV, or V Concrete pipe meeting the requirements of **Subsection 914.02**.

Where Slope Drains are specified, they shall be in accordance with one of the following:

(a) Metal pipe meeting the requirements of **Subsection 915.02.**
(b) High Density Polyethylene pipe meeting the requirements of **Subsection 914.10**.
(c) Polyvinyl Chloride pipe meeting the requirements of **Subsection 914.09**.

Materials for special end connections to other pipes or structures, required to complete the work as indicated on the Plans or directed by the Engineer shall conform to the requirements of **Section 914** and **Section 915** of the Standard Specifications, unless otherwise specified.

Reinforced concrete pipe shall be flat base, round, or oval, as shown on the Plans.

The sizes of pipe shall be identified by the nominal inside diameter. The pipe shall be of the sizes and classes or gauges stipulated in the Contract, shown on the Plans, or established by the Engineer.

Steel and aluminum pipe are considered as optional for corrugated metal pipe, pipe arches, and underdrains by the Department. The Contractor may use either option he prefers, however, in no case shall different metals or corrugations be mixed in a single line of pipe.

When paved or coated corrugated metal pipe and pipe arches are specified, either aluminum coating or bituminous coating may be used. The aluminum or bituminous coated pipe shall conform to the requirements of AASHTO M 274 or AASHTO M 190 respectively.

When precoated corrugated metal pipe and pipe arches are specified, polymer coating shall be used in accordance with **Subsection 915.03.** Coupling bands and all hardware except nuts, bolts and washers shall be of the same material and coating as the pipe.

When corrugated metal pipe arches are specified as "size equivalent round" the dimensions shall be as shown in the Plans.

Subsection 607.07-Joining Pipe. Remove and Replace entire subsection with the following:

607.07-Joining Pipe. Rigid pipe may be of bell and spigot or tongue and groove design, unless one type is specified. The method of joining pipe sections shall be such that the ends are fully entered and the inner surfaces are reasonably flush and even.

Joints for rigid pipe shall be made with: (a) portland cement mortar; (b) rubber gaskets; or (c) other types of joints recommended by the pipe manufacturer and approved by the Engineer may be permitted.

For mortar joints, the pipe ends shall be thoroughly cleaned and wetted with water before the joint is made. Stiff mortar shall then be placed in the lower half of the bell or groove of the pipe section already laid and on the upper half of the spigot or tongue of the section to be laid. The 2 pipe sections shall then be tightly joined with their inner surfaces flush and even. The inside of

the joint shall then be finished smooth and any surplus material removed from the pipe. The completed mortar joints shall be protected against rapid drying by suitable covering material.

Rubber ring gaskets shall be installed so as to form a flexible watertight seal. When other type joints are permitted, they shall be installed or constructed in accordance with the recommendations of the manufacturer.

Metal pipe shall be firmly joined by approved coupling bands.

High Density Polyethylene and Polyvinyl Chloride pipe shall meet the performance requirement for soiltightness, unless watertightness is specified. Joints shall be installed so that the connection of pipe sections, for a continuous line, will be free from irregularities in the flow line.

Pipe shall be inspected before any backfill is placed. Any pipe found to be out of alignment, unduly settled, or damaged shall be taken up and relaid or replaced.

Subsection 607.09-Backfilling. Remove and **replace** entire subsection with the following:

607.09-Backfilling. After the pipe is installed, the trench shall be backfilled in accordance with the provisions of Section 204 and the standard drawings. All pipes shall undergo visual inspection during and after installation to insure conformance to these specifications. Final visual inspections for all pipes shall be conducted no sooner than 30 days after completion of installation and final fill. Final visual inspections shall be conducted from the inlet and outlet ends of all pipe with sufficient hand held lighting to observe any defects. In addition to visual inspection, the following test shall be performed not less than 30 days following completion of pipe installation and final fill placement. All post installation inspections and test shall be observed by Department personnel.

High Density Polyethylene Pipe (HDPE Pipe) , Polyvinyl Chloride Pipe (PVC), and Corrugated Metal Pipe (CMP): The contractor shall be responsible for conducting a deflection test, (mandrel, laser, or manual), on at least 10 percent of the total number of pipe runs representing a minimum 10 percent of the total project footage including a minimum of one run of each pipe size. The Engineer shall randomly select installations to be tested to determine whether the internal diameter of the barrel has been reduced more than 5 percent. If any installation is determined to have deflected more than 5 percent, all pipe installations shall be evaluated for deflection. Documentation of station, pipe size, and deflection results shall be provided to the Engineer.

Reinforced Concrete Pipe (RCP): All RCP shall be visually inspected for deflection, alignment, cracking, and joint construction during and after installation. Any installations where visual inspections detect poor construction techniques shall be further evaluated as directed by the Engineer.

All Pipes with deflections greater than 5 percent of the nominal pipe diameter, undue misalignment, or poor joint construction shall be replaced by the Contractor at his expense. Any excavation or additional work including, but not limited to, base stone or asphalt removal and replacement, required to replace a pipe installation due to poor construction techniques shall be at the Contractor's expense. As visual and deflection test dictate, the Engineer may request additional inspections at the contractors expense.

Subsection 607.12-Method of Measurement. Remove and Replace entire subsection with the following:

607.12-Method of Measurement. Concrete pipe culverts and concrete storm sewers of the different classes, shapes, and sizes specified, will be measured by the linear foot(meter) of pipe installed and accepted. The quantity of pipe cut off, not to exceed 2 ft.(600 mm), will be paid for at the contract bid price for pipe in place.

Corrugated metal pipe, and corrugated metal structural plate pipe will be measured by the linear foot (meter) of pipe installed and accepted. Measurements will be made as follows:

(a) Metal pipe and metal structural plate pipe, with square and vertical ends or with skewed and vertical ends will be measured, in place, end to end of the metal on the centerline of the structure.
(b) Metal pipe and metal structural plate pipe, with square ends beveled, and with ends skewed and beveled, except arch pipe, will be measured, in place, by averaging the end to end distances at the top and bottom of the pipe, measured parallel to the centerline of the structure.
(c) Metal arch pipe and metal structural plate arch pipe with square ends beveled, and with ends skewed and beveled, will be measured, in place, end to end of the metal along the invert of the structure.

High Density Polyethylene pipe will be measured by the linear foot(meter) of pipe installed and accepted. The quantity of pipe cut off, not to exceed 2 ft.(600 mm), will be paid for at the contract bid price for pipe in place.

Polyvinyl Chloride pipe will be measured by the linear foot(meter) of pipe installed and accepted. The quantity of pipe cut off, not to exceed 2 ft.(600 mm), will be paid for at the contract bid price for pipe in place.

Slope Drains will be measured in the same manner as specified for corrugated metal pipe.

Pipe Culverts(Side Drains) of the different sizes specified will be measured by the linear foot(meter) along the centerline of the installed pipe, except that no measurement for payment will be made in excess of the ordered length of the pipe. Pipe Culverts (Side Drains) will be ordered in increments of 2 ft.(600 mm).

Unless otherwise indicated on the Plans, no measurement of structure excavation will be made; and the costs involved shall be included in the unit prices bid for other items of construction. When the Plans provide for direct payment for structure excavation, measurement and payment will be in accordance with **Section 204**.

No payment will be made for labor and materials used in making branch connections. The length of pipe in the branch connection will be measured and included in the quantity of pipe installed in the branch line.

Strutting of corrugated metal pipe and corrugated metal structural plate pipe will not be paid for separately, but the costs thereof shall be included in the unit price bid per linear foot(meter) of pipe.

Subsection 607.13-Basis of Payment. **Revise** to include bedding and back fill as shown below:

The accepted quantities of pipe culverts and storm sewers, measured as provided for above, will be paid for at the contract unit price per linear foot(meter) for each type, class, shape, and size constructed, complete in place, including placing and compacting bedding and backfill, which price shall be full compensation for labor and materials used in making joints, and

connections to other structures; for strutting, when required, and for completing all incidentals necessary to complete the item.

Subsection 614.04 First sentence of the second paragraph. Shall read as follows:

The precast concrete deck units shall be cast in a Precast/Prestressed Concrete Institute, Catergory B-3 certified precast plant under plant control conditions, and in accordance with the TDOT procedure for the Manufacture and Acceptance of pre-cast concrete drainage structures, noise wall panels, and retaining wall panels.

The precast concrete deck units shall be cast in a certified precast plant under plant control conditions, and in accordance with the TDOT procedure for the Manufacture and Acceptance of pre-cast concrete drainage structures, noise wall panels, and retaining wall panels.

Subsection 615.01, Replace the second paragraph, first sentence with the following:

"The fabrication of these items shall be accomplished in plants that have been certified by the Precast/Prestressed Concrete Institute, Plant Certified Inspector (PCI)."

Subsection 615.02, Replace the third paragraph, first sentence with the following:

"The fabrication of precast/prestressed concrete members shall be in a Precast/Prestressed Concrete Institute category B-3 certified plant and have at each fabrication site a technician skilled in the approved pre-stressing method."

Subsection 615.05, Replace the second paragraph with the following:

"The panels shall be fabricated in a plant certified by the Precast/Prestressed Concrete Institute (PCI) category B-3."

Subsection 615.07 First paragraph, fourth sentence, **Change** "4 months" to "6 months"

Subsection 616.05 Revise the last paragraph to the following:

"Tendons shall be placed in rigid ducts after concrete placement is completed. Ducts shall be as specified on plans and in conformance with Subsection 616.07."

Subsection 619.14 Add as the second paragraph

PMC Variable Depth shall be measured by the cubic yard complete in place. The number of cubic yards will be determined by deducting the theoretical volume of Bridge Deck Overlay (PMC) from the total volume of PMC required to obtain the finished grade shown on the Plans or established by the Engineer.

Subsection 621.01 Add "and temporary shoring" after "temporary structures" in the first sentence.

Subsection 621.02 Add the following as the last paragraph:

Temporary shoring shall be used to retain the earth during grading operations and bridge construction to maintain traffic. Temporary shoring shall be installed at the locations shown on the plans or as directed by the engineer. Payment for this item will not be made when used for the installation of drainage structures, utilities, to meet OSHA regulations, or for the convenience of the contractor, unless these locations are specifically shown on the plans. The contractor shall design the temporary shoring for the specific locations and in-situ soil types. The submittal shall be in accordance with **Subsection 105.02**, shall be stamped by a Professional Engineer, and shall include detailed drawings, design calculations, and shoring material requirements. Temporary shoring may be sheet piling, piling/lagging walls, tie back walls, etc…

Subsection 621.03 Add the following as the last paragraph:

Temporary shoring will be measured and paid for by the square foot (square meter) of exposed vertical face area. The bottom of shoring for payment will be where the exposed face intersects the existing or specified grade. The top of shoring for payment will be the actual shoring top, but not more than one (1) foot above where the back of shoring intersects the existing or specified grade.

Subsection 621.04 Add the following as the last paragraph:

Payment for temporary shoring shall be full compensation for all designs, submittals, labor, tools, equipment, materials, and all other incidentals for proper installation and removal of the shoring.

Subsection 623.02 B. 2. First sentence, **Add** after "grade 50" "50S, HPS50W,"

Subsection 623.02 C. 2. Last part of the paragraph, **Add** after "Category I" "Simple Steel Bridges", SBR-1B.