Pavement Smoothness Subtask Group Meeting Notes

Translab Auditorium (5900 Folsom Blvd., Sacramento) – March 16, 2016, (9:00AM – 12:00 Noon)

Welcome and Introduction:

- Distributed sign-in sheet for attendance (see attachment 1) and participants introduced themselves.
- Meeting handouts included the agenda, the approved rock products scoping document, and recently issued CPD 16-2, "Pavement Smoothness Data Submittal"

Caltrans Smoothness Background Information: (Presenter Chuck Suszko)

- Chuck Suszko presented Caltrans pavement smoothness background information beginning from 2002.
- Department had received letters of complaint from the public regarding pavement smoothness including some stating that new pavement projects were actually rougher than those they had replaced. Department's response to those letters were thanking the individuals, but explaining the pavements had met contract requirements. Department received a second letter from one of the individuals in response, suggesting the Department look at other states' requirements.
- Soon after that time, multiple high-profile concrete pavement projects on I-80 had rough rides that met specification requirements using the California Profilograph, but had a lot of chatter. This led to changing the blanking band from 0.3 to 0.0.
- The Department reports annually to FHWA on its pavement inventory, including pavement smoothness using inertial profile measurements. Initially California ranked #49 in the nation for pavement smoothness. Last year's ranking had improved to #47 in the nation.
- Around 2007 – Section 39 (HMA) pavements required must-grind corrections on all pavements.
- Caltrans had inconsistencies in checking pavement smoothness statewide. Some old timers employed the old ride quality test with a cup of coffee on the dashboard to find initial locations and verify with a straightedge, while others (e.g. district 11) utilized the California Profilograph.
- Things changed when an RE was killed in district 11 running the California Profilograph. The primary changes was that Contractors were charged with checking smoothness.
- In 2011, after an industry complaint, another Rock Products Committee produced the requirement for prepave profilographs, prepaving grinding of the existing pavement surface, followed by a thin lift overlay in an effort to improve pavement smoothness results.
- Around 2010 – Peter Vacura of the pavement program was involved with inertial profilers (IP) on the national level. Up until that time there had been prior concerns with the IP technology in terms of repeatability. National development of standards for calibration and repeatability of inertial profilers had been established.
- In 2010, another longer term RPC product was worked on to develop new inertial profiler specifications. Industry involvement at the time were Jim St. Martin (HMA Pavement) and Craig Hennings (Concrete Pavement). Specification limits were initially established looking at other state DOT values.
- In 2011 there was a first round of pilot projects using IP non standard special provisions and UCPRC shadowed these projects.

- Another round of pilot projects followed (approximately 13 in total with 2 concrete pavement and 11 HMA pavement). Results provided to the pavement steering committee.
- Some considerations were made prior to implementation:
    - Already were reporting annually to FHWA with IP information.
    - Safer for personnel collecting smoothness information and less disruption to the public.
    - An initial problem was that there was no means to certify the IP equipment and operators within California at the time. In 2012, a calibration center was established in Sacramento.
    - Specification acceptance criteria was developed from other states using a variety of classifications including variables involving traffic volume and speed.
    - In California most of the roadway system has > 10,000 ADT and would be classified as high volume. Only 2 or 3 are less than this volume.
- In Feb. 2013, after a meeting with the State Pavement Engineer and industry members, IP was adopted as a standard specification where HMA and Concrete Pavements both had acceptance criteria with maximums of 60 on mean roughness index (MRI) and 120 for areas of localized roughness (ALR).
- In 2014, the prepave grinding ALR value was adjusted from 140 to 180 on thin lift overlays.
- When Superpave was initiated the HMA acceptance criteria for ALR was adjusted from 120 to 160.
- Recent observations:
    - Seem to be seeing a lot of projects using an approach for grinding ALRs to 160 or 120 values, but not meeting the 60 MRI.
    - Presently have an end-result specification and see contractors utilize a variety of methods including dramatically different ski lengths.
    - Other states are using incentive/disincentive provisions when it comes to pavement smoothness. We have heard from industry that if they were implemented here the MRI values could be achieved. Caltrans is willing to consider incentive/disincentive provisions if they will offer smoother pavements beyond the current MRI values. In other words, achieving MRIs lower than the existing 60 value.
    - Also willing to work on underlying layers and improvement opportunities through modification of ALR and MRI requirements.
    - Need to see improvements in grinding plans being utilized. Effective and efficient means of corrective grinding when needed. SAM module within PROVAL can be better utilized if enhanced training is provided.
    - Contractors need better quality control measures in place for attaining smoothness. Some contractors have already invested in equipment and technology to improve pavement smoothness.

<u>Questions/Concerns/Statements voiced by attendees:</u>

- Big difference between multi-lane roadway and rural roads, the current requirements do not differentiate between the two.
- Was there a report provided based on the pilot projects and can that be shared? **Caltrans will respond to this item and provide available information.**

- Other states likely started with smoother pavements and Caltrans set these requirements without considering that difference.
- Other states incrementally improved pavement smoothness acceptance criteria over time.
- There never was an agreement on the intermediate surface smoothness requirements.
- Design strategies need to be evaluated.
- Allowances for existing areas that are not corrected (e.g. insufficient prepave grinding days, areas of delamination, transverse working cracks) need to be made, exempted from smoothness acceptance criteria.
- What economic impact was assumed for the costs to attain the revised smoothness values? Some current jobs are showing bids 10-30% higher.
- Impossible to meet the 60 MRI on new concrete pavements without any grinding.
- Discussion needed on projects involving grinding of existing concrete pavements.
- Concerns with RHMA mix design issues and their potential impacts on pavement smoothness.
- HMA and concrete pavements should not have the same smoothness requirements.
- Life-cycle of pavements needs to consider pavement smoothness as a function of time.
- Some states have full pay for MRIs of 95. Ohio has MRI of 65, Michigan has MRI of 70, Texas has MRI of 70.
- Plans require a constant 0.10' removal and does not allow an opportunity for correction of smoothness.
- Provide existing profile information at time of bid and excludable areas would improve bids.
- Provide a reasonable estimate of prepave grinding days or use an alternative method of payment (e.g. square yards or lump sum)
- Look at percentage of improvement instead of a hard MRI value.
- Same shift mill and fill does not allow enough of an opportunity to correct the milled surface significantly for smoothness.
- Lack of quality control for pavement smoothness during pavement operations.
- There needs to be more time allowed for evaluating, developing and submitting grinding plans.
- Certain situations do not offer opportunities to run skis off of a reasonably smooth adjacent pavement.
- Requests to achieve improved pavement smoothness by using multiple lifts with smaller maximum aggregates have been denied.
- Lack of corrective grinding plan training.
- Other agencies do not necessarily consider cold planing a smoothness improvement opportunity.
- Industry also read a recent bidder inquiry and response to highlight concerns with smoothness.
- Industry requested relief from smoothness requirements based on numerous job specific conditions. Caltrans responded that any specification changes (i.e. change orders) involving smoothness would require the approval/concurrence of HQ Construction. Projects will need to use the partnering process and dispute resolution ladder to resolve project specific issues.

Scoping Document Review: (Presenter Ken Darby)

- Due to time overruns, focused only on the scoping document's objectives and deliverables and how they may pertain to some of the concerns voiced by industry.

- Objectives/Deliverables are the following:
  - Enhanced ProVAL software training development for all parties
  - Training development with respect to developing and applying smoothness correction (effective and efficient grinding plans)
  - Training on best paving practices concerning HMA and Concrete pavement operations including related operations (e.g. milling) to improve smoothness
  - Evaluate current smoothness specification requirements with respect to existing pavement and lower lifts and make recommendations (e.g. draft specifications) if specification changes are required.
  - Guidance and procedure documents for design and construction engineers based on collected pavement smoothness data for various pavement strategies
- Also mentioned the need to develop new time frames for the deliverables as there had been a delay from writing the scoping document (December) to its approval (February).

Identify Industry's Goals: (Presenter Don Matthews)

Deliverable 1 – Construction Procedure Directive

Description – Construction Procedure Directive for Pavement Smoothness Data Submittal

- Has this been completed with CPD 16-2 and forms CEM 3736, CEM 3736C and CEM 3736AC?
- These forms do help to make sure information is submitted. However, forms appear to be for information gathering. Information gathering should have been done in a pilot project stage. No pilot projects were designated to help roll out the new specification in order to gather the cost data needed to fairly cover the cost of compliance either for Caltrans or for Contractors. Shouldn't a moratorium be initiated until this data can be collected and true costs determined?

Deliverable 2 – Paving Best Practices Training

Description – Develop short course on paving best practices for achieving pavement smoothness to meet specification requirements

- Training will help so that better paving practices are implemented across the State.
- Who is taking the lead on this, Caltrans or Industry?
- This should include cold planing and how to use the cold planed surface to improve smoothness.
- What if the existing roadway is too rough to get the required smoothness based upon the design and specification requirements? Good construction practices will not make compliance. Design concessions must be made. Example: Mills and fills of 0.10 feet thick where existing MRI greater than 150 in/mi may require profiling, variable depth milling and/or overruns on materials.

Deliverable 3 – ProVAL Training

Description – Develop advanced ProVAL training class with multiple examples on how to efficiently determine necessary pavement corrections

- Who is going to take the lead on this and who is qualified to teach this?
- Industry and Caltrans do not necessarily agree that the SAM module is the most efficient or even an appropriate means to get smoothness on lower lifts.
- Before teaching this, shouldn't a rigorous effort be made to validate the required ProVAL grinding simulator as an appropriate means of correction.

- ProVAL does not simulate cold planning equipment and is erroneously used to do such by Caltrans when justifying design strategies.

Deliverable 4 – Pavement Smoothness Corrections Training

Description – 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

- Who is going to take the lead on this and who is qualified to teach this?
- Right now there is no discernable "expert" for Caltrans or Industry
- This should be for both Industry and Caltrans personnel. The discrepancies between the standards and what is seen in the field creates confusion and uncertainty for the both Caltrans and the contractor.
- Consistency across Districts and REs is essential in application of the specification and corrections.
- Needs to include field conditions that should be excluded that were not necessarily considered during design
  - Crack Seal
  - Delamination during cold planning
  - Working cracks/Failed areas/Poor subgrade
  - Bottom up cracks
  - Type of surface
  - Curves or areas with less than 35 MPH speeds
  - Bridge approaches with defined excluded widths
- As indicated in other Deliverable comments, there are issues with the ProVAL software "grinding plan simulator." Please provide information where it is used verbatim by anyone in the Country to make the corrections required per the current specifications and designs.
- Repeatability / Hypersensitivity - When rerunning a particular travel lane you can never rerun in the exact location each time. The results swing which is problematic. Need some reasonable tolerance between runs, disregarding small ALR's, increase IRI limits or require a percentage of the surface to meet standards.

Deliverable 5 – Pavement Smoothness Data Collection

Description – Collect IP data for pavement projects completed between July 1, 2014 and December 31, 2015

- What is the intent of this information? Again information gathering after the fact. See Deliverable 1 comments regarding pilot projects for new specification.
- John Harvey at UC Davis says he has some observations based on data received from projects thus far. That needs to be made available and regularly updated.

Deliverable 6 – Analyze Pavement Smoothness Data

Description – Analyze collected pavement smoothness data to determine MRI and ALR improvement from various pavement strategies

- Should this not have been done prior to implementing a two size fits all specifications for AC and a one size fits all for concrete.
- To prolong making changes will cost unsuspecting contractors and/or Caltrans. It is becoming readily apparent based on recent bid results that costs are increasing for rehabilitation projects in order to conform to smoothness requirements.
- What is Caltrans willing to spend on conforming to the smoothness specifications? 10%, 20% or 30% on increased project costs. Bid results are starting to show that these numbers are not unrealistic.

Deliverable 7 – Revise Specifications, if necessary

Description - For existing pavements and lower lifts

- We have enough information to change lower lifts requirements right away and should not wait. Unless Caltrans can substantiate with more than antidotal evidence that the current specifications for lower lifts are necessary to achieve smoothness on the final surface. The cost on the lower lifts is way too great to both Caltrans and unsuspecting contractors.
- Do not apply smoothness requirements to CIR surfaces. See above.
- The specification needs to relax with regard to intermediate opportunities, to the extent they exist, and allow contractors to achieve the desired final result as they see fit. Would an incentive/disincentive model to the final surface smoothness get the results at an ultimately cheaper cost?
- The requirement for an ALR of 120 in/mi for concrete is too expensive and does not have the data to show it is necessary.
- Caltrans appears to be hypocritical in following smoothness specifications when the State is paying for the compliance on "PrePave Grinding". There are many instances when Caltrans has waived smoothness because they do not want to spend the money to comply with IRI/MRI specified**.** In contrast, Caltrans has made contractors spend inordinate amount of dollars to meet IRI/MRI.

Deliverable 8 – Design Guidance

Description – Develop design guidance for design engineers so that an appropriate strategy is chosen based on existing pavement smoothness

- Every advertised project must contain sufficient information such as accurate electronic files of preconstruction profiles for a bidder to estimate costs and efforts with reasonable certainty.
- Caltrans should include in the engineer's estimates costs and additional time associated with sufficient prepaving profiling, cold planing and/or grinding to correct a roadway if the existing surface is too rough to meet smoothness how designed and specified.
- For rough roadways beyond what is able to be accomplished with proposed designs, should Caltrans implement smoothness requirements in accordance with Federal Highway specifications (i.e., require relative % improvement in IRI/MRI from existing condition), as opposed to Caltrans' absolute IRI/MRI values regardless of construction method and associated costs?
- If % improvement will not be implemented, what would it take to get the State to a sliding MRI/IRI scale in design prior to bidding? At a minimum, the current design methodologies and construction specifications may need to be changed. For example:
    - Requirement for both lifts of pavement to go down in a single shift. The intermediate lift doesn't have enough time to set up before equipment is backed up on it. In addition, it's very difficult to maintain grade & slope control at the end of the production day / start of next day joint.
    - Variable depth milling will be necessary for conformance in most instances
    - Deeper milling may be necessary resulting in possible material overruns.
    - Mill and fills of 0.25' may need to be allowed in two lifts to obtain smoothness.
    - Ride quality should not trump all other concerns. Structural adequacy of the pavement is essential. If we are going to spend enough money on grinding to pay for an additional overlay, let's put the additional overlay on the project.
    - Rubber Superpave materials that meet mix design requirements are starting to show movement making smoothness corrections difficult.
    - Need to stop taking samples of the AC mix within the wheel paths. Placing mix in the sample holes by hand leads to smoothness issues.

Identify Caltrans' Goals:

- Due to an absence of time this topic was not covered.

Discuss Path Forward:

- Due to an absence of time this topic was not discussed in detail.
- Agreed to meet to further define groups, leads, schedules and develop working plans to meet deliverables. Industry co-chairs to meet independently and then all co-chairs to meet within two weeks.

Roundtable:

- No time for roundtable items.

Action Items, Future Items, Future Meetings, Wrap-up Adjourn:

- The next full group meeting date was set for Friday, April 15, 2016, from 9:00 am to 3:00 pm at Translab Auditorium at 5900 Folsom Blvd, Sacramento.
- **Caltrans to respond to pilot project report request.**
- **Industry co-chair meeting to discuss deliverables and timeframes. Followed by a meeting with all co-chairs to develop deliverable workplans, adjust deliverable timelines and draft future meeting agenda - to occur within two weeks.**
- Action items – see bolded items above.