

Pavement & Materials Partnering Committee
Work Product Scoping Document
New
Blended Supplementary Cementitious Materials (SCMs)
April 1, 2021

Task Group

Concrete Task Group

Title

Blended Supplementary Cementitious Materials (SCMs)

Problem Process

- Annual
- Expedited
- Emerging Initiative

Statement of Effort/Improvement

There is interest to investigate the feasibility of incorporating blended supplementary cementitious materials (SCMs) as an option in the Standard Specifications. Currently, the specifications allow for more than one type of SCM in a concrete mix as specified in Equation 1 of Section 90-1.02B(3). However, the current language limits multiple SCMs from being combined and stored prior to concrete batching.

Purpose

This effort will evaluate the progression of blended SCM standards and if the material properties can be assured with reliability, then specification revisions can be developed by the Department to provide additional SCM options. Aligning with the Department's sustainability and performance goals, this change will facilitate increased utilization of SCMs which have a lower carbon footprint and additional performance benefits when compared to straight portland cement. Preblended SCMs provide a potential benefit to the long-term stability of SCM supplies by offering concrete producers additional options. Blending at ready-mix plants is not a common practice. Many ready-mix suppliers have only one storage silo for SCMs, which is traditionally reserved for storing fly ash. If adopted, ready-mix suppliers with limited silo capacity could provide durable concrete that takes advantage of the benefits of blended SCMs. This change could promote the use of previously unusable SCMs by taking advantage of the positive aspects of multiple SCMs to produce a preblended SCM with composite properties that satisfy the specifications.

Background

The Standard Specifications establish the material and chemical property requirements for many SCMs. When the current specifications were developed, there was uncertainty that the composite properties of preblended SCMs could be sufficiently assured. Since that time, additional standards have been created and the use of blended SCMs has become more mainstream in general construction and transportation projects. It is prudent to reevaluate the feasibility of using preblended SCMs.

Approach

1. Street Ready Assurance

Upon review of Industry and other DOT's specifications, street-ready specifications will be prepared allowing ready-mix suppliers to use existing facilities to store preblended SCMs prior to concrete batching. The revised specifications will be clear and concise in specifying the qualifications of the ingredients, testing procedures, and data submittals.

2. Performance Tracking/Management

Tasks will be simple and manageable.

3. Consistently Implemented

Implementation will take place through the Office of Structure Quality Management. The new specification language will be clearly documented and consistently applied by the specification owner from this office.

4. Pilot Projects (if anticipated)

Not anticipated.

5. Research Needs (if necessary)

Not necessary.

Team Members (Indicate CT Chair and Industry Lead)

CT/Industry	Division/Firm Name	Member Name
CT (Chair)	Pavement Program	Reimond Garcia
CT	METS	Seyedhamed (Hamed) Sadati
CT	SP&I	Craig Knapp
CT	Construction Standards	Samir Ead
Industry (Lead)	Natural Pozzolan Association	Joe Thomas
Industry	Salt River Materials Group	Jeff Hearne
Industry	3M	Sandeep Singh
Industry	Nevada Cement Company	David Imse

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:

The objective of this work product is to make changes to language in the current Standard Specifications to allow for storage of verified preblended SCMs into a single storage facility.

Details:

1. DOT Specifications and National Standards Evaluation.
 - a. Gather and review specifications from at least 5 State DOTs that currently allow storage of preblended SCMs at ready-mix supplier facilities and provide a summary of analysis.
 - b. Gather and review nationally recognized standards and technical guidelines specific to the use of blended SCMs and provide a summary of analysis.
2. Create validation/verification procedures for preblended SCMs being delivered to ready-mix suppliers.
3. Develop/modify/approve specification language based on review and analysis of national standards and State DOT specifications, technical guidelines, and

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- standards to allow storage of preblended SCMs at ready-mix supplier facilities.
 - a. Validation/verification of stored preblended SCMs delivered to ready-mix suppliers.
 - b. Coordinate with Performance Based ASR Mitigation WG as needed.
 - c. Stakeholder review/concurrence.
- 4. Final Report and Recommendations.

Schedule:

Milestones	Name - Responsible Party	Due Date (Start/Complete)
DOT Specs and National Standards Evaluation	Hamed Sadati/Joe Thomas	Apr 2021/Aug 2021
Create validation/verification procedures	Samir Ead/Jeff Hearne	Sept 2021/Nov 2021
Develop/Modify/Approve Specifications	Craig Knapp, Hamed Sadati/Dave Imse	Dec 2021/May 2022
Final Report and Recommendations	Reimond Garcia/Sandeep Singh	Jun 2022/Jul 2022

Resources to Develop and Implement

	Caltrans Hours	Industry Hours
DOT Specs and National Standards Evaluation	200	200
Create validation/verification procedures	160	160
Develop/Modify/Approve Specifications	100	80
Final Report and Recommendations	60	60

Benefits

- Facilitate increased usage of SCMs.
- Construct concrete mixes with a lower carbon footprint.
- Reduce demand of fly ash.

Estimated Impact to Caltrans and Contractor

- Changes to Section 90 CONCRETE of the Standard Specifications.
- Allow ready-mix suppliers to store preblended SCMs without modifications to existing facilities.
- Additional expenses for validation/verification of preblended SCMs.

Impediments to Completion of Deliverables

- Caltrans unwillingness to approve updated specification.
- Lack of coordination/communication within Working Group.

Recommendation and Approval

This scoping document for *Blended Supplementary Cementitious Materials (SCMs)* was prepared by the 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:

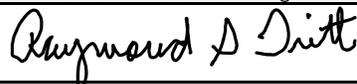
- 1) Street-Ready,
- 2) Monitored and reported for performance,
- 3) Successfully implemented statewide as appropriate.

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

Caltrans Name (Recommendation)	Date	Industry Name (Concurrence)	Date
 Keith Hoffman, Caltrans Task Group Chair	04/26/2021	 George Butorovich, Industry Task Group Lead	04/23/2021
 Kuo-Wei Lee, Caltrans Task Group Member	04/22/2021	 Mark Hill, Industry Task Group Co-Member	04/05/2021
 Ken Solak, Caltrans Task Group Member	04/26/2021	Chu Wei, FHWA	

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

Caltrans Name (Approval)	Date	Industry Name (Concurrence)	Date
 Shaila Chowdhury, Caltrans PMPC Executive Committee – Chair Pavement Program	06/01/2021	 Brandon Milar, Industry PMPC Executive Committee	05/10/2021
 Ray Tritt, Caltrans PMPC Executive Committee Headquarters Construction	05/10/2021	 Charley Rea, Industry PMPC Executive Committee	05/10/2021
 Kevin Keady, Caltrans PMPC Executive Committee Structures Policy and Innovation	05/18/2021		
 Tim Greutert, Caltrans PMPC Executive Committee Materials Engineering and Testing Services	05/26/2021		

Approval Date: 06/01/2021