

# AASHTO Innovation Initiative

[Proposed] Nomination of Innovation Ready for Implementation

## Sponsor

Nominations must be submitted by an AASHTO member DOT willing to help promote the innovation. If selected, the sponsoring DOT will be asked to promote the innovation to other states by participating on a Lead States Team supported by the AASHTO Innovation Initiative.

1. **Sponsoring DOT (State):** California
2. **Name and Title:** J. Shawn Rizzutto, District 11 Maintenance Division Chief

**Organization:** California Department of Transportation

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**City:** San Diego

**State:** California

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## Innovation Description (10 points)

The term “innovation” may include processes, products, techniques, procedures, and practices.

3. **Name of the innovation:**

100% Reclaimed Asphalt Pavement (RAP) utilized in Hot Mix Asphalt (HMA).

4. **Please describe the innovation.**

Use of 100% RAP in the manufacture of HMA, without addition of virgin aggregate or paving grade asphalt.

**5. What is the existing baseline practice that the innovation intends to replace/improve?**

Caltrans has permitted and encouraged the use of 15 to 25 percent RAP. Currently we are piloting the use of up to 40% RAP in our HMA pavements. The use of 100% RAP represents a significant step forward in sustainable pavements and the use of recycled materials.

**6. What problems associated with the baseline practice does the innovation propose to solve?**

Increase use of RAP, while maintaining the quality and service life of HMA pavements. Reduce RAP stockpiles and improve quality of life in the communities where stockpiles are located. RAP stockpiles are at capacity and are usually located in underserved communities. These stockpiles create significant dust and particulate matter (PM 10 or smaller particulate size) issues for the communities where they are located. Quality aggregates are becoming scarcer throughout California, especially in the urban areas of Southern California and mining/hauling of the aggregates creates a significant amount of Green House Gases "GHG". Additionally, the mining/hauling of the aggregates create Vehicle Miles Traveled "VMT". The manufacturing of the paving grade asphalt also contributes to GHG's produced and VMT. The VMT reduction preserves the pavement and increases the service life transportation facilities. The use of 100% RAP HMA conserves natural resources and reduces environmental impacts for the construction process and the increased longevity of the pavements not being impacted by the eliminated VMT of trucks. This material can be produced and shipped at elevated temperatures compared to HMA, allowing for an expanded compaction window. This will allow for better compaction to be achieved and increased pavement service life.

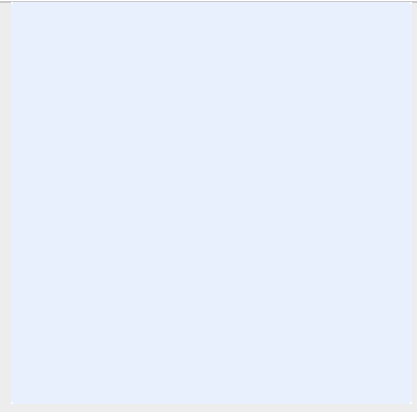
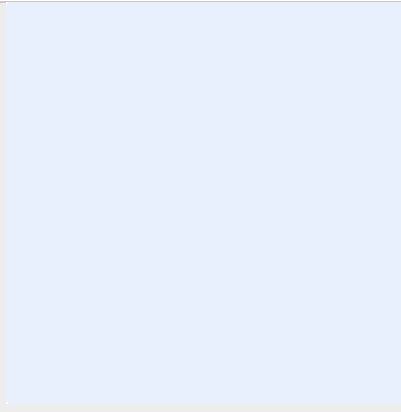
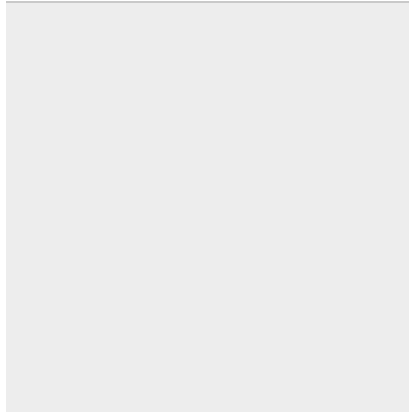
**7. Briefly describe the history of its development.**

Until the 100% RAP HMA process was developed, Caltrans has been limited to 15 to 25 percent RAP in HMA pavements. Recently, Caltrans in partnership with Industry has developed specifications to allow for the use of up to 40% RAP in HMA pavements. These pavements required significant quality control advancements, as well as quality assurance testing and monitoring. The Department has been researching and testing various percentages of RAP in HMA pavements.

**8. What resources—such as technical specifications, training materials, and user guides—have you developed to assist with the deployment effort? If appropriate, please attach or provide weblinks to reports, videos, photographs, diagrams, or other images illustrating the appearance or functionality of the innovation (if electronic, please provide a separate file). Please list your attachments or weblinks here.**

Caltrans and Industry has developed a non-Standard Specification, written a construction report on the production and placement of 100% RAP HMA, including mix design, quality control and quality assurance testing for a control section (HMA) as well as the 100% RAP HMA material.

Attach photographs, diagrams, or other images here. If images are of larger resolution size, please provide as separate files.





## State of Development (40 points)

Innovations must be successfully deployed in at least one State DOT. The All selection process will favor innovations that have advanced beyond the research stage, at least to the pilot deployment stage, and preferably into routine use.

9. How ready is this innovation for implementation in an operational environment? Please select from the following options. Please describe.

- Prototype is fully functional and yet to be piloted
- Prototype has been piloted successfully in an operational environment
- Technology has been deployed multiple times in an operational environment
- Technology is ready for full-scale implementation

This technology has been implemented on the off ramp from Interstate 5 to Hawthorn St in San Diego, CA and in several municipalities in the greater Los Angeles and Riverside areas.

10. What additional development is necessary to enable implementation of the innovation for routine use?

Additional testing to establish life cycle cost analysis, as well as further placement of material to determine crack resistance and truck traffic impacts.

11. Are other organizations using, currently developing, or have they shown interest in this innovation or of similar technology??  Yes  No

If so, please list organization names and contacts. Please identify the source of this information.

Organization	Name	Phone	Email
City of Montebello	Rene Bobadilla	(323) 887-1350	rbobadella@cityofmontebello.com
City OF Huntington Park	Steve Foster	(562)587-4860	mslmuniconsulting@gmail.com
City of Pico Rivera	Gerald Montgomery	(562)801-4350	gmontgomery@pico-rivera.org

## Potential Payoff (30 points)

Payoff is defined as the combination of broad applicability and significant benefit or advantage over baseline practice.

12. How does the innovation meet customer or stakeholder needs in your State DOT or other organizations that have used it?

This innovation meets several of the Departments strategic goals: cultivate excellence, strengthen stewardship and drive efficiency, lead climate action and advance equity and livability in all communities.

13. Identify the top three benefit types your DOT has realized from using this innovation. Describe the type and scale of benefits of using this innovation over baseline practice. Provide additional information, if available, using quantitative metrics, to describe the benefits.

Benefit Types	Please describe:
Choose an item.	Advance Equity and Livability in All Communities
Choose an item.	Lead Climate Action
Choose an item.	Strengthen Stewardship and Drive Efficiency

Provide any additional description, if necessary:

The use of this innovative material advances equity by reducing GHG emissions and VMT, improves the livability in all communities by use of a sustainable recyclable product, provides for a healthier environment, and creates a partnership between Caltrans, communities, municipalities, and industry. This drives efficiency and strengthens stewardship for the communities served by all agencies.

14 How broadly might this innovation be deployed for other applications. in the transportation industry (including other disciplines of a DOT, other transportation modes, and private industry)?

Technology is limited to urban areas with enough RAP to meet demand.

## Market Readiness (20 points)

The All selection process will favor innovations that can be adopted with a reasonable amount of effort and cost, commensurate with the payoff potential.

15. What specific actions would another organization need to take along each of the following dimensions to adopt this innovation?

Check boxes that apply	Dimensions	Please describe:
<input checked="" type="checkbox"/>	Gaining executive leadership support	Increased use of recycle material is supported by Department Leadership. May require public interest finding (PIF) for full implementation once pilot phase is completed.
<input checked="" type="checkbox"/>	Communicating benefits	Easily recognized and identified, once material is determined to be equal or better than conventual HMA.
<input checked="" type="checkbox"/>	Overcoming funding constraints	Material is more costly than conventual HMA, however with implementation cost will come down, as usage is increased.
<input type="checkbox"/>	Acquiring in-house capabilities	N/A. Material is produced by Industry partners.
<input checked="" type="checkbox"/>	Addressing legal issues (if applicable) (e.g., liability and intellectual property)	Process is proprietary but can be available in most of Southern California. Licensing may be an option.
<input checked="" type="checkbox"/>	Resolving conflicts with existing national/state regulations and standards	PIF necessary for full implementation.
<input checked="" type="checkbox"/>	Other challenges	Need to overcome perception that recycled material is not equal to non-recycled material. 100%

16. Please provide details of cost, effort, and length of time expended to deploy the innovation in your organization.

**Cost:** Current Market cost for HMA is \$70-80/ton, while 100% RAP HMA is \$100-110/ton.

**Level of Effort:** Medium. Determine locations for larger projects for placement of 100 % RAP HMA.

**Time:** One to two years to complete the pilot phase, complete research and testing of material under DOT traffic and climatic conditions. Collect data from projects and determine performance metrics of material. Continue to evaluate material and develop a standard specification from the non-standard specifications being utilized during pilot phase.

17. To what extent might implementation of this innovation require the involvement of third parties, including vendors, contractors, and consultants? If so, please describe. List the type of expertise required for implementation.

Expertise existing between the supplier of the RAP HMA material and Caltrans. Specifications have already been developed, testing, and testing standards have been implemented. Production and placement specifications have been developed between Industry and Caltrans. The material has been successfully placed and material is performing very well to date.