

Department of Resources Recycling and Recovery

SCOPE OF WORK

Evaluation of the Use of Recycled Rubberized Asphalt Pavement in Hot Mix Asphalt (Tire Recycling Management Fund, FY 2013/14)

I. INTRODUCTION/OBJECTIVES

Rubberized hot-mix asphalt (RHMA) pavement has been increasingly used in California over the last 10 to 20 years, and as these pavements reach the end of their design lives they are being milled off and replaced with new hot-mix asphalt (HMA) or RHMA. The millings are being added to recycled asphalt pavement (RAP) stockpiles and reused in new conventional HMA. Currently, the amount of RAP used in new HMA in California varies between 15 and 25 percent, and this could increase to 40 percent or higher in the future. Caltrans currently does not permit the use of any RAP in RHMA-G, or gap-graded mixes

Higher quantities of RAP imply higher amounts of older, oxidized (thus stiffer) binder being mixed with the virgin binder in HMA. Although the implications of this on the binder properties/behavior and mix performance are being studied by the University of California Pavement Research Center and other research centers, this research has focused on non-rubberized RAP and no research is being undertaken specifically on the effects of rubberized RAP in the new mixes. Work under this contract will investigate the effects of rubberized RAP on the properties and behavior of the blended binders in new mixes. Additionally, this study will investigate the effects of using conventional RAP at various percentages in RHMA-G mixes. This research will focus on binder properties and will include a series of laboratory performance tests on selected mixes to assess mix performance. Deliverables will include a report detailing any specific issues related to the use of rubberized RAP and conventional RAP in new HMA and RHMA-G mixes, recommendations for additional mix performance studies if required, and recommendations for new specification language to allow the use of RAP in RHMA-G mixes.

II. WORK TO BE PERFORMED

The tasks under this scope of work (SOW) include: a literature review of past investigations; development of a detailed work plan for this study; sample collection and preparation; laboratory testing of the blended binders; laboratory mix testing; preparation of a research report documenting the work performed, results and recommendations.

III. TASKS IDENTIFIED

Task 1- Work plan development – The contractor shall develop a detailed work plan for the tasks of this SOW subject to approval by the Contract Manager. The contractor shall not begin work on Tasks 2-5 before receiving approval of the work plan.

Task 2- Sample collection and preparation – Before RAP sample collection and preparation, the contractor shall conduct a literature review to compile information from past and current pavement recycling research in order to identify data gaps. The contractor shall obtain and process sufficient conventional and rubberized RAP material to conduct all the research under this contract. Material shall be sourced from industry and/or public agency stockpiles or projects. Details of the sample collection and preparation shall follow the procedures delineated in the approved work plan developed in Task 1.

Task 3- Laboratory testing – The contractor shall perform standardized laboratory tests to evaluate, characterize, and analyze the rheological/engineering properties of the RAP and blended (RAP and virgin) binders. Test protocols for this task shall follow the protocols delineated in the approved work plan developed in Task 1.

Task 4- Mix testing – The contractor will conduct standard performance tests on laboratory compacted hot-mix specimens. The scenarios for mix testing will be dependent on the outcome of the literature review and the availability of RAP and rubberized RAP. However, at a minimum, the mix testing specimens shall include: 15% and 25% rubberized RAP in conventional HMA; 10% and 15% conventional RAP in RHMA-G. Test protocols for this task shall follow the protocols delineated in the approved work plan developed in Task 1.

Task 5- Reporting – The contractor shall provide progress reports on the research conducted every six months, beginning on June 1, 2014 and submit a draft comprehensive final report on November 1, 2015. The reports shall include, but not be limited to: research findings, recommendations for implementation of findings, and any specific issues related to the use of rubberized RAP or RAP in conventional HMA or RHMA-G respectively. The contractor shall also develop fact sheets or workshop materials based on the research and findings. The final report and all fact sheets and workshop materials shall be submitted to the Contract Manager in draft form for review and approval. The Contract Manager will provide written approval or requests for changes or revisions to the contractor. The contractor shall incorporate any changes or revisions required by the Contract Manager and submit a final version.

IV. TASK/CONTRACT TIME FRAME

The work under this contract will take approximately 24 months. Assuming a January 1, 2014 start date, the due dates for each task are given below, with some of the tasks being performed concurrently. These due dates may need to be adjusted, pending actual contract start date.

Task	Deliverable Due Dates*
Task 1 – Work plan	March 1, 2014
Task 2 – Sample collection	July 1, 2014
Task 3 - Laboratory testing	April 1, 2015
Task 4 - Mix testing	July 1, 2015
Task 5 - Progress Reports	Every six months starting on June 1, 2014
Task 5 - Draft Final Report	November 1, 2015

* Assumes contract fully executed by January 1, 2014

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, 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 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

All documents and/or reports drafted for publication by or for CalRecycle in accordance with this contract shall adhere to 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 the CalRecycle's uses.

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

B. CONFERENCING PROVISION

The contractor shall take any and all steps necessary to make sure that the event is a model for future recycling, waste prevention, diversion, buy recycled, and waste management events.

Paper Products: All paper products used to fulfill the requirements of this contract (nametags, badges, letters, envelopes, brochures, etc) must contain at least 30% post-consumer recycled content fiber.

Re-usable Cups, Plates & Utensils: To the greatest extent possible, use re-usable/washable utensils, dishes, tableware, etc., rather than single-use disposable products.

Leftover Food/Beverages: All leftover food and/or beverages associated with the event will be donated to an established food donation outlet. Arrangements for the donation must be made prior to the date of the event. CalRecycle staff will assist the contractor in identifying these donation outlets, if needed.

Recycling/Composting: Arrangements must be made with the venue, sponsor, or by contract, to provide adequate collection bins for recyclables, organics (food waste) or biodegradable materials, and trash (non-recyclables). The bins should contain at least 30% post-consumer plastic. In addition, the contractor shall work with the venue and/or sponsors to maximize diversion of the discarded materials.

Soy-based Printing Ink: To the greatest extent possible, soy ink instead of petroleum-based inks should be used to print all documents needed for the event.