

'Performance of Recycled Asphalt Shingles (RAS) in Hot Mix Asphalt'
National Pooled Fund Study TPF-5(213)

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During the third quarter, April 1, 2010 through June 30, 2010, the TPF-5(213) team achieved the following components on the project:

1. The Draft Literature Review was completed and is attached for review. The research team anticipates updating the literature review as more technical information becomes available as well as addressing comments the Technical Advisory Committee provides.
2. Caltrans and the Illinois Department of Transportation joined the pooled fund study. To provide adequate time for the additional demonstration projects and research TPF-5(213) will be extended to August 2012. Although the study will be extended, the initial state partner demonstration projects (Indiana, Iowa, Minnesota and Missouri) and research will be completed and compiled into a report by August 2011. A second report will be completed on the remaining state demonstration projects (CalTrans, Wisconsin, and Illinois) and a final report compiling all research conducted over the study period will be completed by August 2012. A revised budget and schedule is being developed for review.
3. Three demonstration projects were completed this quarter by the Missouri and Iowa DOT's as follows:

Missouri DOT

MO/DOT completed a demonstration project on Highway 65 (Greene/Christian County) South of Springfield to compare two surface mix designs with recycled asphalt shingles, one with a fine ground RAS (3/8" minus) and one with a coarser ground RAS (1/2" minus). The project contractor was Journagan Construction & Aggregates. Both mixes included recycled asphalt pavement (RAP) and ground tire rubber (GTR) with vestenamer. The section utilizing fine ground RAS was placed on May 27, 2010 and included 5%RAS, 10%RAP, 10% GTR by weight of asphalt and 4.5% vestenamer by weight of GTR using a PG64-22. The control section was placed on May 21, 2010 and included 15% RAP with GTR using a PG64-22 which is overall equivalent to a PG70-22 asphalt binder (approximately 2,000 tons of mix for each section). The Missouri DOT also provided an additional mix that contained RAS with polymer modified asphalt to benchmark against the aforementioned field mixes sampled. Materials and mixes were collected by the research team and inventoried at Iowa State University.

Iowa DOT

The Iowa DOT completed two demonstration projects:

- A.** The first demonstration project was completed in June 2010 in Southeastern Iowa (Mahaska County) on Highway 63 near New Sharon, Iowa (South of Montezuma). The contractor was Manatts, Inc. The test sections included two different mix designs: one with 13% RAP and 5% RAS using a PG64-28 asphalt and a second section with 11% RAP and 5% RAS using a PG64-28 asphalt. The mixes were used in the base and surface courses. The control section included 20% RAP only using a PG64-28 asphalt. Materials and mixes were collected and inventoried at Iowa State University.
 - B.** The second demonstration project was completed along Highway 10 near Paulina, Iowa in Sioux County. The contractor was Tri-State Paving, Inc. The demonstration included three test sections utilizing only RAS and no RAP. One section utilized 4% RAS (6-30-2010), one section utilized 5% RAS (6-24-2010) and one section utilized 6% RAS (7-1-2010). All mix designs used a PG58-28 asphalt and 8,000 tons of mix (two days of paving) were placed in each section. The control section did not include any recycled product and used a PG64-22 asphalt with 4,000 tons of mix placed. Materials and mixes were collected and inventoried at Iowa State University.
4. Minnesota DOT collected material and mixes from their 2009 demonstration projects utilizing pre-consumer and post consumer RAS only in mainline shoulders and transition areas placed on MnRoads Research cells. The samples were delivered to Iowa State University in June 2010.
 5. ISU has begun testing on the Indiana DOT samples.
 6. The website is under development and a draft is scheduled to be completed for review at the next Technical Advisory Committee (TAC) meeting.

Next steps for the study include:

- 1) Schedule additional demonstration projects with Wisconsin, California and Illinois;
- 2) Conduct pavement distress surveys on placed pavements in Minnesota and Indiana;
- 3) Organization of next TAC meeting;
- 4) Analyzing samples collected from demonstration projects; and
- 5) Website development.

The above accomplishments will be discussed at the next TAC meeting.

The research team encountered delay in obtaining field materials due to continued rain and flooding that delayed projects in Missouri and Iowa. Iowa State University installed a beam fatigue test apparatus for materials testing and added a second servo-hydraulic test machine for dynamic modulus and flow number testing.