CP² Center

California Pavement Preservation Center Newsletter

No. 76 **Dec 2025**

Organization of the PMPC

The Caltrans-Industry PMPC-Partnering at Its Best!

The Caltrans and Industry Pavement and Materials Partnering Committee (PMPC) serves as a vital collaborative forum between Caltrans and its industry partners. The PMPC was established in 2018 as a collaborative effort by the California Department of Transportation (Caltrans) with the construction industry (Industry) to review and propose improvements to Caltrans roadway construction specifications and test methods for aggregate, asphalt, and concrete materials.

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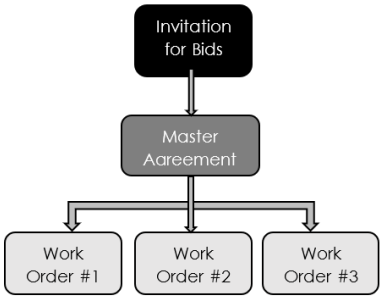

Components of JOC

Job Order Contracting for Caltrans Projects

Senate Bill 146, approved by the Governor on July 10, 2023, authorizes Caltrans to use Job Order Contracting (JOC) through Dec. 31, 2033. Caltrans Highway Maintenance (HM) projects were identified as suitable candidates for JOC implementation. JOC is a project delivery method used for numerous non-complex, repetitive tasks with a narrow scope. It is a construction contract delivered under a master agreement, not a purchase order or service contract. By using JOC for these tasks, Caltrans can address highway and bridge maintenance needs more quickly and efficiently.

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RAP Use in Micro-surfacing

In an effort to expand the use of Reclaimed Asphalt Pavement (RAP) millings beyond their current use in Hot Mix Asphalt (HMA), Caltrans' District 11 (San Diego) initiated a pilot project on SR 78 near Ocotillo Wells using 100% RAP aggregate in micro-surfacing.

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The Caltrans Site Investigation Guide

Caltrans developed the Site Investigation Guide in 2022. This guide provides Caltrans designers with clear reference guidelines and procedures for evaluating site and pavement conditions. The guide focuses on various methods and tests for collecting pavement data essential for site condition assessment, pavement evaluation, and Mechanistic-Empirical (ME) pavement design using CalBack and CalME software for flexible pavements. It also addresses the data requirements for Pavement ME and the Caltrans Rigid Pavement Design Catalog used for rigid pavements.

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WRAPP Update

The Western Regional Association for Pavement Preservation (WRAPP) is currently hard at work putting the final touches on the agenda for our Annual Pavement Preservation Workshop to be held February 4th -6th, 2026, at the Table Mountain Hotel in Friant, CA.

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Regional Transportation Funding Townhall at Chico State

Led by Assemblymember Lori Wilson, community members, transportation professionals, and public officials gathered at California State University, Chico for a regional Townhall focused on the future of the state's transportation funding system. The regional townhall at Chico State highlights leaders' vision for California's future transportation funding.

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Rubberized Hot Mix Asphalt Dense-Graded (RHMA-D)

The Levee Road pilot project consists of a 1.7-mile pavement rehabilitation/ reconstruction project on a two-lane low-volume road at the University of California, Davis. The UCPRC is developing a report that will compile a comprehensive evaluation of the pilot project's construction, QC/QA activities, and the testing of both the control and RHMA-D mixes. The performance of the pilot will continue to be monitored over the coming years

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RAR 2025 Conference in Lisbon

The 25th Anniversary Asphalt Rubber/Rubberized Asphalt Conference (RAR 2025) took place October 14–16, 2025, in Lisbon, Portugal. Over three days and ten technical sessions, it offered keynote lectures, technical presentations, panel discussions, and networking opportunities, covering the evolution of asphalt rubber, new material innovations, and global implementation case studies.

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NICC 2025 Applauded Across the Board

The 23rd Annual Nevada Infrastructure Concrete Conference (NICC) gathered over 200 industry professionals and engineering students on November 4 at the Atlantis Casino Resort in Reno for a full day of insights from NDOT leaders, informative presentations, and engaging panel discussions.

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CCPIC Update

The City and County Pavement Improvement Center (CCPIC) continues to invite cities and counties to host in-person technical presentations on topics such as distress-based pavement management, asphalt compaction and layer bonding, the effects of RAP on local mixes, and AB 2953. Presentations are delivered by Executive Director John Harvey, P.E., PhD, with support from Erik Updyke, P.E., and UC Pavement Research Center staff.

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Ashland, OR: Special Tax Funds Streets

The city of Ashland, Oregon, population 21,000, is just over California's northern border. It's a tourist destination known for its Shakespeare Festival and other live theater events. Recognizing the impacts of the tourist influx on their city, they've come up with an innovative way to create funding for their street maintenance program in the form of a Food & Beverage (F&B) Tax.

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Training Manuals Available

A big achievement of the California Pavement Preservation (CP2) Center has been the development and delivery of the Pavement Preservation Academy (PPA), sponsored by California's SB-1 'fuel tax' funding for workforce training. The online offerings of this comprehensive training have attracted people from Caltrans, Public (State, Cities & Counties) and from Industry.

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UPCOMING EVENTS

WRAPP Workshop 2026	February 4-6, 2026	Friant, CA
CalAPA Spring Conference & Expo	March 10-11, 2026	Pomona

Berkeley Tech Transfer / CCPIC Pavement Classes

CCPIC Pavement Classes	Various Dates

CalAPA Classes

"Asphalt Pavement 101"	Various Dates & Locations

Newsletter of the California Pavement Preservation Center
No. 76 Dec 2025

Disclaimer: Caltrans does not endorse any industry products or services, and the contents of newsletter articles reflect the views of the authors and do not necessarily reflect the official views or policies of Caltrans, the CP2 Center, or the State of California.

Caltrans established the California Pavement Preservation (CP² Center) at CSU, Chico in July 2006, and fully funded the Center in January 2007. Dr. DingXin Cheng is the current Director of the Center. Mr. Rukesh Maharjan is the current Contract Manager of Caltrans.

The purpose of the Center is to provide pavement preservation support services to Caltrans and other public agencies, and to industry. Unique services include developing educational programs in pavement preservation, providing training and staff development opportunities, providing needed technical assistance to public agencies and industry, and managing/conducting research and outreach services, such as this newsletter.

CP² Center News is published quarterly by the CP² Center, Langdon Hall Suite 203, California State University, Chico, Chico, CA 95929-0603, Subscribe/unsubscribe our newsletter by using this link: https://ecc-ce.csuchico.edu/cp2cMailingList/.

The Caltrans-Industry PMPC – Partnering at Its Best!

by Christina Pang, Caltrans Pavement Program

The Caltrans and Industry Pavement and Materials Partnering Committee (PMPC) provides an essential forum for Caltrans to engage with its Industry partners.

Background

The PMPC was established in 2018 as a collaborative effort by the California Department of Transportation (Caltrans) with the construction industry (Industry) to review and propose improvements to Caltrans roadway construction specifications, and test methods for aggregate, asphalt, and concrete materials.

The goal of the PMPC is to operate efficiently and deliver work products in a timely manner by. These work products typically involve improvements to construction contract standards, encompassing construction methods, specifications, and testing methods. During the development or modification of construction contract standards, it is important to engage Industry stakeholders, which may include material suppliers, contractors, and subject-matter experts, for input regarding the constructability of the modifications. Engaging with Industry also provides insights into emerging pavement technologies and materials.

The purpose of the PMPC is to improve construction contract standards by:

1. Providing opportunity for Industry to bring forward issues and/or opportunities for improvement regarding construction contract standards.
2. Allowing a venue to provide input on proposed changes to construction contract standards.
3. Exchanging information regarding new technology, materials, and upcoming initiatives.
4. Providing transparency, stewardship, efficiency, and sustainability.

Organization and Responsibilities

Members of the PMPC aim to work together as a cohesive, cooperative team to support and enhance Caltrans' construction standards. The PMPC Executive Committee recognizes the value in obtaining different perspectives at each level. Organization of the PMPC structure is as follows:

- PMPC committee is sponsored by the deputy directors of Project Delivery and of Maintenance and Operations, who provide general guidance and strategic direction.
- PMPC Steering Committee at the top of the structure consists of the Caltrans Division Chiefs for Maintenance, Construction, Engineering Services, and Research, Innovation and System Information.
- PMPC Executive Committee (EC) The next level of the PMPC is an Executive Committee, which consists of the four Caltrans Divisions and representatives of the two key materials associations. The Caltrans members include the State Pavement Engineer (Chair), State Material Engineer, State Bridge Engineer, and Deputy Division Chief, Division of Construction. The industry group associations represented on the EC are the California Asphalt Pavement Association (CalAPA) and the California Construction and Industrial Materials Association (CalCIMA).
- The two Task Groups (TG) include Asphalt Task Group and Concrete Task Group.
- Below each TG, there are Subtask Groups (STGs). These are co-chaired by Caltrans and Industry.
- Work Product groups are the staff designated to carry out the work outlined in an approved scoping document. These work groups are created under the STGs to work on the work products.

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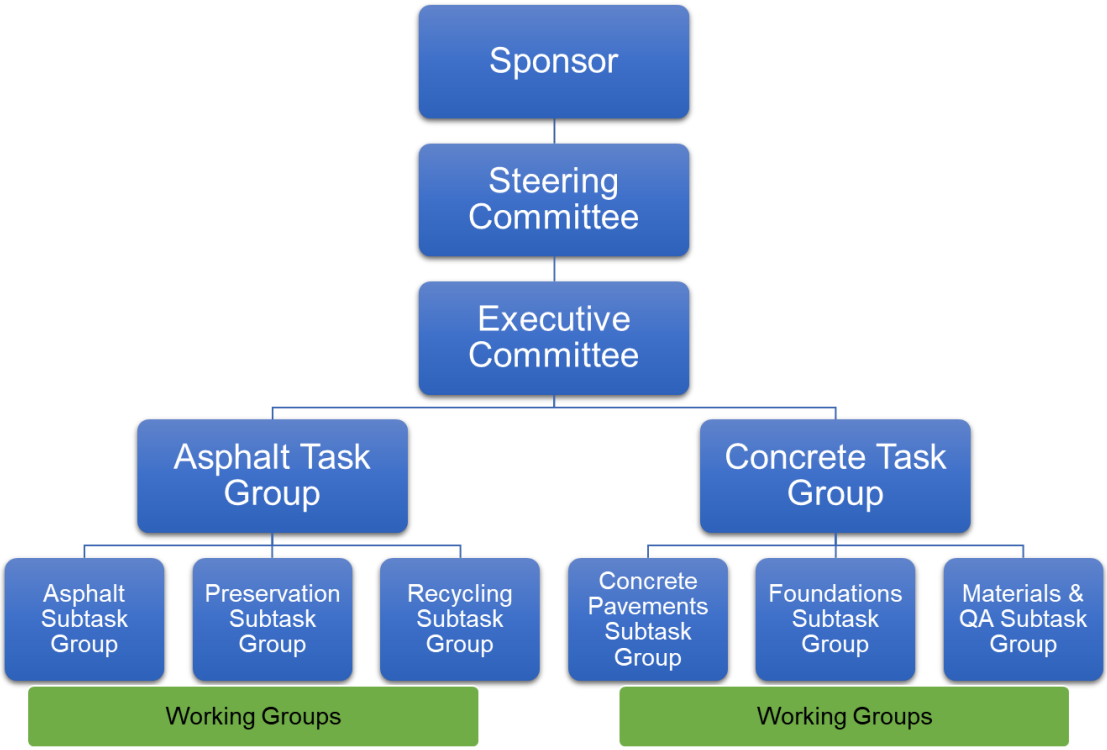

For more information regarding the organization of the PMPC and current members, please click on the following link: https://dot.ca.gov/programs/maintenance/pavement/pavement-materials-partnering-committee

PMPC Accomplishments from the Fiscal Year 24/25

Accomplishments include specifications, test method changes, work products, and Decision Documents (DD) that were completed from the previous fiscal year 24/25.

Asphalt Task Group

- nSSP's developed for the following pilot projects: RAP up to 40% in HMA, 10% RAP in RHMA, up to 3% RAS in HMA
- Section 37 updates for 2024 Standards
- Section 94 updates for 2024 Standards
- Post Plant Gradation Implemented in October 2024
- Selection of virgin binder for HMA up to 25% RAP
- Standard Specification Section 30-4 (Full Depth Recycling-Cement)
- Standard Specification Section 30-5 (Partial Depth Recycling)
- Standard Specification Section 30-6 (Cold Central Plant Recycling)

Concrete Task Group

- Blended Supplementary Cementitious Materials (SCMs) June 2024
- Tracking Concrete Mix Designs in DIME in September 2024
- DD: Remove requirement for aggregate qualification testing for virgin aggregates used in LCB
- Roadmap to Concrete Sustainability and Performance
- Specification Improvement of Concrete Pavements with Rapid Strength Concrete
- Performance Based ASR Mitigation

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Current PMPC Work Product Groups:

- Implementation of Balanced Mix Design
- 10% RAP in RHMA-G
- HMA Acceptance and Pay Criteria
- Standardizing CCPR Specifications
- Update FDR-FA Standard Specification
- PLC in Cold Recycling Working Group
- 100% RAP in Slurry Seals & Micro-surfacing
- 100% RAP in Chip Seals
- Section 37-6 Crack Treatments
- ASR Specifications and Testing Criteria for Authorization of SCMs
- Replacing R Value Testing with an alternate test method
- Use of Low Nuclear Density Gauge (LNDG) to Determine Compaction of Unbound Materials
- Concrete Pavement Specified by Fixed Value of Compressive Strength
- High RAP Working Group

For more information contact Christina Pang at: Christina.Pang@dot.ca.gov

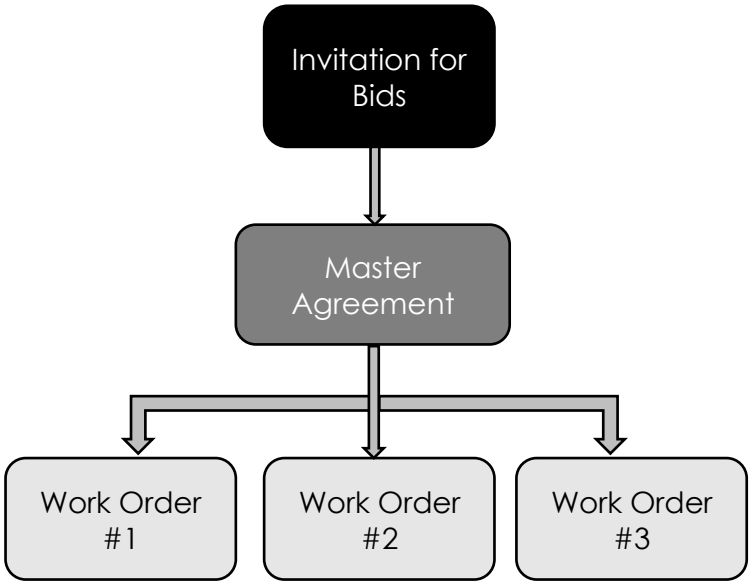
Job Order Contracting for Caltrans Projects

by Arshad Iqbal, Caltrans Division of Maintenance

Senate Bill (SB) 146, was approved by the Governor on July 10, 2023, authorizing Caltrans to use Job Order Contracting (JOC) as a project delivery method until Dec. 31, 2033. Caltrans Highway Maintenance (HM) projects were identified as suitable candidates for JOC implementation. JOC does not come with its own funds but would use funding from existing HM programs.

JOC is a project delivery method utilized to deliver projects comprised of numerous, non-complex, commonly encountered, and repetitive tasks whose scope is narrow. It is a construction contract through a Master Agreement (MA), not a purchase order or service contract. By adopting JOC for these specific tasks, Caltrans can effectively address highway maintenance roadway failures and bridge maintenance needs in a timely manner. In the world of Pavement Preservation, strategies that could qualify for JOC could include common treatments like slurry seals, micro-surfacing and chip seals.

The three main components of JOC are Invitation for Bid (IFB), Master Agreement (MA), and Work Order (WO) phases. By establishing a Master Agreement with prequalified contractors and pre-priced bid items, JOC eliminates the need to conduct a full procurement cycle for each individual project, reducing administrative time, advertising costs, and bid preparation expenses. This streamlined process allows work orders to be issued quickly, enabling faster mobilization and completion.



To implement SB 146, the Division of Maintenance piloted JOC on a handful of projects in HM-1 (Pavement), HM-3 (Bridges & Tunnels), and HM-4 (Safety) programs and has established procedures and guidelines for districts to use.

Caltrans has established external JOC HM webpage to provide current information on JOC documents and advertised projects. The external webpage can be accessed here:

https://dot.ca.gov/programs/maintenance/pavement/pavement-recycling-and-job-order-contracts/job-order-contracting

RAP Use in Micro-surfacing

By Hamed Baha and Ben Haney, Caltrans District 11

In an effort to expand the use of Reclaimed Asphalt Pavement (RAP) millings beyond their current use in Hot Mix Asphalt (HMA), Caltrans' District 11 (San Diego) initiated a pilot project on SR 78 near Ocotillo Wells using 100% RAP aggregate in micro-surfacing.

The Resident Engineer for the project is Daryoosh Shimi.

For more information contact Hamed Baha at Hamed.Baha@dot.ca.gov and Ben Hanley at Benjamin.Haney@dot.ca.gov

Caltrans has produced a brochure about this research effort - read on!

Brochure about This Research Project

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What is micro-surfacing?

Micro-surfacing is a thin, cold-mix asphalt treatment applied to existing roads to seal and protect them. It's an economical pavement preservation process that creates a new surface layer that fills small cracks and ruts.

Why do we use it?

Extends the life of existing pavement while improving safety through increasing skid resistance.

When is it used?

This technique is used for roads with low-to-moderate damage and allows for a quick return to traffic, typically within a few hours.

What are the components of micro-surfacing?

- Aggregates: 82-90%
- Asphaltic Emulsion: 5.5-10.5%
- Cement: 0-3%
- Additives: 0-3%
- Water: As needed

Micro-surfacing Construction

What is this project?

Producing micro-surfacing with 100% Recycled Asphalt Pavement (RAP) aggregate in lieu of 100% virgin aggregates.

Project Specifics:

EA: 11-2N2584

Location: State Route 78 - PM 80.0-95.3, San Diego County

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Pilot Project Specifics

4 locations have been selected within the 30 Lane Miles of standard micro-surfacing. Each location is 1,000 feet in length and spans the width of the lane and adjacent shoulder. Material testing will be performed during construction to ensure specification compliance. The roadway will be evaluated for 3 years after material placement via visual inspection to ensure the material is performing consistently with a standard micro-surfacing mix design.

Why use 100% RAP?

- Sustainable alternative: Recycled aggregate, derived from construction debris, offers a high-performing and sustainable alternative to virgin materials.
- Reduces waste: Using recycled aggregate helps reduce the amount of waste sent to landfills, which is a massive global problem.
- Conserves resources: It allows virgin sand and gravel to be reserved for the most critical applications, ensuring they are not depleted as quickly.
- Additional benefits: 100% RAP Micro-surfacing also allows for a reduction in asphaltic emulsion required in the mix design since the RAP already contains asphalt.
- 2025 Standard Specification Requirements: Asphaltic Emulsion: 5.5-10.5%.

The Caltrans Site Investigation Guide
A key to Effective Pavement Design (Maintenance, Rehabilitation/Reconstruction, and New Construction)

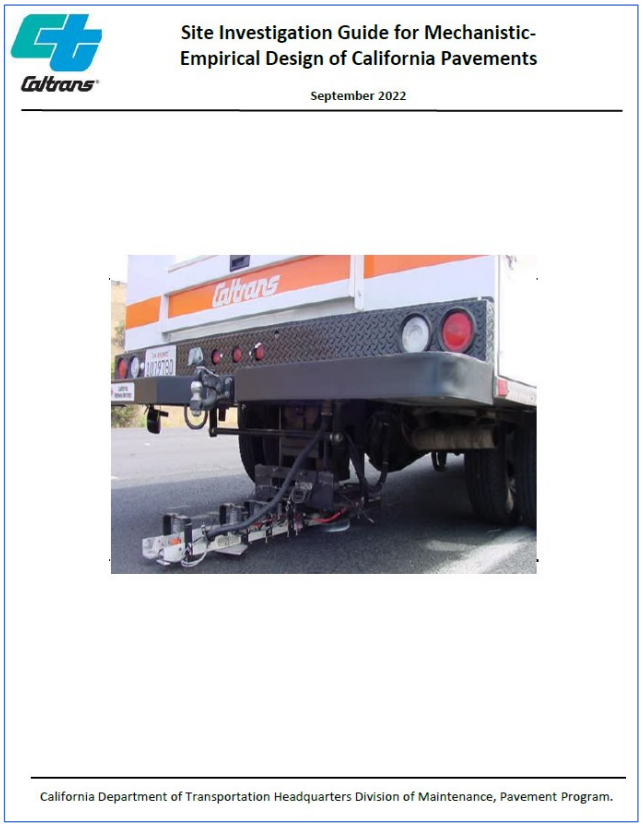
by Dr. Raghubar Shrestha, PE, Senior Pavement Design Engineer

A thorough pavement evaluation is essential for effective maintenance, rehabilitation, and new construction planning. Understanding existing pavement conditions, structural capacity, types and severity of distresses, and their underlying causes allows engineers to select the most cost-effective and sustainable pavement treatment strategies. Without accurate field data and proper evaluation, there is a high risk of applying inappropriate pavement strategies, which can lead to premature failures, increased life-cycle costs, wasted time, and resources, and a higher risk of Change Orders during construction.

By combining field investigations, structural testing, such as Falling Weight Deflectometer (FWD- Caltrans Test Method CT357-2023), material testing, and pavement structural analysis using CalME, engineers can effectively plan, prioritize, and design projects with greater certainty to develop a long-lasting, sustainable pavement network for Californians while ensuring the efficient use of taxpayer funds. There is no additional net cost associated with conducting site investigations. The cost of these field investigations is offset by the savings realized through more efficient pavement structural design. However, to ensure effective evaluation and testing, field investigations should be carefully planned in advance.

Site investigations are an integral part of the project development process, and the level of detail as well as the timing of their completion will vary depending on the type of activity. For maintenance projects, only limited site investigations are required to verify pavement structural and ride quality condition data, as well as distresses obtained from the Pavement Management System (PaveM). For major roadway rehabilitation projects, the initial desktop study and preliminary site investigation are conducted after the pavement sections requiring rehabilitation have been identified, typically during the Project Initiation Report (PIR) stage. A more detailed site investigation for existing pavement is usually performed after the PIR has been approved and the project has been programmed.

In response to the issues outlined above, Caltrans developed the Site Investigation Guide in 2022 (available at Caltrans Site Investigation Guide PDF). This guide provides Caltrans designers with clear reference guidelines and procedures for evaluating site and pavement conditions to support the selection of appropriate maintenance, rehabilitation, and new construction strategies. It serves as a key resource for project and materials engineers conducting site investigations, a critical first step in confirming recommended approaches for Capital Preventive Maintenance (CAPM) projects and in developing structural designs for rehabilitation, widening, reconstruction, or new pavement construction.



Site Investigation Guide

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The guide focuses on various methods and tests for collecting pavement data essential for site condition assessment, pavement evaluation, and Mechanistic-Empirical (ME) pavement design using CalBack and CalME software for flexible pavements. It also addresses the data requirements for Pavement ME and the Caltrans Rigid Pavement Design Catalog used for rigid pavements. In addition, the guide provides California-specific guidance, outlining site investigation procedures that supplement the current Highway Design Manual (HDM) and other available design references.

Takeaways

- The Caltrans Site Investigation Guide is a vital resource for engineers involved in planning, maintenance, rehabilitation, reconstruction, new construction, and improvement of California's roads.
- Cost Efficiency: Conducting site investigations does not add net cost. The expense is offset by savings from more efficient pavement evaluation and structural design.
- The Guide establishes standardized methods for collecting and analyzing pavement data, enabling data-driven decisions, efficient project planning, and sustainable pavement management.
- Accurate site investigations guided by this resource lead to durable, efficient, and long-lasting pavements that benefit the public and ensure responsible use of taxpayer funds.

For more information contact Raghubar Shrestha at: Raghubar.Shrestha@dot.ca.gov or (916) 639-5899

WRAPP Update

by Matt Conarroe, Idaho Asphalt Supply, for WRAPP

The Western Regional Association for Pavement Preservation (WRAPP) is currently hard at work putting the final touches on the agenda for our Annual Pavement Preservation Workshop to be held February 4th -6th, 2026, at the Table Mountain Hotel in Friant, CA. The 2-day event will include educational presentations on the following topics:

- Pavement Preservation Overview
- Preparation for Surface Treatments
- California Transportation Funding
- Considerations When Advertising a Project
- Calibration of Equipment
- Research & MTAG Updates
- Chip Seals & Scrub Seals
- Slurry Seals and Micro-surfacing
- Fog Seals and Rejuvenating Emulsions
- Emulsions - Differences/Benefits/High Modifications
- Multilayer Applications
- Caltrans Perspectives
- Agency Perspectives

The Workshop will also include:

- Industry/Agency Roundtable Discussions
- Vendor Exhibits
- Equipment showcase.

Registration is now open and available at https://www.wrapp.org/

WRAPP/Caltrans Joint Training held a hybrid training session on November 3rd, 2025. Over 150 attendees from Caltrans, local agencies, and contractors were in attendance for this ½ day session. Presentations included Mauricio Serrano, Division of Maintenance Chief, gave a welcome address and Sri Holikatti of Caltrans gave a presentation on Multi-Layer Preservation Pilot Project on Inyo US 395, comparing various chip seals treatments. Ted Maxwell (Maxwell Products) covered Pavement Preparation Prior to Surface Treatments followed by Matthew Conarroe (Idaho Asphalt Supply) presenting on Slurry Seal and Micro Surfacing. Matthew Ferguson (VSS) finished off trainings with a presentation on Multi-layered Applications including Asphalt Rubber Capeseals. The past joint trainings have been highly successful in spreading the word about Pavement Preservation applications and this one was no exception, with a highly engaged question and answer period that lasted over 30 minutes. WRAPP would like to once again thank Caltrans for this continued opportunity to educate and engage with their engineers and staff.

The WRAPP Board also met with newly appointed Director of Caltrans, Dina El-Tawansy, and her staff to give updates on the continued educational partnership and state of the Pavement Preservation Industry in California. Items discussed included: The 2026 WRAPP Workshop, joint WRAPP/Caltrans trainings, maximizing Caltrans' budget by utilizing Pavement Preservation strategies, the PMMPC Asphalt Task Group preservation 'bin list' and working group updates, and discussions on the new Job Order Contracting (JOC) program. WRAPP will continue to provide support and assistance to Caltrans through continued trainings in 2026, revisions and updates with specifications via PMPC, and providing feedback on the new JOC process and projects.

For more information on WRAPP go to https://www.wrapp.org/

Regional Transportation Funding Townhall at Chico State

by DingXin Cheng, Director, CP2 Center

Community members, transportation professionals, and public officials from Butte, Glenn, Tehama, and Plumas Counties gathered at California State University, Chico for a regional Townhall focused on the future of the state's transportation funding system. The event - part of a statewide series - took place in the Behavioral & Social Sciences Building on December 11, 2025, at the California State University, Chico, and brought together key decision-makers to discuss the challenges posed by declining fuel tax revenues and the need for long-term funding solutions. The regional townhall at Chico State highlights leaders' vision for the future of California transportation funding.

The Town Hall was led by **Assemblymember Lori D. Wilson**, Chair of the Assembly Transportation Committee, who welcomed attendees and outlined the purpose of the statewide listening tour: to engage Californians in shaping a fair, sustainable, and accountable transportation funding system. Wilson emphasized the urgency of addressing the state's looming revenue shortfall and the importance of gathering public feedback before major policy decisions are made.

A panel of experts provided an overview of the state's funding system, current financial trends, and potential solutions:

- **Keith Duncan**, Division Chief of Budgets, California Department of Transportation (Caltrans), presented an overview of how California's existing transportation funding model functions, including its reliance on fuel taxes.
- **Sergio Aceves**, District Director, Caltrans District 3, offered a regional perspective, highlighting recent achievements on infrastructure across District 3.
- **Justin Behrens**, Deputy Director of Legislation and Finance, California Transportation Commission, discussed the statewide needs assessment and described how declining gas tax revenues threaten long-term funding stability.
- **Frank Jimenez**, Principal Fiscal & Policy Analyst, Legislative Analyst's Office, examined potential funding mechanisms and policy options under consideration.

Invited Panel Members Gave Speeches at the Townhall Meeting

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Lori D. Wilson and DingXin Cheng at the Meeting

These presentations reinforced a broader understanding of California's transportation funding challenges. For decades, the state's fuel tax—currently 61.2 cents per gallon—has served as a "user-pay" model that directly links road use to revenue. Since 2017, SB 1 has provided much-needed support for maintaining and rehabilitating California's roads and bridges, helping to stabilize investment in critical infrastructure. However, as more fuel-efficient and zero-emission vehicles enter the roadways, fewer drivers are contributing proportionally to the system. This shift has accelerated inequities in who pays for transportation upkeep and has weakened the sustainability of the current revenue structure. Studies now project significant shortfalls over the next decade, with the California Transportation Commission estimating a decline of approximately $31 billion by 2035. To meet the state's long-term infrastructure needs, California must begin developing new, resilient funding approaches.

Transportation Chair, Wilson, closed the session by outlining the upcoming phases of statewide informational hearings and encouraging continued public involvement. These Townhalls, she noted, are essential to crafting solutions that reflect California's evolving transportation needs and values.

The meeting concluded with a Q&A session and public comment period, reinforcing the collaborative nature of the statewide effort. Community members were invited to provide input to help guide future decisions.

For those unable to attend in person, the full program is available to watch via livestream:

https://www.youtube.com/live/8UVTj5dyig4?si=dVlnZCCoiSSA3Nvi

Rubberized Hot Mix Asphalt Dense-Graded (RHMA-D)

by Angel Mateos, John Harvey, Jeff Buscheck, and Stephanus JH Louw, University of California Pavement Research Center (UCPRC)

What is RHMA-D?

RHMA-D is a dense-graded asphalt mix similar to conventional HMA (such as Caltrans Type A HMA), but it incorporates finely ground Recycled Tire Rubber (RTR). Both RHMA-D and HMA have a continuous aggregate gradation close to the maximum density line and comparable total asphalt binder contents. From a fabrication standpoint, the primary difference between RHMA-D and HMA is the inclusion of RTR.

What is Recycled Tire Rubber (RTR)?

The first step in producing RTR is the removal of steel and textile fibers from the used tires. The rubber is then ground in consecutive steps to produce Crumb Rubber Modifier (CRM) with a maximum particle size of about 0.09 in. (passing #8 sieve, < 2.4 mm) and particles from that size down to approximately 0.01 in. (0.25 mm) (Figure 1).

CRM can be treated with asphalt binder at a very high temperature, on the order of 600°F (315°C), in an industrial facility. The elevated temperature breaks the sulfur bonds of vulcanization, reducing the rubber into micrometric size particles that can be uniformly dispersed in the asphalt binder. The final product is known as Terminal Blend (TB) binder, which is a type of polymer-modified binder.

The CRM can also be treated with asphalt binder or other oils in an industrial facility and then coated with powder to prevent the treated particles from clumping together. The final product is known as Engineered CRM (ECRM). The two types of CRM described above that are used in RHMA-D have smaller particle sizes than the CRM used in gap-graded RHMA (RHMA-G, or ARHM-GG) specified by Caltrans and the Greenbook. This allows it to be used in dense-graded RHMA-D.

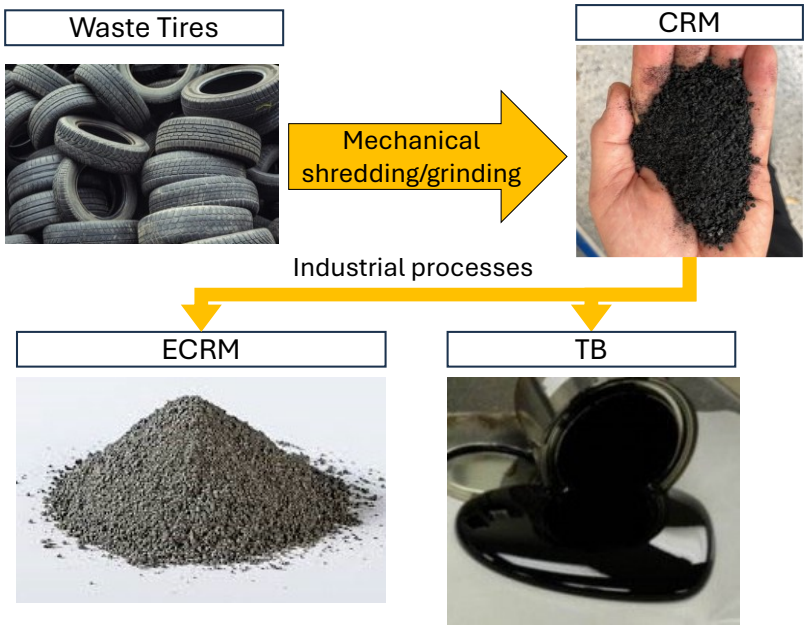

Figure 1. Recycled Tire Rubber

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RHMA-D Fabrication Technologies

To date, three main technologies have been employed to produce RHMA-D:

- Terminal blend: TB asphalt binder is used in asphalt mixing just like any polymer-modified binder. The Greenbook's "Tire Rubber Modified Asphalt Concrete" (TRMAC) is an example of this specific type of RHMA-D.
- Advanced wet: Fine CRM particles (passing #40 sieve, <0.4 mm) are blended with asphalt binder at the plant and then used for mix fabrication. This process is referred to as the "advanced wet" because the fine CRM uses a lower mixing temperature, shorter interaction time, and no extender oil, unlike the conventional wet process used to produce asphalt rubber binder in California.
- Engineered CRM: The ECRM is treated like Reclaimed Asphalt Pavement (RAP) and added directly to the asphalt plant mixing unit, which is a type of "dry process."

Levee Road RHMA-D Pilot Project

Project Description

The Levee Road pilot project consists of a 1.7-mile pavement rehabilitation/reconstruction project on a two-lane low-volume road at the University of California Davis (Figure 2). Two sections (1.2 and 0.5 miles) of existing badly cracked asphalt pavement were rehabilitated/reconstructed using Full-depth Recycling with Cement (FDR-C) and an overlay of 2.4 in. (61 mm) (Figure 3). The east-bound direction was surfaced with a control HMA and the west-bound direction with four different RHMA-D mixes: two with TB binders, one with the advanced wet process, and one with the dry process.

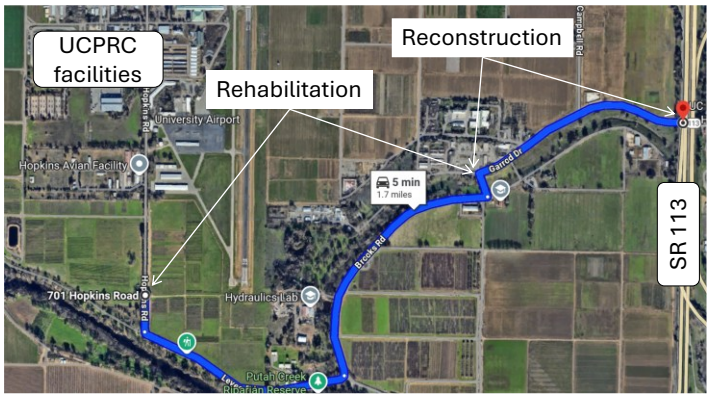

Figure 2. Levee Road Pilot Project Layout

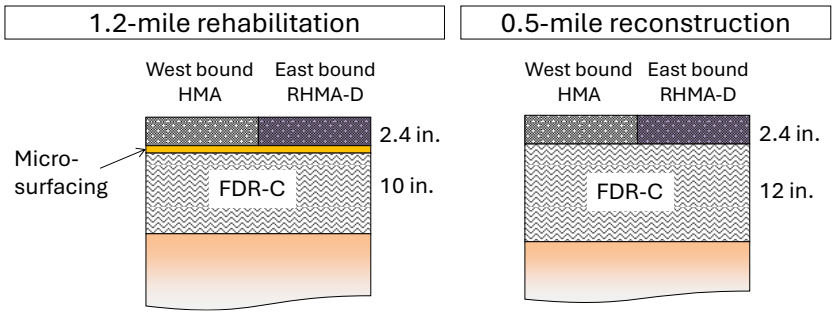

Figure 3. Levee Road Pilot Project Sections

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RHMA-D Mix Design

The control HMA has a 3/4 in. (19 mm) nominal maximum aggregate size, 25% RAP content by aggregate replacement, and 4.7% binder content (PG58-22) by total mass of mix (TMM) and meets Caltrans Section 39 Type A HMA specification. This control HMA was adapted to introduce the RTR for each of the four RHMA-D mixes.

The process of modifying an existing HMA design to incorporate RTR - thereby producing an RHMA - D-varies depending on the technology used to introduce the RTR.

For TB, the process to incorporate RTR can be as simple as substituting the plain binder by a TB binder meeting the same or better PG. In the Levee Road pilot, a Balanced Mix Design (BMD) approach was followed by increasing the binder content to 5.2% (TMM) while verifying the rutting resistance using the Hamburg Wheel Tracking (HWT) test. The two TB binders used in this project had 14.5% and 30% RTR as percent of binder, respectively.

A BMD approach was also used for the mixes using the advanced wet and the ECRM (dry) technologies. In both cases, the aggregate gradation was slightly modified to create more voids in the mineral aggregate (VMA) to introduce the rubber particles while still meeting Caltrans Type A HMA 3/4 in. gradation requirements. The binder content was increased to reach 6.25% ARNMA by TMM, where ARNMA refers collectively to asphalt (A), rubber (R), and Non-Mineral Admixtures (NMA), such as the oil used in ECRM production. The mixture's rutting resistance was evaluated using the HWT test.

Figure 4 shows the ARNMA composition of the control and RHMA-D mixes used in the Levee Road pilot. As a reference, the figure shows also the ARNMA composition of an RHMA-G meeting Caltrans Section 39 specifications. In the RMHA-G case, the extender oil is regarded as a non-mineral admixture.

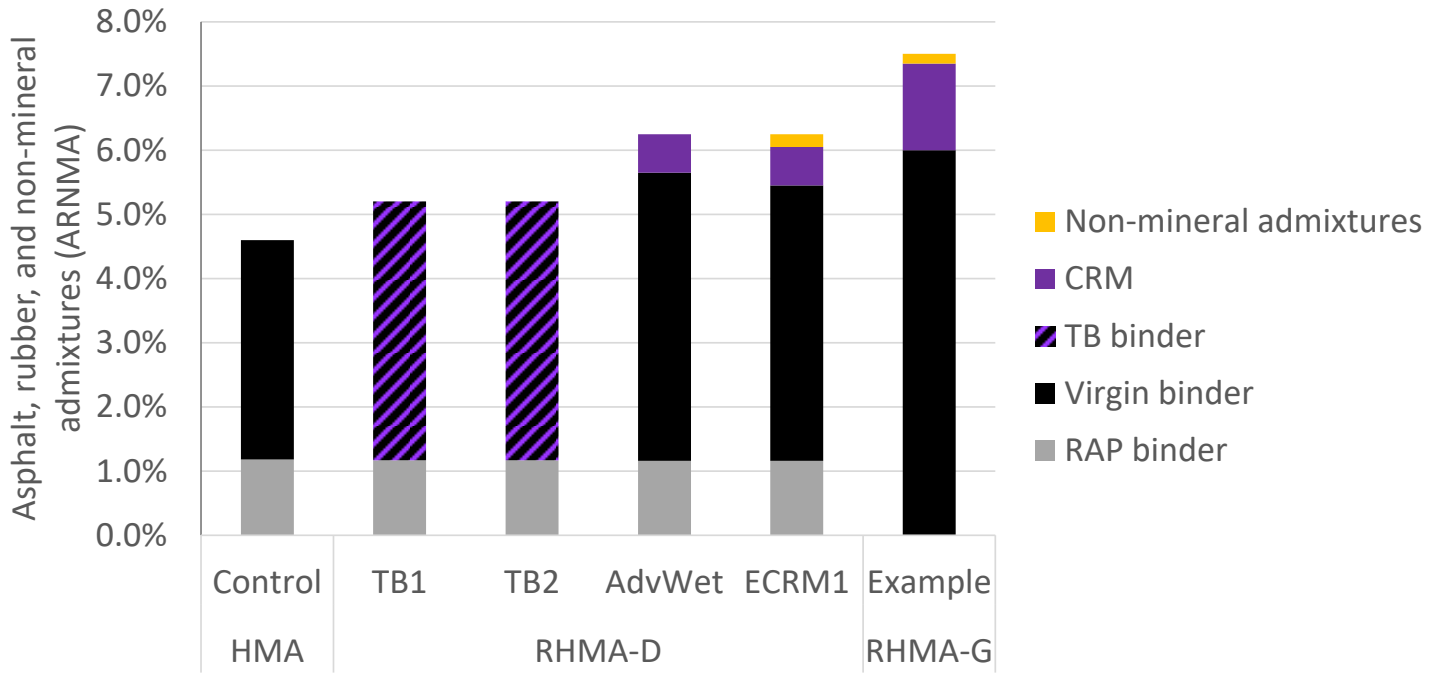

Figure 4. ARNMA Comparison of Levee Road Pilot Project Mixes

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Figure 5 shows the CT_{Index} measured for each of the mixes following the IDEAL Cracking Tolerance (IDEAL-CT, ASTM D8225-19) test. As shown in Figure 5, all RHMA-D mixes met or improved the CT_{Index} of the control mix and, supposedly, its age-related cracking resistance.

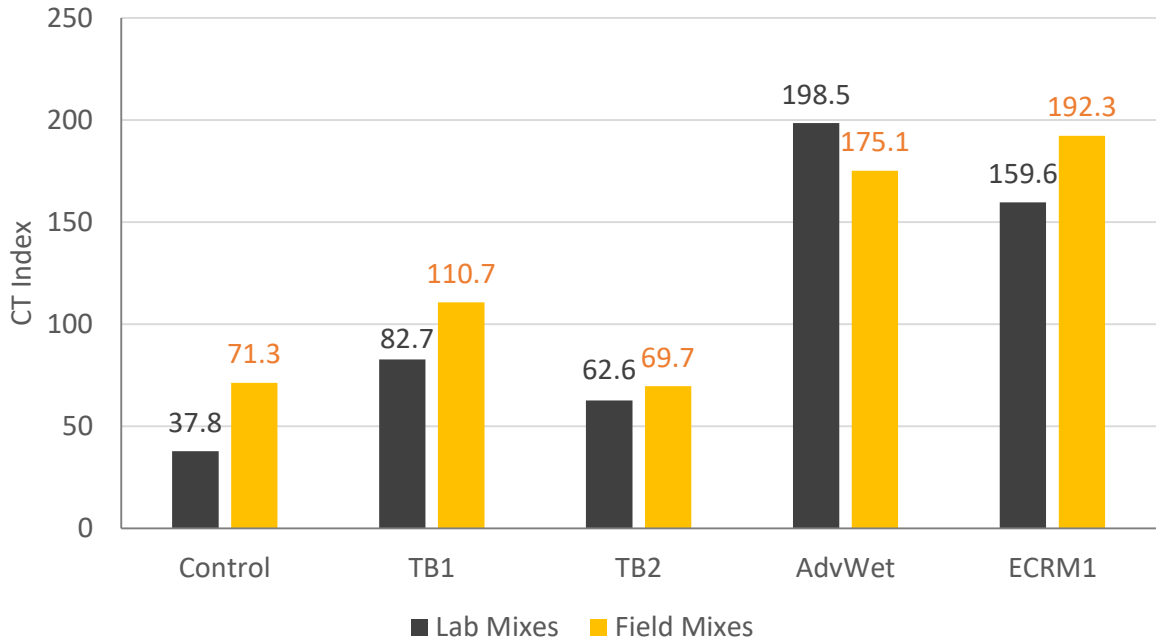

Figure 5. CT_{index} of Levee Road Pilot Project Mixes

Lessons Learned from Construction QC/QA

The pilot construction took place in May 2025 for the 1.2-mi rehabilitation sections and in June 2025 for the 0.5-mi reconstruction sections. The TB binders were delivered to the plant in tanker trailers, the ECRM was pre-blended with the RAP, and the CRM used in the advanced wet process was combined with the plain binder in the asphalt rubber binder interaction tank typically used for producing RHMA-G. Caltrans are evaluating the research data as they are being shared with Caltrans.

The main lessons learned from the construction and the QC/QA testing are summarized below:

- The constructability of the RHMA-D mixes was comparable to that of the control HMA mix, with no significant issues encountered during fabrication, transport, placement, or compaction.
- Cores extracted after compaction showed that the RHMA-D mixes had similar relative density (i.e., air voids) to the control mix.
- Laboratory testing of samples collected during construction indicates that the plant-produced mixes perform similarly to the laboratory mixes fabricated during the mix design phase.
- The feedback from the paving crew was very positive:
  - "Much easier to work with than RHMA-G"
  - "Same or easier to compact than HMA"
  - "Far less smoke and smell" than RHMA-G
  - "A day working with RHMA leaves your mouth and sinus tasting like rubber when you get home, and your skin and clothing strongly smelling of rubber; this has none of those effects or very slight"

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What is Next?

The UCPRC is currently developing a research report that will compile a comprehensive evaluation of the pilot project's construction, QC/QA activities, and the testing of both the control and RHMA-D mixes, with publication expected around mid-2026. Additionally, the performance of the pilot will continue to be monitored over the coming years (the road can also be visited by the public).

The UCPRC and its partners are seeking a local agency to pilot one or more RHMA-D mixes in a one or two-lift section. RHMA-D is expected to provide good performance in thicker layers (two lifts). This second pilot will apply the lessons learned from the Levee Road pilot and further expand the field application of RHMA-D mixes.

Acknowledgements

The Levee Road pilot construction and research is funded and supported by CalRecycle, Caltrans, UC Davis, and the private sector, including Teichert Materials and four RTR suppliers: Wright Asphalt Products Co., which provided the TRMAC™ TB binder; US Polyco, which supplied the SigmaBond TB binder; Crumb Rubber Manufacturers®, which provided the CRM used in the advanced wet process; and Neotech Asphalt, which supplied the engineered CRM RARx.

For more information about this project contact Angel Mateos at: angel-mateos@berkeley.edu

RAR 2025 Conference in Lisbon

by DingXin Cheng, Director, CP2 Center

The 25th Anniversary Asphalt Rubber/Rubberized Asphalt Conference (RAR 2025) was held on October 14–16, 2025, at the National Laboratory of Civil Engineering (LNEC) in Lisbon, Portugal. This milestone event marked a quarter century of international collaboration, research advancements, and innovative applications in asphalt rubber and rubberized asphalt technologies. California continues to be a leader in the use of asphalt rubber binders that utilize ground tire rubber, and it's now mandated by Caltrans.

With more than 140 attendees representing academia, industry, and government agencies worldwide, the conference reaffirmed its position as the premier global forum for rubberized asphalt research and practice.

Across three days and ten technical sessions, RAR 2025 featured a rich program of keynote lectures, technical presentations, panel discussions, and networking opportunities. Topics ranged from the history and evolution of asphalt rubber to cutting-edge material innovations, to large-scale implementation case studies from around the world. The conference underscored the critical role of rubberized asphalt in climate resilience, circular economy strategies, and long-term roadway performance. The diversity of presentations reflected the global relevance of rubberized asphalt, with research contributions from Europe, North America, South America, the Middle East, and Asia. Case studies covered a spectrum of topics such as warm-mix technologies, high RAP mixtures, advanced rheological characterization, waterproofing membranes, photogrammetry for surface evaluation, and long-term field performance assessments.

Dr. Zhanping You, Dr. Ding Cheng, and Dr. Jorge Sousa at RAR 2025

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Dr. Ding Cheng had the privilege of presenting California Pavement Preservation Center (CP2C) research titled "Utilizing Turf Rubber Infill in HMA", a study sponsored by the State of California's 'CalRecycle' Department. Dr. Ding Cheng's presentation explored a timely and environmentally significant opportunity: recycling Turf Rubber Infill (TRI) materials from synthetic athletic fields into asphalt pavement applications. The research investigated both dry and wet methods of incorporating TRI into hot mix asphalt, evaluating performance through mix design and performance testing, for example, Hamburg Wheel Tracking test (HWT), the IDEAL-CT cracking and IDEAL-RT tests. The major findings of the study include the following:

- Dry-process TRI mixtures generally exhibited lower rutting resistance than conventional HMA, though the mixture containing 3% Turf AB met Caltrans rutting criteria.
- Wet-process TRI-modified binder demonstrated significant high-temperature performance improvements, with the modified binder maintaining stiffness up to 94°C.
- Cracking resistance of the wet-process TRI mixtures was exceptional: the TRI-modified mixture achieved a CT_{Index} over 650, more than eight times the recommended minimum threshold.
- TRI asphalt mixtures show strong potential for thin overlay applications, where cracking resistance and fatigue performance are critical.

The study highlights a promising new recycling pathway for TRI materials, aligning with broader sustainability and waste reduction goals.

Ding Cheng and George Way at RAR 2025

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RAR 2025 marked the ninth international RAR conference, continuing a legacy that began decades ago with the pioneering work of leaders like Dr. Jorge Sousa and George Way, formerly of the Arizona DOT. Over the years, this conference series has helped shape global approaches to asphalt rubber - facilitating the exchange of research, field experiences, and best practices that have improved pavements worldwide.

This year's event showcased not only how far the field has come, but also where it is heading. Presentations emphasized:

- New generations of reacted and activated rubber (RAR) technologies
- Synergies between rubber and bio-based modifiers, aerogels, and PET-derived polymers
- Greater integration of AI, data analytics, and automated testing in pavement engineering
- A continued global push toward more durable, resilient, and low-carbon roadway systems

RAR 2025 was an inspiring and energizing event, celebrating 25 years of innovation while laying the groundwork for the next generation of sustainable pavement technologies. The conference demonstrated the ongoing global relevance of asphalt rubber and the vital role it plays in resource conservation, performance enhancement, and the circular economy. A major highlight for the pavement community is that all RAR conference papers are now available free of charge through the Rubberized Asphalt Foundation at: https://ra-foundation.org/. This open-access commitment ensures that the knowledge shared at RAR 2025 reaches engineers, researchers, students, and agencies around the world, supporting continued advancement in rubberized asphalt technologies. For more information, please contact Mr. Geroge Way at GWay516855@aol.com and Dr. Jorge Sousa at jorge.b.sousa@gmail.com.

NICC 2025 Applauded Across the Board

by Mark Gudenas, SWCPA

The 23rd Annual Nevada Infrastructure Concrete Conference (NICC) brought together more than 200 industry professionals and Engineering students on Tuesday, November 4th at the Atlantis Casino Resort in Reno for a full day of insights from Nevada Department of Transportation (NDOT) leaders, illuminating presentations, and engaging panel discussions.

NICC 2025 featured Tracy Larkin Thomason, Director of NDOT, who delivered the opening address, and presentations by WJE's Tom Van Dam, NCE's Sarah Lopez, and Fonte & Co.'s Matt Fonte, who then engaged the audience in a panel discussion on Innovations in Concrete Pavement Durability.

Tom Van Dam of WJE (Left), NDOT Director Tracy Larkin Thomason, and Steven Larkin from Wood Rogers (Right)

NDOT Project Spotlights hosted Cass Sobek and James Dean from Kiewit, who presented the I-15/Tropicana Design-Build Interchange Project, and then Nanette Maxwell and Andrew Lawrence from NDOT, and Kenneth Semenko from Q&D Construction, who talked about the U.S. 395 North Valleys Project.

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Scott Hein, Assistant Director of Engineering at NDOT, presented the Inaugural NDOT Outstanding Team Award to the I-15/Tropicana Design-Build Interchange Project Team, including: Lynnette Russell, former NDOT Assistant Chief of Project Management; Dallan Affleck, NDOT Senior Project Manager; NDOT Bryan Snider, Resident Engineer; Ryan Wheeler, former NDOT Senior Project Manager; Chris Koenig, Kiewit Design-Build Contract Manager; Cass Sobek, Kiewit Project Manager; Ammon Heier, FHWA; Iyad Alattar, FHWA; Andrea Gutierrez, FHWA; Jack Sjostrom, CA Group; Jeremiah Johnston, Avenue Consultants; and Paul Brich, DCS Assistant Resident Engineer.

Following lunch, the University of Nevada, Reno Concrete Canoe Team once again showcased their student-designed-and-constructed, lightweight concrete canoe, highlighted by a video from Canoe Crew Project Manager Georgia Petroff.

California State University at Chico was represented at the NICC this year by Brianne Shorts, President of Women in Concrete, Chico State, who was sponsored by Brent Coulson and Euclid Chemical.

Opening the afternoon sessions, the informative and illuminating Funding of Nevada Highway Construction Panel was moderated by Chris Reilly, Nevada State Infrastructure Coordinator, and featured presentations by Sajid Sulahria, NDOT Deputy Director, Project Delivery & Engineering, David Swallow, Deputy Chief Executive Officer, RTC Southern Nevada, and Dale Keller, Director of Engineering & Deputy Executive Director, RTC Northern Nevada.

Nick Johnson, NDOT Chief of the Project Management Division, presented Alternate Delivery Methods Make Sense, reviewing the success of CMAR, Design-Build, CMGC, and Progressive Design-Build Projects.

Wrapping up the conference was What's a Good Specification by Tom Van Dam and Matt Fonte, followed by a spirited game entitled Spec or Not a Spec? that challenged the audience to identify real NDOT Concrete Pavement Specifications.

NICC 2025 hosted 22 Exhibitors and Sponsors, including CalPortland, CME, Crafco, Euclid Chemical, Jensen Infrastructure, K&K Construction Supply, NCE, Rattle Stick, UES, W.R. Meadows, Master Builders, Ecobeton-USA, Salt River Materials, CEMEX, Chryso Saint-Gobain, DHE Noble, Silver Strike Concrete, Orca Aggregates – Vulcan Materials, Nevada Cement Company, Ames Construction, WJE, and Chem Concrete USA.

For more information go to: www.swcpa.org

CCPIC Update

by Erik Updyke, P.E, CCPIC

The City and County Pavement Improvement Center (CCPIC) continues to invite interested cities and counties to host an in-person technical presentation. Presentation topics include managing pavements by distress, not PCI, the importance of asphalt compaction and bonding of layers, the effect of RAP on city and county asphalt mixes, and AB 2953. Presentations are delivered by John Harvey, P.E., PhD, Executive Director, assisted by Erik Updyke, P.E., Technical Engineer, and staff from the University of California Pavement Research Center. Presentations are offered for free. Host agencies are asked to make the arrangements and invite attendance from neighboring agencies.

Enrollment for both online and self-paced (taken at the convenience of the enrollee) courses in the Pavement Engineering and Management (PEM) and Pavement Construction Inspection (PCI) Certificate Programs continues to be strong. Six self-paced classes are currently available. Pavement preservation-related self-paced classes include CCI-04, Pavement Preservation Construction Inspection with instructor Lance Brown and CCI-06, Construction Inspection of Asphalt Rubber Pavement Materials with instructor Mike Robinson. Two additional self-paced classes, CCC-22, Cold Recycling of Asphalt Pavements and CCC-23, Unpaved Roads Engineering, Construction and Management, both with instructor David Jones, are expected to become available in early Spring 2026.

Enrollment is now open for live, on-line Spring 2026 classes including CCC-03, Pavement Construction Specifications and Quality Assurance, CCC-01, Asphalt Concrete Materials & Mix Design, and CCB-01, Pavement Life Cycle Cost Analysis: the Basics.

For a complete list of classes available for enrollment, go to:
https://registration.techtransfer.berkeley.edu/wconnect/.

Further information about both the self-paced and online classes and enrollment is available on the Berkeley Tech Transfer website, https://www.techtransfer.berkeley.edu/home.

Further information about the CCPIC and the PEM and PCI Certificate Programs is available on the CCPIC website, https://www.ucprc.ucdavis.edu/ccpic/.

If you have any questions or wish to schedule a presentation, please contact eupdyke@ucdavis.edu.

Ashland, OR: Special Tax Funds Streets

by Roger Smith, CP2 Center

The city of Ashland, Oregon, population 21,000, is just over California's northern border. It's a tourist destination known for its Shakespeare Festival and other live theater events. Recognizing the impact of the tourist influx on their city, they've come up with an innovative way to create funding for their street maintenance program in the form of a Food & Beverage (F&B) Tax.

Although the F&B Tax has been around in various forms since 1993, in 2016 voters adjusted the allocation of the funds to include the Street Fund – for projects that include a Pavement Management Program. Today 75% of the F&B Tax goes toward street projects. With the other 25% going towards City Parks.

The 5% tax on restaurant food & beverages produces roughly $3 million per year for the city.

(Based on information in Ashland's "Sneak Preview" magazine.)

Training Manuals Available

by Roger Smith, CP2 Center

A big achievement of the CP2 Center has been the development and delivery of the Pavement Preservation Academy (PPA), sponsored by California's SB-1 'fuel tax' funding for workforce training.

The online offerings of this comprehensive training have attracted people from Caltrans, Public (State, Cities & Counties) and from Industry. Instructors have been Roger Smith, Gary Hicks, Lerose Lane, Ding Cheng and Erik Updike.

The Academy involved 5 segments, spread over 5 days. The 5 segments are based on manuals that have been developed by the CP2 Center and are published on the MTI website. In addition to being used in the Academy, these manuals are always free to the public and downloadable using the following links:

- Asphalt Pavement Repair and Resurfacing Preparation: https://scholarworks.sjsu.edu/mti_publications/414/
- Chip seals: https://transweb.sjsu.edu/sites/default/files/1845A-Chip-Seal-Manual.pdf
- Slurry surfacing: https://transweb.sjsu.edu/sites/default/files/1845B-Cheng-Manual-Slurry-Surfacing.pdf
- Cape seals: https://transweb.sjsu.edu/sites/default/files/1845C-Cheng-Cape-Seal-Manual.pdf
- Thin asphalt overlays: https://transweb.sjsu.edu/sites/default/files/1906-RB-Cheng-Manual-Thin-Asphalt-Overlay.pdf

Future online sessions of the PPA are planned. Stay tuned for more information.

For more information regarding the CP2 Center go to: https://www.csuchico.edu/cp2c/

Here's a summary of pavement conferences, training opportunities and other events coming up…

"Asphalt Pavement 101" (Various Dates & Locations)

This popular CalAPA class is a good review of the basics of asphalt pavement including materials, design, construction and acceptance testing. It's an ideal class for new employees, or for updating experienced ones. In addition to frequent 'in person' training sessions, it can also be offered for special requests, and also as an online webinar. Several sessions are now scheduled, including:

Several sessions are now scheduled, including:

- December 11 - West Sacramento
- January 14 - San Diego
- February 11 - West Sacramento
- March 10 - Pomona

For more information on this and other CalAPA events go to:www.calapa.net

CCPIC Pavement Classes/UC Berkeley Tech Transfer (various dates)

Several training classes have been developed in partnership with the City and County Pavement Improvement Center (CCPIC), funded by California Senate Bill 1, The Road Repair and Accountability Act of 2017.

Class delivery is supported by the Caltrans Division of Local Assistance, which offers reduced registration fees to employees of California's city, county, regional, and other public agencies.

A complete list of classes available for enrollment, go to https://registration.techtransfer.berkeley.edu/wconnect/

Further information about both the self-paced and online classes and enrollment is available on the Berkeley Tech Transfer website, https://www.techtransfer.berkeley.edu/home.

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WRAPP Workshop 2026 **February 3-5, 2026 (Friant, CA)**

The 2026 Pavement Preservation Workshop by the Western Region Association for Pavement Preservation (WRAPP) will feature informative presentations by Industry experts on pavement preservation systems proven to extend pavement life - as well as presentations on specifications and preservation strategies used by multiple agencies. Vendor booths will also be part of this popular Workshop. Save the date!

For more information on this and other WRAPP events please go to: www.WRAPP.org or contact julie@julieackman.com

CalAPA Spring Conference & expo **March 10-11 (Pomona)**

The California Asphalt Pavement Association (CalAPA) will have another well-rounded agenda for its 2026 Spring Conference. There will be an update on the major hot topics in the asphalt world from California and National experts. There will also be a trade-show with vendor exhibits. Save the date!

For more information go to: https://www.calapa.net/