

Department of Resources, Recycling and Recovery

SCOPE OF WORK

Caltrans Warm-Mix Asphalt (WMA) Technology Evaluation

I. INTRODUCTION/OBJECTIVES

Warm Mix Asphalt (WMA) is a suite of technologies that allows a reduction in temperatures for traditional hot-mix asphalt (HMA) production and paving. There are currently four different WMA categories (organic additives, inorganic additives, chemical foaming processes, and mechanical foaming processes), with more than 20 known technologies currently available in the United States.

The California Department of Transportation (Caltrans), local government road authorities, and the construction industry are interested in evaluating WMA technologies used in conventional rubberized, and polymer modified asphalt mixes for:

- Worker health and safety benefits (lower temperatures, less fumes);
- Environmental benefits (reduced stack and construction emissions due to lower temperatures),
- Opportunities to extend the paving season, undertake more night time paving, and to allow longer hauls of HMA,
- Reduced greenhouse gas emissions due to reduced energy inputs (lower temperatures),
- Potential increased pavement service life from improved compaction, and
- Higher productivity at asphalt plants.

Caltrans, through the University of California Pavement Research Center (UCPRC), has been evaluating WMA technologies in a phased research program under a variety of applications. The UCPRC research program includes laboratory testing, accelerated pavement testing, and field tests throughout the state. This program is a comprehensive, controlled study that will provide an indication of longer-term performance in a relatively short time period, thereby reducing the risk for road authorities in implementing the use of WMA technology on higher traffic roads. This Scope of Work (SOW) will assist Caltrans in completing its phased research of WMA technologies.

II. WORK TO BE PERFORMED

The following tasks will be accomplished through this Scope of Work: laboratory performance testing of the gap-graded rubberized mixes (rutting, cracking, and moisture sensitivity performance); evaluation of the binder aging properties of rubberized binders compared to conventional binders to mechanistically quantify the potential effects on rutting and cracking performance; construction and testing of new rubberized open-graded mix designs that have been developed to optimize sound reduction and permeability; evaluation of emissions from rubberized HMA (R-HMA) and rubberized WMA (R-WMA).

III. TASKS IDENTIFIED

1. Laboratory Performance Testing – The Contractor shall conduct laboratory testing for rutting, cracking and moisture sensitivity of gap-graded rubberized warm-mix asphalt mixes to determine performance values. This task will include testing of both field-mixed, field compacted and laboratory-mixed, laboratory compacted materials.
2. Binder Aging Study – The Contractor shall conduct laboratory testing to evaluate the binder aging properties of rubberized binders compared to conventional binder to mechanistically quantify the potential effects on rutting and cracking performance.
3. Emissions Testing – The Contractor shall perform emissions testing of R-HMA and R-WMA during production and construction to quantify emission reductions realized with R-WMA.
4. The Contractor shall construct rubberized open-graded friction course (R-OGFC) test sections and perform accelerated pavement testing.
5. The Contractor shall perform laboratory durability and permeability testing in conjunction with R-OGFC pavement testing.
6. Reporting - The Contractor will provide regular progress reports every six months to the Contract Manager tracking project implementation and success.
 - A. All documents and/or reports drafted for publication by or for CalRecycle in accordance with this contract shall adhere to CalRecycle’s Contractor Publications Guide at www.CalRecycle.ca.gov/Publications/PubGuide/ and, must be reviewed by a technical editor of the Contractor’s choosing to ensure that the reports comply with CalRecycle’s publication guidelines, after which they shall be submitted to and reviewed by the Contract Manager in consultation with the CalRecycle editor.
 - B. *(The Contractor is encouraged to consult with the CalRecycle Contract Manager and editorial staff early in the development process to ensure deliverable requirements are clearly understood and to minimize the need for revisions.)*
 - C. Contractor shall submit a draft final report to the CalRecycle Contract Manager six weeks prior to the due date for the Final Report. The draft, like the final report, must be reviewed by a technical editor of the Contractor’s choosing to assure that the reports comply with CalRecycle’s publication guidelines. The draft will be reviewed by CalRecycle staff who will provide comments or questions that should be addressed or incorporated into the subsequent draft of the report. Any requested changes must be completed by the Contractor and resubmitted to the Contract Manager for final approval. Only when all revisions are made and approved by the Contract Manager will the report be deemed final.
 - D. The Contractor will provide a final report that summarizes all activities outlined in the SOW and including an evaluation of test result, on or before March 31, 2013.
 - E. The final report shall adhere to the CalRecycle Publications Guidelines and shall be reviewed by a technical editor of the Contractor’s choosing. Contractor will not receive final payment until the final report has been approved by the CalRecycle Contract Manager. The final report shall be printed double-sided, on 100 percent recycled-content paper.

- F. Contractor shall be aware that if the final report contains copyrighted work in print (tables, graphics, or photographs), or other materials taken from copyrighted sources, the Contractor shall cite the copyrighted material in the final report and obtain permission to use the copyrighted material. Contractor shall secure express written permission from the copyright holder or the holder's licensing representative. Contractor will include letters of permission to use copyright material as an appendix in the final report. If Contractor does not secure permission to use copyrighted material, said material will not be used in the final report.

IV. CONTRACT/TASK TIME FRAME

Task	Duration	Due/Completion Dates
1	6 months	01/31/12
2	4 months	04/30/12
3	3 months	06/30/12
4	12 months	06/30/12
5	4 months	12/31/12
6	Throughout the Project	Every six months beginning 1/31/12

Note: Some tasks will run concurrently.

V. COPYRIGHT PROVISION

The contractor shall establish for CalRecycle good title in all copyrightable and trademarkable materials developed as a result of this Scope of Work. Such title shall include exclusive copyrights and trademarks in the name of the State of California, Department of Resources Recycling and Recovery.

VI. CALIFORNIA WASTE TIRES

Unless otherwise provided for in this Scope of Work, in the event the contractor and/or subcontractor(s) purchases waste tires or waste-tire derived products for the performance of this Scope of Work, only California waste tires and California waste tire-derived products shall be used. As a condition of payment under the agreement, the contractor shall be required to provide documentation substantiating the source of the tire materials used during the performance of this Scope of Work to the CalRecycle Contract Manager.

VII. WASTE REDUCTION AND RECYCLED-CONTENT PRODUCT PROCUREMENT

In the performance of this Agreement, Contractor shall use recycled content, used or reusable products, and practice other waste reduction measures where feasible and appropriate.

Recycled Content Products: All products purchased and charged/billed to CalRecycle to fulfill the requirements of this contract shall be Recycled Content Products (RCPs), or used (reused, remanufactured, refurbished) products. All RCPs purchased or charged/billed to CalRecycle to fulfill the requirements of the contract shall have both the total recycled-content (TRC) and the postconsumer content (PC) clearly identified on the products. Specific requirements for the aforementioned purchases and identification are discussed in the Terms and Conditions of the Contractual Agreement under Recycled-Content Product Purchasing and Certification.

The Contractor should, at a minimum, ensure that the following issues are addressed, as applicable to the services provided:

A. WRITTEN DOCUMENT PROVISION

All documents and/or reports drafted for publication by or for CalRecycle in accordance with this contract shall adhere to the CalRecycle's *Guidelines For Preparing CalRecycle Reports (available upon request)* and shall be reviewed by CalRecycle's Contract Manager in consultation with one of CalRecycle's editors.

In addition, these documents and/or reports shall be printed double-sided on one hundred percent (100%) recycled-content paper. Specific pages containing full-color photographs or other ink-intensive graphics may be printed on photographic paper. The paper should identify the postconsumer recycled content of the paper (i.e., "printed on 100% postconsumer paper"). When applicable, the contractor shall provide the contract manager with an electronic copy of the document and/or report for CalRecycle's uses.

To the greatest extent possible, soy ink instead of petroleum-based inks should be used to print all documents.