Rock Products Committee
SCOPING DOCUMENT
Pavement Smoothness
December 15, 2015

Task Group

Asphalt Task Group

Concrete Task Group

☐ Annual

☐ Expedited

☒ Emerging Initiative

Title

Pavement Smoothness

Issue/Problem Statement

Since implementation of using an inertial profiler (IP) to measure pavement smoothness along with new specification requirements for acceptance of pavement smoothness based on the International Roughness Index (IRI), contractors have struggled to meet the smoothness requirements.

In addition, Industry has raised concerns regarding the smoothness specification requirements and the non-uniform enforcement of the smoothness specification requirements on projects. Because the pavement smoothness process and procedures are new to California these concerns may be related to a lack of understanding by both Caltrans and contractors, specifically as it pertains to the use of the new pavement smoothness measuring device (IP), new pavement smoothness specification requirements, knowledge on how to use the ProVAL software for analyzing pavement smoothness and how to identify and make the necessary smoothness corrections.

Background

Providing smooth pavements is a priority for Caltrans, Industry, FHWA and traveling public, including freight companies. Previous specifications relied upon the California Profilograph as a means of contract acceptance for pavement smoothness. Caltrans has transitioned from the California Profilograph to the Inertial Profiler (IP) and away from the Profilograph Index to the International Roughness Index (IRI). Most of the other states in the country have also moved to using IP and IRI for pavement smoothness.

The IP provides a safer and more efficient means of measuring pavement profiles. The device, mounted on a standard vehicle, travels at highway speed and thus requires no lane closures. This eliminates the need for workers, contractor and Caltrans, to be on the roadway, thus improving worker safety.

Caltrans currently measures pavement profiles annually as part of the pavement management system. That process also utilizes an IP. This allow Caltrans to measure pavement profile using the same device and measuring index from "cradle to grave."

Caltrans developed specifications that require that the IRI be calculated using the FHWA sponsored software program ProVAL. Final smoothness requirements for HMA are a 60 in/mi mean roughness index (MRI) for lifts greater than 0.20 feet in thickness and 75 in/mi for a thickness less than 0.20 feet. Areas of localized roughness (ALR) requirements are 180 in/mi for lower levels and 160 in/mi for final HMA surfaces.

For concrete, the MRI requirement is 60 in/mi with an ALR requirement of 120 in/mi. This requirement is same for new pavement and grinding existing pavement. Concrete pavement industry representatives have requested that the ALR requirement for new concrete pavement of 120 in/mi be reevaluated based on the 160 in/mi required for HMA. There are also concerns that the same smoothness requirements for new concrete pavement are being applied as the grinding smoothness requirement for concrete pavement rehabilitation.

To assess the effectiveness of the pavement smoothness specifications and to make recommendations for any changes to these specifications, pavement smoothness data must be reviewed and analyzed from projects constructed commencing in 2014 to present. Based on a review of the data submitted for 2014 and 2015 projects, 68 of 155 projects had a prepaving "Perform Inertial Profiler" bid item submitted data. From a further review of the data submitted it was determined that there is a large number of projects that all of the data was not submitted or the contractor did not follow the required file naming convention that allows for proper identification of files for a project. Caltrans and Industry must work together to ensure that all of the required pavement smoothness data is being collected, accurately identified and submitted.

Since beginning the transition to the IP and IRI contractors have struggled to meet the smoothness requirements and Caltrans has had difficulty in applying the specification uniformly. Recent Caltrans and Industry meetings and the pavement smoothness forum held in September 2015 indicate that the pavement smoothness problems are multifaceted.

Purpose

Through training and increased knowledge a better understanding of the inertial profiler, IRI, and appropriate specifications requirements will lead to better paving practices and a better understanding on how to make more efficient pavement smoothness corrections. This, in turn, should improve the contractor's ability to meet the specifications and result in more uniform enforcement of the pavement smoothness specifications. In the long term, this should reduce bid costs and claims related to pavement smoothness.

Objectives/Deliverables

The objectives of this project are improvements in the following areas that will help meet smoothness requirements:

- ProVAL software training
- Training with respect to applying to smoothness corrections
- Training on best paving practices
- Evaluating current smoothness specification requirements with respect to existing pavement and lower lifts and making recommendation if specification changes are required.

The following deliverables will be required:

- Training for determining an effective and efficient process for collecting and analyzing pavement smoothness using IP and ProVAL software
- Training for implementing the most effective and efficient pavement smoothness corrections
- Training for best paving practices
- Revised specifications, if required
- Guidance and procedure documents for design and construction engineers

Timeline

Deliverable	Description	Start Date	End Date
1. Construction Procedure Directive	Construction Procedure Directive for Pavement Smoothness Data Submittal.	12/15/15	2/15/16
2. Paving Best Practices Training	Develop short course on paving best practices for achieving pavement smoothness to meet specification requirements.	12/15/15	3/29/16
3. ProVAL Training	Develop advanced ProVAL training class with multiple examples on how to efficiently determine necessary pavement smoothness corrections.	12/15/15	4/30/16

Deliverable	Description	Start Date	End Date
4. Pavement Smoothness Corrections Training	Develop training for field staff for basic understanding of IP and IP data and how to implement the most efficient and effective pavement smoothness corrections so that corrections by grinding are reduced.	12/15/15	4/30/16
5. Pavement Smoothness Data Collection	Collect IP data for pavement projects completed between July 1, 2014 and December 31, 2015.	12/15/16	4/30/16
6. Analyze Pavement Smoothness Data	Analyze collected pavement smoothness data to determine MRI and ALR improvement from various pavement strategies.	1/15/16	6/15/16
7. Revise Specifications, if necessary	For existing pavement and lower lifts.	2/28/16	7/30/16
8. Design Guidance	Develop design guidance for design engineers so that an appropriate pavement strategy is chosen based on the measured existing pavement smoothness.	2/28/16	7/30/16
9. Construction Policy Bulletin	Develop guidance for implementing any revised specifications for pavement smoothness.	6/01/16	9/30/16

Benefits

- A lower percentage of final pavement surfaces will need corrections to meet the specification requirements for smoothness
- Construction days due to excessive grinding for pavement smoothness will be reduced
- Claims will be minimized

Impacts

- Paving practices related to pavement smoothness will improve to avoid costs for correcting pavement smoothness

- Improves bidability of specifications based on better understanding of what is necessary to achieve smoothness requirements
- Changes to specifications maybe required
- Time and resources will be required for educating/training Caltrans and industry personnel on ProVAL, marking and making smoothness corrections and best paving practices

Resource Requirements

Task	**Caltrans Staff**	**Person Years**
Construction Procedure Directive	Pavement Construction	0.05 0.10
Pavement Smoothness Corrections Training	Pavement Construction	0.15 0.20
Paving Best Practices Training	Pavement Construction	0.10 0.20
Pavement Smoothness Data Collection	Pavement Construction	0.10 0.15
Pavement Smoothness Data Analysis	Pavement Construction	0.20 0.25
Specification Revisions, if necessary	Pavement Construction Office Engineer	0.30 0.10 0.10
Design Guidance Development	Pavement Construction	0.20 0.10
Construction Policy Bulletin Publication	Pavement Construction	0.05 0.10
	Total:	2.55 PYs

Impediments to Completion of Deliverables

- Enough properly identified pavement smoothness data from projects completed in 2014 to present date
- Staff availability to perform necessary ProVAL analysis of data.

Recommendation and Approval

This scoping document for ling method was prepared by the Asphalt and Concrete Task Groups to address an issue that has statewide significance and is within the Rock Products Committee mission. The Task Group Co-Chairs have determined the scope, resources required and timeline for delivery of this project to ensure that the deliverables are achievable in a timely manner.

Scoping Document Recommended for Approval by:

1/5/16

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