

**BULLETIN**

**27**

Bituminous Concrete  
Mixtures, Design  
Procedures, and  
Specifications for Special  
Bituminous Mixtures

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DEPARTMENT OF TRANSPORTATION

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## INTRODUCTION

The contents of this Bulletin are intended for PENNDOT, Contractor and Producer personnel for use in conjunction with the [Field Test Manual \(Publication 19\)](#), [Specifications \(Publication 408\)](#), Special Provisions and Supplements and the Construction Manual (Publication 8).

[Chapter 1](#) gives Department requirements for mixing plants producing hot-mixed, hot-laid bituminous paving mixtures.

[Chapter 1A](#) gives Department requirements for mixing plants producing cold-mixed bituminous paving mixtures.

[Chapter 2](#) contains Department approved procedures for design and control of bituminous paving mixtures using a modified Marshall design procedure and includes procedures for design of Cold Recycled Base Course and Full Depth Reclamation.

[Chapter 2A](#) contains Department references to and modifications of the AASHTO R 35 *Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt* and the AASHTO M 323 *Standard Specification for Superpave Volumetric Mix Design*.

[Chapter 2B](#) contains Department references to and modification of the AASHTO R 46 *Standard Practice for Designing Stone Matrix Asphalt (SMA)*

[Chapter 3](#) contains Department specifications for bituminous stockpile patching materials including inspection, sampling and approval.

[Chapter 4](#) contains a glossary of commonly used terms related to bituminous binder materials, mineral aggregates and bituminous concrete.

Appendices [A](#), [B](#), [C](#), and [D](#) give Department procedures for blending aggregates for mix design and production.

[Appendix E](#) gives the Department design method for seal coats and surface treatments.

[Appendix F](#) gives the Department procedure for obtaining approval to use printed tickets in place of laboratory testing of the completed mix for asphalt content.

[Appendix G](#) describes the Department Hot-Mix Asphalt surge silo/storage system approval procedure.

[Appendix H](#) gives Department Superpave design guidelines for using hot-mix recycled asphalt pavement (RAP) and manufacturer waste recycled asphalt shingles (RAS).

[Appendix I](#) outlines Department requirements for testing of the mixture's theoretical maximum specific gravity and Voids in Mineral Aggregate during volumetric mix design and production quality control.

[Appendix J](#) outlines Department procedures for annual asphalt concrete mix design submittal for both new mix designs and existing mix designs with 0 to < 5 and ≥ 5 Production Quality Control (QC) test results from the previous calendar year.

## REFERENCES

The reference materials listed below should be used in conjunction with this manual. All references to AASHTO and ASTM standard practices, specifications, and test procedures refer to the current approved and published version available at the time of project bid letting. The version dates below are provided for information only, and are current as of October 2010.

### CURRENT DIRECTIVES

[PENNDOT PUBLICATIONS](#), including:

<u><a href="#">2</a></u>	Project Office Manual
8	Construction Manual
<u><a href="#">23</a></u>	Maintenance Manual
37	Specifications for Bituminous Materials (Bulletin No. 25)
<u><a href="#">41</a></u>	Producers of Bituminous Mixtures (Bulletin No. 41)
<u><a href="#">351</a></u>	Bituminous Plant & Field Technicians Manual

To obtain references with a PENNDOT Publication Number, please contact:

PENNDOT Sales Store  
P.O. Box 2028  
Harrisburg PA 17105-2028  
Tel: (717) 787-6746  
Fax: (717) 787-8779

AASHTO SPECIFICATIONS AND TEST METHODS, including:

<u>Test Number</u>	
T 2-91 (2006)	Sampling of Aggregates
T 11-05 (2009)	Materials Finer Than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
T 19M/T 19-09	Bulk Density ("Unit Weight") and Voids in Aggregate
T 40-02 (2006)	Sampling Bituminous Materials
T 49-07	Penetration of Bituminous Materials
T 55-02 (2006)	Water in Petroleum Products and Bituminous Materials by Distillation
T 59-09	Testing Emulsified Asphalts
T 84-10	Specific Gravity and Absorption of Fine Aggregate
T 85-10	Specific Gravity and Absorption of Coarse Aggregate
T 96-02 (2006)	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
T 133-98 (2006)	Density of Hydraulic Cement
T 182-84 (2002)	<i>Discontinued</i> - Coating and Stripping of Bitumen-Aggregate Mixtures
T 195-67 (2007)	Determining Degree of Particle Coating of Bituminous-Aggregate Mixtures
T 209-10	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
T 228-09	Specific Gravity of Semi-Solid Bituminous Materials
T 248-02 (2006)	Reducing Samples of Aggregate to Testing Size
T 283-07	Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage

T 312-09	Preparing and Determining the Density of the Hot-Mix Asphalt Specimens by Means of the Superpave Gyratory Compactor.
TP 71-09	Evaluation of Superpave Gyratory Compactor (SGC) Internal Angle of Gyration Using Simulated Loading

AASHTO Standard/Specification Number

M 92-10	Wire-Cloth Sieves for Testing Purposes
M 320-10	Performance-Graded Asphalt Binder
M 323-07	Superpave Volumetric Mix Design
M 325-08	Stone Matrix Asphalt (SMA)
R 30-02 (2006)	Mixture Conditioning of HMA
R 35-09	Superpave Volumetric Design for HMA
R 46-08	Designing Stone Matrix Asphalt (SMA)

[SPECIFICATIONS \(Pub. 408\)](#), including:

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ASTM STANDARDS, including:

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D 2419-09	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
D 3625-96 (2005)	Standard Practice for Effect of Water on Bituminous-Coated Aggregate Using Boiling Water
D 4318-10	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D 5821-01 (2006)	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate

FIELD AND LABORATORY TESTING MANUAL (Pub. 19), including:

PA Test Method (PTM) No.

<u>100</u>	Amount of Material Finer Than 75 $\mu\text{m}$ (No. 200) Sieve in Aggregate.
<u>402</u>	Determining Moisture or Density of Construction Materials by use of Nuclear Gauges.
<u>616</u>	Sieve Analysis of Coarse and Fine Aggregate
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- [751](#) Measuring Surface Macrotexture Depth Using a Volumetric Technique and Determining Pattern Segregation
- [757](#) Determination of Asphalt Content & Gradation of Hot Mix Asphalt (HMA) by the Ignition Method