

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes



Project Title:

Partnered Pavement Research Center (PPRC) 23: Performance **Related Specifications**

Task Number: 4394

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DRISI provides solutions and knowledge that improves California's transportation system.

Towards Implementation of Recycled Fibers from Novel and Existing Source Materials in Concrete

Identifying and evaluating recycled fiber materials for concrete pavements.

WHAT IS THE NEED?

Fiber-reinforced concrete (FRC) can extend pavement service life and reduce crack and joint repairs. Yet, specifications for FRC are limited, and recycled fibers - often matching or surpassing virgin fibers in performance - remain underused. California needs validated design parameters, supply-chain strategies, and life-cycle cost and environmental data to integrate recycled fibers into concrete paving practices.

WHAT ARE WE DOING?

Phase II of this task builds on initial work (2022–2023) and focuses on:

- Source material sampling, characterization, and fiber production to identify viable recycled fiber feedstocks in California.
- Optimization of fiber size and load through trial batching, industry collaboration, and performance testing.
- Durability evaluation using freeze-thaw and other standardized tests on selected recycled fiber-reinforced concrete (rFRC).
- Phase II research reporting to document findings and refine guidelines.
- Test track construction and testing with Heavy Vehicle Simulator loading to assess fiber contributions to fatigue life and joint load transfer.
- Mechanistic-empirical modeling to incorporate fiber benefits into PavementME design frameworks.
- Final research report and implementation proposal for

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inclusion in Caltrans' Rigid Design Catalog.

WHAT IS OUR GOAL?

The main goal of this task is to validate recycled fibers as effective FRC additives, quantify their environmental and economic benefits, and develop design guidelines and specification language for the California Department of Transportation (Caltrans) to adopt rFRC in concrete pavements.

WHAT IS THE BENEFIT?

Implementing recycled fibers will enhance pavement resilience, reduce reliance on virgin materials, and lower life-cycle costs and carbon emissions. Caltrans gains sustainable infrastructure solutions, cost savings, and leadership in innovative concrete practices.

WHAT IS THE PROGRESS TO DATE?

The research team has made the following progress:

- Reviewed collected fibers and secured additional supplier contacts (90%).
- Developed and launched optimization of fiberreinforced concrete batching and testing plans; drafted the initial technical report (90%).
- Installed the freeze-thaw cabinet and prepared for durability testing of recycled fiber-reinforced concrete (10%).
- Continued drafting the Phase II research report (20%).
- Initiation of test track construction, mechanistic-empirical modeling, and catalog implementation is planned.

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