

## LIFE CYCLE COSTS, SPEED OF PLACEMENT DRIVE COUNTY'S HOT IN-PLACE RECYCLING

**HOT IN-PLACE RECYCLING HELPS FLORIDA'S URBAN HILLSBOROUGH COUNTY  
MEET PAVEMENT MANAGEMENT GOALS OF AFFORDABILITY, DURABILITY**

By Tom Kuennen

A major urban county in Florida is maximizing the value of its pavement management dollars – while enhancing its program's environmental sustainability – by utilizing hot in-place recycling topped with a virgin lift of asphalt in one pass.

Hillsborough County, Fla. – covering the heart of metro Tampa – is responsible for 3,250 centerline miles, with less than five miles of unpaved road. "It's a good-sized inventory for a county of our size," said W. Roger Cox, P.E., senior professional engineer, Engineering Division, Department of Public Works, Hillsborough County, Fla.

inspection truck, and we've now inventoried 1,500 centerline miles, nearly half of our total. In late 2009 we will begin on the second half of our inventory."

Using its new system, Hillsborough County has achieved an audited pavement condition index (PCI) of 76. "Our goals are established by the county board of commissioners, and our goal is to be at a 55 or higher system-wide," Cox said.

### PAVEMENT PRESERVATION PROCESS

Hillsborough County utilizes a preventive maintenance/preservation program in which streets are identified for future work. "Our thought is to spend money on roads that we can improve before they take that steep decline to a low PCI," Cox said. "We want to keep our good roads in good shape, and budget for those roads we have to reconstruct."

The county utilizes nearly the full "toolbox" of pavement preservation treatments articulated by the Foundation for Pavement Preservation (FP<sup>2</sup>) and the Federal Highway Administration (FHWA). "We use several different types of treatments for several different kinds of roads," Cox said. "We have our local roads, arterials and collectors, so we maintain a primary, secondary and tertiary system ranking. You can go into a lot deeper segregation of pavement types, but we've found that if you get too complicated, even though you are adding more calculations, you are not really addressing the specific needs on which you have to spend money."

Therefore, the county tries to match the right treatment, with the right pavement, applied at the right time. MicroPAVER helps the county identify candidate pavements. In addition, an inspection group verifies what is indicated in the database. The program is a good tool to plan with, Cox said, but it can't be used all by itself without field verification.

"We evaluate the road condition-wise, and then utilize the right treatment appropriate for that defect," Cox said. "We utilize single- and double-course micro surfacing for roads that are cracked and raveled. We have a crack-seal program. And we have just started a thin-lift overlay program."

The county uses MicroPAVER pavement management software to inventory streets, track condition and plan maintenance. "We transitioned from a previous system, using an overall condition index on a 1 to 10 scale," Cox said. "This took into consideration seven defects, and evaluated the ride indexes.

"MicroPAVER is different," Cox said. "It allows us to break our system into segments, within which you perform samples. We then do an in-depth evaluation of those samples within the section. It's a visual inspection system, with 19 defects available. We developed our own pavement



**Hot in-place recycling  
with the Cutler  
Repaving process  
helps keep county  
PCI high.**

The county's pavement management program also tracks streets suited for resurfacing, although resurfacing of pavements is considered a capital, as opposed to a maintenance, expense. "The resurfacing budget is not contained in the transportation maintenance division, but is more of a planned expense," Cox said. These resurfacing capital pavement projects include mill-and-fill, hot mix asphalt overlays, and hot in-place recycling.

### REPAVING HILLSBOROUGH COUNTY

As part of its capital expense budget, hot in-place recycling solves Hillsborough County's need to both spend limited funds on durable pavements, while recycling existing pavements as it develops an environmentally sustainable program. Hillsborough County DPW's stated mission is to construct and maintain essential transportation and storm water systems, while focusing on safety and environmental stewardship.

Hillsborough was the first county in Florida to receive national accreditation by the American Public Works Association for delivering these services to citizens with utmost efficiency, cost effectiveness, and quality. Hot in-place recycling helps the county build long-lasting, smooth pavements while optimizing the county's environment.

"You have to have the right treatment on the right road at the right time," Cox said. "It's the absolute key to a cost-effective program. If you put the wrong treatment out there it will not have the survival rate that you need. Our hot in-place recycling is aimed at our arterials, for the most part."

For its growing hot in-place recycling program, Hillsborough County uses a process from Cutler Repaving, Inc., Lawrence, Kan. With hot in-place recycling, the existing pavement is heated to 300 deg F. Once in a softened condition, the pavement is scarified to a depth of 1 in., and 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 deg F, a virgin hot mix asphalt overlay is placed over the recycled leveling course.

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.

### THERMAL BOND BETWEEN LIFTS

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 vice president John 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."

"It's an accepted methodology," Cox said. "The thing I like about it is that placement of the recycled mat and virgin lift on top takes place simultaneously. The bond between the two lifts is homogeneous, laid flat-in. Also, the top lift is made to our asphalt spec; we know exactly what it is, so I know what my customers are driving on. And with the bond between the lifts as strong as it is, we've never had a delamination with that treatment. We've put it on roads with tremendous volumes of traffic, and we've not had a failure."

The county has done cores of the recycled pavements and found the lifts to be seamless. "We have roads that were repaved a decade ago and they are not coming apart," Cox said.

### ENHANCED SPEED OF PLACEMENT

The speed of placement is another benefit, critical on urban arterials lined with businesses that depend on vehicular traffic for profits. "I like the speed of the process," said Robert Swain, senior engineering specialist, Projects Management, Engineering Division, Hillsborough County DPW. "With mill-and-resurface, several nights may go by before the pavement is overlaid. We try to spec that pavement be replaced within 48 hours, but you still have cars driving on the rough surface. We avoid that with hot in-place recycling."

And the speed of the process dictates where it might be used in the county, Cox said. "That goes into the decision into what road will be recycled," Cox said. "It's what defect is present, what the traffic loads are, who the customer is, where is it, and when can we do it? All that figures into the decision along with what kind of gain in longevity will the county get in the long run."

*West Shore Blvd. was recycled in 1997, and in 2009 had a PCI in the mid-70s with no additional maintenance.*





**Hillsborough County estimates recycling saves 30 percent over comparably sized mill-and-overlay.**

The fact that once the recycling/paving train has passed, the project is done, also bears into its use in commercial areas. “Any time we have any lane closures or resurfacing, it has a big impact on local businesses,” Swain said. “With this process, we can collapse that lane closure right behind the machine, so they get out of the way much faster, and keeps the calls down from the businesses.”

“People don’t want us on the road,” Cox said. “Our attitude is to get in, fix it, finish, and get out. With an arterial, we don’t want to be out there every seven years. Instead we want to do the best job we can, with a process that will last, so we don’t have to disrupt drivers any further.”

The process also does not use a tack coat, which can be tracked by tires and shoe soles into parking lots and businesses.

In addition to the benefits of recycled material, hot in-place recycling as executed by Cutler provides a smaller energy consumption and emissions profile cumulatively than nearly every other surface reconstruction method.

In Hillsborough County, use of Repaving is predicated by the condition of the pavement. “If cracking goes well beyond the surface layer, we are looking at a structural issue that will have to be addressed through our reconstruction program,” Swain said. “If not, we can address it with Repaving.”

In fiscal 2007, the county executed over 200,000 sq yd of hot in-place recycling; that’s up

from 60,000 sq yd 10 years ago. Another 10 centerline miles of hot in-place recycling is planned for 2009. Cox estimated that hot in-place recycling saves the county at least 30 percent over a comparable-sized mill-and-overlay. “The savings come principally from the milling costs, which are high,” Cox said. “And whenever you mill off two inches, you have to put two inches back. With hot in-place recycling we’re only putting an inch back. We are better-utilizing what’s there, I’m fixing my defects, and I’ve got cost savings.”

### **BETTER SERVING CUSTOMERS**

In the meantime, the combination of an effective pavement management program – combined with a quality hot in-place recycling program – is providing the county what it needs to better serve its citizen customers.

“We’ve found that if you have sound engineering science that makes sense to the average citizen, you will have a successful program,” Cox said. “If you don’t, that’s when politics get involved, because people will think that’s the only way they will get what they need. They will become very focused on where they live. Most people will not complain about an arterial, but about the local street on which they live first.

“Our program has the ability to plan projects for both maintenance treatments and resurfacing forward into years,” Cox said. “If someone calls


and asks 'what are you going to be doing in my neighborhood', we have the ability to check the programming right on the screen using a visual tool. You can speak to him intelligently about what fiscal year you will be there, what treatment you will use, what else you have done in the area, what you did three years ago, and what you hope to do in two years. For the most part, that's been the key to our success with our customers; being informed, and being able to speak intelligently about what's going on, specifically about their street."

"Once we talk with someone, and give him a certain date, then we will tag that as a commitment," Swain said. "Everyone will see then that the street can't be removed from the list. It's a good program that helps us all but guarantee that the work will be done the year scheduled. And it's even better if there is a budget cut, because we can tell which streets we've already committed to maintaining and which we haven't."

And hot in-place recycling will continue to be part of the mix that keeps those citizen customers happy.

Cox said in terms of life cycle costing, the county was getting as much out of its hot in-place recycling projects as a mill-and-fill. The numbers bear this out. For example, heavily traveled West Shore Blvd. and Broadway Ave. constituted the first work Cutler Repaving did for Hillsborough County, in 1997. "Our price at that time was \$3.46 per sq yd, so the pavement lifecycle cost to-date in 2009 is \$0.29 per sq yd," Cutler's Rathbun said.

With no additional maintenance, in 2009 both roads had a PCI in the mid-70s, Cox said.

"We will continue to use hot in-place recycling," Cox said. "I don't see us backing away from it at all. Our hot in-place recycling program has been very successful and I think that we will continue to build on that success, because it saves the county money." 

**Recycle with Cutler.** For more information: p. 785-843-1524 F. 785-843-3942 [cutlerrepaving.com](http://cutlerrepaving.com)

**CUTLER Repaving, Inc.**  
921 EAST 27th STREET • LAWRENCE, KANSAS 66046

