

**PACIFIC COAST CONFERENCE ON ASPHALT
SPECIFICATIONS-SEATTLE, WA**

MAY 10, 2016

RECYCLING COMMITTEE REPORT

COCHAIRS: CHARLIE PAN & STEVEN ESCOBAR

PSSAS RECYCLING COMMITTEE REPORT

The 2012 PCCAS Charges to the Recycling Committee were:

1. Evaluate the performance of Cold Recycled pavements after two years of service.
2. Evaluate the performance of hot recycled pavements in service.
3. Work in conjunction with the Paving/Asphalt Mixture Committee regarding performance of higher RAP/RAS.
4. Evaluate the feasibility of using RAP in slurry seals.

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The Committee's Activity on the Charge of Evaluation of the performance cold recycled pavements after 2 years of service:

This charge consumed most the committee's activities for 2-3 years.

A brief review of the Committee's activity:

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The Committee selected the following Projects for the Performance Evaluation:

Nevada Projects:

1. IR 80 (near Elko, NV) placed in 2007.
2. US 95 (near Winnemucca, NV) placed in 2009.
3. US 50 (near Hickison Summit, NV) placed in 2011.

Design: 1.5w% lime slurry + 1.5w% CMS-2S.

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California Projects:

1. Highway 16 (03-2M4604) placed in 2007.
2. Highway 36 (02-1E9804) placed in 2009.
3. Highway 97 (02-1E0804) placed in 2011.
4. Highway 44/299 (02-2E6604) placed in 2011.

The California projects had no cement addition.

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The Committee selected the following tests to performed on the constructed specimens from each project:

1. Hamburg Wheel Track Testing.
2. Air Voids.
3. Hveem Stability.
4. Marshall Stability.

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The conclusions were:

1. 4" specimen showed the most distress from coring from coring operations than 6" specimen.
2. With a limited number of projects, the general data trends were:
 - a. Constructed air voids, %, decreased with time by about 2.7 to 10.2% from mix design values.
 - b. Constructed air voids were lower in the wheel path centerline locations.

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Conclusions (continued)

- c. Marshall Stabilities were higher in constructed specimen than mix design values.
3. No information was available on the percent air voids at the mix design stage.
4. The best rut resistance was NDOT U.S. 95 & Caltrans Highway 97 with less than 4 mm after 20,000 cycles.
5. No correlation between percent air voids & rut depth could be established with the test data.

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The Committee's Report on the field service can be found the website, PCCAS.org under the Report tab.

We would like to express our appreciation & gratitude on testing done for this evaluation to:

1. Washington DOT - Joe DeVol (Hamburg & Gmm).
2. Nevada DOT – Charlie Pan (Hveem Stabilities & Coring)
3. Caltrans – Hamid Moussavi (Coring).
4. APART – Steven Escobar (Marshall Stabilities).

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Other Cold-In-Place Recycling Presentation:

Dr. Hajj's presentation on CIR projects in the Reno area & Other findings on the university's research in performance for cold recycled mixtures. Important aspects:

1. Tensile strengths with freeze thaw conditioning
2. Targeted air voids of 12-14% in construction.
3. The use of lime slurry to achieve TSR & air voids.

Please see Dr. Hajj presentation "Cold-In-Place Recycling Pavements/Materials Program at UNR" on PCCAS.org under Reports tab.

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Other Cold-In-Place Recycling Presentation:

Dr. Ding Cheng (CP2 Center) gave a presentation on SR 198 Caltrans CIR Project dealing with new technique on getting in-place air voids after final field compaction. Also, the Hamburg Wheel Track was used on field produce recycled mix. More work is needed. Hopefully, Caltrans will continue field performance evaluations on this project.

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2. Committee activity to evaluate the performance of Hot Recycled pavements in service was limited.

Don Powell noted a concern of using hard asphalt binder (PG 70-10) with RAP and lime slurry in a hot climate. Early cracking has been observed in private paving project.

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Tony Limas gave a presentation on Caltrans' RAP/RAS specification overview. Key points

were:

- a. When using RAP between 15-25%, contractor can use one PG grade lower (both ends) with higher testing frequency in QC testing.**
- b. RAP/RAS can use rejuvenators/wax products to meet project's specified PD grade but QC testing frequency is much higher.**

Please see Tony's presentation on PCCAS.org website under Report tab.

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Dr. Sebally gave very interesting presentation on the evaluation of asphalt mixtures with RAP and Warm mix additives.

For further details, please go to PCCAS.org under Report tab to see the presentation.

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4. Committee's activity on evaluating the feasibility using RAP in slurry seals.

Edgard Hitti detailed the use of RAP in cape seal applications in California.

For further details please go to PCCAS.org to see the presentation under Report tab.



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Suggested New Charges for your consideration:

- 1. Continue monitoring new developments in mix designs & performance of cold recycled mixture.**
- 2. Evaluate the performance of hot recycled pavements in service & new mix design protocols.**

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Suggested New Charges for your consideration:

- 3. Continue work in conjunction with the Paving/Asphalt Mixture Committee regarding performance of higher RAP/RAS.**
- 4. Continue to evaluate the feasibility of RAP in all surface seals (slurry, chip, scrub & cape).**

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Suggested New Charges for your consideration:

5. Evaluate the mix design protocols and performance of cold foam recycled RAP mixtures.



Questions?