1.0 SCOPE

This Standard Practice outlines the laboratory procedures and requirements for hot mixed bituminous mix design.

2.0 REFERENCE STANDARDS

Asphalt Institute Manual

MS-2 Mix Design Methods for Asphalt Concrete
SP-2 Superpave Mix Design

ASTM Standards

C117 Minerals Finer than 75 um (No.200) Sieve in Mineral Aggregates by Washing
C127 Specific Gravity and Absorption of Coarse Aggregate
C128 Specific Gravity and Absorption of Fine Aggregate

C136 Sieve Analysis of Fine and Coarse Aggregates
C702 Reducing Samples of Aggregate to Testing Size
D2041 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
D2172 Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
D2419 Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
D2726 Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
D3203 Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
D4791 Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
D5821 Determining the Percentage of Fractured Particles in Coarse Aggregate
D6307 Asphalt Content of Hot Mix Asphalt by Ignition Method
D6926 Preparation of Bituminous Specimens using Marshall Apparatus
D6927 Marshall Stability and Flow of Bituminous Mixtures

AASHTO Standards

R35 Superpave Volumetric Design for Asphalt Mixtures
R30 Mixture Conditioning of Hot Mix Asphalt (HMA)
T283 Resistance of Compacted Asphalt Mixtures to Moisture Induced Damage
T304 Uncompacted Void Content of Fine Aggregate
T312 Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Gyratory Compactor

2.0 GENERAL

Council of Independent Laboratories (CCIL) Type A Certification is required to conduct all mix designs.

3.0 PROCEDURE

Mix design shall be prepared in accordance to the appropriate *Asphalt Institute Manual* and relevant ASTM or AASHTO standard from the above listed references.

3.1 Exceptions

3.1.1 Asphalt Cement grade

The asphalt cement grade shall be specified in the Contract.

3.1.2 Mix Design

The mix design shall meet the requirement of the Contract.

4.0 MIX DESIGN REPORT REQUIREMENTS

The Mix Design Report shall include the following:

4.1 Project Information
- 4.1.1 Contract number
- 4.1.2 Region
- 4.1.3 PTH or PR
- 4.1.4 Mix type
- 4.1.5 Contractor’s company name

4.2 Asphalt Cement
- 4.2.1 Asphalt cement supplier
- 4.2.2 Asphalt cement type
- 4.2.3 Specific gravity

4.3 Source Description for Individual Aggregates
- 4.3.1 Description of each aggregate material
- 4.3.2 Source of each aggregate material
- 4.3.3 Location of stockpile(s)

4.4 Aggregate Properties
- 4.4.1 Fractured Faces, %
- 4.4.2 Flat and elongated particles, % (Superpave mix only)
- 4.4.3 Fine aggregate angularity (Method A), % (Superpave mix only)
- 4.4.4 Sand equivalent, % (Superpave mix only)
- 4.4.5 Specific gravity of individual and combined aggregates
- 4.4.6 Water absorption of individual and combined aggregates, %

4.5 Job Mix Formula (JMF)
- 4.5.1 Recommended asphalt cement content, % of total weight of bituminous mix
- 4.5.2 Asphalt cement contribution of the RAP, % of total weight of bituminous mix
- 4.5.3 Design combination (blend) of aggregates, % of total mass of the dry aggregates
- 4.5.4 Gradation of individual and combined aggregates, % passing each sieve
- 4.5.5 Maximum theoretical density, kg/m^3
- 4.5.6 Bulk density at N_{Ini} and N_{max} as a percent of maximum theoretical density (Superpave mix only)
- 4.5.7 Bulk density at N_{design} (Superpave mix only)
- 4.5.8 Bulk density at Design blows, kg/m^3 (Marshall mix only)
- 4.5.9 Air voids content, %
- 4.5.10 Voids in mineral aggregates (VMA),%
- 4.5.11 Voids filled with asphalt (VFA), %
- 4.5.12 Gradation of extracted aggregates, % passing each sieve
- 4.5.13 Asphalt absorption, % by total weight of bituminous mix
- 4.5.14 Effective asphalt content, % by total weight of bituminous mix
- 4.5.15 Dust to binder ratio, % (Superpave mix only)
- 4.5.16 Marshall stability, kN (Marshall mix only)
- 4.5.17 Marshall flow, units of 0.25 mm (Marshall mix only)
- 4.5.18 Tensile strength ratio, %

4.6 Details of Each Trial Mixture
- 4.6.1 Design combination (blend) of aggregates, % of total mass of the dry aggregates
- 4.6.2 Asphalt cement content, % of total weight of bituminous mix
- 4.6.3 Graphs showing the variation of each of the following against the asphalt binder contents from different trials
  - 4.6.3.1 Maximum theoretical density, kg/m^3
  - 4.6.3.2 Bulk density, kg/m^3
  - 4.6.3.3 Air voids content, %
  - 4.6.3.4 Voids in mineral aggregates (VMA),%
  - 4.6.3.5 Voids filled with asphalt (VFA), %
  - 4.6.3.6 Asphalt absorption, % by total weight of bituminous mix
  - 4.6.3.7 Marshall stability, kN (Marshall mix only)
- 4.6.4 Marshall flow, units of 0.25 mm (Marshall mix only)