WPMA
WESTERN PAVEMENT MAINTENANCE ASSOCIATION
*"$aving California's Roads with Asphalt-Rubber"*tm

HON. LLOYD LEVINE (RET.), EXECUTIVE DIRECTOR

WPMA COMMENTS ON DRAFT SCOPING PLAN
RE: TIRES/TIRE DERIVED ASPHALT

March 30, 2017

To: Mary Nichols, Chair, CA Air Resources Board

Cc: Scott Smithline, Director, CA Department of Recycling

Subject: Scoping Plan - GHG emissions reductions from Asphalt Rubber

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An increase in the use of Asphalt Rubber by Caltrans and local governments will result in a significant reduction in GHG emissions from the paving sector.

ASPHALT RUBBER

For the Scoping Plan, our comments are specifically focused on the reductions in GHG emissions associated with the production of Asphalt Rubber as compared to conventional hot mix asphalt. Asphalt-Rubber is produced by utilizing recycled automobile and truck tires to create a visco-elastic binder. Because of the crumb rubber content, Asphalt Rubber has enhanced performance properties such as resistance to fatigue cracking and extended service life. When produced and applied correctly, Asphalt-Rubber produces better quality, longer lasting pavements at a lower cost than traditional hot mix asphalt.

In addition to providing longer-lasting, better quality road surfaces, Asphalt-Rubber helps remove millions of tires from California's waste stream every year, preventing them from ending up in landfills and dangerous tire piles. In the quest for sustainability the combination of an enhanced paving material along with its environmental benefits make Asphalt-Rubber the ideal paving material for California.

Caltrans has been using Asphalt Rubber in California for over 40 years and is extremely familiar with its properties and benefits. However, there are several ways Caltrans can SIGNIFICANTLY increase the use of Asphalt Rubber on an annual, and ongoing basis.

SPECIFIC COMMENTS ON SCOPING PLAN

The draft scoping plan does not calculate or include any GHG savings from the paving sector. The WPMA is asking that GHG reductions from the use of Asphalt Rubber be specifically calculated and included in the scoping plan.

Our industry has long understood, in addition to diverting millions of tires from landfills, **there are significant GHG reductions to be realized from a significant increase in the use of Asphalt Rubber instead of conventional hot mix asphalt paving strategies**.

The reductions come from several places:

1) Asphalt Rubber Hot Mix can be placed at half the thickness of conventional hot mix asphalt and provide the same service life. That means half the weight/volume of the material that needs to be transported and half the amount of aggregate that needs to be mined. When combined, we believe the reduction in GHG emissions from transportation trucks, application vehicles, and mining operations can be significant.

2) Asphalt Rubber lasts considerably longer than conventional asphalt, as long as 25-30 years in some cases. This means roadbeds need to be repaired or replaced far less frequently, also reducing the GHG emissions related to producing and placing the material by more than 50%.

3) Finally, tires not used for other purposes such as Asphalt Rubber can end up in tire piles such as the one in Tracy, CA in the late 1990s. That fire burned for two years before it was finally extinguished. While these fires are infrequent, the use of tires in paving diverts them from tire piles and reduces the quantity available to burn.

How to Achieve GHG Reduction – Implementation of Policy

The following three items are derived from the Memorandum issued by Caltrans on February 10, 2015 (copy attached). In that memo, Caltrans made Rubberized Hot Mix Asphalt the default hot mix paving product to be used on all Caltrans jobs.

- GHG Reduction Strategy #1

  Implement a policy making Asphalt Rubber Chip Seals the default chip seal product, and requiring a specific justification if a different chip seal product is to be used. This policy would be based on and nearly identical to the one implemented by Caltrans in the Asphalt Rubber Hot Mix (Caltrans uses the acronym RHMA) memo (See Appendix A, attached). Caltrans has established that using Asphalt Rubber Chip Seal provides the equivalent service life as a 2.4 inch conventional hot mix asphalt overlay (See Appendix B, attached). However, per lane mile paved, Asphalt Rubber Chip Seals use just 15 percent of total materials, by weight, as compared to a conventional hot mix asphalt overlay[1]. This results in a significant reduction in trucking and construction time, thus also significantly reducing GHG generated by any given project.

- GHG Reduction Strategy #2

  Requiring the use of an Asphalt-Rubber Interlayer, also commonly referred to in the Industry as Asphalt-Rubber Aggregate Membrane (ARAM) Interlayer and Stress Absorbing Membrane Interlayer -Rubberized (SAMI-R), will significantly extend the service life of pavements. The use of Asphalt Rubber Interlayers has been shown to significantly extend the service life of the pavement. If the resurface and replacement schedule were cut in half, that would result in a 50% reduction in heavy vehicle use associated with removing and replacing the roadbed. Asphalt-Rubber Interlayers have been used successfully by Caltrans for over 40 years. It is a proven product with known and quantifiable benefits. Asphalt-Rubber Interlayer consumes the equivalent of approximately 600 scrap tires per lane mile, equivalent to 6 million tires annually.

[1] An Asphalt Rubber Chip Seal incorporates approximately 16 tons of binder per lane mile (7,040 sy x 0.60 g/sy application rate) and approximately 124.0 tons of aggregate screenings (7,040 sy x 35 lbs. per square yard). The combination of these two components equals 140 tons per lane mile. Utilization of a conventional hot mix asphalt overlay placed at 2.4 inches (the equivalent thickness required for a conventional hot mix asphalt overlay to equal the same service life of an Asphalt Rubber Chip Seal) would equate to 912 tons.

- GHG Reduction Strategy #3
  By combining both Asphalt Rubber Hot Mix and Asphalt Rubber Interlayers into composite layering systems, in many cases, total reconstruction of a roadway can be avoided. Results from previous projects have shown Asphalt Rubber Composite Layering Systems provide equal service life to a complete reconstruction strategy. Not only is material and trucking reduced, but considerable dollars are saved and public inconvenience is reduced (traffic delays) as compared to total reconstruction.

When combining the total asphalt paving work done each year by state and local governments to the highways, streets and roads, there are tens of thousands of tons of hot mix asphalt being transported around the state along with equivalent amounts of material being removed offsite. A significant reduction in the tonnage transported and a similar reduction in the frequency of the work necessary to lay hot mix asphalt will result in significant, long-term GHG reductions from the substitution of Asphalt Rubber for conventional asphalt.

CONCLUSION

The WPMA is committed to being a good partner to the State of California. We produce a product that has significant cost and environmental benefits for the state, and those benefits include **GHG reductions from the substitution of Asphalt Rubber for conventional hot mix asphalt paving systems**. We stand by willing to lend our expertise and understanding to assist CARB in identifying and calculating GHG reductions and helping the state meet its overall GHG reduction targets.

WHO IS THE WPMA?

The Western Pavement Maintenance Association (WPMA) is comprised of companies involved in pavement preservation who produce and apply Asphalt-Rubber. The WPMA represents some of the largest Asphalt-Rubber and tire processing companies in California.

The WPMA's mission is to educate policy makers at all levels of government as to the numerous, significant advantages of using Asphalt-Rubber in highway and road paving projects. In addition to helping to educate policy makers, the WPMA acts as a resource to provide information and assistance in matters concerning waste tire processing, crumb-rubber production, and Asphalt-Rubber pavements.

APPENDIX A

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help Save Water!

To: DIRECTOR
CHIEF DEPUTY DIRECTOR
DEPUTY DIRECTORS
DISTRICT DIRECTORS
DIVISION CHIEFS

Date: February 10, 2015

File: Crumb Rubber Usage in HMA Pavements

From: KARLA SUTLIFF
Deputy Director
Project Delivery

STEVE TAKIGAWA
Deputy Director
Maintenance and Operations

Subject: **Crumb Rubber Usage in Hot Mix Asphalt (HMA) Pavements**

Public Resources Code §42703 requires Caltrans to use 11.58 pounds of crumb rubber modifier (CRM) per metric ton of total asphalt paving material placed for calendar year 2013 and beyond. The 11.58 pounds of CRM per metric ton equates to the requirement that Caltrans must use CRM in **35 percent** of the total hot mix asphalt (HMA) placed statewide.

The "2013 Crumb Rubber Report" notes that Caltrans did not meet the goal of 35 percent usage of the rubberized HMA (RHMA) when compared with HMA. Caltrans achieved a statewide total of 22.9 percent RHMA usage in 2013 (see Attachment "C").

To ensure that Caltrans increases RHMA usage to meet the legislative mandate, all HMA projects shall be screened for the appropriate application of RHMA. Updated interim guidance for RHMA usage is attached (see Attachment "A").

If a project qualifies for RHMA usage, and the district proposes **not** to use RHMA, the project will need an exception signed by the District Director (see Attachment "B"). This requirement for use of RHMA will be mandatory for projects with a ready-to-list milestone date after April 1, 2015.

We encourage each district director to monitor RHMA planned usage vs. actual tonnage placed throughout the calendar year. For questions regarding crumb rubber usage, contact Sri Balasubramanian at (916) 274-6194 or via email to <balasubramanian@dot.ca.gov>, or Chuck Suszko at (916) 798-6029 or via email to <chuck.suszko@dot.ca.gov>.

Attachment "A" – Interim Crumb Rubber Modifier Guidance
Attachment "B" – Crumb Rubber Usage Reporting
Attachment "C" – 2013 RHMA Usage by District

ATTACHMENT A – Interim Crumb Rubber Modifier Guidance

The Highway Design Manual (HDM) Chapter 630, "Flexible Pavement," is undergoing a significant update, to be published in Spring of 2015. Until the update is published, the following guidance shall be used:

RHMA is the default pavement surface course. It shall be specified **unless** any of the following criteria are present:

- When HMA project quantities are 1,000 tons or less, or stage-construction operations require less than 1,000 tons of HMA per stage. This is due to the increased costs associated with mobilizing an asphalt rubber blending plant. (Note: The 1,000-ton minimum **does not apply** in greater Los Angeles/Inland Empire areas due to existing HMA production plants that have full time RHMA blending capability on site.)
- When ambient temperatures at the time of RHMA placement will be below 45 degrees Fahrenheit. (Note: Capital and HM projects should be delivered during seasons of the year when ambient temperatures are conducive to placing RHMA within specified parameters for its use.)
- Where the roadway elevation is above 3,000 feet.
- When HMA is used as a concrete pavement asphalt base or bond-breaker.

If RHMA will not be used due to factors not noted above (availability, constructability, environmental factors, and/or cost), the decision must be documented.

The Maintenance Technical Advisory Guide (MTAG), Volume I, Flexible Pavement Preservation, Chapter 3, "Treatment Selection," will be revised to state:

> "When RHMA is an acceptable pavement strategy, RHMA-G must be used unless it is found to be inappropriate for use due to availability, constructability, environmental factors, and/or cost. See Highway Design Manual, Chapter 630, "Flexible Pavement," for inappropriate use of RHMA and documentation requirements."

Exceptions for not using RHMA on capital projects must be recommended by the Deputy District Director for Design. Exceptions for not using RHMA on maintenance projects must be recommended by the Deputy District Director for Maintenance. All exceptions, for both capital and maintenance projects, must be approved by the District Director. Approved exception documentation must be forwarded to the State Pavement Engineer.

Documentation for all flexible pavement projects not using RHMA must:

- Be based on this memo or on the guidance in the HDM for inappropriate use;
- Have exceptions approved by the District Director;
- Be provided in the project scoping document (Project Initiation Document [PID], or Project Report [PR]);
- Submitted to Pavement Program, Office of Planning and Programming, Attention Crumb Rubber Reporting; and,
- Included in the Ready To List (RTL) submittal.

Successful use of RHMA requires adequate ambient temperature and additional measures during placement, to ensure adequate compaction.

The following apply to projects where the placement of RHMA will need to occur when the ambient temperatures will be:

55°F or above - Section 39 of the standard specifications allows for placement of RHMA above ambient temperature of 55°F and requires the use of a Material Transfer Vehicle (MTV).

50°F to 54.9°F - Use special provision (39-3 for RHMA-G or 39-4 for RHMA-O or RHMA-O-HB) that includes, in addition to use of MTV by the Standard Specifications, the requirement to use warm mix additive technology

45°F to 49.9 °F - Request from the Pavement Program a non-standard special provision (NSSP) for RHMA. The NSSP for RHMA includes, in addition to the use of MTV required by the Standard Specifications, requirements for the use of:

1. Warm mix additive technology
2. End dumps that deposit the RHMA directly into the MTV
3. Intelligent Compaction (no limitation on minimum quantity of RHMA)

Less than 45°F – Suspend placement of RHMA until the required temperature is reached.

Where RHMA cannot be used, an appropriate Performance Graded-Modified (PG-M) asphalt binder must be considered as an alternative. PG-M may contain 10 percent minimum CRM which counts towards the Caltrans annual requirement of CRM usage .

During construction ensure RHMA usage as designed. Review the contractors' Critical Path Schedule (CPM) to determine if the planned time of year for RHMA placement will comply with the temperature requirements for RHMA. If the schedule on CPM shows RHMA placement will occur at temperatures lower than what is specified in the contract for RHMA, consider adding by change order the lower temperature requirements for RHMA (but no lower than 45°F) or suspending the work until temperatures are adequate. Change Orders to remove RHMA from contracts must have concurrence of the District Director and approval from HQ Construction.

Attachment "B" – Crumb Rubber Usage Reporting

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help Save Water!

To: PAVEMENT PROGRAM
Office of Office of Planning and Programming
Attention: Crumb Rubber Reporting
PROJECT FILE
READY TO LIST (RTL) SUBMITTAL

Date: Month Day, Year

File: (leave blank if not used)

From: {Insert Name}
Project Engineer

Subject: **Crumb Rubber Usage Reporting**

Contract Number	County/Route/Post Miles	Project ID Number
Project Description		Type of Project ☐ Highway Maintenance(HM) ☐ Capital Preventative Maintenance (CAPM) ☐ Rehabilitation ☐ New Construction
Bid Item Description:	Estimated Tons of HMA	

Rubberized Hot Mix Asphalt (RHMA) is not being used on this project because:

- RHMA is inappropriate for use on this project based on one of the following:
  - ☐ HMA project quantities are 1,000 tons or less or stage construction operations require less than 1,000 tons of HMA per stage.
  - ☐ Estimated ambient temperatures at the time of placement will be below 45°F (for night work).
  - ☐ Roadway elevation is above 3,000 feet.
  - ☐ HMA will be placed as a concrete pavement asphalt base or bondbreaker.
- ☐ Exception approved by the District Director on {insert date}.
  (See attached approved exception)

Submitted by:

_____
{Insert Name}
Project Engineer

_____
{Insert Name}
Deputy District Director Design or Deputy District Director Maintenance

APPENDIX B

design life. For flexible pavements over untreated bases, the minimum thickness of a HMA overlay with a ten-year design life should be half the thickness of the existing surface course layer but not to exceed 0.35 foot.

For flexible pavements over treated bases (as defined in the previous section on structural adequacy), a minimum HMA overlay of 0.35 foot should be used for a 20-year design life.

Exception: when the underlying material is a thick rigid layer (0.65 foot or more) such as an overlaid jointed plain concrete pavement that was not cracked and seated, a minimum thickness of 0.45 foot should be used.

(2) Adjust thickness if the pavement design life is different than 10 years. For a twenty-year design life, experience has shown that the thickness should be 125 percent of the ten-year thickness for reflective cracking retardation.

(3) Adjust overlay thickness for alternative materials.

A thickness equivalency of not more than 1:2 is given to the RHMA-G when compared to the HMA for reflective crack retardation. The equivalencies are tabulated in Table 635.1D.

If a SAMI-R is placed under a non-rubberized hot mix asphalt that is engineered for reflective crack retardation, the equivalence of a SAMI-R depends upon the type of base material under the existing pavement. When the base is a treated material, a SAMI-R placed under HMA or OGFC is considered to be equivalent to 0.10 foot of HMA. When the base is an untreated material SAMI-R is equivalent to 0.15 foot of HMA.

Table 635.1D
Reflective Crack Retardation Equivalencies
(Thickness in feet)

HMA (1)	RHMA-G	RHMA-G over SAMI-R
0.15	0.10	
0.20	0.10	
0.25	0.15	
0.30	0.15	
0.35	• 0.15 if crack width < 1/8 inch • 0.20 if crack width ≥ 1/8 inch or underlying material CTB, LCB, or rigid pavement	• N/A for crack width < 1/8 inch • 0.10 if crack width ≥ 1/8 inch and underlying material untreated • 0.15 if crack width ≥ 1/8 inch and underlying material CTB, LCB, or rigid pavement
0.45	0.15 over 0.15 HMA	0.20

NOTE:

(1) See Index 635.1(5)(b) for minimum and maximum HMA thicknesses recommended by the Department for reflective crack retardation on flexible pavements.

A Geosynthetic Pavement Interlay (GPI) placed under HMA that is engineered for reflective crack retardation provides the equivalent of 0.10 foot of HMA. This allows the engineer to decrease the new profile grade and also save on HMA materials.