



2025 PWOI: Innovative Rubber Pavement Products Come to Rural and Remote California



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Why Choose Asphalt Rubber?

- Less maintenance
- Resistance to reflective cracking
- Established life cycle cost-effectiveness
- Can be used in reduced thickness
- Proven alternative to costly reconstruction
- Quieter pavements
- Environmentally friendly
- Proven use for over 40 years





RAC uses 2,000 recycled tires
per lane mile for a 2-inch overlay

2.4 tires per ton of mix



How is Asphalt Rubber Made



Challenges/Opportunities

In remote areas or smaller tonnage projects there are logistical and cost challenges associated with mobilizing traditional field-blended asphalt-rubber equipment





Challenges/Opportunities

- New technologies developed
 - Pre-blend asphalt and crumb rubber
 - Ship cold to area hot plant
- No mobilization of blender and other equipment required
- Not made in California yet



PelletPAVE - TR

- Starts as blended "wet process."
- Cooled and chopped into pellets.
- Stored and shipped at ambient temperature until needed.
- Added through the RAP collar or directly into a pug mill where it is blended with oil & aggregate to produce a rubber modified hot mix.



SmartMIX

- Fine grind crumb tire reacted with asphalt oil at temperature to fully react rubber particles.
- Added to the mix through the RAP collar at about 10-12 pounds per ton of mix.

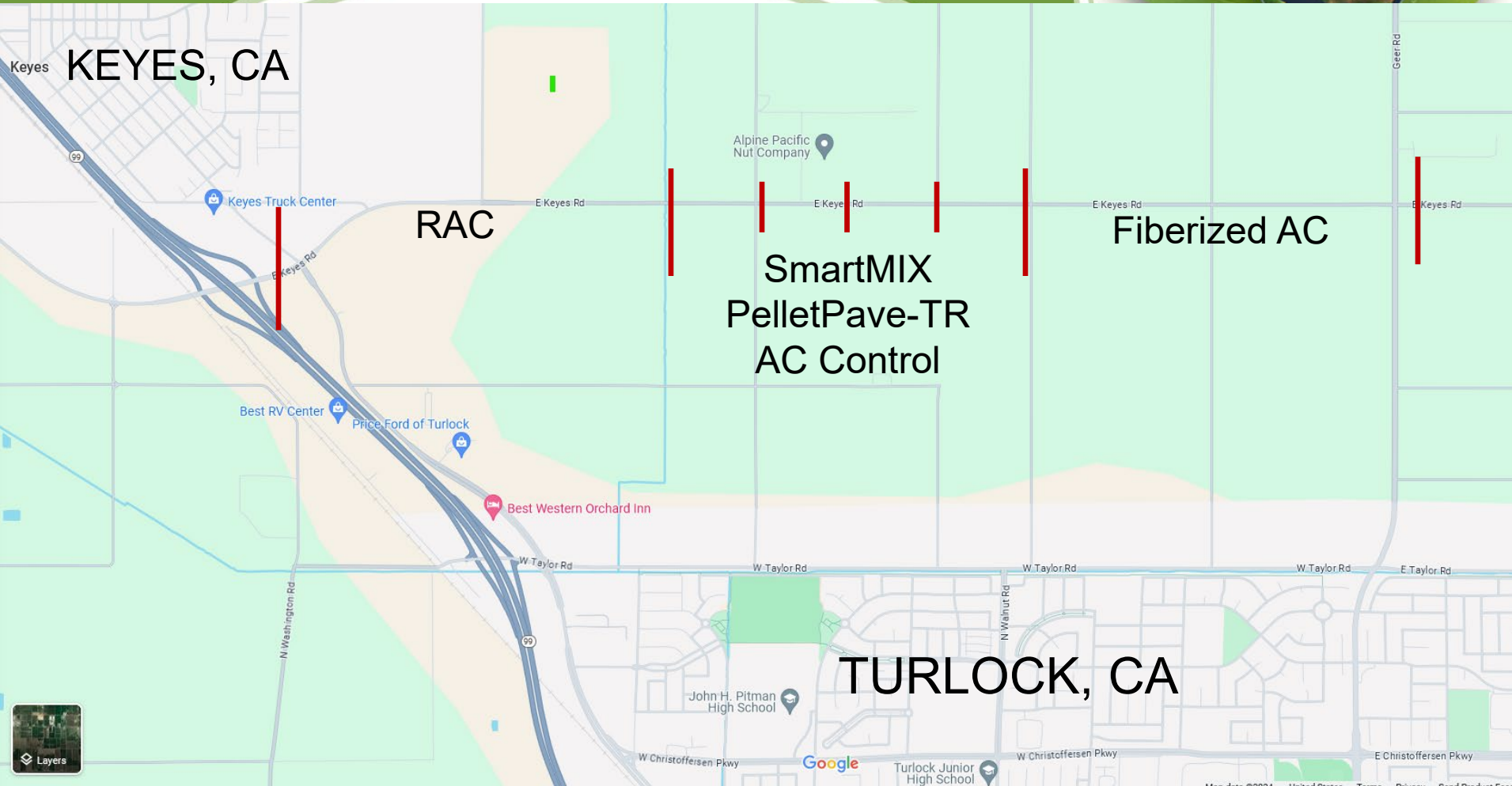


Stanislaus Pavement Test Sections

- Fall 2024 construction
 - 3 Miles long, 5 different materials
 - Conventional AC Control
 - Fiber AC (FORTA –FI)
 - 3 Rubber products!
 - RAC
 - SmartMIX
 - PelletPAVE-TR
- } Pre-Blended



Test Pavement – E. Keyes Road



CalRecycle Leadership

- Provided \$715,000 to install and document the Test Project
- Solicited letters of interest from several public agencies to place a pilot project to evaluate
- Stanislaus County selected



CalRecycle Leadership

- Test sections will include documentation of construction.
- Long-term evaluation of test sections will be made to identify potential performance benefits.
- Documented and transparently shared to interested parties.





CalRecycle Leadership Contracts With:

- NCE, Mike Robinson, LLC, Chico State, and Interwest
 - Pre-overlay evaluations, design, and field construction observations.
 - Long-term evaluation and documentation.





Stanislaus County Leadership

- Added ~ \$1,471,000 to project extending limits to include:
 - 3,770 tons of traditional asphalt rubber
 - 1,550 tons of fiber reinforced asphalt,
 - Base repairs, and
 - Striping.



Test Section Bids

- PelletPave - \$250* per ton in place
1,250 LF 542 tons
- SmartMix - \$224* per ton in place
1,250 LF 542 tons
- Conventional AC - \$126 per ton in place
1,500 LF 650 tons
- Asphalt Rubber - \$137 per ton in place
7,350 LF 3,770 tons
- Fiber AC - \$144 per ton in place
3,400 LF 1,550 tons

Contractor: United Pavement Maintenance
Supplier: George Reed



* Includes shipping
California tires to
factory out of state



Schedule of Values

Data behind per in-place ton bid

- Mix Design
- Mobilization
- Aggregate
- Binder
- Product*
- Mix/Haul/Place

* Includes shipping
California tires to
factory out of state



Current Pavement Conditions



Existing Condition



Existing Condition





Construction and Monitoring

- Pre-paving pavement evaluation
 - Drones and field survey
- Observe material production at plants
- Pavement inspection and material testing
- Document field process in detail
- Note any challenges with specific materials



Mix Design

- Responsibility for mix designs on Contractor
- Efficient - allows Contractor more control, more representative of a typical project.



Construction Photos



Construction Photos



Construction Photos



Construction Photos



Construction Photos



Construction Photos

ARHM -G



Construction Photos

ARHM - G



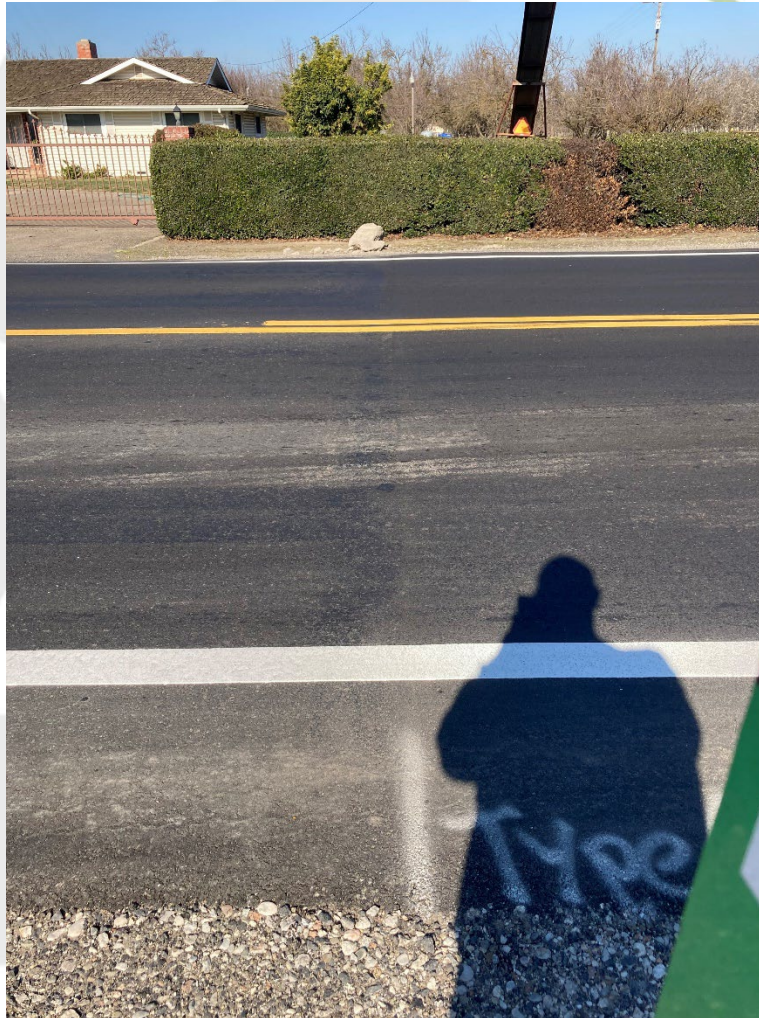
Construction Photos

Control



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PelletPAVE



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PelletPAVE



Construction Photos

SmartMIX



Construction Photos

SmartMIX



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SmartMIX



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SmartMIX



Construction Photos

Fiber



Construction Photos

Fiber



Testing

- Aggregate, loose hot mix samples for mixture properties and cores for field density were obtained for the SmartMIX™, PelletPAVE TR, and AC control mixes.



Aggregate Testing

- T 30 Aggregate Gradation
- T 176 Sand Equivalent
- T 335 Percent Crushed Particles
- D4791 Flat & Elongated Particles
- T 96 LA (Los Angeles) Abrasion
- T 304 A Fine Aggregate Angularity
- T 255 Moisture Content of Aggregates



Testing Loose Mix & Cores

- T 308 Binder Content Ignition Oven
- T 329 Moisture Content
- T 269/275 Air Voids
- Suite of MS-2 tests for volumetrics
- D2950 Density / Relative Compaction
- CT 389 Hamburg Wheel Tracker
- T 283 Tensile Strength Ratio.





Testing

Material	Binder Content Spec: JMF - 0.3%, +0.5%		In-Place Density Cores Spec: 91% min.	Tensile Strength Ratio Spec: 70% min.	Hamburg Wheel Tracker Spec: 15,000 passes min. at 12.5 mm
SmartMIX	6.2%	JMF 5.75%	93.8%	83%	Did not reach 12.5 mm. 25,000 passes at 9 mm
PelletPAVE	5.8%	JMF 5.75%	93.6%	94%	Did not reach 12.5 mm. 25,000 passes at 4 mm
HMA Type A Control	5.8%	JMF 5.3%	95.5%	87%	Did not reach 12.5 mm. 25,000 passes at 15 mm

Reporting

- Goal is to produce unbiased report on findings on new rubber materials
- Report to contain project start to finish details with recommendations



Additional CalRecycle Work

- Rubberized Pavement Grant Program
 - Updating grant awards (\$/ton) of RAC placed using recent cost data
- Developing RAC performance curves for use in pavement management program (StreetSaver).



Thank You!

