Construction Policy Bulletin

CPB 15-6 **Implementation of Hot Mix Asphalt Superpave Mix Design**

References: 2010 *Standard Specifications* Section 39, "Hot Mix Asphalt"

Construction Manual Section 6-107, "Materials Acceptance Sampling and Testing"

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Approved:

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Background

The Hveem method of mix design for asphalt concrete used by Caltrans was developed by Francis Hveem in the 1920s and remained unmodified until the 1960s. Since its development, many changes have occurred to the conditions on which the Hveem method was based, such as loading, traffic volumes, and materials properties. In 2012, Caltrans began revising its asphalt concrete mix design method to align with the American Association of State Highway and Transportation Officials (AASHTO) hot mix asphalt (HMA) mix design. Other states which use the Marshall method of mix design have been making this change too.

The Strategic Highway Research Program developed the Superior Performing Asphalt Pavements (Superpave™) method of mix design to replace the Hveem and Marshall methods. Superpave™ incorporates performance-grade asphalt binder characterized by environmental conditions and aggregate properties requirements to improve asphalt pavement performance. The volumetric analysis common to the Hveem method is the basis for the Superpave method. The most significant changes from the Hveem method are: (1) replacing the Hveem compactor by the gyratory compactor and, (2) compaction effort in the mix design based on traffic volume. The Superpave™ method ties asphalt binder and aggregate selection into the mix design process, and considers traffic and climate.

Superpave™ methodology was incorporated into Section 39, "Hot Mix Asphalt," of the 2010 revised *Standard Specifications* (RSS) in April 2014. As a result, most Caltrans test methods have been replaced with AASHTO test methods. This also requires revising the sampling and testing frequencies shown in Table 6-1.12, "Materials Acceptance Sampling and Testing Requirements: Hot Mix Asphalt," of the *Construction Manual*.

Existing Procedure

The contractor is required to prepare a job mix design based on the Hveem method in accordance with California Test Methods 366, 367, and 371, and submit it to the resident engineer on Construction Engineering Management (CEM) forms. Depending on the type of project, there are three hot mix asphalt construction processes—method, standard, and quality control/quality assurance. The contractor must control the quality of material and workmanship by maintaining a documented quality control plan and procedures.

Depending on the type of construction process and mix type, acceptance is based on visual and acceptance testing. Sampling and acceptance testing frequencies are shown on Table 6-1.12, "Materials Acceptance Sampling and Testing Requirements: Hot Mix Asphalt," of the *Construction Manual*.

New Procedure

The contractor must prepare the HMA mix design based on Superpave™ mix design requirements, which have been incorporated into Section 39, "Hot Mix Asphalt," of the 2010 revised *Standard Specifications*. The major changes in HMA mix design are the use of the gyratory compactor to determine mix volumetrics and Hamburg wheel-track testing of compacted HMA to determine resistance to rutting. The following table shows the new mix design test methods versus the California Test Method used for the Hveem mix design:

Hot Mix Asphalt Mix Design Testing		
Quality Characteristic	**Superpave™ Mix Design Test Method**	**Hveem Mix Design Test Method**
Gyration compaction (no. of gyrations)	AASHTO T 312	N/A
Air voids content	AASHTO T 269	California Test 367
Voids in mineral aggregate	SP-2 Asphalt Mixture Volumetrics	California Test 367
Dust proportion	SP-2 Asphalt Mixture Volumetrics	California Test 367
Stabilometer value	N/A	California Test 366
Hamburg wheel track	AASHTO T 324 (Modified)	N/A
Moisture susceptibility	AASHTO T 283	California Test 371

With the implementation of the Superpave method, the following forms related to mix design, job mix formula, and production start-up evaluation have been updated:

- CEM-3511, "Contractor Job Mix Formula Proposal"
- CEM-3512, "Contractor Hot Mix Asphalt Design Data"
- CEM-3513, "Caltrans Hot Mix Asphalt Verification"
- CEM-3514, "Contractor Job Mix Formula Renewal"
- CEM-3703, "Caltrans Production Start-up Evaluation"

The forms are available at http://www.dot.ca.gov/hq/construc/forms.htm.

The contractor must control the quality of material and workmanship by maintaining a documented quality control plan and procedures specified under Section 39-1.01C(3), "Quality Control Plan," and Section 39-1.01D(8), "Quality Control," of the revised *Standard Specifications.*

With the implementation of Superpave, the acceptance quality characteristics, test methods, and requirements have been changed. In addition, the elimination of the HMA construction processes of method, standard, and quality control/quality assurance in the specifications required updating Table 6-1.12, "Materials Acceptance Sampling and Testing Requirements: Hot Mix Asphalt," of the *Construction Manual*. There have also been changes made to the hot mix asphalt sample sizes because the samples are based on split samples—one sample for acceptance testing, and one for dispute resolution. If the contractor requests split samples, you must double the amount of hot mix asphalt sampled to provide four split samples—one for acceptance testing, one for the contractor, and two for dispute resolution. In the next revision to Section 39 of the *Standard Specifications*, if the contractor wants samples, the specification will require the contractor to provide their own personnel to take samples adjacent to where the state samples. This will eliminate the requirement that the state provide split samples for the contractor. The updated Table 6-1.12 is attached.

If you have questions or comments regarding this bulletin, please contact Kee Foo, Division of Maintenance, Pavement Program, at kee_foo@dot.ca.gov or (916) 274-6077, or Ebi Fini, Division of Construction, at ebi_fini@dot.ca.gov or (916) 227-5396.

Attachment: *Construction Manual* Table 6-1.12, "Materials Acceptance Sampling and Testing Requirements: Hot Mix Asphalt"