# Cutler Courier

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## Focus on Arizona

There's no place quite like south-central Arizona, where fast-growing cities like Phoenix, Scottsdale and Tucson contrast with vast expanses of desert and isolated mountain ranges, and where high tech plants producing computer chips and aerospace technology co-exist with centuries-old saguaro and barrel cactus.

This is a land of extremes, where summer temperatures can exceed the 100 degree mark for days on end, yet nighttime temperatures can quickly fall below freezing. Where rush hour traffic can be intense, or virtually nonexistent. And where, sometimes, the biggest problem facing highway engineers can be the lack of an accessible supply of asphalt.

*"In a sense, the hot in-place recycling process is a great way to get two inches of overlay for the price of one. And since we were able to eliminate the use of a rejuvenating agent, that saved our county even more money."*

*Bob Erdman, Materials Engineer with the Maricopa County DOT*

This issue of the Cutler Courier examines Cutler Recycling's recent achievements in two unique areas of south-central Arizona: Maricopa County, which encompasses the Phoenix area's "Valley of the Sun," and Pima County, which extends from the urban metropolis of Tucson to remote towns surrounded by desert and mountain ranges.

## Cutler single-pass process proven effective on chip sealed asphalt

As asphalt pavement ages and dries, and light oils evaporate, it tends to lose its viscosity. To restore viscosity to the recycled asphalt, the Cutler single-pass recycling process adds an emulsified rejuvenating agent to the recycled material before it is laid down as a new leveling course.

But can the HIPR process also be used to rejuvenate roadways that already contain an average to high binder content? That was the question Department of Transportation officials in Maricopa County, Arizona sought to answer in early 1998, when they contacted Cutler Repaving about rejuvenating a section of county roadway that had received numerous chip seal treatments over the proceeding years.

"We felt the hot in-place recycling process offered certain benefits," reports Bob Erdman, Materials Engineer with the Maricopa County DOT. "But we were also aware that the Cutler process adds a rejuvenating agent to the recycled mix to restore the binder content back to original levels. That posed a potential problem, since so many of our county roads have been chip sealed over the years, and the

binder content is often higher than you would typically expect to see in older asphalt."

Maricopa County DOT officials decided to test the Cutler process on a three-mile section of Williams Field Road, a four-lane arterial roadway which feeds a former Air Force Base in the southeastern corner of the county. The surface displayed minor levels of rutting, along with intermediate levels of longitudinal and transverse cracking, and county officials felt it would be a good candidate to experiment with the hot in-place recycling process. But since tests showed that the roadway already contained an asphalt content of greater than 6 percent, DOT officials were concerned that adding yet more binder to the mix would adversely affect stability.

After inspecting the site, Cutler officials concluded that the hot in-place recycling process should perform just as well on chip sealed asphalt as on asphalt containing low levels of binder. The only difference would be that Cutler would exclude the addition of the recycling agent to the recycled asphalt.

"As it turned out, the Cutler process worked just great without adding a rejuvenating agent," says Erdman. "The high level of binder already present in the asphalt assured us of ample viscosity in the recycled mix. Cutler's equipment train recycled the top inch of asphalt, and then placed a one-inch 12.5 mm mix over the top in the same pass."

Erdman says the process produced an excellent riding surface. Evaluations of the ride based on the International Roughness Index (IRI) two months after project completion showed an IRI index rating of 51-86 (very good to excellent). The same evaluation conducted a year after the project had been completed revealed an IRI index rating of 58-77 (very good to excellent), which Erdman says is equivalent to the ride of a two-inch asphalt/rubber overlay (see chart above.)

## International Roughness Index

Ride evaluation of Williams Field Road, Maricopa County, Arizona, prior to and following hot in-place asphalt recycling.

| IRI Scale | | | | |
|---|---|---|---|---|
| 0-59 (Excellent) | | | | |
| 60-94 (Very Good) | | | 51-86 | 58-77 |
| 95-170 (Good) | 98-144 | 136-166 | | |
| 171-270 (Fair) | | | | |
| >271 (Poor) | | | | |
| | Oct., 1995 After chip scal | April, 1998 Pre-HIPR | June, 1998 2 months after HIPR treatment | May, 1999 1 year after HIPR treatment |

*Ride analysis conducted by Maricopa, County DOT*

That wasn't the only advantage offered by the hot in-place recycling process. Erdman reports that Maricopa County also discovered other important benefits from the single pass recycling process that they hadn't anticipated, including reduced traffic congestion and delays.

"We found that the single-pass process causes very minimal inconvenience to the motoring public, compared to a conventional two-step hot resurfacing process, where we have to bring in equipment in two separate stages.

"Cutler's single-pass system combines all of the steps into a single equipment train," Erdman continues. "And both the recycled leveling course and the wearing course are put down with the same piece of equipment. So the length of time you tie up a traffic lane is virtually negligible. After the compactor has rolled the hot mix, you can literally start striping and picking up cones as soon as the asphalt has cooled to ambient temperatures."

Some highway engineers also believe the single-pass recycling process enhances motorist safety. "I'd have to agree that with this process, you have equipment blocking the roadway about half as long as you do with a conventional two-step resurfacing process," Erdman concurs.

In addition to creating a hot, thermal bond between the recycled and new asphalt layers, the Cutler process also produces a thermal bond between adjoining lanes. As a consequence, Erdman was surprised to discover that the process literally eliminated the presence of longitudinal joints between lanes.

"We found that as the equipment train lays down each successive lane, the heating process appears to create a monolithic bond with the previous lane. It's essentially impossible to find a longitudinal joint between the lanes," he emphasizes. "I expect that will lead to better long-term performance, since there's no crack for water to seep down into the base."

Erdman reports that the project was completed in just 13 days, well under deadline, and at a cost considerably below that of a conventional two-step hot resurfacing job.

"In a sense, the hot in-place recycling process is a great way to get two inches of overlay for the price of one," he says. "And since we were able to eliminate the use of a rejuvenating agent, that saved our county even more money."

The Williams Field Road project represented the first time the hot in-place recycling process had been used in the area without the addition of a rejuvenating agent. As a result, it attracted considerable interest from other city, county and state highway departments, including the Arizona Department of Transportation and the City of Phoenix.

Erdman says the Maricopa County "experiment" exceeded DOT expectations. Cutler has since been awarded another county contract, using the same process, on sections of three roads in Maricopa County.

"Our department is responsible for about 3,000 miles of roadway, 2,000 of which are paved," Erdman concludes. "Now that we know that the hot in-place recycling process will produce good results on roadways that have been chip sealed several times, I feel that we've added another tool to our toolbox."

## HIPR does the job for half the cost in metropolitan Tucson

There's no lack of variety in Subhash Raval's job as the Public Works Manager for Pima County, Arizona. Raval's department is responsible for the streets and roads that serve large sections of metropolitan Tucson, as well as for the hundreds of miles of remote roads and highways that provide access to the dozens of communities scattered throughout this 9,200-square-mile county.

In the spring of 1999, the Pima County Department of Public Works contracted with Cutler Repaving to complete road rejuvenation projects in two areas of the county that could hardly have been more unalike.

The first project consisted of a mile-and-a-half stretch of Flowing Wells Road, a heavily traveled arterial road serving metropolitan Tucson. Since the last chip seal treatment some ten years earlier, the roadway had begun to show evidence of rutting and block cracking. Raval, who had become familiar with the Cutler process some years earlier when he served as Director of Public Works in the Chicago area, believed the HIPR process could help reduce costs and ease traffic congestion along this busy road.

"This is a high traffic road, with an Average Daily Traffic count of at least 21,300, including 10 to 14 percent truck traffic, so traffic congestion during the resurfacing project was a concern," says Raval. "The road also serves a number of commercial businesses whose owners were concerned about the length of time their entryways would be blocked."

*Two views of the HIPR process of Flowing Wells Road, Pima County, Arizona*

The Cutler crew began work in April, using the single-step recycling process to remove the ruts and cracks in the top inch of existing asphalt, and then recycling that asphalt into a new leveling course. That was immediately followed with a new one-inch wearing surface. The entire project, including four lanes and a center turn lane, would be completed within a week.

Raval observes that the HIPR process achieved a density of 95 percent. And because the Cutler equipment train travels at a rate of 17 to 18 feet per minute, completing each lane in a single process, traffic disruptions and closures of access lanes to businesses were held to a minimum.

"I don't think any portion of the roadway was closed to traffic for more than an hour at a time," says Raval. "The business owners were pleased with the process, and traffic flow was maintained at a good level. And, importantly, we got the job done for about $3 per square yard, or about half the $6 per square yard we estimated it would have cost for a conventional two-inch overlay."

## HIPR cuts road rehabilitation cost by two-thirds in remote Ajo

While nearly two-thirds of Pima County's population lives in the Tucson area, this scenic county also contains some of the most dramatic desert landscape to be found in the nation. Here, you'll find the Saguaro National Park, the Organ Pipe Cactus National Monument, and the famous Kitt Peak National Observatory atop 6,875-foot-high Kitt Peak.

There are more than 40 communities and towns within Pima County, many of them located in isolated desert and mountain valleys and often served by a single highway. Among them is Ajo, Arizona, an

unincorporated community of about 7,000 residents located in the western part of Pima County. Founded as a silver and copper mining town in the early 1900's, Ajo sits just 40 miles north of the Mexican border and more than 100 miles west of Tucson.

Early in 1999, the Pima County Public Works Department selected several roads serving residential areas of Ajo for resurfacing work. Raval notes that some 30 years had passed since many of these roads had been resurfaced, and that the roads were in generally poor condition, with potholes, ruts and alligator cracking.

Because the nearest source of asphalt was in Tucson, more than 100 miles distant, conventional resurfacing methods would have proven cost-prohibitive. "We estimated that it would have cost us between $12 and $12.50 per square yard to remove the top inch of wearing surface, and then truck enough asphalt in from Tucson to resurface these roads with a conventional two-inch overlay," he explains.

"But despite their poor condition, the roads still contained sufficient asphalt to utilize the hot in-place recycling process, which substantially decreased our need for fresh asphalt. We determined that the county would achieve significant economic savings by bringing in Cutler's hot in-place recycling equipment for this job."

*Two-lane suburban road in Ajo, Arizona resurfaced by Cutler Repaving*

Cutler's equipment train arrived that spring, with recycling work beginning on April 19. Over the next 4-1/2 weeks, the company would recycle and resurface nearly eight miles of suburban two-lane roads.

"Cutler's single-pass recycling process made it possible for us to complete the entire project for an average cost of just $4 per square yard, nearly two-thirds less than a conventional overlay would have cost," Raval emphasizes.

"We were very pleased with the quality of work that Cutler delivered on both of these jobs. Their people are very knowledgeable, they provide excellent service, and each project was completed on schedule. I don't think we could have asked for anything more." ■

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