



Caltrans Division of Research,  
Innovation and System Information

# Research



# Results

Pavement

## JANUARY 2016

**Project Title:**

Monitoring of Selected Quieter  
Pavement Test Sections

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## Analyzing the Noise Quality of Different Pavement Types

Rubberized open-graded asphalt has the longest  
noise-reducing performance

### WHAT IS THE NEED?

Pavement smoothness influences vehicle wear and tear, road user comfort, emissions, and quietness. To determine the most cost-effective approaches for maintaining roadway smoothness and quietness, Caltrans initiated the Quiet Pavement Research program in 2007 to identify the longevity of current materials and potential new alternatives and which strategies to use. For nearly a decade, researchers have been collecting data and conducting extensive field and laboratory studies on the characteristics of pavements surfaced with four typical Caltrans asphalt mixes as well as experimental mixes. The evaluations have included pavements that ranged in age from newly paved to 8 years old at the start of the study, resulting in data covering pavement surfaces with ages up to 15 years old.

### WHAT WAS OUR GOAL?

The goal was to complete the acoustical and ride-quality performance analysis of the asphalt pavements that had been tested in previous years and continue monitoring the noise performance over time to develop noise models for use in the pavement management system.

### WHAT DID WE DO?

Caltrans, in partnership with the University of California Pavement Research Center at Davis, studied the latest six years of data gathered from California pavements surfaced with four typical Caltrans asphalt mixes to assess how certain properties, such as macrotexture and permeability, affect tire-pavement noise, ride quality, and durability. The researchers also reviewed data from pavement sections with experimental mixes. The team evaluated how effective open-graded mixes are in reducing noise compared with other asphalt surface types, which



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included dense- and gap-graded mixes. As part of the study, the researchers investigated the effects of air and pavement temperature and fire characteristics on the measured noise level in terms of on-board sound intensity. New wide spot laser equipment was installed to collect profiles on longitudinally textured surfaces. The list of selected quieter pavement test sections was modified to produce a more balanced experiment design of texture types, ages, traffic levels, and rainfall.

## WHAT WAS THE OUTCOME?

The researchers used the data collected over the years to develop and improve statistical models to predict the functional life of the four surface mix types. Caltrans can use these predictions to inform policy decisions, update the pavement management system, and perform life-cycle cost analysis. The research findings indicate that the mix with the longest noise-reducing performance is rubberized open-graded asphalt.

## WHAT IS THE BENEFIT?

Traffic noise affects the quality of life of those who use the roads and those who live near them. This study produced an extensive database that can be used to produce quieter, longer lasting pavement in California.

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