Pavement & Materials Partnering Committee
Work Product Scoping Document
New
Replacing the Compaction Method to Determine the Application Rate of Lime for Soil Stabilization
April 2, 2021

Task Group

Concrete Task Group

Problem Process

☒ Annual
☐ Expedited
☐ Emerging Initiative

Title

Replacing the Compaction Method to Determine the Application Rate of Lime for Soil Stabilization

Statement of Effort/Improvement

Caltrans standard practice to determine the application rate of lime for lime stabilized soils is currently determined using CT 373 test method, which utilizes a kneading compactor for the fabrication of test specimens. The availability of kneading compactors and skilled testers is vanishing as the kneading compactor is not being used in asphalt concrete testing.

The kneading compactor is expensive and takes substantially more time to perform CT 373 testing. The existing economical and less time-consuming ASTM or AASHTO test methods used to determine cement application rate for cement stabilized soils could be beneficial to determine the application rate of lime for the efficient construction of lime stabilized subgrade.

Purpose

The availability of the kneading compactor for the fabrication of test specimens is rapidly vanishing and thus resulting in higher costs for testing under CT 373 test method to determine the lime application rate. The use of available ASTM or AASHTO test methods to determine the lime application rate will reduce time and use of resources for both Industry and Caltrans.

Background

Caltrans has been using CT 373 test method to determine the utilization of lime for the stabilization of clayey subgrade to enhance load carrying capacity and provide a stable construction platform for the pavement construction. In addition, lime stabilized soils improve soil characteristics, mitigate vertical movement of subgrade due to the changes in moisture conditions and ultimately enhance the overall pavement performance.

Asphalt concrete testing has replaced the use of kneading compactor for the fabrication of test specimens with gyratory compactor which has consequently

reduced the use and availability of kneading compactor and skilled laboratory technicians required to operate the equipment.

Caltrans successfully utilizes the ASTM test method for the determination of cement application rate for the cement stabilized soils and a similar national test method could be utilized for the determination of lime application rate for the lime stabilized soils. The procedure for using ASTM test method is relatively simple, and economical with a reduced turnaround time for test results. This will also allow contractors to change the lime application rate for the varying subgrade types encountered during construction.

Approach

1. Street Ready Assurance

   Upon review of existing national ASTM and AASHTO standard test methods and other State DOT specifications, street ready specification language will be prepared.

2. Performance Tracking/Management

   Task will be manageable and simple.

3. Consistently Implemented

   Implementation will take place through the Office of Concrete Pavements. The new specification language will be clearly documented and consistently applied by a lead individual from this office.

4. Pilot Projects (if anticipated)

   Not anticipated

5. Research Needs (if necessary)

   Not necessary

Team Members

CT/Industry	Division/Firm Name	Member Name
CT Chair	HQ Pavements	Deepak Maskey
CT	HQ Pavements	Raghubar Shrestha

CT/Industry	Division/Firm Name	Member Name
CT	HQ Materials Engineering and Testing Services (METS)	Joshua Moore
CT	HQ Construction Standards	Samir Ead
Industry Lead	G3 Quality	Jordan Roper
Industry	Griffin Soil	Don Grebs
Industry	Sierra Geotech	Rob Lawrence
Industry	Graymont	Narain Hariharan

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

Objectives/Deliverables/Due Dates

Description:

1. Review existing CT 373 test method and available ASTM, and AASHTO test methods pertaining to the fabrication, handling, curing and strength testing of lime stabilized soil test specimens.
2. Review other State DOT specifications pertaining to the determination of lime application for lime stabilized soils.
3. Review Industry Test Methods pertaining to the determination of lime application for lime stabilized soils.
4. Develop specification languages for determining the application rate of lime for soil stabilization.
5. Provide recommendation for revising the existing Caltrans Standard Specifications, Section 24-2 for Lime Stabilized Soil.
6. Develop field conformance testing of lime stabilized soils for acceptance.

Details:

Milestones	Name - Responsible Party	Due Date (Start/Complete)
1. Review CT 373, ASTM and AASHTO test methods	Deepak Maskey and Don Vivant	May 01/ Aug 31, 2021
2. Review other State DOT	Deepak Maskey and Don	July 01/ Sep 30, 2021

Milestones	Name - Responsible Party	Due Date (Start/Complete)
specifications	Vivant	
3. Draft specification languages	Deepak Maskey and Don Vivant	Oct 01, 2021/ Jan 31, 2022
4. Prepare final edited draft specification	Deepak Maskey and Don Vivant	Feb 01/ April 30, 2022

*Some milestones listed above may not be necessary

Resources To Develop and Implement

	Caltrans Hours in FY 21/22	Industry Hours FY 21/22
Review CT 373, ASTM and AASHTO test methods	80	80
Review other State DOT specifications	100	100
Draft specification languages	40	40
Prepare final edited draft specification	20	20

Benefits

- Reduce laboratory testing time and test result reporting time.
- Reduce cost for testing specimens.
- Efficient application of lime for soil stabilization.
- Requires less skilled personnel to operate equipment.
- Allows the use of more common laboratory testing equipment.

Estimated Impact to Caltrans and Contractor

- Change in Caltrans Standard Specifications for Section 24-2.
- Smooth construction.
- Reduce test results turnaround time.
- Reduce additional expenses for laboratory equipment and trained personnel.

Impediments to Completion of Deliverables

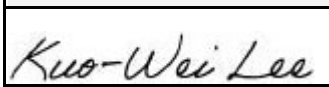
- Stakeholder resistance to change.
- Lack of coordination and contribution of task group members.
- Lack of human and material resources.
- Lack of support by managers, functional units, and staffs.

Recommendation and Approval

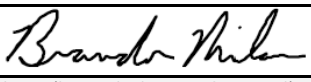
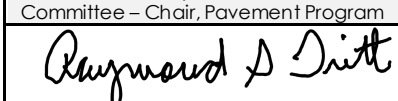
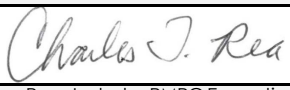
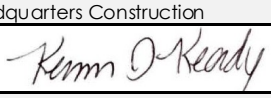
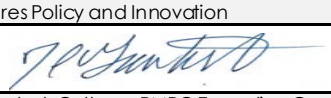
This scoping document for Replacing the Compaction Method to Determine the Application Rate of Lime for Soil Stabilization was prepared by Pavement Foundation Sub Task Group to address a priority issue with statewide significance and is within the Pavement & Materials Partnering Committee mission as 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 to attempt and ensure 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: is scoping document for *Performance Based ASR Mitigation* was prepared by *Concrete Task 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 to attempt to ensure 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 (name and date):

Caltrans Name (Recommendation)	Date	Industry Name (Concurrence)	Date
	04/14/2021		04/14/2021
Keith Hoffman, Caltrans Task Group Chair		George Butrovich, Industry Task Group Lead	
	04/21/2021		04/20/2021
Kuo-Wei Lee, Caltrans Task Group Member		Mark Hill, Industry Task Group Co-Member	
	04/22/2021		
Ken Solak, Caltrans Task Group Member		Chu Wei, FHWA	

Scoping Document Approval and Industry Concurrence by (name and date):

Caltrans Name (Approval)	Date	Industry Name (Concurrence)	Date
	04/30/2021		04/22/2021
Shaila Chowdhury, Caltrans PMPC Executive Committee – Chair, Pavement Program		Brandon Milar, Industry PMPC Executive	
	04/23/2021		04/22/2021
Raymond Tritt, Caltrans PMPC Executive Committee Headquarters Construction		Charley Rea, Industry PMPC Executive Committee	
	04/23/2021		
Kevin Keady, Caltrans PMPC Executive Committee Structures Policy and Innovation			
	04/30/2021		
Tim Greutert, Caltrans PMPC Executive Committee Materials Engineering and Testing Services			

Approval Date: 04/30/2021