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

(Rev. 5-18-15)
(Rev. 11-16-15)
(Rev. 6-27-16)
(Rev. 12-2-16)
(Rev. 5-15-17)
(Rev. 11-6-17)
(Rev. 5-14-18)
(Rev. 10-8-18)
(Rev. 5-13-19)
(Rev. 12-30-19)

January 1, 2015

Supplemental Specifications - Section 900

of the

Standard Specifications for Road and Bridge Construction

January 1, 2015

Subsection 901.01 (pg. 918), 5-14-18; Add the following sentence as the second paragraph of the subsection:

Provide hydraulic cement, selected from the Department's QPL, which conforms to the following for the kind and type specified or allowed:

Portland cement.....AASHTO M 85
Portland blast-furnace slag cement (Type IS) AASHTO M 240
Portland-pozzolan cement (Type IP).....AASHTO M 240
Portland-limestone cement (Type IL) .....AASHTO M 240

The maximum allowable equivalent alkalies is 0.60% for all cements and blended cements used in concrete riding surfaces with aggregates meeting the requirements of 903.24. This includes Class CP, A Paving, and DS concrete mixtures.

Subsection 901.01 (pg. 918), 5-13-19; **Hydraulic Cement**; Revise 1st paragraph:

Provide hydraulic cement, selected from the Department's Producer List that conforms to the following for the kind and type specified or allowed:

Subsection 903.01 - Table 903.01-1 (pg. 920), 5-18-15; Replace Note (1) with the following:

"(1)If the fine aggregate is manufactured from crushed stone and if material finer than the No. 200 sieve consists of the dust of fracture, essentially free from clay or shale, this limit may be increased to 5%.

Subsection 903.01 (pg. 920), 5-13-19; **Fine Aggregate for Concrete**; Revise No. 3:

3. Provide fine aggregate meeting the quality requirements in 903.25.

Subsection 903.01 - Table 903.01-1, Table 903.01-2 (pg. 921), 5-15-17; replace Tables 903.01-1 and 903.01-2 with the following Tables:

Table 903.01-1: Limits of Deleterious Substances in Fine Aggregate for Concrete

Substance	Maximum Permissible Limits Percent by Weight
Clay Lumps	0.5
Coal and Lignite	0.5
Material Passing the No. 200 Sieve [(1)(3)]	3.0
Other deleterious substances (such as shale, alkali, mica, coated/grains, soft and flaky particles) [(1) (2)]	3.0

(1) If the fine aggregate is manufactured from crushed stone and if material finer than the No. 200 sieve consists of the dust of fracture, essentially free from clay or shale, this limit may be increased to 10%.

(2) Determine other organic impurities according to AASHTO T 267.

(3) If the fine aggregate is manufactured from crushed gravel and if material finer than the No. 200 sieve consists of the dust of fracture, essentially free from clay or shale, this limit may be increased to 3.5%.

Table 903.01-2: Gradation Requirements for Fine Aggregate

Sieve Size	Total Percent Passing by Weight
3/8 inch	100
No. 4	95-100
No. 16	50-90
No. 50	5-35
No. 100	0-20
No. 200 [(1)]	0-3

(1) If the fine aggregate is manufactured from crushed stone and if material finer than the No. 200 sieve consists of the dust of fracture, essentially free from clay or shale, this limit may be increased to 10%.

Subsection 903.02 (pg. 921), 5-13-19; **Fine Aggregate for Mortar;** Revise 1st paragraph:

Provide mortar sand that conforms to AASHTO M 45, meets the quality requirements in 903.25, and that is uniformly graded from coarse to fine within the limits specified in Table 903.02-1.

Subsection 903.03 (pg. 922-923) 11-16-15; Coarse Aggregate for Concrete, modify the 4th and 5th paragraphs, update Table 903.03-1: Coarse Aggregate Sizes to the following:

"Coarse aggregate in Portland cement concrete bridge decks and overlays on interstates and four or more lane highways consisting of Size No. 57 shall meet 903.24.

The coarse aggregates for travel lanes and bridge decks shall be crushed and consist of stone, slag, gravel, quartzite, gneiss, or combination thereof with an absorption of plus 4 material not to exceed 5%. Do not use uncrushed gravel, pea gravel, or any other uncrushed particles. Crushed gravel, if used, shall consist of siliceous washed particles after processing, of which at least 70% by count of the material retained on the No. 4 sieve contains a minimum of two fractured faces. One face shall be fractured for the approximate average diameter or thickness of the particle."

Table 903.03-1

Application	**Coarse Aggregate Size (1)**
Structural concrete	No. 57
Self-Consolidating concrete	Maximum-No.67
Prestressed concrete	No. 57 or 67
Precast concrete	Any size fraction
Concrete curbing placed by machine-extrusion methods	No. 7, 57, 67, or 78
Cement treated permeable base (2)	No. 57

(1) Gradation shall conform to **903.22**.

(2) Aggregate shall meet the quality requirements specified below.

Subsection 903.03 (pg. 922) 5-15-17; Coarse Aggregate for Concrete, add the following as the 4th paragraph:

"Coarse aggregate in two-lift composite pavements shall consist of Size No. 467 in the lower lift, graded as specified in 903.22. Coarse aggregate in the upper lift shall be Size No. 57 or 67 graded as specified in 903.22 and shall meet 903.24 riding surface requirements."

Subsection 903.03 (pg. 923), 5-13-19; **Coarse Aggregate for Concrete**; Revise 6th paragraph and Table 903.03-1:

For other uses of concrete, provide coarse aggregate of the sizes specified in Table 903.03-1, or as otherwise shown or directed. If proposing to use a coarse aggregate size not specified in Table 903-03.1 or shown on the plans, submit a written request to Regional Materials and Tests explaining the necessity for the change.

Table 903.03-1: Coarse Aggregate Sizes

Application	Coarse Aggregate Size [1]
Structural concrete	No. 57
Self-Consolidating Concrete	Maximum No. 67
Prestressed concrete	No. 57 or 67
Precast concrete	Any size fraction
Concrete for Bridge Repair	No. 7, 57, 67, or 78
Concrete curbing placed by machine-extrusion methods	No. 7, 57, 67, or 78
Cement treated permeable base [2]	No. 57

[1] Gradation shall conform to 903.22.

[2] Aggregate shall meet the quality requirements specified below.

Subsection 903.03-2 (pg. 924) 5-15-17; Revise Table 903.03-2: Limits of Deleterious Substances in Coarse Aggregate for Concrete, update Material passing No. 200 Sieve and Footnote 2:

Table 903.03-2: Limits of Deleterious Substances in Coarse Aggregate for Concrete

Substance	Maximum Percent by Weight
Soft or non-durable fragments (fragments that are structurally weak such as shale, soft sandstone, limonite concretions, gypsum, weathered schist, or cemented gravel), and organic impurities as determined by AASHTO T 267 [1]	3
Coal and lignite [1]	1
Clay lumps [1]	0.25
Material passing the No. 200 sieve [1] [2]	1.5
Thin or elongated pieces (length greater than 5 times average thickness)	10
Other local deleterious substances [1]	1

[1] The sum of the percentages of these materials (i.e., soft or non-durable fragments, coal and lignite, clay lumps, material passing the No. 200 sieve, and other local deleterious substances) shall not exceed 5.0.

[2] For crushed aggregate, if all the material finer than the No. 200 sieve, as determined in accordance with AASHTO T 11, consists of the dust of fracture, essentially free of clay or shale, this limit may be increased to 2.0.

Subsection 903.03 B (pg. 924), 5-13-19; **Soundness**; Revise subsection:

B. Quality Requirements

The coarse aggregate shall meet the quality requirements in 903.25.

Subsection 903.04 (pg.925), 5-13-19; A**ggregate for Lean Concrete Base;** Remove entire subsection:

Subsection 903.05 – Aggregate for Mineral Aggregate Base and Surface Courses (pg. 925) 5-15-17; add reference to subsection **903.05 C.** in the second paragraph of subsection A.:

"**903.05 Aggregate for Mineral Aggregate Base and Surface Courses**

Provide crushed stone, crushed slag, crushed or uncrushed gravel, or crushed or uncrushed chert that may be blended with crushed recycled concrete or screened reclaimed asphalt pavement (RAP), together with material such as manufactured sand or other fine materials that are either naturally contained or added as needed to conform to these Specifications.

Provide aggregate of Types A and B, as specified below.

A. Type A Aggregate

Provide hard, durable particles or fragments of stone, slag, gravel, or chert, and other finely divided mineral matter.

The Contractor may use recycled concrete aggregate per 903.05 C. or reclaimed asphalt pavement~~,~~ at a maximum rate of 25% by weight~~,~~ for Type A aggregate, provided the combined aggregate blend meets all the requirements specified below. Crush and screen the recycled concrete and asphalt to produce a uniform stockpile before blending it with the virgin material. Keep the recycled stockpiles free of bricks, steel, wood, and all other deleterious materials. "

Subsection 903.05 A (pg. 925-926), 5-13-19; **Type A Aggregate**; Revise Nos. 1, 2, & 3, & Remove Table 903.05-01:

1. **Crushed Stone.** Provide stone free of silt and clay and having a coarse aggregate portion (retained on the No. 4 sieve) that conforms to the quality requirements specified in 903.25.

2. **Crushed Slag.** Provide material that:

    a. Is free of silt and clay,
    b. Meets the quality requirements in 903.25,
    c. Is reasonably uniform in density, and
    d. Has a dry-rodded weight of at least 70 pounds per cubic foot.

3. **Gravel and Chert.** Screen gravel and chert. All oversize material may be crushed and fed uniformly back over the screen. The coarse aggregate portion shall conform to the quality requirements specified in 903.25. The portion of the material passing the No. 40 sieve shall be non-plastic, or shall have a liquid limit of not greater than 30 and a plasticity index of not more than eight.

Subsection 903.05 – Aggregate for Mineral Aggregate Base and Surface Courses (pg. 925-926) 5-15-17; add reference to subsection **903.05 C.** in the second paragraph of subsection B.:

"For Provide crushed or uncrushed gravel, crushed or uncrushed chert, crushed stone or crushed slag, and other finely divided particles.

The Contractor may use recycled concrete aggregate per 903.05 C. or reclaimed asphalt pavement~~,~~ at a maximum rate of 30% by weight~~,~~ for Type B aggregate, provided the combined aggregate blend meets all the requirements specified below. Crush and screen recycled concrete and asphalt to produce a uniform stockpile before blending it with the virgin material. Keep the recycled stockpiles free of bricks, steel, wood, and all other deleterious materials."

Subsection 903.05 – B. Type B Aggregate (pg. 927), 5-18-15; Replace the 1st paragraph of subsection 3. With the following:

"3. Do not use material having clay content greater than 12%, as determined by hydrometer analysis performed in accordance with AASHTO T 88. Material may be used having a clay content exceeding 12% if a plasticity index-fines product does not exceed 3 when calculated by the following formula"

Subsection 903.05 B (pg. 927), 5-13-19; **Type B Aggregate**; Revise 3rd paragraph:

Provide Type B aggregate meeting the same requirements as specified in **903.05.A** for Type A aggregate, with the following exceptions:

1. The aggregate shall meet the quality requirements in 903.25 for Mineral Aggregate Base – Type B.

2. Screen Type B aggregate. Oversize materials may be wasted or crushed and returned over the screen and uniformly blended with the other material.

3. Do not use material having a clay content greater than 12%, as determined by hydrometer analysis performed in accordance with AASHTO T 88. Material may be used having a clay content exceeding 12% if a plasticity index-fines product does not exceed 3 when calculated by the following formula:

$$\frac{\%\ \text{Passing No. 40 sieve} \times \text{P. I. of Minus No. 40 Material}}{100}$$

Subsection 903.05 – Aggregate for Mineral Aggregate Base and Surface Courses (pg. 928) 5-15-17; add section C to the bottom:

C. Reclaimed Concrete Aggregate. Provide material comprised of concrete reclaimed from the demolition of a concrete structure or pavement. Reclaimed Concrete Aggregate may only be used as a mineral aggregate base course, subbase or shoulder course. The material shall be free of any materials classified as Solid or Hazardous Waste, especially asbestos, lead and mercury, with test

results submitted by the contractor to the Project Supervisor. These test results shall be certified and notarized. The percentage of wear as determined in accordance with AASHTO T 96 shall not exceed 50. Deleterious substances shall be kept to a minimum, and may not be higher than the amounts listed on Table 903.05-3.

Table 903.05-3: Deleterious Materials

Material	Maximum Permissible Limits Percent by Weight
Brick	5
Bituminous Concrete Materials	5
Weathered Rock	2
Wood	0.1
Metals	0.1

The gradations of the coarse and fine fractions of aggregate shall be such that, when combined in proper proportions, the resultant mixture will fall within the grading specified in Table 903.05-4.

Table 903.05-4: RCA Grading Tolerances

Sieve Size	Total Percent Passing per Weight
1 ½ inch	100
1 inch	85-100
¾ inch	60-95
3/8 inch	50-80
No. 4	40-65
No. 16	20-40
No. 100	5-18

Subsection 903.05 C (pg. 928), 5-13-19; **Reclaimed Concrete Aggregate**; Revise 1st paragraph:

C. Reclaimed Concrete Aggregate

Provide material comprised of concrete reclaimed from the demolition of a concrete structure or pavement. Reclaimed Concrete Aggregate may only be used as a mineral aggregate base course, subbase or shoulder course. The material shall be free of any materials classified as Solid or Hazardous Waste, especially asbestos, lead and mercury, with test results submitted by the contractor to the Project Supervisor. These test results shall be certified and notarized. Theaggregate shall meet the quality requirements in 903.25. . Deleterious substances shall be kept to a minimum, and may not be higher than the amounts listed on Table 903.05-3.

Subsection 903.06 A (pg. 929), 5-13-19; **Coarse Aggregate (retained on a No. 4 sieve);** Revise 1st paragraph:

Provide crushed stone, crushed granite, crushed gravel, crushed slag, or a combination of these materials. This material shall conform to the physical properties of ASTM D692 and the quality requirements of 903.25., The aggregate shall contain no more than 5% soft or nondurable particles.

Subsection 903.06 B (pg.929), 5-13-19; **Fine Aggregate (passing a No. 4 sieve)**; Revise 1st paragraph:

Provide limestone fines, natural sand, sand manufactured from stone, gravel, or slag, or combinations of these materials, consisting of hard, tough grains free from injurious amounts of deleterious substances. The fine aggregate shall meet the quality requirements in 903.25. Do not use fine aggregate or screenings containing calcium sulfate ($CaSO_4$/gypsum) if more than 5% of the material passing the No. 8 sieve is chemically composed of sulfur trioxide (SO_3).

Subsection 903.06 - C. Combined Aggregate Grading (pg. 930) 11-16-15; add the following sentence at the end of the first paragraph:

"For mixtures including recycled asphalt pavement, RAP, and/or recycled asphalt shingles, RAS, stockpiles will not be considered as contributing to the required minimum of three stockpile sizes."

Subsection 903.11 - Aggregate for Asphaltic Concrete Surface Coarses (Hot Mix) (pg. 934) 11-16-15; add the following sentence at the end of the first paragraph:

"For mixtures including recycled asphalt pavement, RAP, and/or recycled asphalt shingles, RAS, stockpiles will not be considered as contributing to the required minimum of three stockpile sizes."

Subsection 903.11 (pg. 934) 11-16-15; A. Coarse Aggregate (retained on a No. 4 sieve), revise the 1st paragraph and subsection 3:

"Provide aggregate, consisting of crushed stone, crushed slag, crushed gravel, crushed granite, crushed quartzite, crushed gneiss, or natural combinations of these materials.",

"3. Combined aggregate shall consist of siliceous particles processed from washed material, of which at least 70% by count of the material retained on the No. 4 sieve shall have a minimum of two fractured faces, one of which must be fractured for the approximate average diameter or thickness of the particle. Do not add pea gravel or uncrushed particles. The absorption of the crushed aggregate retained on the No. 4 sieve shall not exceed 5% when tested in accordance with AASHTO T 85."

Subsection 903.11 A (pg. 934), 5-13-19; **Coarse Aggregate (retained on a No. 4 sieve);** Revise paragraph and No. 1:

Provide aggregate, consisting of crushed stone, crushed slag, crushed gravel, crushed granite, crushed quartzite, crushed gneiss, or natural combinations of these materials. The coarse aggregate shall meet the physical requirements of ASTM D692, with the following exceptions and additions:

1. Sodium The aggregate shall meet the quality requirements in 903.25.

Subsection 903.11 - A. Coarse Aggregate (retained on a No. 4 sieve) (pg. 934), 5-18-15; revise subsection 2. as follows:

"2. Material retained on the No. 4 sieve shall contain a maximum of 10% elongated pieces (length greater than five times the average thickness)"

Subsection 903.11 B (pg. 935), 5-13-19; **Fine Aggregate (passing a No. 4 sieve);** Revise No. 2:

2. Fine aggregate shall meet the quality requirements in 903.25.

Subsection 903.11 C. Combined Aggregate Grading (pg. 936) 10-8-18; Table 903.11-2 Revise Table to add TLE information:

Table 903.11-2: Asphalt Concrete Surface Course Mixture Designation Design Range of Gradations

Sieve Size	Total Percent Passing by Weight				
	Grading D	Grading E	Grading TL	Grading TLD/ TLE	Grading OGFC
3/4 inch	--	--	--	--	100
5/8 inch	100	100	--	--	--
1/2 inch	95-100	95-100	100	100	85-100
3/8 inch	80-93	80-93	100	90-100	55-75
No. 4	54-76	54-76	89-94	54-76	10-25
No. 8	35-57	35-57	53-77	35-57	5-10
No. 30	17-29	17-29	23-42	17-33	--
No. 50	10-18	10-18	--	10-18	--
No. 100	3-10	3-11	9-18	3-10	--
No.	0-6.5	0-8	6-14	4-7	2-4

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Subsection 903.11 C. 2. (pg. 937) Grading E, add TLE to the title:

"**Grading E and TLE.** When using Grading E as a surface for traffic lanes, 50% to 80% of the mineral aggregate shall be composed of crushed limestone, and the remaining 50% to 20% shall be natural sand, slag sand, sand manufactured from gravel or other approved non-skid aggregates, or any combination of these materials, with the following exceptions:

The sand percentage on the Job Mix Formula (JMF) shall range from 20% to 50%. However, if needed to meet or improve the specified design criteria, the Contractor may alter the limestone and sand percentage by 5% from the percentage shown on the original JMF. If altering the aggregate percentages shown on the original JMF, submit a revision of the original design showing the altered percentages of aggregate.

b. When using Grading E for surfacing of shoulders or other non-traffic lane construction, the mineral aggregate may be composed entirely of limestone, including Size No. 10 (screenings) and manufactured sand, but in no case shall the mineral aggregate for this construction consist of less than 50% limestone.

c. Recycled Asphalt Pavement (RAP) milled from Department or other State Highway Agency projects shall be assumed to contain 75% non-skid material."

Subsection 903.11 C.3. (pg. 938), 6-27-16; revise the 1st paragraph of subsection C.3 to the following:

"**3. Grading OGFC.** A minimum of 75% of the aggregate shall meet the requirements specified in 903.24 for Surface Mixtures (Non-Skid Aggregates). The coarse aggregate shall have at least 90% crushed aggregate with two fractured faces and 100% with one fractured face as determined in accordance with ASTM D5821. The coarse aggregate shall have a LA Abrasion value of less than 40% and a maximum absorption of 3.0%."

Subsection 903.11 (pg. 938), 12-2-16; Add the following to C. as subsection 5.:

"**5. Grading C, CS, CW.** The mixture shall meet all requirements of **903.06.** When using Grading C, CS, or CW as a final riding surface for traffic lanes and the design ADT is greater than 1000, a minimum of 75% of the aggregate shall meet the requirements specified in **903.24** for Surface Mixtures (Polish-Resistant Aggregate) for the appropriate levels."

Subsection 903.12 (pg. 938) 11-16-15; A. Aggregate for Slurry Seal, revise the 1st paragraph a A. as shown; delete the 2nd paragraph:

"The aggregate shall be crushed slag, crushed granite, or crushed stone (crushed stone as specified in 903.24), meeting the requirements of ASTM D692, except the gradation shall be as specified in Table 903.12-1. The aggregate shall have a minimum sand equivalent, as determined in accordance with AASHTO T 176, of 45.

Subsection 903.12 A (pg. 938), 5-13-19; **Aggregate for Slurry Seal**; Revise 1st paragraph:

The aggregate shall be crushed slag, crushed granite, or crushed stone (crushed stone as specified in **903.24**), meeting the requirements of ASTM D692, except the gradation shall be as specified in Table 903.12-1. The aggregate shall meet the quality requirements in 903.25.The aggregate shall have a minimum sand equivalent, as determined in accordance with AASHTO T 176, of 45.

Subsection 903.12 (pg. 939) 11-16-15; B. Aggregate for Micro-Surface: modify the first paragraph, delete the second paragraph:

"The aggregate shall be crushed slag, crushed granite, or crushed stone (crushed stone as specified in **903.24**) meeting the gradation limits specified in Table 903.12-2 and the physical properties of ASTM D692, except the percent of fractured pieces shall be 100. The aggregate shall have a minimum sand equivalent, as determined in accordance with AASHTO T 176, of 65. Polish-resistant aggregates will not be required for leveling courses, provided they will be covered with riding surface mixtures.

Subsection 903.12 B (pg. 939), 5-13-19; **Aggregate for Micro-surface:** Revise 1st paragraph:

The aggregate shall be crushed slag, crushed granite, or crushed stone (crushed stone as specified in **903.24**) meeting the gradation limits specified in Table 903.12-2 and the physical properties of ASTM D692, except the percent of fractured pieces shall be 100. The aggregate shall meet the quality requirements in 903.25. The aggregate shall have a minimum sand equivalent, as determined in accordance with AASHTO T 176, of 65. Polish-resistant aggregates will not be required for leveling courses, provided they will be covered with riding surface mixtures.

Subsection 903.12 (pg. 939) 5-15-17; B. Aggregate for Micro-Surface: Add the following as the 2nd paragraph:

"If blending aggregates from more than one source, use automated proportioning and blending equipment which has individual bins for each aggregate source used to produce a stockpile meeting the job mix formula gradation. Proportion and blending equipment shall be calibrated at the beginning of production. All aggregate sources shall meet the requirements of **Table 903.24-1**. Do not blend aggregates with a front end loader. Proportion the aggregate to produce a uniform gradation meeting the requirements specified in Table 903.12-2. The contractor shall provide a Type A laboratory as defined by **106.06** capable of verifying gradation at the location where blending occurs."

Subsection 903.13 (pg. 940), 12-2-16; modify the last sentence of the 1st paragraph:

"Provide aggregate consisting of crushed stone, crushed slag, or crushed gravel, meeting the quality requirements of ASTM D692, except that at least 50% by count of crushed gravel aggregates shall have at least one fractured face. Crushed slag aggregate retained on the No. 4 sieve shall contain no more than 20% by weight of glassy particles. Provide aggregates meeting the requirements of **903.24 except, if ADT is less than 1000**."

Subsection 903.13 (pg. 940), 5-13-19; **Aggregate for Bituminous Seal Coat**; Revise 1st paragraph:

Provide aggregate consisting of crushed stone, crushed slag, or crushed gravel, meeting the physical requirements of ASTM D692, except that at least 50% by count of crushed gravel aggregates shall have at least one fractured face. The aggregate shall meet the quality requirements of 903.25. Crushed slag aggregate retained on the No. 4 sieve shall contain no more than 20% by weight of glassy particles. Provide aggregates meeting the requirements of **903.24** except, if ADT is less than 1000.

Subsection 903.15 (pg. 941), 5-15-17; revise the 3rd paragraph:

"The Contractor may use recycled concrete aggregate per 903.05 C. or reclaimed asphalt pavement (RAP), at a maximum rate of 25% by weight~~,~~ provided the combined aggregate blend meets all the requirements specified above. If blending, crush and screen the recycled concrete and/or asphalt to produce a uniform stockpile before blending it with the virgin material. Keep the reclaimed asphalt pavement stockpiles free of bricks, steel, wood, and all other deleterious materials. The virgin and reclaimed pavement blend shall meet the quality requirements specified in Table **903.05-1**."

Subsection 903.15 (pg.941), 5-13-19; **Aggregate for Aggregate-Cement Base Course;** Revise 3rd paragraph:

Recycled concrete aggregate per 903.05C or reclaimed asphalt pavement (RAP) may be used at a maximum rate of 25% by weight, provided the combined aggregate blend meets all the requirements specified above. If blending, crush and screen the recycled concrete and/or asphalt to produce a uniform stockpile before blending it with the virgin material. Keep the reclaimed asphalt pavement stockpiles free of bricks, steel, wood, and all other deleterious materials. The virgin and reclaimed pavement blend shall meet the quality requirements specified in 903.25.

Subsection 903.17 (pg. 941), 5-13-19; **Aggregate for Underdrains**; Revise 1st paragraph:

Provide crushed stone, crushed slag, or washed gravel meeting the physical requirements of ASTM D692, the quality requirements of 903.25, and the gradation requirements specified for Size 6, 7, 8, 57, or 78 in **903.22**.

Subsection 903.18 (pg. 942), 5-13-19; **Aggregate for Sand-Asphalt Surface Course;** Remove entire subsection:

Subsection 903.19 (pg. 942-943), 5-13-19; **Lightweight Aggregates for Structural Concrete;** Revise Subsection:

Provide lightweight aggregate conforming to AASHTO M 195, with the following additions:

1. Produce the lightweight aggregate by fusing raw shale, slate, or clay in a rotary kiln, to yield particles having a wear of not more than 40% when tested in accordance with AASHTO T 96.

2. The lightweight coarse aggregate shall conform to the gradation requirements for size 3/4 inch to No. 4, as shown in Table 1 of AASHTO M 195.

3. The aggregate shall meet the quality requirements in 903.25.

4. Concrete with approximately 6% air content made from the aggregate shall have a minimum durability factor of 90% when tested in accordance with AASHTO T 161.

5. Use material listed on the Department's QPL.

Subsection 903.24 (pg. 946), 5-18-15; Modify the 1st paragraph to the following:

"Provide coarse aggregate consisting of crushed gravel, crushed granite, crushed slag, crushed quartzite, crushed gneiss, or crushed sandstone. Other crushed aggregate may be used provided it has the chemical, physical, and performance characteristics specified in Table 903.24-1."

Subsection 903.25 (pg. 947), 5-13-19; **Aggregate Quality Requirements**: Add new Subsection.

Table 903.25-1: Fine Aggregate Quality Requirements

Application	Sodium Sulfate Soundness Loss AASHTO T 104, %max	L A Abrasion AASHTO T 96, %max	Absorption AASHTO T 84, %max
Concrete (903.01)	10	40 (1)	N/A
Mortar (903.02)	10	N/A	N/A
Hot Mix Asphalt Mix Base and Leveling Courses (903.06)	12	40 (1)	N/A
Hot Mix Asphalt Surface Courses (903.11)	12	40 (1)	N/A
Slurry Seal (903.12)	12	40 (1)	N/A
Microsurface (903.12)	12	40 (1)	N/A

(1)Applicable for fine aggregate manufactured from limestone or dolomite.

Table 903.25-2: Coarse Aggregate Quality Requirements

Application	Sodium Sulfate Soundness Loss AASHTO T 104, %max	L A Abrasion AASHTO T 96, %max	Absorption AASHTO T 84, %max
Concrete (903.03)	9	40	5
Mineral Aggregate Base – Type A (903.05)	15	50	N/A
Mineral Aggregate Base – Type B (903.05)	20	50	N/A
Reclaimed Concrete Aggregate (903.05)	N/A	50	N/A
Hot Mix Asphalt Mix Base and Leveling Courses (903.06)	9	50	5
Hot Mix Asphalt Surface Courses (903.11)	9	40	5(1)
Bituminous Seal Coat (903.13)	12	40	N/A
Double Bituminous Surface Treatment (903.14)	12	40	N/A
Aggregate Cement Base Course (903.15)	15	50	N/A
Underdrains (903.17)	12	50	N/A
Lightweight Concrete (903.19)	9	40	10
Machined Riprap (709.02)	12	N/A	N/A
Graded Solid Rock (203.02)	12	N/A	N/A
Solid Rock Fill (205.04)	12	N/A	N/A
Masonry Stone (921.07)	12	N/A	N/A

(1)Maximum absorption for OGFC is 3.0%

Subsection 904.01 (pg. 948-950), 5-13-19; **Asphalt Cements:** Combined supplemental specifications from 5-15, 11-15, 6-16, 12-16, and 11-17; Replace entire subsection with the following:

904.01 Asphalt Cements

Only obtain asphalt cement for use on Department projects from Certified Asphalt Cement Suppliers that have an approved Quality Control Plan in accordance with the Department's Standard Operating Procedures.

Asphalt cement shall conform to AASHTO M 320 and Department procedures. Direct Tension testing is not required.

Instead of PG 64-22, the Contractor may use asphalt cement graded to PG 67-22. PG 67-22 shall conform to the requirements of AASHTO M 320 when the applicable tests are conducted at 67 °C and -12 °C, and the dynamic shear of the rolling thin film, pressure aged vessel sample is tested at 26.5 °C.

To modify the asphalt, properly blend one or more modifier(s) consisting of styrene butadiene (SB), styrene butadiene styrene (SBS), or styrene butadiene rubber (SBR), or Ground Tire Rubber (GTR) to a PG 64-22 or PG 67-22 base asphalt.

GTR used to modify asphalt shall meet the requirements of 921.17. Blending of GTR into asphalt cement shall occur only at the asphalt terminal. "

Polyphosphoric acid may be used as a modified not exceeding 0.5% by weight of asphalt binder and may only be used when the primary modifier is one of the styrene-based products listed above.

In addition to the above, asphalt cement modified with GTR shall meet the following requirement. The temperature difference determined by the Separation Test shall not exceed 15 °F. The separation test shall consist of taking the difference in softening point, as determined by the Ring and Ball Test (AASHTO T53), between the top and bottom thirds of a specimen prepared per ASTM D7173.

In addition to the above requirements, the asphalt cements shall meet the requirements specified in Table 904.01-1.

Table 904.01-1: Requirements for Asphalt Cement

Property*	PG 64-22, PG 67-22	PG 70-22	PG 76-22	PG 82-22
Non-recoverable creep compliance at 3.2kPa, Jnr(3.2), kPa^{-1} at 64°C, Max	4.5	1.0	0.5	0.5
% Difference in Non-Recoverable Creep Compliance, Jnr(diff) at 64°C, %, Max	75	75**	n/a	n/a

* Tested in accordance with AASHTO T350.
** Shall be waived if Jnr(3.2) is equal to or less than 0.5

PG76-22 and PG82-22 grade asphalts shall meet the requirements for Indication of Elastic response as defined in Appendix X1 of AASHTO M332. PG70-22 grade asphalts shall have a minimum percent recovery at 3.2 kPa of 29%.

Furnish a certification to the Engineer on each project stating that the asphalt cement provided meets the Department's specification. Ensure that quality control and compliance testing are completed in accordance with the asphalt supplier's approved quality control plan and Department procedures. Identify on the certification, the type(s) of modifier used.

In addition, the asphalt cement supplier shall provide a temperature-viscosity curve for PG 64-22 and PG 67-22 asphalt cements with a recommended mixing temperature range. In order to develop a temperature-viscosity curve, it may be necessary to run the viscosity test at a higher temperature, based on the softening point of the modified asphalt cement.

Subsection 904.01 (pg. 949), 12-30-19; **Asphalt Cements;** Add to end of 4th paragraph:

The use of Re-refined Engine Oil Bottoms (REOB) or Vacuum Tower Asphalt Extender (VTAE) is prohibited.

Subsection 904.01 (pg. 949), 5-13-19; **Asphalt Cements**; Revise paragraph below Table 904.01-1:

PG76-22 and PG82-22 grade asphalts shall meet the requirements for Indication of Elastic response as defined in AASHTO R92. PG70-22 grade asphalts shall have a minimum percent recovery at 3.2 kPa of 29%.

Subsection 904.03 (pg. 951) 11-16-15; Emulsified Asphalts, Add "TTT-3" to 904.03-1 with the following requirements:

Saybolt-Furol Viscosity @ 77 °F, seconds	10-100
Particle Charge	Positive
Sieve Test, %	0.1 Max
Residue by	Distillation(1)
Residue, %	50 Min
Demulsibility, %	65 Min
Penetration	40-90

[1]-Distill at 350°F

Subsection 904.03 (pg. 954), 12-2-16; Revise Table 904.03-1(c) to remove TTT-1, TTT-2, and TTT-3:

Table 904.03-1(c): Test Requirements for Emulsified Asphalt

Practices	**AASHTO Test Method**	**CRS-2P**	**RS-2**	**RS-1**
Saybolt-Furol Viscosity @ 77 °F, seconds	T59	n/a	n/a	20-100
Saybolt-Furol Viscosity @ 122 °F, seconds	T59	100-400	75-400	n/a
Storage Stability Test, 24- h, %	T59	1 Max	1 Max	1 Max
5-day Settlement, %	T59	n/a	n/a	n/a
Particle Charge	T59	Positive	n/a	n/a
Sieve Test, %	T59	0.1 Max	0.1 Max	0.1 Max
Residue by	T59	*Evaporation*	Distillation	Distillation
Residue, %	T59	65 Min	63 Min	55 Min
Demulsibility,	T59	40 Min	60 Min	60 Min

Practices	AASHTO Test Method	CRS-2P	RS-2	RS-1
%				
Distillate, %	T59	n/a	n/a	n/a
Oil Test, %	T59	n/a	n/a	n/a
Stone Coating	T59	n/a	n/a	n/a
Float Test, seconds	T50	n/a	n/a	n/a
Penetration	T49	75-175	100-200	100-200
Elastic Recovery, % (2)	T301	50 Min	n/a	n/a
Ductility @ 77 °F, cm	T51	40 Min	40 Min	40 Min
Ductility @ 40 °F, cm	T51	n/a	n/a	n/a
R&B Softening Point, °F	T53	125 Min	n/a	n/a
Original G*/sind @ 82 °C	T315	n/a	n/a	n/a

Subsection 904.03 (pg.954), 5-18-15; Replace with the following:

Subsection 904.03, Table 904.03-1(c). Modify as follows for TTT-1, TTT-2:

Table 904.03-1(c): Test Requirements for Emulsified Asphalt

Practices	AASHTO Test Method	CRS-2P	RS-2	RS-1	TTT-1	TTT-2
Saybolt-Furol Viscosity @ 77 °F, seconds	T59	n/a	n/a	20-100	20-100	10-100

Practices	**AASHTO Test Method**	**CRS-2P**	**RS-2**	**RS-1**	**TTT-1**	**TTT-2**
Saybolt-Furol Viscosity @ 122 °F, seconds	T59	100-400	75-400	n/a	n/a	n/a
Storage Stability Test, 24- h, %	T59	1 Max	1 Max	1 Max	1 Max	1 Max
5-day Settlement, %	T59	n/a	n/a	n/a	n/a	n/a
Particle Charge	T59	Positive	n/a	n/a	n/a	Positive
Sieve Test, %	T59	0.1 Max	0.1 Max	0.1 Max	0.1 Max	0.1 Max
Residue by	T59	*Evaporation*	Distillation	Distillation	Distillation	Distillation (1)
Residue, %	T59	65 Min	63 Min	55 Min	50 Min	50 Min
Demulsibility, %	T59	40 Min	60 Min	60 Min	n/a	n/a
Distillate, %	T59	n/a	n/a	n/a	n/a	n/a
Oil Test, %	T59	n/a	n/a	n/a	n/a	n/a
Stone Coating	T59	n/a	n/a	n/a	n/a	n/a
Float Test, seconds	T50	n/a	n/a	n/a	n/a	n/a
Penetration	T49	75-175	100-200	100-200	0-20	40-90
Elastic Recovery, % (2)	T301	50 Min	n/a	n/a	n/a	n/a
Ductility @ 77 °F, cm	T51	40 Min	40 Min	40 Min	n/a	n/a
Ductility @ 40 °F, cm	T51	n/a	n/a	n/a	n/a	n/a
R&B Softening Point, °F	T53	125 Min	n/a	n/a	60-75	n/a
Original G*/sind @ 82 °C	T315	n/a	n/a	n/a	1.0 Min	n/a

Practices	AASHTO Test Method	CRS-2P	RS-2	RS-1	TTT-1	TTT-2

(1) Distill at 350 °F

(2) Straight-sided mold, 20-cm elongation, 5min hold, 25 °C

Subsection 905.01 (pg. 956) 5-14-18, Revise subsection, add part C. Polypropylene Foam Type:

"**905.01 Preformed Joint Fillers (Non-Extruding and Resilient Types)**

Provide preformed joint fillers as shown on the Plans. When designated, punch holes in preformed joint filler to admit the dowels.

Furnish the filler for each joint in a single piece for the full depth and width required for the joint unless otherwise directed by the Engineer. If the Engineer approves the use of more than one piece for a joint, fasten the abutting ends securely, and hold to shape by stapling or using other positive means of fastening satisfactory to the Engineer.

A. Bituminous Type

Provide bituminous type preformed joint fillers conforming to AASHTO M 213.

B. Non-Bituminous Types

Provide non-bituminous types of preformed joint filler conforming to AASHTO M 153, Type I, II, or III, as specified.

C. Polypropylene Foam Type

Provide semi-rigid, closed-cell, polypropylene foam, preformed expansion joint filler conforming to ASTM D8139. "

Subsection 908.04 (pg. 968), 5-18-15, High Strength Bolts, A. Specifications; Add the following to the first paragraph:

"Unless otherwise shown on the Plans, mechanically galvanize all bolts, nuts and washers in accordance with ASTM B695 Class 50."

Subsection 908.04 (pg. 968), 12-2-16, High Strength Bolts, A. Specifications; revise the first paragraph:

"Unless otherwise shown on the Plans, all bolts, nuts and washers shall be coated with acceptable coating in accordance with ASTM F3125 for the respective grade."

Subsection 908.04 (pg. 968) 12-2-16; revise A. Specifications, 1.:

"A. Specifications: 1. Bolts. ASTM F3125, Grade 325 and Grade 490 - High Strength Bolts for Structural Joints"

Subsection 908.04 (pg. 970) 12-2-16; Revise C. Testing, 3. Assemblies, subsection f., update Table 908-04-2:

C. Testing, 3. Assemblies, f. Table 908.04-2 The minimum rotation, from a snug tight condition (10% of the specified proof load), shall be as specified in Table 908.04-2.

Table 908.04-2: Rotation from Snug Tight Condition

Bolt Length	Minimum Rotation from Snug
Up to and including 4 diameters	240 degrees (2/3 turn)
Over 4 diameters, but not exceeding 8 diameters	360 degrees (1 turn)
Over 8 diameters	480 degrees (1-1/3 turn)

(Note: These values differ from those shown in ASTM F3125.)

Subsection 908.07 (pg. 973), 5-14-18; Add the following as the last sentence in the subsection:

"Furnish the Engineer a certification from the manufacturer identifying each heat number and certifying that the requirements from AASHTO M 105 and the above additions have been met."

Subsection 909.01B(pg. 977), 12-2-16; Remove the 4th paragraph referencing a tolerance of 5% from B. Steel Posts and Braces.

Subsection 909.01 C (pg. 978), 12-30-19; **Wood Posts and Braces;** Revise last paragraph 909.01 C;

909.01 Stock Fence…

C. Wood Posts and Braces…

Treat posts, braces, and anchors with a preservative treatment, conforming to **911.02.A**. All preservatives must be registered with the U.S.EPA under FIFRA. Fabricate or frame the timbers before treatment.

Subsection 909.02 (pg. 980-981), 12-2-16; Remove the word minimum from Table 909.02-1:

Table 909.02-1: Post and Braces

Application	Material	ASTM Specification	Nominal Diameter (inches)	Outside Diameter (inches)
Line Posts	Galvanized steel pipe	F1083	1.5	1.900
	Aluminum alloy standard (ANSI Schedule 40) pipe	B429, Alloy 6063, Temper T6	1.5	1.900
	Triple coated steel pipe with a 0.120-inch wall thickness	F1043, Group I-C	1.5	1.900

Application	Material	ASTM Specification	Nominal Diameter (inches)	Outside Diameter (inches)
End, Corner, and Pull Posts	Galvanized standard steel pipe	F1083	2.0	2.375
	Aluminum alloy standard (ANSI Schedule 40) pipe	B429, Alloy 6063, Temper T6	2.0	2.375
	Triple coated steel pipe with a 0.130-inch wall thickness	F1043, Group I-C	2.0	2.375
End and Corner Braces	Galvanized standard steel pipe	F1083	1.25	1.660
	Aluminum alloy standard (ANSI Schedule 40) pipe	B429, Alloy 6063, Temper T6 (for corner posts: B241)	1.25	1.660
	Triple coated steel pipe with a 0.111-inch wall thickness	F1043, Group I-C	1.25	1.660

Subsection 909.03 (pg. 983), 12-2-16; Remove the last paragraph of the subsection.

Subsection 909.01 C (pg. 978), XX-XX-19; **Wood Posts and Braces;** Revise 2nd sentence 909.06, Revise paragraph 909.07:

909.06 Timber Rail…

Provide treated timber, when specified, conforming to 911.02~~.A~~.

909.07 Guard Rail Posts

Provide railing posts of the section, weight, and length shown on the Plans. The posts may be made of wood, conforming to 911.02~~.A~~, or steel, conforming to ASTM A36 and galvanized in accordance with ASTM A123.

Section 911 (pg. 996-999), 12-30-19; **Timber and Timber Piles;** Revise Entire Section:

SECTION 911 – LUMBER, TIMBERS AND TIMBER PILES

911.01 Lumber & Timbers

A. General

Refer to AASHTO M 168 for grading and terminology. This Section primarily addresses bridge and miscellaneous roadway materials. ~~When using lumber or timbers in buildings (houses or similar type structures), use one of the preservative type treatments noted in AASHTO M 133, applied in accordance with and at the rates specified in the current AWPA procedure for such treatment.~~

B. Species of Wood

Use Southern Yellow Pine~~, of at least medium grain,~~ in accordance with Southern Pine Inspection Bureau (SPIB) Specifications or as ~~unless~~ otherwise shown on the Plans.

C. Grades of Lumber and Timber

~~Lumber ordered in multiple lengths shall be graded after having been cut to length. When shown on the Plans or specified in the Contract,~~ Provide lumber and timbers for permanent use in structures that is grade marked or hammer stamped by a recognized acceptance agency~~. Provide timber~~ that conforms to the following:

1. **Yard Lumber.** Provide yard lumber with a grade of C Finish, when a choice quality grade for finish purposes~~, that is reasonably clear and without defects or blemishes that will detract~~

~~from a finish~~ and appearance is a requirement, especially when painted.

a. **No. 1.** Provide #1 Grade lumber and timbers for general construction and utility purposes where strength is a consideration. ~~Sound and tight knotted stock. Size of defects and blemishes limited.~~

b. **No. 2.** Provide #2 Grade lumber and timbers for general construction and utility purposes where strength is not a consideration~~. Allows somewhat (approximately 50%) larger and coarser defects than No. 1. May be considered grain tight lumber.~~

2. **Structural or Stress Rated Lumber and Timber.** As specified or otherwise noted in the plans, ~~P~~provide lumber and timbers of a structural grade conforming to the grading rules of the Southern Pine Inspection Bureau (SPIB). Allowable stress shall be in accordance with the current SPIB grading rules.

~~3. **Stress Grades for Structural Purposes.** Where the Specifications or Plans call for standard stress grades for various structural purposes, provide material of the grades shown on the Plans.~~

911.02 ~~Untreated and~~ Treated Lumber and Timbers

~~A. Treated Timber~~

Treated lumber and timbers ~~refers to timber of the species called for,~~ shall conform to the requirements of 911.01 and are to be treated by a pressure method to retain the minimum ~~quantity~~ retention of preservative per cubic foot of ~~the specified preservative~~ wood for the designated use as outlined in American Wood Protection Association (AWPA) Standard U1, Commodity Specification A: Sawn Products. ~~Use preservatives meeting the requirements of AASHTO M 133. for the particular type provided.~~ All preservatives must be registered with the U.S.EPA under FIFRA.

~~For timber that is to be pressure-treated, no heartwood requirement or sapwood limitation shall apply.~~

The Engineer will not accept treated structural lumber or timbers for use unless it has been inspected and found satisfactory both before and after treatment. Material that is grade marked and or tagged bearing the mark of an agency accredited under the American Lumber Standards Committee, Inc. (ALSC) shall be acceptable. Alternatively, the manufacturer may furnish a notarized Certificate of Compliance which includes the tally, grade, and preservative retention of material provided.

~~B. Untreated Timber, Heart Requirements~~

~~Ensure that all timber to be used without preservative treatment shows not less than the following amounts of heartwood:~~

~~1. Stringers, floorbeams and flooring: 80% of heart of any girth.~~

~~1. Caps, sills, and posts: 75% of heart on each of the four sides measured across the side.~~

~~1. Bracing, structs, rails, and similar: 80% of heart on both sides measured across the side.~~

911.03 Timber Piles

A. General

Provide untreated or treated timber piles in accordance with ASTM D25 Standard Specification for Round Timber Pile.

~~Cut timber piles from live, solid, sound trees, preferably during the winter season. Ensure that timber is free from defects such as injurious ring shakes, large, loose or unsound knots, decay, or other defects that might impair its strength or durability. Sound knots are allowable provided the greatest diameter of the knot does not exceed 4 inches or one-third of the diameter of the pile at the point where it occurs. Saw the butts square.~~

Fabricate round piles to meet the minimum diameters specified in Table 911.03-1. ~~for the tip and a section 3 feet from the butt, measured under the bark~~

Table 911.03-1: Timber Pile Diameters

Length of Pile	Tip Diameter (inches)	Butt End Diameter (inches)
20 feet and under	8	11
Over 20 feet up to 40 feet	8	12
Over 40 feet up to 60 feet	7	12
Over 60 feet	6	13

The diameter of the piles at the butt shall not exceed 18 inches.

~~Square piles shall have the dimensions shown on the Plans.~~

~~Cut piles above the ground swell. Peel all piles so as to remove all the rough or outer bark and at least 80% of the inner bark.~~

~~Do not leave any strips of inner bark larger than 3/4 x 8 inches on the pile. Provide a space of at least 1 inch wide between strips. Ensure that at least 80% of any circumference is free from inner bark.~~

Provide piles that have a uniform taper from butt to tip and are straight grained. ~~, and meet the following requirements.~~

~~1. A line drawn from the center of the butt to the center of the tip shall not fall outside the center of the pile more than 0.75% of the length at any point.~~

~~1. Piles shall be free from reverse bends.~~

~~1. In short bends, the distance from the center of the pile to a line stretched from the center of the pile above the bend to the center of the pile below the bend shall not exceed 4% of the length of the bend or 2-1/2 inches.~~

~~1. Trim all knots close to the body of the piles. Piles shall be free from twist exceeding half the~~

~~circumference in any 20 feet of length.~~

~~A. **Untreated Timber Piles**~~

~~Provide untreated timber piles conforming to the general requirements for timber piles specified in **911.03.A**, with the following additions:~~

~~**1.** For piles that will be below water level at all times, the Contractor may provide untreated timber piles of any species of wood that will satisfactorily withstand driving.~~

~~**1.** For use in exposed work, provide untreated timber piles from one of the following species: white oak, post oak, cypress, or southern yellow pine, except loblolly pine. Ensure the piles have a diameter or heartwood of not less than 80% of the required diameter of the pile.~~

~~C~~B. ~~Treated~~ **Preservative Treatment** ~~of Timber Piles~~

Pressure preservative treat timber piles with a preservative specified in AASHTO M133 and in accordance with AWPA U1, Commodity Specification E: Round Timber Piling, UC4C. ~~Provide treated timber piles conforming to the general requirements for timber piles specified in **911.03.A**, with the following additions:~~ All preservatives must be registered with the U.S.EPA under FIFRA.

~~1.The Contractor may provide treated timber piles of any species that will satisfactorily withstand driving and that will take the required preservative treatment.~~

~~2.Treat the timber piles with a preservative conforming to AASHTO M 133 in accordance with requirements of the current AWPA procedure~~

Subsection 912.05 (pg. 1001), 6-27-16; Add subsection 912.05 – Brick Paving Units:

"912.05 Brick Paving Units

Provide brick of the kind and grade specified.

A. Masonry Brick

1. Sidewalk: ASTM C902, Class SX, Type 1
2. Crosswalks and Roadway: ASTM C1272, Type R

B. Concrete Brick and Truncated Dome Concrete Brick

Provide brick conforming to ASTM C936

C. Truncated Dome Brick

Provide brick conforming to ASTM C902, Class SX, Type 1"

Subsection 914.08 (pg. 1006), 5-13-19; **Precast, Concrete Box Sections**; Revise 1st paragraph:

For culverts, storm drains, and sewers, provide precast reinforced concrete box sections conforming to ASTM C1577. Manufacture all precast concrete box sections in accordance with the Department's

Subsection 914.07 (pg. 1005), 12-30-19; **Plastic and polyethylene Corrugated Tubing;** Revise subsection:

Provide tubing conforming to AASHTO M 252 or ASTM F667~~405~~ for Heavy Duty Tubing, with the following exception:

Tubing having an elongation greater than 5% but less than 10% is acceptable provided the minimum pipe stiffness requirements in Table 1 are met when tested in accordance with ASTM F667~~405~~, Section ~~8~~9.~~7~~5, using a 12-inch base plate.

Subsection 915.02 (pg. 1007), 6-27-16; modify the description of 915.03, remove zinc coated, iron from 915.02 A. update the first paragraph of 915.02 A., Remove subsection B. Aluminum Coated Steel Pipe, Revise C. to become B., revise D to become C, Remove 1st and 2nd paragraphs of D now C, revise E to become D, update 915.03 to match index title: :

"SECTION 915 – METALLIC PIPE

915.01 Ductile Iron or Cast Iron Pipe
Provide ductile iron pipe conforming to ASTM A716 for the specified diameters and strength classes. Unless otherwise specified, either smooth, corrugated, or ribbed pipe may be furnished. For pipe diameters in excess of 48 inches, conform to ANSI Standard for Cast Iron Pit Cast Pipe, or as otherwise specified in the Contract, for the specified diameter and strength class.
Provide cast iron drain pipe conforming to ASTM A74. Unless otherwise specified, provide ductile iron pressure pipe for water lines or sewer construction conforming to the requirements of ASTM A377 for the diameters and working pressures specified.

915.02 Corrugated Metal Pipe Culverts, Pipe Arches, and Underdrains
A. Corrugated Steel Pipe, Pipe Arches, and Underdrains
Provide corrugated steel pipe, pipe arches, or underdrains, including special sections, such as elbows and flared ends, that conform to AASHTO M 36, aluminum-coated Type 2 meeting AASHTO M274. Special Sections shall be the same thickness as the pipe, arch, or underdrain to which they are joined. Furnish shop-formed elliptical pipe and shop-strutted pipe only where shown on the Plans.

B. Corrugated Aluminum Pipe, Pipe Arches, and Underdrains
When using corrugated aluminum pipe, pipe arches, or underdrains, conform to the applicable requirements of AASHTO M 196. Use special sections, such as elbows and flared end sections that conform to the applicable requirements of AASHTO M 196 and that are of the same gauge as the conduit to which they are joined.

C. Structural Plate Corrugated Steel and Aluminum Structures

Corrugated aluminum alloy structural plate for pipe, pipe arches, and arches shall conform to the requirements of AASHTO M 219.

D. Bituminous Coating
When material supplied for any of the items specified above are to be bituminous-coated, ensure that the metal to be coated is free of grease, dirt, and other contaminants. Bituminous coating and paving shall conform to the requirements of AASHTO M 190. Apply the coating in accordance with the manufacturer's recommended procedures and as directed by the Department."

915.03 Polymer Pre-coated, Corrugated Steel Pipe, Culverts and Underdrains
Provide polymer pre-coated corrugated steel pipe conforming to AASHTO M 245, Grade250/250, unless otherwise specified."

Subsection 916.05 E. (pg. 1012); 12-2-16, Add sentence to first paragraph:

"Fabricators must be AISC certified as specified in **602.04 A.4**."

Subsection 917.02.A.6. (pg. 1023), 6-27-16; Revise the following:

"**6. Anchor Bolts.** Use anchor rods of high strength steel meeting the requirements of ASTM F 1554, Grade to be determined by design. Fit each anchor bolt with a hex nut and lock-washer."

Subsection 917.11 (pg. 1031), 12-30-19; **Service Poles and Wood Standards;** Revise 1st paragraph:

917.11 Service Poles and Wood Standards

Provide wood service poles and standards of the class and length shown on the Plans. Unless otherwise specified, provide poles and standards of treated southern pine, classified according to the latest American Standard Dimensions of Southern Pine Poles, and that meet the requirements of ANSI 05.1. Treat the poles with pentachlorophenol or other approved treatment at the rate recommended by the local power authority, unless otherwise specified. The treatment shall conform to **911.03.~~C.~~**

Subsection 918.01 (pg. 1033-1035), 5-14-18; Revise the 1st paragraph and 3rd paragraph of A. General, Revise Table 918.01-1, Table 918.01-2, Table 918.01-4, Table 918.01-5, Revise the last paragraph of B. Seed Groups, Revise Table 918.01-6 Temporary Seeding:

A. General

Provide seed meeting the rules and requirements of the Tennessee Department of Agriculture Chapter 0080-05-06.

Pack grass seed in new bags or bags that are sound and not mended.

The vendor shall notify the Department before making shipments to allow the Department to arrange for inspection and testing of stock.

The vendor shall furnish the Department a certified laboratory report from a Society of Commercial Seed Technologists accredited commercial seed laboratory or from a State seed laboratory showing the analysis of the seed to be furnished. The report from an accredited commercial seed laboratory shall be signed by a Registered Member of the Society of Commercial Seed Technologists. The Department may take samples of the seed to check against the certified laboratory report. Sampling and testing will be in accordance with the requirements of the Tennessee Department of Agriculture.

Use commercial grade 10-10-10 fertilizer or equivalent.

B. Seed Groups

When a seed group is used, provide mixtures meeting the requirements specified in Tables 918.01-1 through 918.01-5, unless otherwise specified.

Table 918.01-1: Group A (February 1-July 1)

Kind of Seed	Quantity, Percent by Weight
Kentucky 31 Fescue	80
Korean Lespedeza	15
Annual Rye Grass	5

Table 918.01-2: Group B (June 1-August 15)

Kind of Seed	Quantity, Percent by Weight
Kentucky 31 Fescue	5575
Korean Lespedeza	15
German Millet	10

Table 918.01-3: Group B1 (April 15 - August 15)

Kind of Seed	Quantity, Percent by Weight
Bermudagrass (hulled)	70
Annual Lespedeza	30

Table 918.01-4: Group C (August 1-December 1)

Kind of Seed	Quantity, Percent by Weight
Kentucky 31 Fescue	70
EAnnual Rye Grass	20
White Clover	10

Table 918.01-5: Group C1 (February 1-December 1)

Kind of Seed	Quantity, Percent by Weight

Crown Vetch	25
Kentucky 31 Fescue	70
Annual Rye Grass	5

Uniformly mix seed when forming Groups. Do not mix Group seed until each type seed that is used to form the Group has been tested separately and meets DOA requirements for purity and germination.

C. Over-Seeding

Groups A, B, and C, when sown on slopes 3:1 and steeper, shall be over seeded with Sericea Lespedeza at the rate of 15 pounds per acre. When over-seeding is performed between February 1 and July 1, use Scarified Sericea Lespedeza with an additional 2 pounds per acre of Weeping Lovegrass. Between July 1 and December, use unhulled Sericea Lespedeza. Only use Group C1 when shown on the Plans.

D. Temporary Seeding

For temporary seeding, use seed groups and approved varieties as specified in Table 918.01-6.

Table 918.01-6: Temporary Seeding

Seed Group (Season)	Kind of Seed	Percent by Weight
Group D (January 1 – May 1)	ItAnnual Rye Grass	33-1/3%
	Korean Lespedeza	33-1/3%
	SSpring Oats	33-1/3%
Group E (May 1 – July 15)	SSorghum-Sudan Crosses (1)	100%
	or	
	StGerman Millet (2)	100%
Group F July 15 – January 1	BCereal Rye	66-2/3%
	ItAnnual Rye Grass	33-1/3%

Subsection 918.04 (pg. 1036), 12-2-16; add as a 2nd paragraph:

"For small quantities less than 100 units of seeding or sod, bagged pelletized or agricultural limestone meeting the Department of Agriculture Tennessee Liming Materials Act may be utilized."

Subsection 918.04 (pg. 1036), 5-13-19; **Agricultural Limestone**; Revise 1st and 2nd paragraphs:

Provide agricultural limestone
-meeting the Department of Agriculture Tennessee Liming Materials Act ~~utilized~~

Subsection 921 (pg. 1049), 11-6-17, Section 921 – Miscellaneous Materials, add Ground Tire Rubber to the Index:

"921.17 Ground Tire Rubber ……..1060"

Subsection 921.01 (pg. 1049), 5-18-15, Water; Replace subsection with the following:

"For mixing concrete, use water that is reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter, and other substances injurious to the finished product. Water provided by a municipal utility may be used without testing.

All other water shall have quality results submitted in accordance with the frequency listed in Table 921.01-01. All water quality results shall adhere to Table 921.01-2.

Table 921.01-1 Testing Frequency for Mixing Water

Water Source	**Testing Frequency(1)**
Municipal	NA
Non-Municipal	Every 3 months; tested annually after 4 consecutive passing tests

(1) The frequency may vary at the discretion of the Department.

Table 921.01-2 Quality Requirements for Mixing Water

Maximum Concentration in Mixing Water	**Limits**	**ASTM Test Method (1)**
Chloride Ion Content, ppm	500	C114
Alkalies as (NaO2 + 0.658 K2O), ppm	600	C114
Sulfates as SO4, ppm	3000	C114
Total Solids by mass, ppm	50000	C1603
pH	4.5-8.5	(2)
Resistivity, Minimum, kohm-cm	0.500	D1125
Soluble Carbon Dioxide, ppm	600	D513
Calcium and Magnesium, ppm	400	D511
Iron, ppm	20	(2)
Phosphate, ppm	100	D4327

(1) Other methods (EPA or those used by water testing companies) are generally acceptable.
(2) No ASTM method available.

Subsection 921 (pg. 1049) 10-8-18, Miscellaneous Materials, Remove 921.03 Sodium Chloride from the Content list:

Subsection 921.01 (pg. 1049), 5-14-18, Water; Remove Resistivity, Soluble Carbon Dioxide, Calcium and Magnesium, Iron, and Phosphate from Table 921.01-2 Quality Requirements for Mixing Water:

Table 921.01-2 Quality Requirements for Mixing Water

Maximum Concentration in Mixing Water	**Limits**	**ASTM Test Method (1)**
Chloride Ion Content, ppm	500	C114
Alkalies as (NaO2 + 0.658 K2O), ppm	600	C114
Sulfates as SO4, ppm	3000	C114
Total Solids by mass, ppm	50000	C1603
pH	4.5-8.5	(2)

(1) Other methods (EPA or those used by water testing companies) are generally acceptable.
(2) No ASTM method available.

Subsection 921.03 (pg. 1050) 10-8-18, Miscellaneous Materials, Remove subsection 921.03 Sodium Chloride:

Subsection 921.06 (pg.1051) 11-16-15; B. Bituminous Additives - 1. Anti-Stripping Additive, replace the ASTM C977 reference with AASHTO M 303.

> "Use hydrated lime conforming to AASHTO M 303or other heat-stable asphalt anti-stripping additive containing no ingredient harmful to the bituminous material or the workmen and that does not appreciably alter the specified characteristics of the bituminous material when added in the recommended proportions.**"**

Subsection 921.06 B. Bituminous Additives (pg.1052) 10-10-16; revise the 3rd paragraph to the following:

> "When using an anti-stripping additive other than hydrated lime, use a dosage rate of 0.3%, unless either gravel is used as a coarse aggregate or test results indicate moisture susceptibility, in which case mix at a dosage rate of 0.5%.

Subsection 921.06 B. 2. (pg. 1052) 11-6-17; B. Bituminous Additives, 2. Silicone Additives, Remove description and add the following sentence:

"2. Silicone Additives. The amount of silicone added to asphalt cement shall not exceed 2 oz. of silicone per 5500 gallons asphalt cement."

Subsection 921.07 (pg. 1053), 5-13-19; **Masonry Stone**; Revise 2nd paragraph:

Masonry stone shall meet the quality requirements in 903.25.

Subsection 921.10 (pg. 1056), 5-13-19; **Precast Manholes and Catch Basins**; Revise 1st paragraph:

Provide precast manholes and catch basins that conform to ASTM C478 and that are made in accordance with the Department's Standard Operating Procedure 5-3.

Subsection 921.15 (pg. 1060), 5-13-19; **Fly Ash;** Revise 3rd paragraph:

Obtain fly ash from an approved source as shown on the Department's Producer List.

Subsection 921.15 (pg. 1060), 5-13-19; **Fly Ash;** Revise Table 921.15-1:

Table 921.15-1: Fly Ash Requirements

Property	Fly Ash Class	
	F	C
A. Chemical Requirements: Uniformity Requirements		
The loss on ignition of individual samples shall not vary from the average established by the 10 preceding tests, or by all preceding tests if the number is less than 10, by more than: Loss on ignition, max variation, percentage points from average	1.0	1.0
B. Physical Requirements: Pozzolanic Activity Index		
With Portland cement, at 7 days, min, % of control	60	60
With Portland cement, at 28 days, min, % of control	75	75

Subsection 921.16 (pg. 1060), 5-13-19; **Ground Granulated Blast Furnace Slag;** Revise 2nd paragraph:

Obtain ground granulated blast furnace slag from an approved source as shown on the Department's ~~QPL~~ Producer List.

Subsection 921.17 (pg. 1060) 11-6-17; Ground Tire Rubber, add the following subsection:

"921.17 Ground Tire Rubber

Provide Class 30-1 Ground Tire Rubber (GTR) as defined by ASTM D5603 except for as noted in table 921.17-1. The material shall also be certified to meet the requirements of Table 921.17-01. Include certification of the GTR with the bill of lading for the modified asphalt cement.

Table 921.17-1: Requirements for Ground Tire Rubber

Property	Specification
Specific Gravity	1.15 +/- 0.05
Moisture Content	0.75% Max
Ferrous Metal Content	0.01% Max
Fiber Content	0.5% Max
Ash (ASTM E1131)	10% Max