

HOT IN-PLACE RECYCLING (HIR)

Presented by:
Patrick A. Faster



Who is **GALLAGHER** **ASPHALT** ?

- **Founded in 1928**
- **3rd-Generation, Family-owned Highway Paving Contractor**
- **Asphalt Plants throughout the Chicagoland area**
- **Well-respected and active member of NAPA, ARTBA, NCAT**
- **Hot In-place Recycler (HIR) for over 65 years**
- **3rd Largest HIR Company in the United States**



Who is



Chicago Testing
Laboratory, Inc.



- **Founded in 1912**
- **A Full-Service Engineering and Construction Management firm**
- **Industry leader in QC/QA of asphalt, asphalt materials, liquids, aggregates, concrete and soils**
- **Provides testing, inspection, training, consulting & research**
- **Well-respected and active member of NAPA, ARTBA, NCAT**
- **Provides over 150 years of combined expertise, state-of-the-art facilities and a high degree of professionalism**







U.S. Department of Transportation
Federal Highway Administration

FHWA RECYCLED MATERIALS POLICY Announced – February, 2002



ADMINISTRATOR'S MESSAGE:

The National Highway System (NHS) is extensive, with over 160,000 miles of highway pavements and over 128,000 structures, built using large quantities of asphalt, concrete, steel, and aggregate, and smaller quantities of nonferrous metals, plastics, and other materials. Much of the system was constructed in the 1960's and 70's and is in need of major rehabilitation or total reconstruction; and much of the materials used to build that system can be recycled for use in the new construction.

In order to carry out the mission of the FHWA, i.e., to “improve the quality of the Nation’s highway system,” the NHS must be properly preserved, maintained, rehabilitated, and when necessary, reconstructed. Maintenance of highways and associated structures is critical to our ability to provide the safest, most efficient roadway system possible, while simultaneously providing the greatest level of protection to the human and natural environment.

The same materials used to build the original highway system can be re-used to repair, reconstruct, and maintain them. Where appropriate, recycling of aggregates and other highway construction materials makes sound economic, environmental, and engineering sense. The economic benefits from the re-use of nonrenewable highway materials can provide a great boost to the highway industry. Recycling highway construction materials can be a cost-saving measure, freeing funds for additional highway construction, rehabilitation, preservation or maintenance.



The FHWA policy is:

1. Recycling and reuse can offer engineering, economic and environmental benefits.
- 2. Recycled materials should get first consideration in materials selection.**
3. Determination of the use of recycled materials should include an initial review of engineering and environmental suitability.
4. An assessment of economic benefits should follow in the selection process.
5. Restrictions that prohibit the use of recycled materials without technical basis should be removed from specifications.

FHWA has a longstanding position that any material used in highway or bridge construction, be it virgin or recycled, shall not adversely affect the performance, safety or the environment of the highway system. This remains a cornerstone in our policy statement. In order to foster innovation and future development we support research, field trials, and project demonstrations showcasing the findings.



ARRA Recycling Disciplines

- **Cold Planing / Milling**
- **Hot In-place Recycling (HIR)**
- **Cold In-place Recycling (CIR)**
- **Full Depth Reclamation**
- **Soil Stabilization**



ARRA Sub-categories within the HIR Discipline

- **Surface Recycling** (ie. Heater Scarification)
- **Remixing**
- **Surface Repaving**



Gallagher Asphalt's Hot In-place Recycling Options

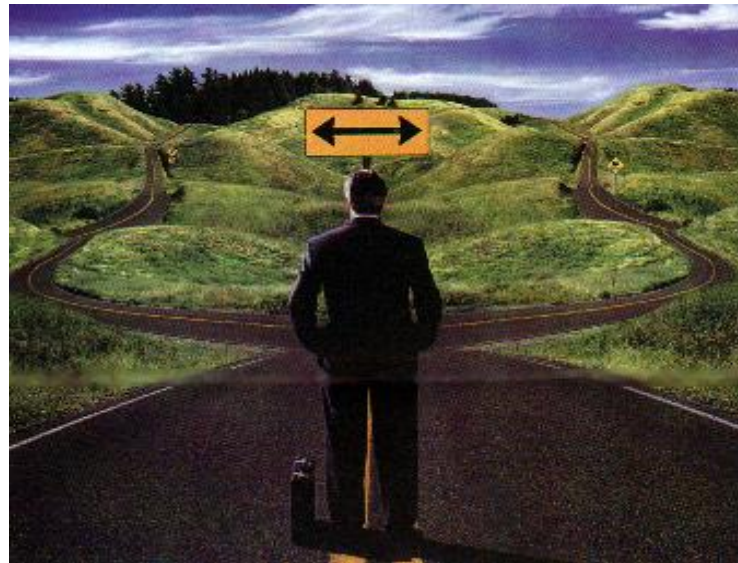
- **Re-HEAT**
- **Surface Recycling (Heater Scarification)**



HIR

Where Does IT Fit In?

Re-Construction



Preservation



Value of "Timely" Pavement Maintenance

Pavement Condition

Very Good

Good

Fair

Poor

Very Poor

Time for HIR

Time (Years)

0

2

4

6

8

10

12

14



Typical Grind & Overlay

- Grind to a 2" depth
- Haul grindings away
- Tack course
- Haul leveling course to jobsite
- Place level course
- Roll it
- Haul surface course to jobsite
- Place surface course
- Roll it



So, Re-HEAT or Conventional Heater Scarification?



What is the Hot In-place Recycling **SURFACE METHOD?**

Hot In-place Recycling Surface Method is an on-site, in place, pavement preservation method that consists of **heating, scarifying, mixing, replacing and re-compacting** the existing bituminous pavement.



What is the Conventional Heater Scarification SURFACE METHOD?



Surface Recycling: Step 1

1st Pre-Heater takes pavement temp to 180 – 200 degrees



Surface Recycling: Step 2

2nd Heater takes pavement temp to 280 – 300 degrees



Surface Recycling: Step 3

Introduction of rejuvenating agent



Surface Recycling: Step 4

Spring-loaded tines set hydraulically at prescribed depth will drag over existing structures to avoid damage



Surface Recycling: Step 5

Full width reversible augers to re-mix



Surface Recycling: Step 6

Re-profiling with standard paving screed

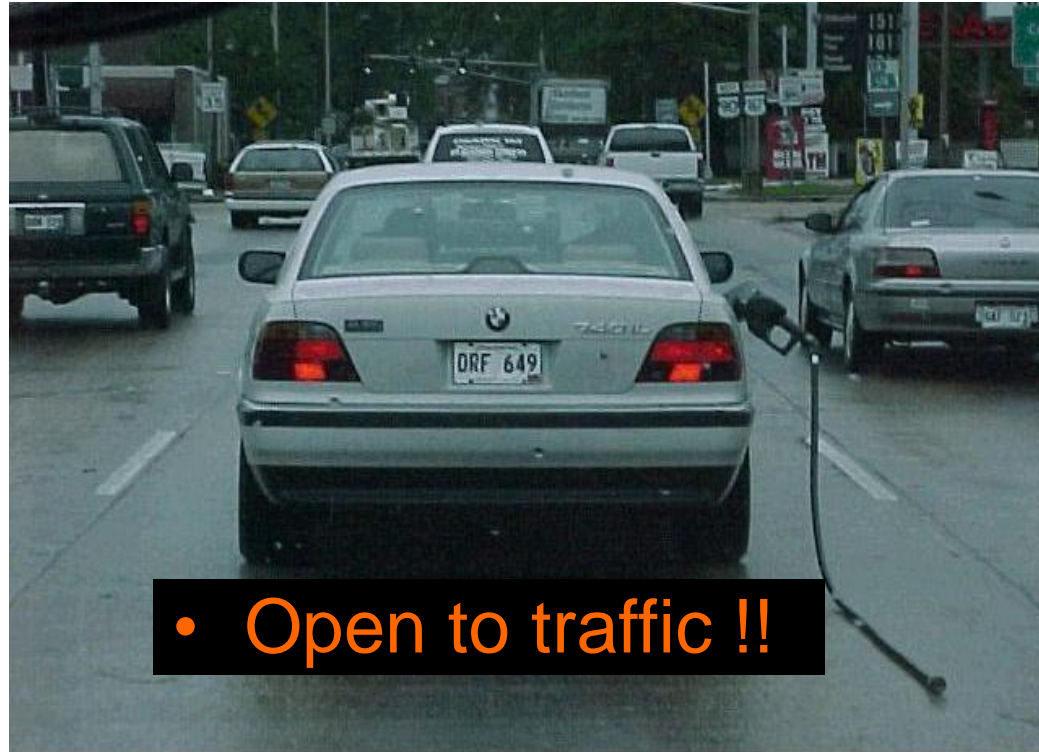


Surface Recycling: Step 7

Roller



Open to Traffic. . .



Surface Recycling: Step 8

The now re-plasticized asphalt is ready to receive its final surface course; such as:

- Hot mix
- Micro Surface
- Slurry Seal
- Chip Seal



What is the Hot In-place Recycling Method?



Re-HEAT is an on-site, in-place, pavement preservation method that consists of heating the existing pavement, removing the top surface course, adding an asphalt rejuvenating emulsion, mixing the material uniformly in an on-board mixing drum, re-laying the recycled material, followed by compacting.





Step 1: Heating the Existing Pavement

The road surface is softened with radiant convection heat.





Step 2: Removing Top Surface Course

A rotary blade system dislodges the material for processing.





Step 3: Adding Asphalt Emulsion

Additives are injected to reconstitute the rejuvenated asphalt.





Step 4: On-Board Mixing Plant

A heated mixing plant uniformly blends the additives with the asphalt.





Step 5: Relaying Recycled Material

The rejuvenated asphalt is immediately placed to the correct slope and grade.





Step 6: Compaction

While still hot, the newly recycled asphalt pavement is rolled to final compaction.





E81

GALLAGHER
ASPHALT



E81

GALIGH
ASPH

REJUVENATOR
(500 GAL)





CARLS
EZIV

Made in USA

HOTMIX 8

Open to Traffic. . .



Rejuvenating Agent Application Rate

Both HIR processes will introduce a rejuvenating agent typically at the rate of $1/10^{\text{th}}$ gallon per square yard.



Prerequisites for HIR

1. Pavement must be structurally-sound with no base failures
2. Pavement must have at least 3” of hot mix asphalt



What Types of Asphalt Pavements Are Candidates for Hot In-place?











Waukesha County, Wisconsin





St. Louis, Missouri





Hot In-place Comparison

	Re-HEAT	Heater Scarification
Need for Surface Treatment /Overlay	No	Yes
Materials Added During Process	Asphalt Rejuvenator	Asphalt Rejuvenator
SYs per Day	4,500	9,000
Pavement Penetration Depth	Up to 2" (Depending on Surface Course Thickness)	Up to 1.5" (Depending on Surface Course Thickness)
In-Place Mixing Capability	On-board drum mixer	Scarifying Tines & Augers
Thermal Bond Effect	Moderate - High	Low - Moderate
Mat Re-Placement	Conventional paving screed	Conventional paving screed
Compaction Equipment	Double Drum Vibratory Roller	Double Drum Vibratory Roller
Budgetary Price per SY	\$7.00 Total	\$3.50 plus Surface Treatment/Overlay



So What Have We Done ?



Go Green, Save Green!

- Saves time & reduces 'user delays'
- Minimizes the demand on oil & aggregate (non-renewable resources)
- Re-uses/recycles the existing materials – liquid asphalt & aggregates
- Eliminates milling dust & hassles
- Eliminates trucking pollution & traffic
- Reduces overall emissions by 65%
- Reduces carbon footprint by 80%
- Uses propane – a cleaner energy source
- Uses a dual stage incineration system to protect air quality during operation



	\$/SY	Save	\$/Mile	Save
Traditional 2" mill and fill with 2" surface mix vs HIR with 1" surface overlay	\$9.30 \$6.65	28%	\$130,944.00 \$93,632.00	\$37,312.00
Traditional 2" mill and fill with 2" surface mix vs HIR with 1" surface overlay with edge milling 1" depth.	\$9.30 \$6.90	26%	\$130,944.00 \$97,152.00	\$33,792.00
PG& C with 2.5" binder and 1.5" Surface vs PG& C with 2" HIR and 1.5" surface	\$12.79 \$9.83	23%	\$180,136.00 \$138,336.00	\$41,800.00
Traditional 2" mill and fill with 2" surface mix vs HIR with Chip Seal Surface	\$9.30 \$4.40	53%	\$130,944.00 \$61,952.00	\$68,992.00
Traditional 2" mill and fill with 2" surface mix vs 1" Mill, HIR, 1" surface overlay	\$9.30 \$8.15	12%	\$130,944.00 \$114,752.00	\$16,192.00
Traditional 2" mill and fill with 2" surface mix vs 1" Mill, HIR, 1.5" surface overlay	\$9.30 \$9.73	-5%	\$130,944.00 \$136,928.00	-\$5,984.00
Traditional 2" mill and fill with 2" surface mix vs Re-HEAT	\$9.30 \$7.00	25%	\$130,944.00 \$98,560.00	\$32,384.00



Used by Many DOTs:



New York State
Department of Transportation



Thank You! Any Questions?

www.hotinplacerecycling.com

