

Pavement & Materials Partnering Committee
Work Product Scoping Document
New
Develop California Test for Full Depth Recycling – Cement and
Update Specification for Unconfined Compressive Strength and
Terminology
August 9, 2021

Task Group

Recycling Subtask Group, Asphalt Task Group

Problem Process

- Annual
- Expedited
- Emerging Initiative

Title

Develop California Test for Full Depth Recycling – Cement and Update Specification for Unconfined Compressive Strength and Terminology

Statement of Effort/Improvement

The current guidance for Full Depth Recycling – Cement (FDR-C) mix design procedure is included in the *Guide for Partial- and Full-Depth Pavement Recycling in California* as Laboratory Procedure LP-8-C. This procedure needs to be standardized as a California Test (CT) method. Also, current Caltrans FDR-C specifications specify a design unconfined compressive strength (UCS) range of 300 to 600 psi (2.1 to 4.1 MPa), a range of 300 to 450 psi (2.1 to 3.1 MPa) should be targeted to minimize the risk of shrinkage cracking.

The Department is moving towards the use of Portland Limestone Cement (PLC) as an option for ordinary portland cement. The use of PLC will be evaluated for suitability in FDR-C by reviewing available information of PLC use in similar applications to FDR-C. If it is determined that PLC would need further testing or research that would delay the scope of the CT and spec revisions, a separate scoping document would be developed. Conversely, if it is found that PLC could be included without additional efforts or delay, it would be included into this work.

Purpose

The purpose of the PMPC work product group is to develop a CT method for FDR-C, update FDR-C specifications to the recommended UCS limit based on UCPRC research and evaluate the use of PLC in FDR-C through literature research.

Background

FDR-C is a pavement rehabilitation technique in which the full thickness of the asphalt pavement and a portion of the underlying layers, along with a small percentage of added cement, are pulverized to provide a homogeneous pavement material. The stabilized material is then compacted in-place with compaction equipment, resulting in a stiff, stabilized base course ready for a new surface course. FDR-C have been part of the Standard Specifications for over 6 years. During this time, mix designs have been evaluated using a non-standard test procedure, LP-8-C.

Approach

The CT will be developed based on the LP-8-C version in the current Guide for Partial- and Full-Depth Pavement Recycling in California. The specifications will be updated based on the recommendations in the guide and will reference the new CT. The working group will reach out to UCPRC when questions arise during the development of the CT and RSS. Any impacts to acceptance criteria for job-produced materials will be in consultation with the Independent Assurance Program. Since this is a revision to an existing standard specification, consistent implementation will be achieved by the RSS.

1. Street Ready Assurance

The FDR-C specifications have been in the Standard Specifications for many years. This revision updates existing requirements to produce a better product. The new CT will be developed based on LP 8-C, which was developed by UCPRC. Both the RSS and CT will be routed to the District Materials Engineers, Caltrans lab managers, and industry for review and comments.

2. Performance Tracking/Management

Construction issues with the revisions and new CT can be tracked by the regular methods already in place at METS. METS Reps will be informed of revisions and will be asked to communicate and document any constructions issues encountered. Long term performance of this FDR-C strategy will be tracked by the Pavement Program.

3. Consistently Implemented

The working group will perform outreach to District Materials Engineers,

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District Maintenance Engineers, and Designers with the goal to provide them with current information. The Guide for Partial- and Full-Depth Pavement Recycling in California will be revised to delete LP-8-C to avoid confusion among users.

4. Pilot Projects

N/A

5. Research Needs

N/A

Team Members (Indicate CT Chair and Industry Lead)

CT / Industry	Division / Firm Name	Member Name
CT – Chair	METS	Guadalupe Magana
Industry – Lead	California Nevada Cement Association	Nathan Forrest
Caltrans	Office of Asphalt Pavements	Saeed Pourtahmasb or Christina Pang
Caltrans	District Representative	Ron Longazo
Caltrans	Construction	Pete Spector
Industry	Aragon Geotechnical	Fernando Aragon
Industry	MT Hall & Associates	Tom Hall
Industry	Griffin Soil Group	Don Greb

Team should not include any more than 4 Caltrans staff and 4 members from Industry. See PMPC Standard Operating Procedures for more information.

Objectives/Deliverables/Due Dates

Description:

1. Perform literature review for suitability of PLC in FDR-C
2. Develop California Test for FDR-C (CT 314)
3. Draft RSS for FDR-C to update UCS requirement and reference new CT
4. Send new CT and draft RSS to districts for review and comment
5. Review final comments by districts and adjust CT and RSS if necessary
6. Finalize RSS and CT

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7. Include an executive briefing to the ATG and possibly the EC
8. Submit RSS to OE for publishing
9. Post CT
10. Develop IA implementation plan for CT certifications
11. Document decisions and recommendation in a final report

Details:

Milestones	Name - Responsible Party	Due Date (Start/Complete)
1. Perform Literature Review of PLC in FDR-C	Nathan Forrest – Industry	6/2022 – 8/2022
2. Develop California Test for FDR-C (CT 314)	Guadalupe Magana – METS	6/2022 – 8/2022
3. Draft RSS for FDR-C to update UCS requirement and reference new CT	Saeed Pourtahmasb or Christina Pang	6/2022 – 8/2022
4. Circulate RSS and CT for review	Guadalupe Magana – METS	9/2022
5. Respond to comments and incorporate into RSS and CT	Working Group	10/2022
6. Review and approve final RSS and CT	ATG	11/2022
7. Submit RSS to OE for publishing	Saeed Pourtahmasb or Christina Pang – Pavement Program	12/2022
8. Publishing new CT	Guadalupe Magana – METS	12/2022
9. Work with IA to develop work plan for certifications	Guadalupe Magana – METS	12/2022
10. Final report and recommendations	Nathan Forrest – Industry	12/2022 – 1/2023

*Some milestones listed above may not be necessary; final report is mandatory.

Resources To Develop and Implement

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Work Scope	Caltrans Hours	Industry Hours
PLC Research CT Development Specification Writing Review Publish RSS and CT Final Report	1200	600

Benefits

- Improve performance of FDR-C.
- Promote more recycling strategies as directed by SB-1.
- Standardize and maintain quality standards for FDR-C specification

Estimated Impact to Caltrans and Contractor

There should be minimal impacts as FDR-C is currently part of the Standard Specifications.

Impediments to Completion of Deliverables

No foreseen impediments to completion.

Recommendation and Approval

This scoping document for “Develop California Test for Full Depth Recycling – Cement and Update Specification for Unrefined Compressive Strength and Terminology” was prepared by the Recycling Subtask Group to address a priority issue with statewide significance and is within the Pavement & Materials Partnering Committee mission as described in the Pavement & Materials Partnering Committee Charter. The Subtask Group members have determined the scope, resources required and timeline for delivery of this project so that the deliverables are achievable. A signature here indicates that each Task Group and PMPC Executive Committee is committed to providing the resources to support this effort within the prescribed timeframes. Furthermore, it is everyone’s responsibility to ensure that the final effort/improvement will be:

- 1) Street-Ready,
- 2) Monitored and reported for performance,
- 3) Successfully implemented statewide as appropriate.

Scoping Document Recommendation and Industry Concurrence by PMPC TG:

Caltrans Name (Recommendation)	Date	Industry Name (Concurrence)	Date
<i>Cathrina Barros</i>	05/19/2022	<i>Pat Imhoff</i>	05/19/2022
Cathrina Barros, Acting Caltrans Task Group Chair Office of Asphalt Pavements	Date	Pat Imhoff Industry Task Group Member	Date
<i>Jacquelyn Wong</i>	06/01/2022	<i>Phillip Reader</i>	05/23/2022
Jacquelyn Wong Caltrans Task Group Member Office of Central Laboratories	Date	Phil Reader Industry Task Group Member	Date
<i>Joseph Dongo</i>	05/27/2022	<i>Scott Dmytrow</i>	06/02/2022
Joseph Dongo, Acting Caltrans Task Group Member Office of Construction Standards	Date	Scott Dmytrow Industry Task Group Member	Date
		<i>Dennis McElroy</i>	06/06/2022
		Dennis McElroy (Jun 6, 2022 08:41 PDT)	
		Dennis McElroy Industry Task Group Member	Date

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Scoping Document Approval and Industry Concurrence by PMPC EC:

Caltrans Name (Recommendation)

Industry Name (Concurrence)

Tom Pyle 06/10/2022

Brandon Milar 06/09/2022
Brandon Milar (Jun 9, 2022 18:50 EDT)

Tom Pyle
 Caltrans Executive Committee Chair
 Pavement Program

Brandon Milar
 Industry Executive Committee Member

Raymond A. Ditt 06/16/2022

Charles Rea 06/09/2022
Charles Rea (Jun 9, 2022 15:41 PDT)

Raymond Tritt
 Caltrans Executive Committee Member
 Construction

Charley Rea
 Industry Executive Committee Member

Gudmund Setberg 06/09/2022

Gudmund Setberg
 Caltrans Executive Committee Member
 Structure Design

Keith Hoffman 06/09/2022
Keith Hoffman (Jun 9, 2022 16:18 PDT)

Approval Date: 06/16/2022

Keith Hoffman, Acting
 Caltrans Executive Committee Member
 Materials Engineering and Testing Services











ATG-RSTG - SD - FDR-C (05-05-22 ATG Approved)

Final Audit Report

2022-06-16

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By:	Ian Sun Chee Fore (s139817@dot.ca.gov)
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-  Document created by Ian Sun Chee Fore (s139817@dot.ca.gov)
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-  Document emailed to Tom Pyle (tom.pyle@dot.ca.gov) for signature
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-  Document emailed to Ray Tritt (ray.tritt@dot.ca.gov) for signature
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 Agreement completed.

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