

by Tom Kuennen, Contributing Editor

## Hot In-Place Repaving Solves Problems for Older Dallas Suburb

Traffic woes are minimized, while significantly lower pavement life-cycle costs are enjoyed by the City of University Park.

An innovative hot in-place recycling *repaving* process for aged asphalt pavements is solving street maintenance and resurfacing headaches for an older established suburb in the Dallas area, while providing remarkably low annualized pavement life-cycle costs per square yard.

The result is residents who don't suffer from prolonged, disruptive street milling and resurfacing, and long-lived pavements that save money for the city and its taxpayers.

University Park, Texas, is a residential community of 23,000, located approximately 5 miles north of downtown Dallas. It is bordered on three sides (east, north, and west) by the larger city of Dallas, and by Highland Park on the south.

### Classic rectangular grid

The street system is a classic rectangular grid, and the entire city was built out by the 1950s. It has 75 centerline miles of streets, with some 150 lane-miles, in a 3.7-square mile area. Residential lots of only 50-foot frontage comprise 60% of the total, so University Park is very urban, despite being a suburb.

Beginning in the 1920s, its older streets were constructed of concrete, and since, all have been overlaid with asphalt, making pavement maintenance and preservation a prime mission for University Park Public Works. Pavement ills include potholes, longitudinal and transverse cracking, and substantial heaving of pavement subbases due to expansive, clayey soils.

In University Park, through the 1980s, deteriorated asphalt pavements were cold-milled, broomed, and resurfaced at a later date.

"Up to the early 1990s, we were using traditional mill-and-overlay to resurface streets," said Gene R. "Bud" Smallwood, P.E., director of public works, City of University Park. "But there was a timing conflict

between when the street was milled, and when the overlay contractor could get there. That caused a lot of distress on behalf of the residents, because dust and chips of loose, milled surface would get on cars and provide other inconveniences. In some cases, it was four to six weeks before the street was finally paved. Dust was the biggest factor and the citizens would not put up with that."

As a result, Smallwood looked at one-pass in-place recycling methods. "At that time, in 1991, we began with HIR repaving," Smallwood said. "It solved all our problems, because on a given street, the contractor moves in and moves out very quickly, and the inconvenience factor is nil."

### In-place recycling, plus virgin lift

University Park's HIR repaving contractor is Cutler Repaving of Lawrence, Kansas. Cutler's unique repaving process heats, scarifies, and applies recycling agent to an existing, aged driving course, and places that material as a new leveling course. The same machine immediately tops that recycled leveling course with a virgin hot-mix-asphalt overlay fed into the repaver from the front, which bonds thermally with the recycled leveling course to form a monolithic pavement.

University Park is an expensive upscale community, with higher average per-capita incomes, and it shows among the fine homes and landscaping along its streets. "Hot in-place recycling has the potential to harm landscaping along the curb line," Smallwood said. "If there is landscaping close to the curb, the contractor will use sheets of plywood to shield, preserve, and protect the abutting landscaping. That's been good for us from an operations and public relations viewpoint."

University Park has relatively few commercial businesses or shopping districts, for which speed of construction can mean profit or loss over the course

# Maintenance Matters



**HIP-recycled Preston Road is a major artery in University Park, Texas.**

of a project. Nonetheless, the speed of construction can be critical for its citizens, who entertain extensively in their homes. “Improvement of the pavement is job No. 1, but the inconvenience factor in this town is a very critical issue, be it pavement reconstruction, or water or sewer improvements,” Smallwood said.

## **Monitoring pavement condition**

The city monitors pavement conditions and programs annual restorative work on that basis. University Park did have a pavement management system program at one time, but abandoned it when the city began extensive use of hot in-place recycling, because the software did not incorporate HIR recycling as an option.

“We had a canned PMS program previously, but don’t have one now,” Smallwood said. “An initial pavement inventory was done at that time, and we followed the system for a while, but the software quickly became obsolete. Instead, we go by visuals. Each year we identify which pavements need to be resurfaced, and do them.”

“HIR recycling adds to pavement life, but the PMS software program did not identify the recycling process as a strategy that would improve pavement longevity,” said Bob Whaling, P.E., city engineer. “But we like the HIR process, it’s been good for us and our residents, so we decided not to use the PMS any more.”

“It’s a long-standing problem for municipalities and other road agencies,” said John Rathbun, vice president-sales, Cutler Repaving. “A lot of pavement management systems do not include recycling alternatives in their strategies, and as a result, some agencies say they can’t use in-place recycling because it’s not a choice offered by their system.”

The overall condition of a pavement is the trigger to whether it will be repaved or not. “If it’s got any alligator or longitudinal cracking, or low spots, or need for profiling, it will be a candidate,” Smallwood said.

“Some streets have needed replacement,” Whaling said. “For those, we use the in-place repaving process to provide a stop-gap pavement, which allows us time to design and program enough money to do a complete reconstruction.” One such street repaved in advance of reconstruction is a major thoroughfare — Lovers Lane.

## ***University Park, Texas, proves hot in-place recycling is appropriate for urban grids as well as rural highways.***

“Prior to our in-place recycling, we execute spot repairs, like replacing heaved or failed bases,” said Jennifer Shell, P.E., civil engineer. “Typically, we will replace the expansive soil base — often with compacted, crushed concrete fines — place a concrete base to match the existing underlying pavement, and then pave asphalt on top, to be recycled later in the one-pass process.”

### **HIP recycling in urban environment**

Because hot-in-place recycling involves large, special-purpose mobile equipment, there is a belief that it's suited for long stretches of rural highway, but not for crowded urban environments. But University Park proves HIR is appropriate for tight urban grids as well as the hinterlands.

“We've used it on our two major traffic carriers, both of which are four-lane streets, carrying up to 20,000 vehicles per day, with very good success,” Smallwood said.

Also, the city's experience with traffic parking and congestion means that a one-pass process like HIR repaving is much less disruptive than cold milling, followed later by tack coat and overlay.

“All the residential streets have parking allowed on both sides of the street,” Smallwood said. “Getting the streets repaved is a real opportunity in that all those cars have to go somewhere else during the period of construction, and repaving minimizes the disruption. We're looking for a quality product that can be placed in a short period of time, and this process has worked well for us.”



**Westchester Drive at Highland Park High School, University Park, Texas, was HIP recycled in 2003.**

In fact, instead of complaints, public works gets compliments from citizens after repaving projects. “Quite honestly, we get accolades, even though most of our work is done through residential areas,” Smallwood said. “We've gotten comments each year suggesting that the get-in, get-out process really works for us. Our citizens do frequently express concerns on various issues, but they're also quick to let us know what we're doing right as well.”

A typical inquiry asks about the length of the project, because the resident will be hosting a bridge club or tea that afternoon. “We've done several projects where we've been able to work around social events on the street, due to the one-pass process,” Smallwood said.

“A lot of our resurfacing is related to curb-and-gutter replacement, and water and sewer work,” Whaling said. “We will do our replacements or utility work one year, and repave the street the second year.”

### **One-pass operation**

In Cutler's exclusive mobile repaving process, the existing pavement is heated to 300 degrees F. When in the resulting softened, pliant condition, the pavement is scarified to a depth of 1 inch, and in the repaving unit, a recycling agent that restores the viscosity of the aged asphalt is mixed into the scarified, reclaimed asphalt.

This reclaimed material then is reapplied and distributed with a screed as a 1-inch leveling course. While that material remains at a minimum 225 degrees F, a virgin hot-mix-asphalt overlay is placed over the recycled leveling course almost immediately.

Cutler's repaving machine scarifies, applies recycling agent, places the leveling course, and applies the new overlay simultaneously in one pass. That benefits road users because there is no delay between the time the pavement is recycled and the time a riding or friction course is placed, resulting in a safer work zone for road users and for contractor personnel. And because the hot virgin mix is placed over the heated, recycled leveling course, the process achieves a thermal bond between the recycled layer and the new layer.

“From an engineering point of view, there is no delamination between the recycled layer and the new overlay,” said Cutler's Rathbun. “That's very important in predicting life-cycle performance. The same heat that's used to take the road apart is used to put it back together, and the two layers are effectively compacted into one lift.”

The entire machine moves forward at a rate of 15 to 20 feet per minute. The virgin surface is applied by a four-section vibratory screed no more than 3 feet behind the leveling course screed, fed from a





## ***The combination of recycled original driving course, topped with fresh HMA, creates a long-lived, monolithic pavement.***

hopper at the front of the repaver via a drag/slat conveyor chain which brings the HMA through a tunnel along the length of the machine, to the paving screed. The result is a monolithic, 2-inch, finished pavement that is equivalent in ride to a 2-inch mill and overlay.

The complete HIR repaving pass takes place over a very short time, meaning traffic barricades can come down quickly, with all reclaimed material used on the spot without hauling, so user delays are kept at a minimum compared to conventional mill-and-fill recycling projects.

Traffic can drive on the new pavement as quickly as with conventional paving, while driveways and intersections are blocked for about 15 minutes. And the objectionable tack coat ahead of HMA paving is eliminated.

### **Documented long-term savings**

The repaver combination of complete restoration of recycled original driving course, topped immediately with a virgin hot-mix-asphalt lift, provides a long-lived monolithic asphalt pavement that holds up well to traffic and the hot Texas sun.

The repaved section's durability is such that University Park has been able to document annual pave-



**HIP-recycled Wentwood Drive is one of dozens of attractive streets in upscale University Park, Texas.**

ment life-cycle costs that keep decreasing year after year.

For example, Golf Drive was repaved in 1992 at a cost of \$4.93 per square yard. Still in very good condition, Golf exhibits a 2007 life-cycle cost of only \$0.33 cents per square yard.

Purdue Street was repaved in 1995 at a cost of \$5.03 per square yard, and 12 service years later, boasts a life-cycle cost of \$0.42 cents per square yard.

The performance is such that the city has steadily increased its use of repaving, from 33,631 square yards in 1992, to 41,510 in 1998, to 68,581 in 2004, to just over 90,000 square yards in 2005.

"We do what we feel is necessary," Smallwood said.

"We look closely at cost, but if one year we need to do twice as much work as the previous year, we'll do it. Our curb-and-gutter work has increased each year, as has our utility work, and that also is driving our increased use of repaving."

For University Park, that means finding the best solution among many possible solutions. "We have to balance the inconvenience that road work brings to our citizens against the need for a product that will get the job done for a long period of time," Smallwood said. "Repaving isn't the cheapest way to go, and it's not the most expensive way to go, but it's the optimal way to go for our needs." **BR**

