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**Remarks and Instructions**

The *Materials Manual M 46-01* has been revised. Please remove and recycle the contents of the old *Materials Manual M 46-01* and replace with the May 2021 revision.

The complete manual, revision packages, and individual chapters can be accessed at [www.wsdot.wa.gov/publications/manuals/m46-01.htm](http://www.wsdot.wa.gov/publications/manuals/m46-01.htm).

For updating printed manuals, page numbers indicating portions of the manual that are to be removed and replaced are shown below.

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Please contact Kevin Burns at 360-709-5412 or [mawdslr@wsdot.wa.gov](mailto:mawdslr@wsdot.wa.gov) with comments, questions, or suggestions for improvement to the manual.

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**Washington State  
Department of Transportation**

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# Materials Manual

M 46-01.39

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**Engineering and Regional Operations**  
State Materials Laboratory

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| Asphalt Mixture  |       |           |           |   |
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| T 424            | WSDOT                 |           | ✓         | Power Interruption Test Procedure   |
| T 425            | WSDOT                 |           | ✓         | Environmental Chamber Test Procedure  |
| T 427            | WSDOT                 |           | ✓         | Loop Amplifier Test Procedure   |
| T 428            | WSDOT                 |           | ✓         | Traffic Controller Compliance Inspection and Test Procedure   |
| SOP 429          | WSDOT                 |           | ✓         | Methods for Determining the Acceptance of Traffic Signal Controller Assemblies  |
| T 430            | WSDOT                 |           | ✓         | Uninterruptible Power Supply (UPS) System Compliance Inspection and Test Procedure  |
| 1188             | IEEE                  |           |           | Standards Publication: Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) batteries for Stationary Applications |
| ATC 5301         | AASHTO<br>ITE<br>NEMA |           |           | Publication: Advanced Transportation Controller (ATC) Cabinet Standard  |
| 62040-3          | IEC                   |           |           | Standards Publication: Uninterruptible Power Systems (UPS) – Method for specifying the performance and test requirements  |

| Geotechnical – Soils |        |           |           |   |
|----------------------|--------|-----------|-----------|---|
| Procedure Number     | Owner  | Field Use | In Manual | Test Method   |
| R 58                 | AASHTO |           |           | Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test   |
| R 75                 | AASHTO |           |           | Developing a Family of Curves   |
| R 75                 | WAQTC  | ✓         | ✓         | FOP for AASHTO R 75, Developing a Family of Curves  |
| T 88                 | AASHTO |           |           | Particle Size Analysis of Soils   |
| T 89                 | AASHTO |           | ✓         | Determining the Liquid Limit of Soils (Checklist Only)  |
| T 90                 | AASHTO |           | ✓         | Determining the Plastic Limit and Plasticity Index of Soils (Checklist Only)  |
| T 99                 | AASHTO |           |           | Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in) Drop                          |
| T 99                 | WAQTC  | ✓         | ✓         | FOP for AASHTO T 99, Moisture-Density Relations of Soils Using a 5.5 lb (2.5 kg) Rammer and a 12 in (305 mm) Drop     |
| T 100                | AASHTO |           |           | Specific Gravity of Soils   |
| T 180                | AASHTO |           |           | Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in) Drop                          |
| T 180                | WAQTC  | ✓         | ✓         | FOP for AASHTO T 180, Moisture-Density Relations of Soils Using a 10 lb (4.54 kg) Rammer and an 18 in (457 mm) Drop   |
| T 208                | AASHTO |           |           | Unconfined Compressive Strength of Cohesive Soil  |
| T 215                | AASHTO |           |           | Permeability of Granular Soils (Constant Head)  |
| T 216                | AASHTO |           |           | One-Dimensional Consolidation Properties of Soils   |
| T 236                | AASHTO |           |           | Direct Shear Test of Soils Under Consolidated Drained Conditions  |
| T 265                | AASHTO |           |           | Laboratory Determination of Moisture Content of Soils   |
| T 265                | WAQTC  | ✓         | ✓         | FOP for AASHTO T 265, Laboratory Determination of Moisture Content of Soils   |
| T 296                | AASHTO |           |           | Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression                              |
| T 297                | AASHTO |           |           | Consolidated, Undrained Triaxial Compressive Test on Cohesive Soils Shear   |
| T 501                | WSDOT  |           | ✓         | Test Method to Determine Durability of Very Weak Rock   |
| D 2487               | ASTM   |           |           | Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)           |
| D 2488               | ASTM   |           |           | Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)                               |
| D 4186               | ASTM   |           |           | One-Dimensional Consolidation Properties of Saturated Cohesive Soils Using Controlled-Strain Loading                  |
| D 4644               | ASTM   |           |           | Slake Durability of Shales and Similar Weak Rocks   |
| D 5084               | ASTM   |           |           | Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter                 |
| D 5311               | ASTM   |           |           | Load Controlled Cyclic Triaxial Strength of Soil  |
| D 5731               | ASTM   |           |           | Determination of the Point Load Strength Index of Rock and Application to Rock Strength Classifications               |
| D 6467               | ASTM   |           |           | Torsional Ring Shear Test to Determine Drained Residual Shear Strength of Cohesive Soils                              |
| D 6528               | ASTM   |           |           | Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils  |
| D 7012               | ASTM   |           | ✓         | Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures |

| Geotextile and Steel |        |           |           |  |
|----------------------|--------|-----------|-----------|--|
| Procedure Number     | Owner  | Field Use | In Manual | Test Method  |
| E 18                 | ASTM   |           |           | Rockwell Hardness of Metallic Materials  |
| A 143                | ASTM   |           |           | Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement |
| T 244                | AASHTO |           |           | Mechanical Testing of Steel Products   |
| A 370                | ASTM   |           |           | Definitions for Mechanical Testing of Steel Products   |
| F 606                | ASTM   |           |           | Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets              |
| T 914                | WSDOT  | ✓         | ✓         | Practice for Sampling of Geosynthetic Material for Testing   |
| T 915                | WSDOT  |           | ✓         | Practice for Conditioning of Geotextiles for Testing   |
| T 923                | WSDOT  |           | ✓         | Thickness Measurement of Geotextiles   |
| T 925                | WSDOT  |           | ✓         | Standard Practice for Determination of Long-Term Strength for Geosynthetic Reinforcement   |
| T 926                | WSDOT  |           | ✓         | Geogrid Brittleness Test   |
| D 1683               | ASTM   |           |           | Failure in Sewen Seams of Woven Fabrics  |
| D 4354               | ASTM   |           | ✓         | Standard Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing  |
| D 4355               | ASTM   |           |           | Deterioration of Geotextiles From Exposure to Light, Moisture and Heat in a Xenon-Arc-Type Apparatus   |
| D 4491               | ASTM   |           |           | Water Permeability of Geotextiles by permittivity  |
| D 4533               | ASTM   |           |           | Trapezoid Tearing Strength of Geotextiles  |
| D 4595               | ASTM   |           |           | Tensile Properties of Geotextiles by the Wide-Width Strip Method   |
| D 4632               | ASTM   |           |           | Grab Breaking Load and Elongation of Geotextiles   |
| D 4751               | ASTM   |           |           | Determining Apparent Opening Size of a Geotextiles   |
| D 6241               | ASTM   |           |           | Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe  |

| Paint            |       |           |           |  |
|------------------|-------|-----------|-----------|--|
| Procedure Number | Owner | Field Use | In Manual | Test Method  |
| D 523            | ASTM  |           |           | Specular Gloss   |
| D 823            | ASTM  |           |           | Producing Films of Uniform Thickness of Paint, Coatings and Related Products on Test Panels                                |
| D 1475           | ASTM  |           |           | Density of Liquid Coatings, Inks, and Related Products   |
| D 2244           | ASTM  |           |           | Standard Practice for Calculation of Color Tolerances and Color Differences From Instrumentally Measured Color Coordinates |
| D 2369           | ASTM  |           |           | Volatile Content of Coatings   |
| D 2621           | ASTM  |           |           | Infrared Identification of Vehicle Solids From Solvent-Reducible Paints  |
| D 2697           | ASTM  |           |           | Volume Nonvolatile Matter in Clear or Pigmented Coatings   |
| D 2698           | ASTM  |           |           | Determination of the Pigment Content of Solvent-Reducible Paints by High-Speed Centrifuging                                |

| Pavement Soils   |        |           |           |   |
|------------------|--------|-----------|-----------|---|
| Procedure Number | Owner  | Field Use | In Manual | Test Method   |
| T 242            | AASHTO |           |           | Frictional Properties of Paved Surfaces Using a Full-Scale Tire   |
| T 272            | AASHTO |           |           | One-Point Method for Determining Maximum Dry Density and Optimum Moisture   |
| T 272            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 272, One-Point Method for Determining Maximum Dry Density and Optimum Moisture                           |
| T 307            | AASHTO |           | ✓         | Determining the Resilient Modulus of Soils and Aggregate Materials  |
| T 310            | AASHTO |           |           | In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)                       |
| T 310            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 310, In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) |
| T 606            | WSDOT  |           | ✓         | Method of Test for Compaction Control of Granular Materials   |
| T 610            | WSDOT  |           | ✓         | Method of Test for the Capillary Rise of Soils  |
| SOP 615          | WSDOT  | ✓         | ✓         | Determination of the % Compaction for Embankment & Untreated Surfacing Materials Using the Nuclear Moisture-Density Gauge |
| SOP 738          | WSDOT  | ✓         | ✓         | Establishing Maximum Field Density for Recycled Concrete Aggregates by Test Point Evaluation                              |
| T 807            | WSDOT  | ✓         | ✓         | Method of Operation of California Profilograph and Evaluation of Profiles   |
| D 4694           | ASTM   |           |           | Deflections with a Falling-Weight-Type Impulse Load Device  |

| Standard Practice |       |           |           |   |
|-------------------|-------|-----------|-----------|---|
| Procedure Number  | Owner | Field Use | In Manual | Test Method   |
| QC 1              | WSDOT |           | ✓         | Standard Practice for Cement Producers/Suppliers That Certify Portland Cement and Blended Hydraulic Cement                                    |
| QC 2              | WSDOT |           | ✓         | Standard Practice for Asphalt Suppliers That Certify Performance Graded and Emulsified Asphalts   |
| QC 3              | WSDOT |           | ✓         | Quality System Laboratory Review  |
| QC 4              | WSDOT |           | ✓         | Standard Practice for Fly Ash Producers/Importers/Distributors That Certify Fly Ash   |
| QC 5              | WSDOT |           | ✓         | Standard Practice for Ground Granulated Blast-Furnace Slag Producers/Importers/Distributors That Certify Ground Granulated Blast-Furnace Slag |
| QC 6              | WSDOT |           | ✓         | Annual Prestressed Plant Review and Approval Process  |
| QC 7              | WSDOT |           | ✓         | Annual Precast Plant Review and Approval Process  |
| QC 8              | WSDOT |           | ✓         | Standard Practice for Development, Submittal and Approval of Hot Mix Asphalt Mix Designs  |
| QC 9              | WSDOT |           | ✓         | Standard Practice for Approval of Recycled Materials Facilities of WSDOT Recycled Concrete and Returned Concrete                              |
| QC 10             | WSDOT |           | ✓         | Standard Practice for Approval of Recycled Materials Facilities from Stockpiles of Unknown Sources  |
| QC 11             | WSDOT |           | ✓         | Standard Practice for Aggregate Producers Participating in the Quality Aggregate Program  |
| QC 12             | WSDOT |           | ✓         | Standard Practice for Evaluation of Aggregate Sources   |



| Numerical Order  |          |           |           |   |
|------------------|----------|-----------|-----------|---|
| Procedure Number | Owner    | Field Use | In Manual | Test Method   |
| LRFD CONS        | AASHTO   |           |           | Section 18, Bearing Devices   |
| QC 1             | WSDOT    |           | ✓         | Standard Practice for Cement Producers/Suppliers That Certify Portland Cement and Blended Hydraulic Cement                                    |
| QC 2             | WSDOT    |           | ✓         | Standard Practice for Asphalt Suppliers That Certify Performance Graded and Emulsified Asphalts   |
| QC 3             | WSDOT    |           | ✓         | Quality System Laboratory Review  |
| QC 4             | WSDOT    |           | ✓         | Standard Practice for Fly Ash Producers/Importers/Distributors That Certify Fly Ash   |
| QC 5             | WSDOT    |           | ✓         | Standard Practice for Ground Granulated Blast-Furnace Slag Producers/Importers/Distributors That Certify Ground Granulated Blast-Furnace Slag |
| QC 6             | WSDOT    |           | ✓         | Annual Prestressed Plant Review and Approval Process  |
| QC 7             | WSDOT    |           | ✓         | Annual Precast Plant Review and Approval Process  |
| QC 8             | WSDOT    |           | ✓         | Standard Practice for Development, Submittal and Approval of Hot Mix Asphalt Mix Designs  |
| QC 9             | WSDOT    |           | ✓         | Standard Practice for Approval of Recycled Materials Facilities of WSDOT Recycled Concrete and Returned Concrete                              |
| QC 10            | WSDOT    |           | ✓         | Standard Practice for Approval of Recycled Materials Facilities from Stockpiles of Unknown Sources  |
| QC 11            | WSDOT    |           | ✓         | Standard Practice for Aggregate Producers Participating in the Quality Aggregate Program  |
| QC 12            | WSDOT    |           | ✓         | Standard Practice for Evaluation of Aggregate Sources   |
| TEES             | Caltrans |           |           | Caltrans Transportation Electrical Equipment Specifications   |
| PE-1             | NEMA     |           |           | Standards Publication: Uninterruptible Power Systems (UPS) – Specification and Performance Verification                                       |
| TS-1             | NEMA     |           |           | Standards Publication: Traffic Control Systems  |
| TS-2             | NEMA     |           |           | Standards Publication: Traffic Controller Assemblies with NTCIP Requirements  |
| TM 2             | WAQTC    | ✓         | ✓         | FOP for WAQTC TM 2, Sampling Freshly Mixed Concrete   |
| T 11             | AASHTO   |           |           | Materials Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing  |
| TM 14            | WAQTC    |           | ✓         | Laboratory Prepared Asphalt Mixture Specimens   |
| E 18             | ASTM     |           |           | Rockwell Hardness of Metallic Materials   |
| T 19             | AASHTO   | ✓         | ✓         | Bulk Density (“Unit Weight”) and Voids in Aggregate (Rodding Procedure Only) (Checklist Only)   |
| T 21             | AASHTO   |           |           | Organic Impurities in Fine Aggregates for Concrete  |
| T 22             | AASHTO   |           |           | Compressive Strength of Cylindrical Concrete Specimens  |
| T 22             | WSDOT    | ✓         | ✓         | FOP for AASHTO T 22, Compressive Strength of Cylindrical Concrete Specimens   |
| T 23             | AASHTO   |           |           | Making and Curing Concrete Test Specimens in the Field  |
| T 23             | WAQTC    | ✓         | ✓         | FOP for AASHTO T 23, Making and Curing Concrete Test Specimens in the Field   |
| T 24             | AASHTO   |           |           | Obtaining and Testing Drilled Cores and Sawed Beams of Concrete   |

| Numerical Order  |        |           |           |  |
|------------------|--------|-----------|-----------|--|
| Procedure Number | Owner  | Field Use | In Manual | Test Method  |
| T 27             | AASHTO |           |           | Sieve Analysis of Fine and Coarse Aggregates   |
| T 27_T 11        | WAQTC  | ✓         | ✓         | FOP for AASHTO T 27_T 11, Sieve Analysis of Fine and Coarse Aggregates                     |
| R 28             | AASHTO |           |           | Standard Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel |
| R 29             | AASHTO |           |           | Standard Practice for Grading or Verifying the Performance Grade (PG) of an Asphalt Binder |
| R 30             | AASHTO |           |           | Standard Practice for Mixture Conditioning of Hot Mix Asphalt (HMA)                        |
| T 30             | AASHTO |           |           | Mechanical Analysis of Extracted Aggregate   |
| T 30             | WAQTC  | ✓         | ✓         | FOP for AASHTO T 30, Mechanical Analysis of Extracted Aggregate                            |
| T 37             | AASHTO |           |           | Sieve Analysis of Mineral Filler for Hot Mix Asphalt (HMA)                                 |
| R 39             | AASHTO |           |           | Standard Practice for Making and curing Concrete Test Specimens in the Laboratory          |
| T 44             | AASHTO |           |           | Solubility of Bituminous Materials   |
| R 47             | AASHTO |           |           | Reducing Samples of Asphalt Mixtures to Testing Size                                       |
| R 47             | WAQTC  | ✓         | ✓         | FOP for AASHTO R 47, Reducing Samples of Asphalt Mixtures to Testing Size                  |
| T 48             | AASHTO |           |           | Flash and Fire Points by Cleveland Open Cup  |
| T 49             | AASHTO |           |           | Penetration of Bituminous Materials  |
| T 50             | AASHTO |           |           | Float Test for Bituminous Materials  |
| T 51             | AASHTO |           |           | Ductility of Asphalt Materials   |
| T 53             | AASHTO |           |           | Softening Point of Bitumen (Ring-and-Ball Apparatus)                                       |
| R 58             | AASHTO |           |           | Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test                      |
| T 59             | AASHTO |           |           | Emulsified Asphalts  |
| T 65             | AASHTO |           |           | Mass (Weight) of Coating on Iron and Steel Articles With Zinc or Zinc-Alloy Coatings       |
| R 66             | AASHTO |           |           | Sampling Asphalt Materials   |
| R 66             | WAQTC  | ✓         | ✓         | FOP for AASHTO R 66, Sampling Asphalt Materials  |
| E 70             | ASTM   |           |           | pH of Aqueous Solutions With the Glass Electrode   |
| T 72             | AASHTO |           |           | Saybolt Viscosity  |
| R 75             | AASHTO |           |           | Developing a Family of Curves  |
| R 75             | WAQTC  | ✓         | ✓         | FOP for AASHTO R 75, Developing a Family of Curves   |
| R 76             | AASHTO |           |           | Reducing Samples of Aggregate to Testing Size  |
| R 76             | WAQTC  | ✓         | ✓         | FOP for AASHTO R 76, Reducing Samples of Aggregate to Testing Size                         |
| IP 78-16         | FHWA   |           |           | Type 170 Signal Controller System Hardware Specification                                   |
| R 79             | AASHTO |           |           | Vacuum Drying Compacted Asphalt Specimens  |
| R 79             | WAQTC  | ✓         | ✓         | FOP for AASHTO R 79, Vacuum Drying Compacted Asphalt Specimens                             |
| T 84             | AASHTO |           |           | Specific Gravity and Absorption of Fine Aggregates   |
| T 85             | AASHTO |           |           | Specific Gravity and Absorption of Coarse Aggregates                                       |
| T 85             | WAQTC  | ✓         | ✓         | FOP for AASHTO T 85, Specific Gravity and Absorption of Coarse Aggregate                   |
| T 88             | AASHTO |           |           | Particle Size Analysis of Soils  |

| Numerical Order  |        |           |           |   |
|------------------|--------|-----------|-----------|---|
| Procedure Number | Owner  | Field Use | In Manual | Test Method   |
| T 89             | AASHTO |           | ✓         | Determining the Liquid Limit of Soils (Checklist Only)  |
| R 90             | AASHTO |           |           | Sampling Aggregate Products   |
| R 90             | WAQTC  | ✓         | ✓         | FOP for AASHTO R 90, Sampling Aggregate Products  |
| T 90             | AASHTO |           | ✓         | Determining the Plastic Limit and Plasticity Index of Soils (Checklist Only)                                      |
| R 96             | AASHTO |           |           | Installation, Operation, and Maintenance of Ignition Furnaces   |
| T 96             | AASHTO |           |           | Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine        |
| R 97             | AASHTO |           |           | Sampling Asphalt Mixtures   |
| R 97             | WAQTC  | ✓         | ✓         | FOP for AASHTO R 97, Sampling of Asphalt Mixtures   |
| T 99             | AASHTO |           |           | Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305 mm (12-in) Drop                      |
| T 99             | WAQTC  | ✓         | ✓         | FOP for AASHTO T 99, Moisture-Density Relations of Soils Using a 5.5 lb (2.5 kg) Rammer and a 12 in (305 mm) Drop |
| T 100            | AASHTO |           |           | Specific Gravity of Soils   |
| T 105            | AASHTO |           |           | Chemical Analysis of Hydraulic Cement   |
| T 106            | AASHTO |           |           | Compressive Strength of Hydraulic Cement Mortars (Using 50-mm or 2-in Cube Specimens)                             |
| T 106            | WSDOT  | ✓         | ✓         | FOP for AASHTO for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)       |
| T 107            | AASHTO |           |           | Autoclave Expansion of Hydraulic Cement   |
| M 111            | AASHTO |           |           | Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products   |
| T 112            | AASHTO |           | ✓         | Clay Lumps and Friable Particles in Aggregate   |
| T 113            | WSDOT  |           | ✓         | Method of Test for Determination of Degradation Value   |
| T 119            | AASHTO |           |           | Slump of Hydraulic Cement Concrete  |
| T 119            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 119, Slump of Hydraulic Cement Concrete  |
| T 121            | AASHTO |           |           | Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete   |
| T 121            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 121, Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete                     |
| T 123            | WSDOT  | ✓         | ✓         | Method of Test for Bark Mulch   |
| T 125            | WSDOT  |           | ✓         | Determination of Fiber Length Percentages in Wood Strand Mulch  |
| T 126            | WSDOT  |           | ✓         | Determination of Fiber Length Percentages in Hydraulically-Applied Erosion Control Products                       |
| T 127            | WSDOT  |           | ✓         | Preparation of Leachate Sample for Testing Toxicity of HECF Effluents   |
| SOP 128          | WSDOT  | ✓         | ✓         | Sampling for Aggregate Source Approval  |
| T 129            | AASHTO |           |           | Amount of Water Required for Normal Consistency of Hydraulic Cement Paste   |
| T 131            | AASHTO |           |           | Time of Setting of Hydraulic Cement by Vicat Needle   |
| T 133            | AASHTO |           |           | Density of Hydraulic Cement   |
| T 137            | AASHTO |           |           | Air Content of Hydraulic Cement Mortar  |
| C 140            | ASTM   |           |           | Sampling and Testing Concrete Masonry Units and Related Units   |
| T 141            | AASHTO |           |           | Sampling Freshly Mixed Concrete   |

| Numerical Order  |        |           |           |  |
|------------------|--------|-----------|-----------|--|
| Procedure Number | Owner  | Field Use | In Manual | Test Method  |
| A 143            | ASTM   |           |           | Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement |
| T 152            | AASHTO |           |           | Air Content of Freshly Mixed Concrete by the Pressure Method   |
| T 152            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 152, Air Content of Freshly Mixed Concrete by the Pressure Method   |
| T 153            | AASHTO |           |           | Fineness of Hydraulic Cement by Air Permeability Apparatus   |
| T 162            | AASHTO |           |           | Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency  |
| T 166            | AASHTO |           |           | Bulk Specific Gravity ( $G_{mb}$ ) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens   |
| T 166            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 166, for Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens                                |
| T 176            | AASHTO |           |           | Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test  |
| T 176            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 176, Plastic Fines in Graded Aggregates and Soils by the Use of the Sand Equivalent Test  |
| T 180            | AASHTO |           |           | Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop  |
| T 180            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 180, Moisture-Density Relations of Soils Using a 10 lb (4.54 kg) Rammer and an 18 in (457 mm) Drop                                |
| T 196            | AASHTO |           | ✓         | Air Content of Freshly Mixed Concrete by the (Volumetric Method) (Checklist Only)  |
| T 197            | AASHTO |           |           | Time of Setting of Concrete Mixtures by Penetration Resistance   |
| T 198            | AASHTO |           |           | Splitting Tensile Strength of Cylindrical Concrete Specimens   |
| T 208            | AASHTO |           |           | Unconfined Compressive Strength of Cohesive Soil   |
| T 209            | AASHTO |           |           | Theoretical Maximum Specific Gravity ( $G_{mm}$ ) and Density of Asphalt Mixtures  |
| T 209            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 209, Theoretical Maximum Specific Gravity ( $G_{mm}$ ) and Density of Asphalt Mixtures  |
| T 215            | AASHTO |           |           | Permeability of Granular Soils (Constant Head)   |
| T 216            | AASHTO |           |           | One-Dimensional Consolidation Properties of Soils  |
| T 228            | AASHTO |           |           | Specific Gravity of Semi-Solid Asphalt Materials   |
| T 231            | AASHTO |           |           | Capping Cylindrical Concrete Specimens   |
| T 231            | WSDOT  | ✓         | ✓         | FOP for AASHTO T 231, Capping Cylindrical Concrete Specimens   |
| T 236            | AASHTO |           |           | Direct Shear test of Soils Under Consolidated Drained Conditions   |
| T 240            | AASHTO |           |           | Effect of Heat and Air on a Moving Film of Asphalt Binder (Rolling Thin-Film Oven Test)  |
| T 242            | AASHTO |           |           | Frictional Properties of Paved Surfaces Using a Full-Scale Tire  |
| T 244            | AASHTO |           |           | Mechanical Testing of Steel Products   |
| M 251            | AASHTO |           |           | Plain and Laminated Elastomeric Bridge Bearings  |
| T 255            | AASHTO |           |           | Total Evaporable Moisture Content of Aggregate by Drying   |
| T 255            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 255, Total Evaporable Moisture Content of Aggregate by Drying   |

| Numerical Order  |        |           |           |   |
|------------------|--------|-----------|-----------|---|
| Procedure Number | Owner  | Field Use | In Manual | Test Method   |
| T 260            | AASHTO |           |           | Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials  |
| T 265            | AASHTO |           |           | Laboratory Determination of Moisture Content of Soils   |
| T 265            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 265, Laboratory Determination of Moisture Content of Soils   |
| T 267            | AASHTO |           |           | Determination of Organic Content in Soils by Loss on Ignition   |
| T 269            | AASHTO |           |           | Percent Air Void in Compacted Dense and Open Asphalt Mixtures   |
| T 272            | AASHTO |           |           | One-Point Method for Determining Maximum Dry Density and Optimum Moisture   |
| T 272            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 272, One-Point Method for Determining Maximum Dry Density and Optimum Moisture                                       |
| T 277            | AASHTO |           |           | Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration  |
| T 288            | AASHTO |           | ✓         | Determining Minimum Laboratory Soil Resistivity (Checklist Only)  |
| T 289            | AASHTO |           |           | Determining pH of Soil for Use in Corrosion Testing   |
| T 296            | AASHTO |           |           | Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression  |
| T 297            | AASHTO |           |           | Consolidated, Undrained Triaxial Compressive Test on Cohesive Soils Shear   |
| T 301            | AASHTO |           |           | Elastic Recovery Test of Asphalt Materials by Means of a Ductilometer   |
| T 303            | AASHTO |           |           | Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction                               |
| T 304            | AASHTO |           |           | Uncompacted Void Content of Fine Aggregate  |
| T 304            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 304, Uncompacted Void Content of Fine Aggregate  |
| T 307            | AASHTO |           | ✓         | Determining the Resilient Modulus of Soils and Aggregate Materials  |
| T 308            | AASHTO |           |           | Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method   |
| T 308            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 308, Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method                               |
| T 309            | AASHTO |           |           | Temperature of Freshly Mixed Hydraulic Cement Concrete  |
| T 309            | WAQTC  | ✓         | ✓         | FOP for AASHTO T309, Temperature of Freshly Mixed Portland Cement Concrete  |
| T 310            | AASHTO |           |           | In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)                                   |
| T 310            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 310, In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)             |
| C 311            | ASTM   |           |           | Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland Cement Concrete   |
| T 312            | AASHTO |           |           | Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor                       |
| T 312            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 312, Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor |
| T 313            | AASHTO |           |           | Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)                                     |
| T 313            | WSDOT  |           | ✓         | Method of Test for Cement-Latex Compatibility   |

| Numerical Order  |        |           |           |  |
|------------------|--------|-----------|-----------|--|
| Procedure Number | Owner  | Field Use | In Manual | Test Method  |
| T 314            | WSDOT  |           | ✓         | Method of Test for Photovolt Reflectance   |
| T 315            | AASHTO |           |           | Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)   |
| T 316            | AASHTO |           |           | Viscosity Determination of Asphalt Binder Using Rotational Viscometer  |
| SOP 318          | WSDOT  |           | ✓         | Standard Operating Procedure for Melting of Flexible Bituminous Pavement Marker Adhesive for Evaluation                                  |
| T 324            | AASHTO |           | ✓         | Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures  |
| T 329            | AASHTO |           |           | Moisture Content of Asphalt Mixtures by Oven Method  |
| T 329            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 329, Moisture Content of Asphalt Mixture by Oven Method   |
| T 331            | AASHTO |           |           | Bulk Specific Gravity ( $G_{mb}$ ) and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method                       |
| T 331            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 331, Bulk Specific Gravity ( $G_{mb}$ ) and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method |
| T 335            | AASHTO |           |           | Determining the Percentage of Fracture in Coarse Aggregate   |
| T 335            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 335, Determining the Percentage of Fracture in Coarse Aggregate   |
| T 350            | AASHTO |           |           | Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)                                       |
| T 355            | AASHTO |           |           | In-Place Density of Asphalt Mixtures by Nuclear Methods  |
| T 355            | WAQTC  | ✓         | ✓         | FOP for AASHTO T 355, In-Place Density of Asphalt Mixtures by Nuclear Methods  |
| T 359            | AASHTO |           |           | Pavement Thickness by Magnetic Pulse Induction   |
| A 370            | ASTM   |           |           | Definitions for Mechanical Testing of Steel Products   |
| T 413            | WSDOT  | ✓         | ✓         | Method of Test for Evaluating Waterproofing Effectiveness of Membrane and Membrane-Pavement Systems                                      |
| T 417            | WSDOT  |           | ✓         | Method of Test for Determining Minimum Resistivity and pH of Soil and Water  |
| T 421            | WSDOT  |           | ✓         | Traffic Controller Inspection Procedure  |
| T 422            | WSDOT  |           | ✓         | Transient Voltage Test (Spike Test) Procedure (optional)   |
| T 423            | WSDOT  |           | ✓         | Conflict Monitor Test Procedure  |
| T 424            | WSDOT  |           | ✓         | Power Interruption Test Procedure  |
| T 425            | WSDOT  |           | ✓         | Environmental Chamber Test Procedure   |
| T 426            | WSDOT  |           | ✓         | Pull-Off Test for Hot Melt Traffic Button Adhesive   |
| T 427            | WSDOT  |           | ✓         | Loop Amplifier Test Procedure  |
| T 428            | WSDOT  |           | ✓         | Traffic Controller Compliance Inspection and Test Procedure  |
| SOP 429          | WSDOT  |           | ✓         | Methods for Determining the Acceptance of Traffic Signal Controller Assemblies   |
| T 430            | WSDOT  |           | ✓         | Uninterruptible Power Supply (UPS) System Compliance Inspection and Test Procedure   |
| T 432            | WSDOT  |           | ✓         | Flexibility Test for Hot-Melt Adhesives  |

| Numerical Order  |       |           |           |   |
|------------------|-------|-----------|-----------|---|
| Procedure Number | Owner | Field Use | In Manual | Test Method   |
| C 457            | ASTM  |           |           | Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete   |
| C 495            | ASTM  |           |           | Compressive Strength of Lightweight Insulated Concrete  |
| T 501            | WSDOT |           | ✓         | Test Method to Determine Durability of Very Weak Rock   |
| D 523            | ASTM  |           |           | Specular Gloss  |
| C 579            | ASTM  |           |           | Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes                               |
| F 606            | ASTM  |           |           | Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets |
| T 606            | WSDOT |           | ✓         | Method of Test for Compaction Control of Granular Materials   |
| T 610            | WSDOT |           | ✓         | Method of Test for the Capillary Rise of Soils  |
| SOP 615          | WSDOT | ✓         | ✓         | Determination of the % Compaction for Embankment and Untreated Surfacing Materials Using the Nuclear Moisture-Density Gauge           |
| D 638            | ASTM  |           |           | Tensile Properties of Plastics  |
| D 695            | ASTM  |           |           | Compressive Properties of Rigid Plastics  |
| T 716            | WSDOT | ✓         | ✓         | Method of Random Sampling for Locations of Testing and Sampling Sites   |
| T 720            | WSDOT |           | ✓         | Method of Test for Thickness Measurement of Hot Mix Asphalt (HMA) Cores   |
| SOP 729          | WSDOT | ✓         | ✓         | Standard Operating Procedure for Determination of the Moving Average of Theoretical Maximum Density (TMD) for HMA                     |
| SOP 730          | WSDOT | ✓         | ✓         | Standard Operating Procedure for Correlation of Nuclear Gauge Densities With Hot Mix Asphalt (HMA) Cores                              |
| SOP 731          | WSDOT | ✓         | ✓         | Standard Operating Procedure for Determining Volumetric Properties of Hot Mix Asphalt   |
| SOP 732          | WSDOT | ✓         | ✓         | Standard Operating Procedure for Volumetric Design for Hot-Mix Asphalt (HMA)  |
| SOP 733          | WSDOT | ✓         | ✓         | Standard Operating Procedure for Determination of Pavement Density Differentials Using the Nuclear Density Gauge                      |
| SOP 734          | WSDOT | ✓         | ✓         | Standard Operating Procedure for Sampling Hot Mix Asphalt After Compaction (Obtaining Cores)  |
| SOP 735          | WSDOT | ✓         | ✓         | Standard Operating Procedure for Longitudinal Joint Density   |
| SOP 736          | WSDOT |           | ✓         | In-Place Density of Bituminous Mixes Using Cores  |
| SOP 737          | WSDOT |           | ✓         | Procedure for the Forensic Testing of HMA Field Cores   |
| SOP 738          | WSDOT | ✓         | ✓         | Establishing Maximum Field Density for Recycled Concrete Aggregates by Test Point Evaluation  |
| D 792            | ASTM  |           |           | Density and Specific Gravity (Relative Density) of Plastics by Displacement   |
| T 802            | WSDOT | ✓         | ✓         | Method of Test for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)  |
| C 805            | ASTM  |           |           | Rebound Number of Hardened Concrete   |
| C 805            | WSDOT | ✓         | ✓         | Rebound Hammer Determination of Compressive Strength of Hardened Concrete   |
| T 807            | WSDOT | ✓         | ✓         | Method of Operation of California Profilograph and Evaluation of Profiles   |

| Numerical Order  |       |           |           |   |
|------------------|-------|-----------|-----------|---|
| Procedure Number | Owner | Field Use | In Manual | Test Method   |
| T 808            | WSDOT | ✓         | ✓         | Method for Making Flexural Test Beams   |
| T 810            | WSDOT | ✓         | ✓         | Method of Test for Determination of the Density of Portland Cement Concrete Pavement Cores  |
| T 812            | WSDOT | ✓         | ✓         | Method of Test for Measuring Length of Drilled Concrete Cores   |
| T 813            | WSDOT | ✓         | ✓         | Field Method of Fabrication of 2 in (50 mm) Cube Specimens for Compressive Strength Testing of Grouts and Mortars   |
| T 814            | WSDOT |           | ✓         | Method of Test for Water Retention Efficiency of Liquid Membrane-Forming Compounds and Impermeable Sheet Materials for Curing Concrete                          |
| T 818            | WSDOT |           | ✓         | Air Content of Freshly Mixed Self-Compacting Concrete by the Pressure Method  |
| T 819            | WSDOT |           | ✓         | Making and Curing Self-Compacting Concrete Test Specimens in the Field  |
| D 823            | ASTM  |           |           | Producing Films of Uniform Thickness of Paint, Coatings and Related Products on Test Panels   |
| C 881            | ASTM  |           |           | Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete  |
| C 882            | ASTM  |           | ✓         | Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear (Checklist Only)   |
| T 914            | WSDOT | ✓         | ✓         | Practice for Sampling of Geosynthetic Material for Testing  |
| T 915            | WSDOT |           | ✓         | Practice for Conditioning of Geotextiles for Testing  |
| T 923            | WSDOT |           | ✓         | Thickness Measurement of Geotextiles  |
| T 925            | WSDOT |           | ✓         | Standard Practice for Determination of Long-Term Strength for Geosynthetic Reinforcement  |
| T 926            | WSDOT |           | ✓         | Geogrid Brittleness Test  |
| C 939            | ASTM  |           |           | Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)   |
| C 939            | WSDOT | ✓         | ✓         | FOP for ASTM for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)  |
| 1188             | IEEE  |           |           | Standards Publication: Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) batteries for Stationary Applications |
| C 1218           | ASTM  |           |           | Water-Soluble Chloride in Mortar and Concrete   |
| C 1437           | ASTM  |           |           | Standard Test Method for Flow of Hydraulic Cement Mortar  |
| D 1475           | ASTM  |           |           | Density of Liquid Coatings, Inks, and Related Products  |
| C 1604           | ASTM  |           |           | Obtaining and Testing Drilled Cores of Shotcrete  |
| C 1611           | WSDOT | ✓         | ✓         | FOP for ASTM C 1611/C 1611M Standard Test Method for Slump Flow of Self-Consolidating Concrete  |
| C 1621           | WSDOT | ✓         | ✓         | FOP for ASTM C 1621/C 1621M Standard Test Method for Passing Ability of Self-Consolidating Concrete by J-Ring   |
| D 1683           | ASTM  |           |           | Failure in Sewn Seams of Woven Fabrics  |
| D 1751           | ASTM  |           |           | Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)                                  |
| D 2240           | ASTM  |           |           | Standard Test Method for Rubber Property – Durometer Hardness   |
| D 2244           | ASTM  |           |           | Standard Practice for Calculation of Color Tolerances and Color Differences From Instrumentally Measured Color Coordinates                                      |



| Numerical Order  |                       |           |           |  |
|------------------|-----------------------|-----------|-----------|--|
| Procedure Number | Owner                 | Field Use | In Manual | Test Method  |
| D 2369           | ASTM                  |           |           | Volatile Content of Coatings   |
| D 2487           | ASTM                  |           |           | Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)          |
| D 2488           | ASTM                  |           |           | Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)                              |
| D 2621           | ASTM                  |           |           | Infrared Identification of Vehicle Solids From Solvent-Reducible Paints  |
| D 2628/<br>M 220 | ASTM                  | ✓         | ✓         | Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements   |
| D 2697           | ASTM                  |           |           | Volume Nonvolatile Matter in Clear or Pigmented Coatings   |
| D 2698           | ASTM                  |           |           | Determination of the Pigment Content of Solvent-Reducible Paints by High-Speed Centrifuging                          |
| D 3111           | ASTM                  |           |           | Flexibility Determination of Hot-Melt Adhesives by Mandrel Bend Test Method  |
| D 3723           | ASTM                  |           |           | Pigment Content of Water Emulsion Paints by Temperature Ashing   |
| D 4186           | ASTM                  |           |           | One-Dimensional Consolidation Properties of Saturated Cohesive Soils Using Controlled-Strain Loading                 |
| D 4354           | ASTM                  |           | ✓         | Standard Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing              |
| D 4355           | ASTM                  |           |           | Deterioration of Geotextiles From Exposure to Light, Moisture and Heat in a Xenon-Arc-Type Apparatus                 |
| D 4491           | ASTM                  |           |           | Water Permeability of Geotextiles by Permittivity  |
| D 4533           | ASTM                  |           |           | Trapezoid Tearing Strength of Geotextiles  |
| D 4595           | ASTM                  |           |           | Tensile Properties of Geotextiles by the Wide-Width Strip Method   |
| D 4632           | ASTM                  |           |           | Grab Breaking Load and Elongation of Geotextiles   |
| D 4644           | ASTM                  |           |           | Slake Durability of Shales and Similar Weak Rocks  |
| D 4694           | ASTM                  |           |           | Deflections with Falling-Weight-Type Impulse Load Device   |
| D 4751           | ASTM                  |           |           | Determining Apparent Opening Size of a Geotextile  |
| D 5084           | ASTM                  |           |           | Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter                |
| D 5167           | ASTM                  |           |           | Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation   |
| ATC 5301         | AASHTO<br>ITE<br>NEMA |           |           | Publication: Advanced Transportation Controller (ATC) Cabinet Standard   |
| D 5311           | ASTM                  |           |           | Load Controlled Cyclic Triaxial Strength of Soil   |
| D 5329           | ASTM                  |           |           | Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt Pavements and Portland Cement Concrete Pavements |
| D 5731           | ASTM                  |           |           | Determination of the Point Load Strength Index of Rock and Application to Rock Strength Classifications              |
| D 6241           | ASTM                  |           |           | Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe                          |
| D 6467           | ASTM                  |           |           | Torsional Ring Shear Test to Determine Drained Residual Shear Strength of Cohesive Soils                             |
| D 6528           | ASTM                  |           |           | Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils   |
| D 6690           | ASTM                  |           |           | Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements  |

| Numerical Order  |       |           |           |   |
|------------------|-------|-----------|-----------|---|
| Procedure Number | Owner | Field Use | In Manual | Test Method   |
| D 6931           | ASTM  |           | ✓         | Indirect Tensile (IDT) Strength of Asphalt Mixtures   |
| D 7012           | ASTM  |           | ✓         | Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures   |
| D 7091           | ASTM  | ✓         | ✓         | Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals (Checklist Only) |
| 62040-3          | IEC   |           |           | Standards Publication: Uninterruptible Power Systems (UPS) – Method for specifying the performance and test requirements  |



## WSDOT Standard Practice for HMA Mix Designs QC 8

### *Standard Practice for Development, Submittal and Approval of Hot Mix Asphalt Mix Designs*

#### 1. Scope

- 1.1 This standard specifies requirements and procedures for evaluation and approval of Hot Mix Asphalt mix designs for the Qualified Products List.
- 1.2 This standard may involve hazardous materials, operations and equipment. It does not address all of the safety problems associated with their use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

#### 2. Referenced Documents

- 2.1 WSDOT Standards
  - 2.1.1 [Standard Specifications for Road, Bridge, and Municipal Construction](#) M 41-10

#### 3. Terminology

- 3.1 **AASHTO** – American Association of State Highway and Transportation Officials
- 3.2 **Contractor/Producer** – The Contractor, Producer or production facility that has the capacity for producing HMA meeting WSDOT [Standard Specifications](#).
- 3.3 **ASA** – Aggregate Source Approval
- 3.4 **ASTM** – American Society of Testing and Materials
- 3.5 **HMA** – Hot Mix Asphalt
- 3.6 **PG** – Performance Graded asphalt binder
- 3.7 **QPL** – Qualified Products List
- 3.8 **State Materials Laboratory** – 1655 S. 2nd Avenue SW, Tumwater, WA 98512-6951
- 3.9 **WSDOT** – Washington State Department of Transportation
- 3.10 **Business Days** – All weekdays, excluding state and federal holidays
- 3.11 **Bituminous Materials Section** – Testing Laboratory located at the WSDOT State Materials Laboratory

#### 4. Significance and Use

- 4.1 This standard specifies procedures for designing, submitting, evaluating and approving HMA mix designs for inclusion to the QPL.

#### 5. Mix Design Development

- 5.1 The Contractor/Producer or designee shall develop a HMA mix design in accordance with Section 5-04.2(1) of the *Standard Specifications*. The HMA mix design aggregate structure, asphalt binder content, anti-stripping additive, rutting susceptibility and indirect tensile strength shall be determined in accordance with WSDOT SOP 732, FOP for AASHTO T 324 and WSDOT FOP for ASTM D 6931 and meet the requirements of Sections 9-03.8(2) and 9-03.8(6) of the *Standard Specifications*.

- 5.1.1 The Contractor/Producer's mix design %Gmm Ndesign must be  $96.0 \pm 0.2\%$  at the optimum percent binder (Pb).

#### 6. Submission to the WSDOT Qualified Products List

- 6.1 Once the HMA mix design has been developed, the Contractor/Producer shall contact the QPL Engineer (at [qpl@wsdot.wa.gov](mailto:qpl@wsdot.wa.gov)) or 360-709-5442 to initiate the HMA mix design submittal process.
- 6.2 To initiate the mix design submittal process, the Contractor/Producer shall provide the following:
- Company contact and billing information
  - A completed copy of WSDOT Form 350-042
  - A completed WSDOT Product Submittal Application Form
  - ASA Report for the aggregate source(s)
  - QPL Contractor/Producer Product Information page(s) for the PG asphalt binder and the anti-stripping additive
  - Certification on the source of the recycled materials and applicable documentation per *Standard Specifications* Sections 5-04.2 and 9-03.21(1) for mix designs containing Recycled Asphalt Pavement (RAP) and/or Reclaimed Asphalt Shingles (RAS)
- 6.3 Once the information from Step 6.2 is received the QPL Engineer will forward the Contractor/Producer's submittal to the Bituminous Materials Section and assign a QPL evaluation tracking number. This will initiate the timeline associated with each step of the mix design evaluation process in Section 6 of this plan, as shown in Table 1.
- 6.4 The Bituminous Materials Section will review the mix design submittal (WSDOT Form 350-042) and all documentation provided to ensure it is complete and meets specification requirements. The Bituminous Materials Section will notify the QPL Engineer once the review is complete. Mix design submittals that are incomplete or do not meet the specification requirements will be rejected and require resubmittal in accordance with Section 6.2 of this plan. All timelines in Table 1 will restart with resubmittal of mix designs.

- 6.5 If the mix design submittal is complete and meets specification, the QPL Engineer will provide the following to the Contractor/Producer:
- QPL evaluation tracking number
  - Initial letter detailing mix design evaluation
  - Cost sheet for mix design evaluation detailing submittal requirements and associated charges
- 6.6 After payment is received for the mix design evaluation, the Bituminous Materials Section will contact the Contractor/Producer and schedule the mix design materials delivery date.
- 6.6.1 The Contractor shall submit representative samples of aggregate, RAP and RAS (if required), totaling 700 pounds proportioned to match the Contractor's proposal to the State Materials Laboratory for testing.

For example, if the Contractor's proposal consists of five stockpiles with the following blending ratio:

| Material | Ratio |
|----------|-------|
| ¾" - #4  | 20%   |
| ½" - #8  | 30%   |
| #4 - 0   | 30%   |
| RAP      | 15%   |
| RAS      | 5%    |

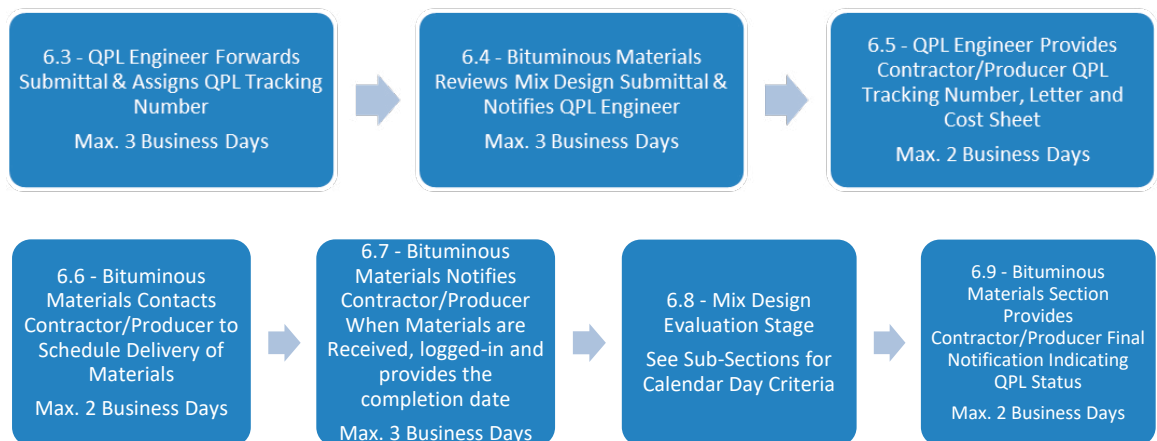
Calculate the amount of aggregate needed from each stockpile in the following manner:

| Material |                | Pounds of Aggregate Needed Per Stockpile |
|----------|----------------|--|
| ¾" - #4  | 700 lbs x 0.20 | 140 pounds                               |
| ½" - #8  | 700 lbs x 0.30 | 210 pounds                               |
| #4 - 0   | 700 lbs x 0.30 | 210 pounds                               |
| RAP      | 700 lbs x 0.15 | 105 pounds                               |
| RAS      | 700 lbs x 0.05 | 35 pounds                                |

- 6.6.2 Transport aggregate in bags or other containers so constructed as to preclude loss or contamination of any part of the sample, or damage to the contents from mishandling during shipment. The weight limit for each bag or container of aggregate is 30 pounds maximum.
- 6.6.3 Each aggregate bag or container shall be clearly marked or labeled with suitable identification including the contract number, aggregate source identification and size of stockpile material.

- 6.7 The Bituminous Materials Section will notify the Contractor/Producer when the mix design materials have been received, logged-in and a calendar day completion will be provided to the Contractor/Producer as specified in Section 6.9.
  - 6.7.1 Mix design materials that are non-representative and/or out of specification will be rejected and require resubmittal of all mix design material. Mix design materials that are rejected and not picked up by the Contractor/Producer within 2 working days of the receipt of rejection will be disposed of. All timelines in Table 1 will restart with resubmittal of mix design materials.
- 6.8 A priority queue will be established by the Bituminous Materials Section for HMA mix design evaluations.
  - 6.8.1 Preference will be given to mix designs submitted for WSDOT contracts.
  - 6.8.2 HMA mix design evaluations for WSDOT contracts will be completed within 25 calendar days after the notification in Section 6.8.
  - 6.8.3 HMA mix design evaluations that are not for WSDOT contracts will be completed approximately 40 calendar days after the notification in Section 6.7.
  - 6.8.4 The Bituminous Materials Section reserves the right to limit the number of HMA mix design evaluations accepted for non WSDOT contracts at any time. Workload and staffing will dictate the number of HMA mix design evaluations accepted at one time.
- 6.9 After the mix design evaluation is complete the Bituminous Materials Section will provide the following:
  - Final notification indicating QPL status after completion of the mix design evaluation.

**Table 1 Timelines Associated with Each Step of the Mix Design Evaluation Process**



## 7. Mix Design Evaluation

- 7.1 The HMA mix design submitted by the Contractor/Producer will be evaluated by the Bituminous Materials Section in accordance with Section 9-03.8(2) and 9-03.8(6) of the *Standard Specifications*. All communication from the Bituminous Materials Section will be to the Contractor's/Producer's contact as specified on WSDOT Form 350-042.
- 7.2 HMA mix designs will be placed on the QPL provided they meet the requirements of Section 9-03.8(2) and 9-03.8(6) of the *Standard Specifications*.
- 7.2.1 Voids in Mineral Aggregate (VMA) must be within 0.5% of the minimum specification in accordance with Section 9-03.8(2) of the *Standard Specifications* for the class of HMA evaluated.
- 7.2.2 % Gmm at N design must be within 1.5% of the specification in Section 9-03.8(2) of the *Standard Specifications* for the class of HMA evaluated.
- 7.2.3 Voids Filled with Asphalt (VFA) in Section 9-03.8(2) will not be part of the mix design evaluation.
- 7.3 A mix design that fails to meet the requirements listed in Section 7.2, 7.2.1 and 7.2.2 will not be accepted or placed on the QPL.
- 7.4 Adjustments to mix designs will not be allowed once they have been evaluated.
- 7.5 The Contractor/Producer will be issued a QPL mix design record providing the mix design is in compliance with Section 9 of this Standard Practice.
- 7.6 The QPL listing for HMA mix designs will show the following information:
- Company name
  - HMA Class
  - Aggregate Source(s)
  - PG Grade
  - PG Supplier
- Anti-stripping additive brand and quantity (if applicable)

## 8. Referencing Mix Designs From The QPL

- 8.1 Requests for reference HMA mix designs for non WSDOT projects will be completed on WSDOT Form 350-041 and emailed to [BituminousMaterials@wsdot.wa.gov](mailto:BituminousMaterials@wsdot.wa.gov).
- 8.2 Reference HMA mix design reports will be issued for new mix designs on active and awarded WSDOT contracts once accepted and placed on the QPL.
- 8.3 Reference HMA mix design reports will be issued for current mix designs on active and awarded WSDOT contracts provided the HMA production history is in compliance with *Standard Specifications* Section 5-04.3(11)F.

**9. Removal From The QPL**

- 9.1 HMA mix designs will be automatically removed from the QPL in accordance with [Standard Specifications](#) Section 5-04.2(1).
- 9.2 HMA mix designs may be removed from the QPL if found in nonconformance with the [Standard Specifications](#) or this Standard Practice. Causes for removal from the QPL may include, but are not limited to the following:
- Failure to comply with requirements of Standard Practice QC 8.
  - HMA mix designs that are out of compliance in accordance with [Standard Specifications](#)
  - Section 5-04.3(11)F.
  - Failure to notify WSDOT of changes in HMA production.
  - Removal at the request of the Contractor/Producer

**10. Ignition Furnace Calibration Factor (IFCF) Samples**

- 10.1 Each HMA mix design submitted for evaluation will have 12 IFCF samples produced for WSDOT as part of the QPL evaluation process.
- 10.2 The Contractor/Producer may elect to have 4 IFCF samples produced as part of the QPL evaluation process.