ADDITIONALLY SELECTED TECHNOLOGIES 2012

Hot In-Place Recycling Fact Sheet

The Challenge

With over three million miles of paved roads in the United States and fewer dollars to care for them, the need for high-quality and cost-effective alternatives to virgin paving techniques has never been greater.

While a large number of state DOTs have tried one or more hot in-place asphalt pavement recycling methods, these processes remain under-utilized nationwide based on surveys of the states. A 1994 synthesis survey found that while 65 percent of state highway agencies had tried hot in-place recycling (HIR), only 20 percent were employing the method on a regular basis.

More recently, a 2011 NCHRP synthesis survey reported that 34 of 45 responding state DOTs had experience with using HIR but only 21 continued to use it. The synthesis author reported common reasons for unhappiness were cost overruns and poor performance experiences. But when the problematic projects were looked at closely, poor project selection was frequently the root of the problem.

The three most common hot in-place recycling methods are resurfacing, repaving, and remixing.

–NCHRP Synthesis 421

Hot In-Place Recycling Paving Train Including Multiple Pavement Heaters. Photo: American Recycling and Reclamation Association.

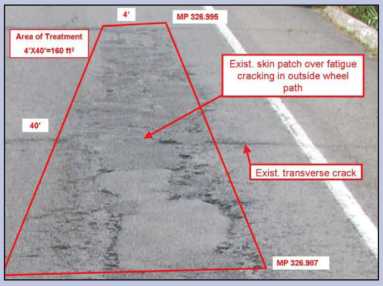
Hot In-Place Recycling Pavement Repair Equipment.

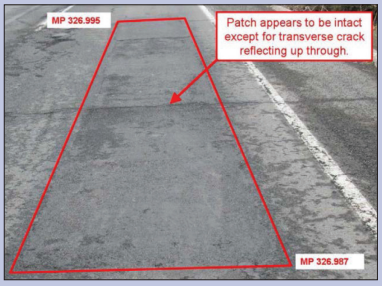
What Types of Hot In-Place Recycling Are Available?

The three most common hot in-place recycling methods are resurfacing, repaving, and remixing. Resurfacing involves heating and scarifying the surface to the depth being recycled in one equipment pass, followed by conventional compaction. A thin overlay of new hot mix asphalt (HMA) is usually placed on top of the recycled layer soon thereafter. The repaving recycling process achieves heating, scarifying, and placement of the new HMA layer above the recycled layer simultaneously, with compaction equipment then following. The remixing process heats, scarifies, and then mixes the paving materials being reclaimed with asphalt additives, new aggregate, and often new HMA. This blend of materials is then re-laid on the roadway and conventionally compacted.

A fourth HIR method has recently been developed and is primarily used for patching at this time. This method has provided the Utah DOT a superior option to placement of cold mix when cold-weather patching is required. The Utah DOT reports this method to be the only method they have found to reliably provide a durable cold-weather patch.

A 2011 NCHRP synthesis survey reported that 34 of 45 responding state DOTs had experience with using HIR but only 21 continued to use it. The synthesis author reported common reasons for unhappiness were cost overruns and poor performance experiences. But when the problematic projects were looked at closely, poor project selection was frequently the root of the problem.





Heatwurx™ asphalt pavement repair demonstrations on US 89 in Utah, (L-R): Before, after and 5 months later.

What are the Benefits of HIR?

- Reduced project costs by optimizing the value of in-place materials
- Shortened construction times than with the mill and fill process
- Fewer traffic-flow disruptions than with the mill and fill process, resulting in environmental and safety benefits
- Reduced use of new construction materials, thereby slowing exhaustion of quality material sources
- Exceptionally good ride quality is frequently obtained

Acknowledgements

NCHRP Synthesis 421, authored by Mary Stroup-Gardiner, was a primary reference in preparing this fact sheet. This helpful document is found at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_421.pdf.

The Solution

While long-term users of HIR are sold on its benefits, they acknowledge that proper project selection is essential to obtaining desirable results. Several best practice project selection considerations follow.

1. The pavement must be structurally sound for the expected traffic level, without high levels of distress below about two inches.
2. For low traffic level roadways, it's important to be certain the pavement can support the heavy HIR construction equipment to be used.
3. Pavement surfaces containing multiple seal coats or asphalt-rubber binder or which are composed of paving mixtures designed to be porous are poor HIR candidates because of difficulties obtaining satisfactory heat levels throughout the layer being recycled. If adequate heat levels can be obtained, the composition and properties of the recycled mixture are often problematic.
4. Pavements that are heavily crack sealed and/or patched to the point of assuring wide swings in binder content and mixture composition are poor candidates.
5. For a high chance of successful HIR application, surface layers of selected pavements should not have severely oxidized asphalt cement because of difficulty in properly blending with rejuvenating materials.
6. Good candidate roadways do not contain tight turns because of the large size and difficulty in maneuvering full-lane-width HIR construction equipment. Roadways with steep grades are also less than desirable candidates because of the size and weight of the required equipment.
7. The most appropriate HIR method should be selected for the given roadway. The remixing method should be used when the pavement layer being recycled contains an over abundance of asphalt cement, thereby allowing recapture of necessary stability through rebalancing the asphalt and aggregate blend.

Achieving necessary pavement heating without charring and selecting effective additives to rejuvenate the aged pavement material are also keys to success. Technology improvements made over the years have minimized the potential for problems arising in these areas.

Contacts:

Rukhsana Lindsey
Utah Department of Transportation
801-965-4196
rlindsey@utah.gov

Cameron Kergaye
Utah Department of Transportation
801-965-2576
ckergaye@utah.gov

Mary Stroup-Gardiner
Gardiner Technical Service, LLC
530-809-083
gts_llc@hotmail.com

Magdy Mikhail
Texas Department of Transportation
512-465-3686
magdy.mikhail@txdot.gov