

## 2012 In-Place Recycling Conference Summary

The 2012 Western States Regional Recycling Conference<sup>1</sup> featured 27 technical presentations from speakers representing state, local, and federal road agencies; industry, and academia.

On the first day of the conference, several speakers described cold in-place recycling (CIR), full depth reclamation (FDR), hot in-place recycling (HIR), and cold planing.

Most speakers spoke of the advantages of recycling which included environmental benefits, materials savings, lower costs, good performance, institutional support, and contracting / specification flexibility. Some speakers talked about disadvantages, barriers, and needs.

Environmental advantages included lower greenhouse gas emissions from the manufacture and transportation of materials, and less need to dispose of used materials in landfills.

Materials advantages included reuse of existing aggregates, use of foamed and warm mix asphalt, the ability to stabilize bases through the use of chemical, e.g., Portland cement, mechanical, or bituminous means. The reduced need for disposal is also a materials advantage.

Cost advantages included monetary savings, and shorter construction times. In many projects, it is possible to use simpler traffic control arrangements resulting in cost savings. One speaker estimated the life cycle break even cost at 12 years<sup>2</sup>.

Many speakers claimed that recycling resulted in performance at least as good as conventional methods. Several performance advantages were mentioned, including reduced reflective cracking, removal of functional distress, improved profiles, successful treatment for stripping, improved ride quality, improved friction, improved bonding, less noise, reduced traffic disruption, disruption of cracking patterns, and improved resistance to water infiltration. One speaker claimed the product had been improved by the use of engineered emulsions, and the addition of certain chemical and other additives. Another speaker claimed that stabilization was beneficial because it was able to increase the effective depth of the base.

One speaker said that recycling addressed and was consistent with the 3 Es, viz., Environment, Engineering, and Economics.

In the area of contracting and specifications, recycling was able to take advantage of innovations such as end-product specifications and the flexibility of statewide contracts covering multiple projects. Other contracting advantages included the ability to construct in one pass, elimination of abrupt lane edges, reduced exposure of milled surfaces, and speed of construction. One speaker mentioned the use of a specification for cold in-place (CIR) and cold in-plant (CPR) recycling. Other speakers spoke of the necessity to take cores in the planning phase of recycling. Two speakers lamented the lack of National Standards and the lack of uniformity of widely varying FDR mix designs.

Several speakers spoke about the conditions that would render a pavement suitable for some form of recycling. In general these would include pavements with fatigue cracking, large thermal cracking, inadequate surface maintenance, raveling, potholes, or poor ride. HIR would be particularly suitable for pavements with minimum deterioration, distress confined to the surface layer, and a sound structure. The recycling depth would be up to 2". CIR would be suitable for pavements with moderate deterioration and

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<sup>1</sup> Held at Ontario, California, 11-13 September 2012.

<sup>2</sup> Based on a HMA typical life of 16 years in western Washington.

deeper non-load distress. The recycling depth would be up to 6". FDR, a type of reconstruction, would be appropriate for pavements with extensive distress. The recycling depth would vary from 3" to 15".

Recycling is not suitable for certain conditions. Recycling would not be indicated for pavements containing geotextiles (and other non-recyclable materials), high asphalt binder content, high traffic, remote locations (few contractors and high mobilization costs), thin pavement layers, inconsistent and non-uniform materials. Other barriers included excessive regulations and the high risk aversion of some agencies resulting from prior bad experiences with recycling.

One speaker spoke of a pressing need market the recycling concept.

Finally, several speakers made general recycling observations:

- Asphalt pavements should be repaired in the first 40% of their deterioration,
- ARRA<sup>3</sup> has published a Basic Asphalt Recycling Manual (BARM),
- NHI Training Course 131050<sup>4</sup> deals with recycling,
- Government support for recycling is shown by FHWA / AASHTO collaboration,
- MAP-21 encourages in-place recycling, and
- NCHRP Synthesis 421<sup>5</sup> deals with recycling.

The second day of the conference featured several field trips to observe actual urban area roadway recycling projects using cold in-place recycling (CIR), full depth reclamation (FDR), cold central plant recycling (CCPR), processing of RAP slurry and RAP chip, micro-milling, and texture seal.

The timing of the field trips was highly beneficial, coming as it did after the more theoretical presentations and discussions on the previous day when the main highlights of the various recycling processes were still fresh in the minds of the participants.

Prior to the field observations, the delegates were able to inspect at close quarters a Wirtgen WR 2500 S Full Depth Recycling (FDR) machine which was demonstrated on a construction yard access road.

The recycling projects were being constructed in urban areas and demonstrated the ease with which the contractors were able to work under traffic. None of the recycling projects caused major traffic disruptions.

The field trip also featured a plant tour where the delegates were able to observe RAP collected from the project site being treated for use as slurry surfacing. The delegates were also shown demonstrations of RAP slurry (slurry seal that uses reclaimed asphalt pavement instead of virgin aggregate and micro-milling using closely spaced (0.2") cutting heads.

The field observations were a conference highlight and served to link the theory presented on the first day with the equipment, materials, and actual construction under real traffic conditions. The demonstrations illustrated the value of the flexibility of recycling and its ability to be applied under real traffic conditions.

Future conferences could be improved by extending the implementation component of the meeting and showing more variations of the recycling methods.

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<sup>3</sup> ARRA ≡ Asphalt Recycling and Reclaiming Association.

<sup>4</sup> FHWA-NHI #131050 "*Asphalt Pavement In-Place Recycling Technologies*".

<sup>5</sup> NCHRP Synthesis 421 "*Recycling and Reclamation of Asphalt Pavements Using In-Place Methods*".

A further improvement would be the inclusion of information on how to initiate and follow through with a recycling program. This is an area in which experienced agencies could assist agencies just starting out with answers to frequently asked questions and documentation such as testing methods and recycling specifications.

The presentations and field trip were digitally recorded and the PowerPoint versions of the conference presentations as well as edited recordings are available at <http://www.pavementpreservation.org/conferences/regional-in-place-recycling-conferences/2012-workshop/> or by going to the NCPP Home Page (<http://www.pavementpreservation.org/>) and clicking on Initiatives / Regional In-Place Recycling / 2012 Western States Meeting – Ontario, California (September).