Rock Products Committee
SCOPING DOCUMENT
Revised September 15, 2008

Task Group

Hot Mix Asphalt Task Group (HMATG)

Title

Hot Mix Asphalt (HMA) Tests Subgroup—Updating HMA California Test Methods (CTMs) Technical Working Group (TWG) (HMATG Item 1, Draft Rock Products FY2008/09 Work Plan)

Issue/Problem Statement (*What is the issue?*)

California Department of Transportation (Caltrans) dense-graded, gap-graded, and open-graded HMA design procedures and HMA-related materials and aggregate tests have not been updated for many years, while the technology and science of materials and HMA have changed significantly. There is a need to update and revise HMA design procedures, interrelated test methods, and reference documents.

This effort will include the work of three joint Caltrans/industry expert task groups (ETGs): the HMA (Hveem) ETG, the HMA (Aggregates) ETG, and the HMA (Other Tests) ETG. The activities of these three ETGs are guided by this TWG, which consists of a panel of Caltrans and industry representatives comprised of three cochairs plus the cochairs from each of the ETGs.

Each ETG has prepared a work plan and schedule. This scoping document includes the resources and commitments of the TWG and three ETGs.

Purpose/Timeline (*Why we need to work on this.*)

The work was initiated in early May 2008 with a one-day workshop to establish objectives, framework, and timeline for the effort. It is anticipated that products from all groups will be delivered at two times throughout. Those test methods that have most impact or those test methods requiring least revision may be delivered by January 1, 2009, for implementation in the 2009 construction season. All others will be delivered by July 1, 2009. This is an ambitious schedule, but one that has been agreed to by all participants.

Objectives/Deliverables (*What is important to be done and what is the expected outcome?*)

The objectives are to establish or review and revise (as needed) mix design procedures and various HMA-related test methods that reflect current standard practices and to include the latest technology applicable to the Hveem mix design procedures, aggregate testing, field testing, and equipment calibration.

A list of the tests to be considered by each ETG is included in the TWG work plan.

Benefits (*For example, increased life cycle or reduced costs.*)

Updated HMA design procedures and various HMA-related aggregate and field tests will reflect current standard practices and the latest technology. New test methods should provide uniform and consistent mix design, testing, and calibration procedures.

Impacts (*What are the impacts to policy, specifications, construction practices, and stakeholders?*)

Construction practices and laboratories will be impacted. Caltrans and industry will use new mix design methods and test procedures on projects statewide. Specifications in Section 39, "Hot Mix Asphalt," of the Caltrans *Standard Specifications* will be updated to reflect the revised test methods.

Training for the new and revised tests will be required.

Resource Requirements (*Staff hours and expenses.*)

- Division of Engineering Services–Materials Engineering and Testing Services–Office of Flexible Pavement Materials = 5.200 PYs*
- Districts = 2.100 PYs
- Industry = 5.650 PYs
- Consultant = 1.700 PYs
- Travel costs are required to meet METS and district travel to Sacramento, the Bay Area, and Southern California. Travel expenses are estimated at $32,000.

Impediments to Completion of Deliverables

No impediments are identified.

*PY—Personnel year

Rock Products Committee
SCOPING DOCUMENT
Revised September 12, 2008

Task Group

Hot Mix Asphalt Task Group (HMATG)

Title

Section 39 Evaluation (HMATG Item 2, Draft Rock Products FY2008/09 Work Plan)

Issue/Problem Statement (*What is the issue?*)

The revised Section 39, "Hot Mix Asphalt," of the California Department of Transportation (Caltrans) *Standard Specifications* is included in all Caltrans projects that complete the Plans, Specifications, and Estimates process after November 1, 2007. The Federal Highway Administration, in leading the peer review team to complete the revision of Section 39, recommended evaluation of the new procedures and standards for hot mix asphalt (HMA) acceptance established in Section 39.

Purpose/Timeline (*Why we need to work on this.*)

A Section 39 Evaluation Task Group consisting of Caltrans and industry representatives has been formed. The task group will examine the implementation practices of the districts, examine standards established, and provide a statistical evaluation of the quality control and acceptance standards for HMA.

The work should last through March 2010, assuming no unexpected problems occur.

Objectives/Deliverables (*What is important to be done and what is the expected outcome?*)

The objectives of this work plan are to:

- Evaluate implementation of the revised Section 39.
- Develop proposals for revisions based on the evaluation.
- Prepare a final report to the Federal Highway Administration documenting the evaluation results and recommendations for changes.

Benefits (*For example, increased life cycle or reduced costs.*)

Updated HMA design procedures will reflect current standard practices and the latest technology applicable to the Hveem mix design procedures. New test methods should provide uniform and consistent mix design procedures.

Impacts (*What are the impacts to policy, specifications, construction practices, and stakeholders?*)

Industry's process control, production, and placement practices could be impacted. Caltrans quality assurance and contract compliance practices could be impacted.

Training for the new specifications may be required.

Resource Requirements (*Staff hours and expenses.*)

- Division of Engineering Services–Materials Engineering and Testing Services–Office of Flexible Pavement Materials = 2.750 PYs*
- Districts = 0.300 PYs
- MACTEC (consultant) = 0.250 PYs
- Industry = 2.850 PYs
- Travel costs are required to meet every two weeks in Sacramento, the Bay Area, and Southern California and to travel to project sites to review contract documents. Travel expenses are estimated at $10,000.

Impediments to Completion of Deliverables

No impediments are identified.

*PY—Personnel year

Rock Products Committee
SCOPING DOCUMENT
Revised September 12, 2008

Task Group

Hot Mix Asphalt Task Group (HMATG)

Title

Superpave Gyratory Compactor (SGC) Evaluation
(HMATG Item 3, Draft Rock Products FY2008/09 Work Plan)

Issue/Problem Statement (*What is the issue?*)

The availability of kneading compactors remains uncertain because of the pending retirement of the predominant manufacturers of kneading compactors. Maintenance of aging kneading compactors statewide is increasingly difficult. Differences in various existing kneading compactor models have caused significant challenges in equipment calibration. Therefore, an increased variation in test results can be expected because of these factors. This variation is indicated by one limited study of kneading compactors that reported a 1.2 percent variance in relative density for multilaboratory precision.

As a result of the Strategic Highway Research Program, a gyratory compactor has been developed. This piece of equipment is used by most other state transportation departments. Considerable attention has been given to the method for hot mix asphalt (HMA) sample preparation and equipment calibration that produces a reasonably low variation.

Purpose/Timeline (*Why we need to work on this.*)

The work outlined in this scoping document will examine the substitution of the kneading compactor with the SGC in Hveem mix design.

The work should last through August 2013, assuming no unexpected problems occur.

Objectives/Deliverables (*What is important to be done and what is the expected outcome?*)

The objectives of this work plan are to:

- Determine if the SGC should be used in Hveem mix design.
- Determine the variation in relative density of samples compacted with the SGC.
- Determine the equivalent compaction effort between the SGC and the kneading compactor for each mix type and maximum aggregate size.

- Determine the stability correction factor between the SGC and the kneading compactor for each mix type and maximum aggregate size.

- Implement use of the SGC in Hveem mix design.

Benefits (*For example, increased life cycle or reduced costs.*)

Less variable compaction equipment, such as the SGC, will produce more consistent HMA as well as less variation in test results. This will lead to higher quality and longer-lasting asphalt pavement and decrease differences between contractor and state test results on HMA projects.

Impacts (*What are the impacts to policy, specifications, construction practices, and stakeholders?*)

The difference between contractors' and engineers' test results will be minimized with adoption of less variable equipment, such as the SGC, which will lead to fewer disputes and claims related to material specifications. Less variable equipment will produce more consistent HMA and improve HMA construction practices.

If the SGC proves acceptable, there will be required equipment changes for both the State and industry. Training in the new test method and equipment calibration and maintenance will be required.

Resource Requirements (*Staff hours and expenses.*)

- California Department of Transportation–Division of Engineering Service–Materials Engineering and Testing Services–Office of Flexible Pavement Materials = 3.000 PYs*

- Districts = 1.000 PYs

- MACTEC (consultant) = 1.000 PYs

- Industry = 0.500 PYs

- There may be travel expenses for meetings in the north and south. Travel expenses are estimated at no more than $2,000.

Impediments to Completion of Deliverables

No impediments are identified.

*PY—Personnel year

Rock Products Committee
SCOPING DOCUMENT
Revised September 12, 2008

Task Group

Hot Mix Asphalt Task Group (HMATG)

Title

Evaluation of Warm Mix Asphalt (WMA) Technologies
(HMATG Item 4, Draft Rock Products FY2008/09 Work Plan)

Issue/Problem Statement (*What is the issue?*)

WMA is a group of technologies that reduce the production temperature of hot mix asphalt (HMA) from 30º to 100ºF. This technology has been used throughout a majority of the United States in various applications. State transportation departments and industry have claimed that workability of the mix is improved, and increased workability may lead to improved compaction. In addition, lower production temperatures may also reduce emissions, fumes, and odors at HMA production facilities.

While there have been extensive studies in dense-graded HMA and Superpave applications using WMA, California has a unique set of mix parameters that have not been evaluated in other states. The WMA Task Group needs to develop a performance specification and testing protocol to correctly implement the use of WMA technologies in California.

Purpose/Timeline (*Why we need to work on this.*)

The National Asphalt Pavement Association, state transportation departments, and the Federal Highway Administration have formed a nationwide task group to study WMA technologies and develop specifications and testing protocol for WMA projects. Due to an increased interest in "green" technology, WMA is being used throughout the country as a potential means to address environmental concerns. WMA technologies have viable applications in California; however, the California Department of Transportation (Caltrans) needs to understand the technologies and implement them in a way that most benefits the State.

Caltrans has used WMA in several small projects in 2008. The use of WMA in these small projects has generated interest in using it in larger tonnage projects. Before more projects are constructed, past projects require evaluation and specifications need to be fully developed. An appropriate materials testing plan needs to be developed as well, which may differ from HMA materials testing.

The work should last through July 2010, assuming no major problem focus studies are required.

Objectives/Deliverables (*What is important to be done and what is the expected outcome?*)

The objective is to evaluate the use of WMA in HMA applications used by Caltrans. It is anticipated that new specifications and practices will be the outcome.

Benefits (*For example, increased life cycle or reduced costs.*)

Reduction in HMA production temperatures and placement temperatures will provide several benefits. These environmental, health, and safety benefits include reduced emissions, fumes, and odors at the asphalt production facilities and cooler work environments. Energy savings from lower production temperatures have occurred in other states using WMA technology.

In addition, the use of WMA technology has been shown to improve the workability of the material. Workability improvements may result in higher in-place density. This decrease in air voids decreases the permeability of the HMA, which can reduce water damage. Lower in-place air voids also will improve resistance to fatigue and thermal cracking and may improve rutting resistance.

Workability improvements also have the potential to extend the construction season and the time available for placement of the HMA mixture during a given day. Due to enhanced workability of the HMA, it may be placed under cooler weather conditions, which benefits areas of the State where hotter placement temperatures are not possible, such as District 1.

Impacts (*What are the impacts to policy, specifications, construction practices, and stakeholders?*)

Most HMA plants can use WMA technologies with little modification of the existing plants. There is little modification to construction practices when using WMA. There will be WMA specifications to be developed. These specifications will require changes to Section 39, "Hot Mix Asphalt," of the Caltrans *Standard Specifications*.

Resource Requirements (*Staff hours and expenses.*)

- Division of Engineering Services–Materials Engineering and Testing Services–Office of Flexible Pavement Materials = 1.500 PYs*
- Districts = 0.500 PYs
- MACTEC (consultant) = 0.250 PYs
- Industry = 0.500 PYs
- Travel costs are required to meet in Northern and Southern California, to provide district support on projects, and to review project sites. Travel expenses are estimated at $12,000.

Impediments to Completion of Deliverables

No impediments are identified.

*PY—Personnel year

Rock Products Committee
SCOPING DOCUMENT
Revised September 12, 2008

Task Group

Hot Mix Asphalt Task Group (HMATG)

Title

Evaluation of Moisture Sensitivity Testing and Treatments
(HMATG Item 5, Draft Rock Products FY2008/09 Work Plan)

Issue/Problem Statement (*What is the issue?*)

There is still some uncertainty about the effectiveness of laboratory test methods for ascertaining the moisture sensitivity of dense-graded hot mix asphalt (HMA) and rubberized hot mix asphalt, gap-graded (RHMA-G). The California Department of Transportation (Caltrans) has implemented a two-year pilot program to evaluate California Test (CT) 371, "Method of Test for Resistance of Compacted Bituminous Mixture to Moisture Induced Damage," a variation of AASHTO Standard Method of Test T283, "Resistance of Compacted Bituminous Mixture to Moisture Induced Damage." If CT 371 is to be used for Caltrans projects, it is important that both the State and the contractors/producers understand the level of treatment that may be required, the variability of the test in laboratory comparisons, and the changes that will be identified by the test between mix design and plant production of HMA and RHMA-G. Early test results from RHMA-G may have identified a problem with using CT 371 on rubberized or gap-graded HMA.

In addition to evaluating CT 371, as the effectiveness and variability of AASHTO T283 variations are debated nationwide, Caltrans, like many other state transportation departments, is considering the use of the Hamburg Wheel Tracking Device (HWTD) to characterize the moisture sensitivity of HMA and RHMA-G.

Purpose/Timeline (*Why we need to work on this.*)

In an attempt to resolve this matter, the Moisture Sensitivity Asphalt Concrete Task Group (MSACTG) proposes to collect CT 371 data from all quality control/quality assurance projects for two years. If resources allow, a parallel laboratory testing program will be undertaken with the HWTD. Upon completion of the data collection and analysis, a report will be prepared. As noted above, the evaluation of conventional dense-graded HMA and RHMA-G will be conducted concurrently. At the end of the two-year pilot program, the MSACTG will continue to collect data only from projects identified within the two-year period for the life of the projects.

Objectives/Deliverables (*What is important to be done and what is the expected outcome?*)

The objectives of this work plan are as follows:

- Determine the consistency of CT 371 for assessing the moisture mitigation treatments of dense-graded HMA and RHMA-G.
- If resources allow, determine the effectiveness of the HWTD for assessing the moisture sensitivity of dense-graded HMA and RHMA-G.
- Determine changes in CT 371 results between mix design and plant-produced HMA to determine how production influences test results.
- Determine the variability of CT 371 test results generated from production samples.
- Develop a specification for production samples based on CT 371 test results.
- Determine the relationship between CT 371 and HWTD test results.
- Document the following:
  - CT 371 test results for untreated and treated mixes.
  - CT 371 results for laboratory-produced and plant-produced materials.
  - The number and percentage of projects that require treatment based on CT 371 test results.
  - The number and type of treatment strategies selected for each mix type.
  - The number of projects in which materials with a plasticity index greater than 4 are used.

Deliverables will include a preliminary report at the end of the two-year pilot program and a final report after completion of all construction projects involved with the two-year pilot program. The reports will provide conclusions and recommendations.

Benefits (*For example, increased life cycle or reduced costs.*)

The results of this program should allow Caltrans to identify and treat HMA marginal materials prior to production, thus minimizing or eliminating performance problems in the field, and to provide a test that can be used for quality control and quality assurance during HMA production.

Impacts (*What are the impacts to policy, specifications, construction practices, and stakeholders?*)

Construction practices and laboratories may be affected. Caltrans and industry may use new mix design methods and test procedures on projects statewide. Specifications in Section 39, "Hot Mix Asphalt," of the Caltrans *Standard Specifications* may need to be updated to reflect the findings of this analysis.

Resource Requirements (*Staff hours and expenses.*)

- Division of Engineering Services–Materials Engineering and Testing Services–Office of Flexible Pavement Materials = 2.750 PYs*
- Districts = 0.300 PYs
- MACTEC (consultant) = 0.250 PYs
- Industry = 0.250 PYs
- Travel costs are required for meeting in Northern and Southern California. Travel expenses are estimated at $5,000.

Impediments to Completion of Deliverables

Finding and constructing pilot projects.

*PY—Personnel year

Rock Products Committee
SCOPING DOCUMENT
July 30, 2008

Task Group

Hot Mix Asphalt Task Group (HMATG)

Title

Developing Reclaimed Asphalt Shingles (RAS) Recycling Specifications and Test Procedures (HMATG Item 6, Draft Rock Products FY2008/09 Work Plan)

Issue/Problem Statement (*What is the issue?*)

According to recycling industry sources, nine state transportation agencies currently allow use of RAS in hot mix asphalt (HMA), authorized either by adopted specifications or by transportation agency special provisions. Actual utilization of RAS by paving contractors is not yet widespread, reflecting its relative newness, the consequent lack of an established market, and contractor experience. Approximately 11 million tons of asphalt shingle waste are generated each year in the United States. Currently, the most common disposal method for asphalt shingles in the U.S. is landfilling.

Purpose/Timeline (*Why we need to work on this.*)

The California Department of Transportation (Caltrans) has entered into an interagency agreement with the California Integrated Waste Management Board (CIWMB) to study the addition of post-manufactured RAS in HMA mixtures. An advisory group consisting of Caltrans, the CIWMB, and industry representatives has been formed to assist in the design and evaluation of the demonstration project. This will include the development of specifications and construction procedures, as well as the formulation of quantitative measures to evaluate the performance of the asphalt shingle paving project.

The timeline is dependent on finding a pilot project. The CIWMB deadline for the final report is April 2009.

Objectives/Deliverables (*What is important to be done and what is the expected outcome?*)

Caltrans, the CIWMB, and industry have formed an advisory group to conduct a demonstration project using preconsumer RAS in an HMA paving project. It is envisioned that the demonstration project initially will experiment with several different mix designs based on input from the project partners, including the HMA plant, the contractor, the advisory group, and other Caltrans staff.

Benefits (*For example, increased life cycle or reduced costs.*)

In addition to saving landfill space, the benefits of recycling asphalt shingles in asphalt concrete include possible economic savings and improved pavement performance. There may be an immediate economic benefit due to asphalt reclamation. California plants produce

fiberglass-based shingles, which are approximately 20 percent asphalt. HMA has approximately 6 percent asphalt binder. Therefore, a small percentage of shingles (e.g., 5 percent by weight of aggregate) can displace a large percentage of asphalt binder (approximately 20 percent). Other economic factors include recyclers' tipping fees, costs to grind the shingles, price of virgin asphalt, and transportation costs.

Another benefit may be improved pavement performance. Because the asphalt used in shingles is harder than pavement asphalt, the pavement benefits may include improved resistance to rutting, increased stability, decreased temperature susceptibility, and improved compaction.

Impacts (*What are the impacts to policy, specifications, construction practices, and stakeholders?*)

Actual utilization of RAS by paving contractors is not yet widespread, reflecting its relative newness, the consequent lack of an established market, and contractor experience. The addition of RAS to the HMA process is very similar to incorporating reclaimed asphalt pavements in HMA. Most production facilities in California are set up to incorporate the reclaimed asphalt pavement in HMA mixtures or at least are familiar to this process. Thus, the impact of adding RAS to HMA mixtures will be minimal. Specifications in Section 39, "Hot Mix Asphalt," of the *Standard Specifications* will not be changed. Potentially, there could be a reduced cost of HMA after pilot projects.

Resource Requirements (*Staff hours and expenses.*)

In addition to the $150,000 from the interagency agreement, the CIWMB will partner with Caltrans to secure materials for completion of the construction pilot project by forming strategic partnerships to obtain additional funding or the procurement of materials below market prices. It is anticipated the required staff for this project are as follows:

- Division of Engineering Services–Materials Engineering and Testing Services–Office of Flexible Pavement Materials = 0.500 PYs*
- Districts = 0.100 PYs
- Industry = 0.200 PYs
- Travel costs required to the project site and for meetings. Estimated travel expenses will be submitted by August 29, 2008.

Impediments to Completion of Deliverables

No impediments identified. However, finding a suitable demonstration project may take time.

*PY—Personnel year

Rock Products Committee
SCOPING DOCUMENT
July 30, 2008

Task Group

Hot Mix Asphalt Task Group (HMATG)

Title

Developing a Draft Proposal for a Certification Program for Hot Mix Asphalt (HMA) Suppliers (HMATG Item 7, Draft Rock Products FY2008/09 Work Plan)

Issue/Problem Statement (*What is the issue?*)

Develop and implement a statewide Certificate of Compliance (COC) program for HMA suppliers and mixes in California. This program would parallel the COC program in existence for performance-graded binders.

Note: The HMATG has not yet assigned this task to a subgroup. This scoping document is intended to serve as a placeholder.

Purpose/Timeline (*Why we need to work on this.*)

This COC program for HMA suppliers and mixes will require better and more consistent control of the quality of all HMA production and mixes, bring all HMA plants in California into compliance with quality control (QC) testing, facilitate California Department of Transportation (Caltrans) and local agency oversight of HMA production quality, and raise the level of competence for HMA suppliers and compliance of HMA materials for all agencies with limited or no quality assurance testing.

This COC program should take one year to develop, with consensus, and another two years to become operational.

Note: The full timeline will be developed by the joint subgroup of the HMATG assigned to the task.

Objectives/Deliverables (*What is important to be done and what is the expected outcome?*)

- The HMA COC document needs to be written, be specific on the required testing, and be accepted by both Caltrans and the HMA producers.

- A Caltrans Web page needs to be established for listing all HMA COC plants and mixes.

- A process for Caltrans oversight of the participating suppliers needs to be developed and implemented.
- A process for Caltrans review and oversight of the program needs to be developed and implemented.

Benefits (*For example, increased life cycle or reduced costs.*)

- Better control of HMA mix quality.
- Improved HMA quality.
- Fits in a systematic approach to QC and quality assurance for materials specifications.
- Benefit for local agencies with limited or no quality assurance testing capability.
- Can provide a statewide system and database.

As Caltrans moves to end product specifications and requirements for additional QC testing by contractors, this is an obvious step toward improving the level of competence throughout the industry and improving the quality of HMA throughout the State.

Impacts (*What are the impacts to policy, specifications, construction practices, and stakeholders?*)

An HMA COC program should be referred to and required as part of the Caltrans *Standard Specifications*. Its implementation should not affect policy or specifications. The HMA COC would certify an HMA production facility for its QC of the HMA production process and the quality of the HMA mixes for which it is certified.

It will make QC and quality acceptance testing during construction better organized and easier.

Stakeholders are Caltrans, HMA producers, local agencies, and testing labs (which may be hired to do QC testing for some of the HMA producers).

Resource Requirements (*Staff hours and expenses.*)

The resources required should be very similar to that what was required to implement and operate the COC program for performance-graded binders.

It is anticipated the required staff for this project are as follows:

- Division of Engineering Services–Materials Engineering and Testing Services–Office of Flexible Pavement Materials = 1.000 PYs*
- Districts = 0.500 PYs
- Industry = 2.000 PYs
- Travel costs required for meetings. Estimated travel expenses will be submitted by August 29, 2008.

Impediments to Completion of Deliverables

The HMA producers, presently with insufficient QC, and those never producing for Caltrans may resist because the COC program will require more testing from them, and it may reveal HMA quality problems at particular HMA plants.

*PY—Personnel year

Rock Products Committee
SCOPING DOCUMENT
[Date]

Task Group

Title

[PLACEHOLDER FOR HMATG-8, High-Volume Reclaimed Asphalt Pavement (RAP) (Less Than 15 Percent) Recycled in HMA—Developing Specifications and Test Procedures]

Issue/Problem Statement (*What is the issue?*)

Purpose/Timeline (*Why we need to work on this.*)

Objectives/Deliverables (*What is important to be done and what is the expected outcome?*)

Benefits (*For example, increased life cycle or reduced costs.*)

Impacts (*What are the impacts to policy, specifications, construction practices, and stakeholders?*)

Resource Requirements (*Staff hours and expenses.*)

Impediments to Completion of Deliverables