Hot-in-Place Recycling

Presented by:

Patrick A. Faster

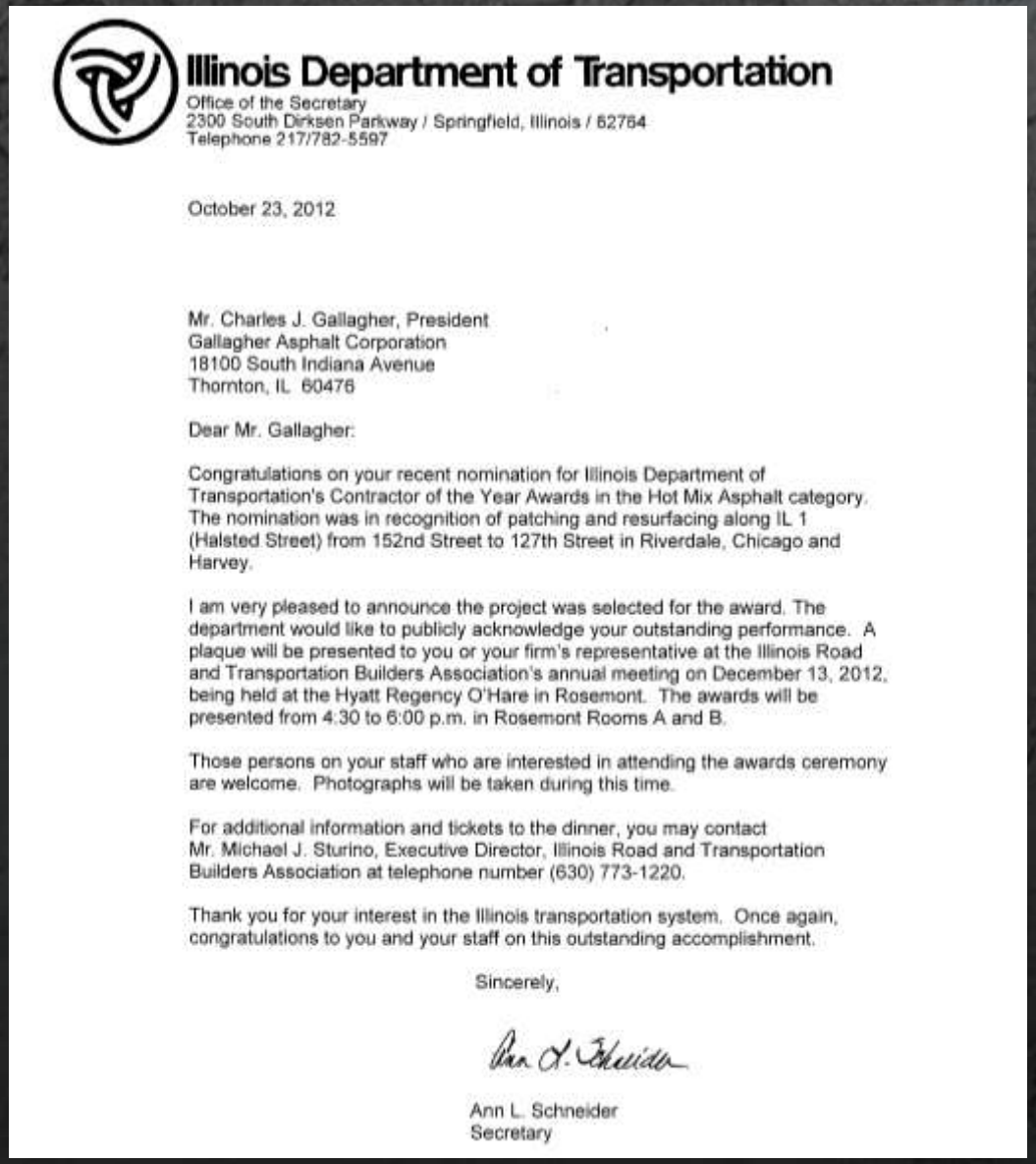
Who is GALLAGHER ASPHALT?

- 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 for over 35 years
- 3rd Largest HIP Recycler in the U.S.

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

2012 IDOT Contractor of the Year



Illinois Department of Transportation
Office of the Secretary
2300 South Dirksen Parkway / Springfield, Illinois / 62764
Telephone 217/782-5597

October 23, 2012

Mr. Charles J. Gallagher, President
Gallagher Asphalt Corporation
18100 South Indiana Avenue
Thornton, IL 60476

Dear Mr. Gallagher:

Congratulations on your recent nomination for Illinois Department of Transportation's Contractor of the Year Awards in the Hot Mix Asphalt category. The nomination was in recognition of patching and resurfacing along IL 1 (Halsted Street) from 152nd Street to 127th Street in Riverdale, Chicago and Harvey.

I am very pleased to announce the project was selected for the award. The department would like to publicly acknowledge your outstanding performance. A plaque will be presented to you or your firm's representative at the Illinois Road and Transportation Builders Association's annual meeting on December 13, 2012, being held at the Hyatt Regency O'Hare in Rosemont. The awards will be presented from 4:30 to 6:00 p.m. in Rosemont Rooms A and B.

Those persons on your staff who are interested in attending the awards ceremony are welcome. Photographs will be taken during this time.

For additional information and tickets to the dinner, you may contact Mr. Michael J. Sturino, Executive Director, Illinois Road and Transportation Builders Association at telephone number (630) 773-1220.

Thank you for your interest in the Illinois transportation system. Once again, congratulations to you and your staff on this outstanding accomplishment.

Sincerely,

Ann L. Schneider
Secretary


ARRA

ARRA

PPRA
Pavement Preservation & Recycling Alliance

ncpp
National Center for Pavement Preservation
MICHIGAN STATE UNIVERSITY
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

U.S. Department of Transportation
Federal Highway Administration

AEMA
Asphalt Emulsion Manufacturers Association

ISSA
PRESERVING PAVEMENT
International Slurry Surfacing Association
Slurry & Micro Surfacing, Chip Sealing & Crack Treatment

FP²

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.

Congress declares that it is in the national interest to promote the use of innovative technologies and practices that increase the efficiency of construction of, improve the safety of, and extend the service life of highways and bridges…The innovative technologies and practices described in paragraph (1) include state-of-the-art intelligent transportation system technologies, elevated performance standards, and new highway construction business practices that improve highway safety and quality, accelerate project delivery, and reduce congestion related to highway construction…such as… '(ii) innovative construction equipment, materials, or techniques, including the use of in-place recycling technology and digital 3-dimensional modeling technologies;

Recycling Course 101

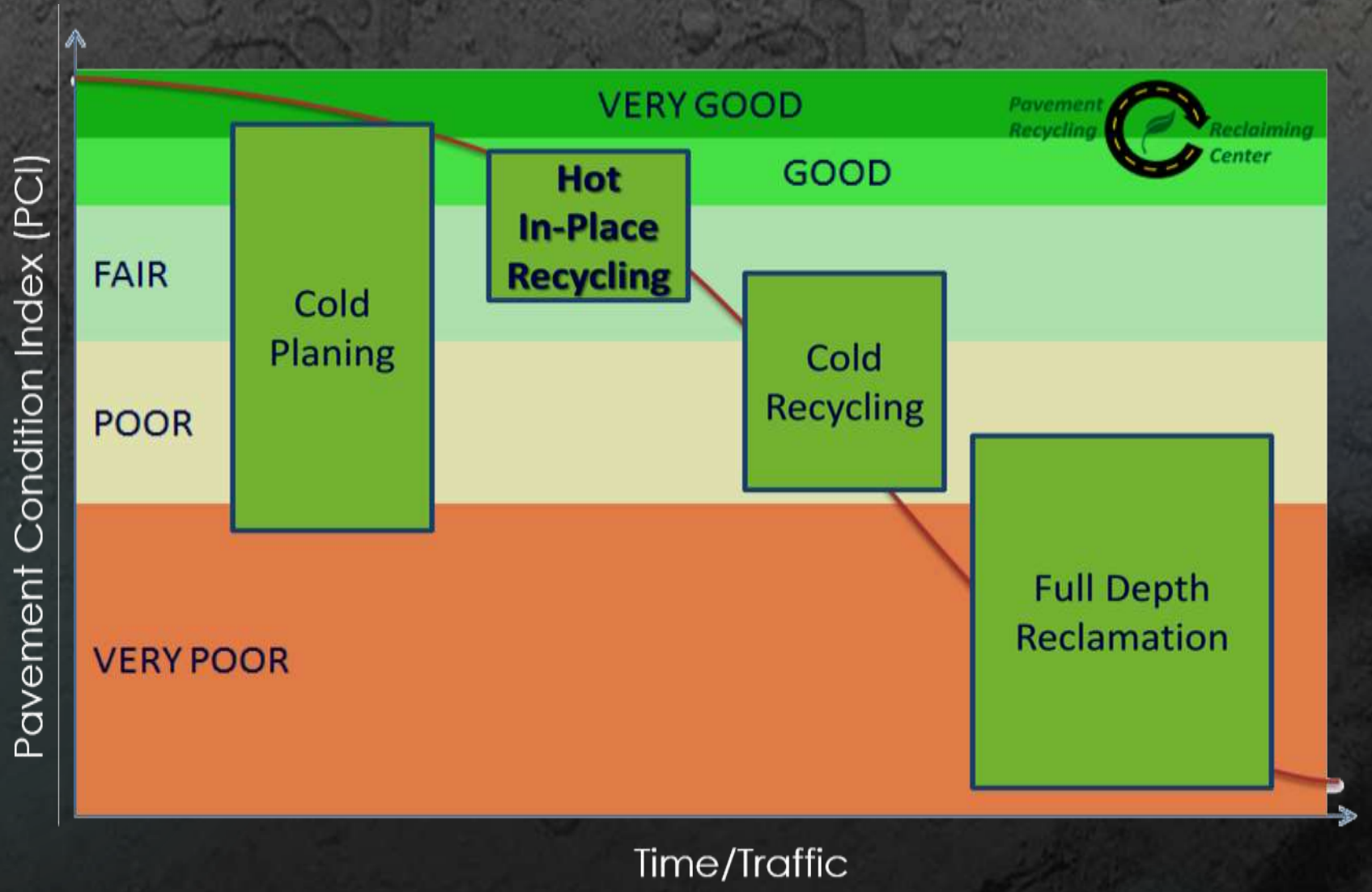
Not Your Father's…..

ARRA Recycling Disciplines

	Service Life	Approx. Cost (per Sq. Yd)
• Cold Planing / Milling	Anytime	$1 - $3
• Hot in Place Recycling	5-10 Years	$4 - $5
• Cold in Place Recycling	7-13 Years	$8
• Full Depth Reclamation	15 Years Plus	$18 - $23
• Soil Stabilization	15 Years Plus	FDR + $3

Right Road • Right Fix • Right Time

Inventory Assess Perform


Pavement Condition Index (PCI)
VERY GOOD
GOOD
FAIR
POOR
VERY POOR
Pavement Recycling
Reclaiming Center
Cold Planing
Hot In-Place Recycling
Cold Recycling
Full Depth Reclamation
Time/Traffic

ARRA Sub-categories within the HIR Discipline

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

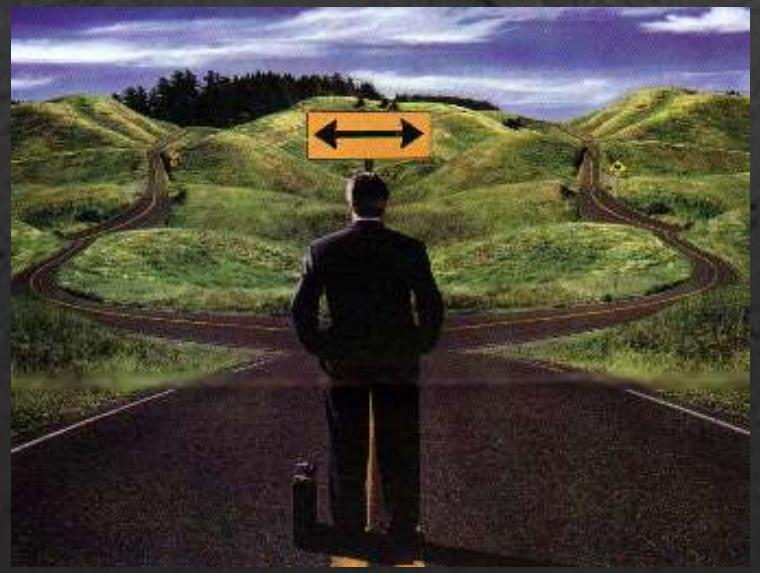
Gallagher Asphalt's Hot-in-Place Recycling Options:

- Surface Recycling (Heater Scarification)
- Re-HEAT

HIR

Where Does IT Fit In?

Re-Construction



Preventive

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

What is the Hot-in-Place Recycling **SURFACE METHOD?**

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

Surface Recycling: Step 1

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

Surface Recycling: Step 2

Hot in Place SCARIFY

- 2nd Heater takes pavement temp to 280 – 300 degrees

Surface Recycling: Step 3

Hot inPlace SCARIFY

- Introduction of rejuvenating agent

Surface Recycling: Step 4

Hot in Place SCARIFY

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

Surface Recycling: Step 5

Hot in Place SCARIFY

- Full width reversible augers to re-mix

Surface Recycling: Step 6

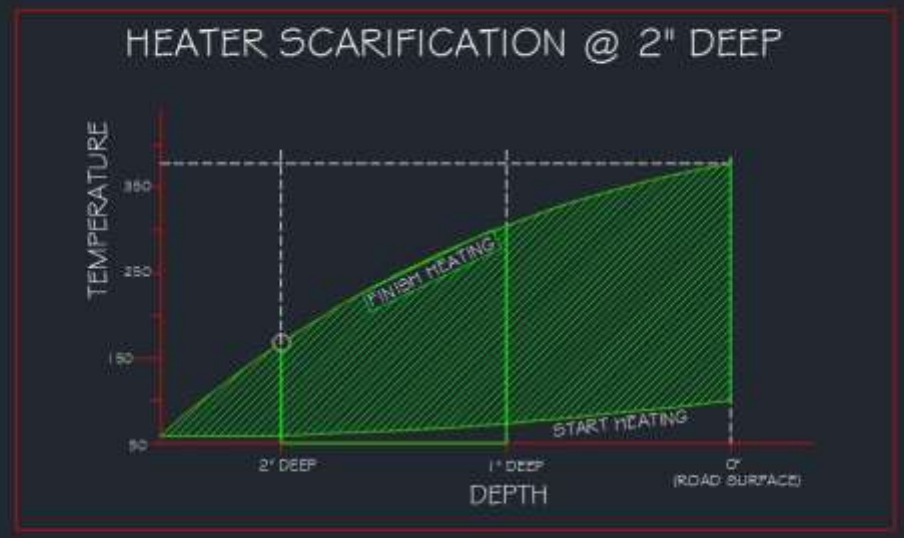
Hot in Place SCARIFY

- Re-profiling with standard paving screed

Surface Recycling: Step 7

- Roller

Open to Traffic. . .


HEATER SCARIFICATION @ 2" DEEP
TEMPERATURE
350
250
150
50
FINISH HEATING
START HEATING
2" DEEP
1" DEEP
0"
(ROAD SURFACE)
DEPTH

Surface Recycling: Step 8

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

- Hotmix
- Microsurface
- Slurry Surface
- Chip Seal

What is Hot in Place Re-HEAT METHOD?

Re-HEAT is an on-site, in place, pavement rehabilitation 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.

Open to Traffic. . .

Rejuvenating Agent Application Rate

Both HIR process will introduce a rejuvenating agent typically at the rate of 1/10th gallon per square yard.

Pre-requisites for HIR:

- Pavement must be structurally-sound with no base failures
- Pavement must have at least 3” of hotmix asphalt

What Types of Asphalt Pavements Are Candidates for Hot-in-Place?

Typical Candidates for HIR:

NON-Candidates for HIR:

Wisconsin

Missouri

Minnesota

Indiana

Ohio

Tennessee

New Jersey

Oregon

Georgia

Hot-in-Place Comparison

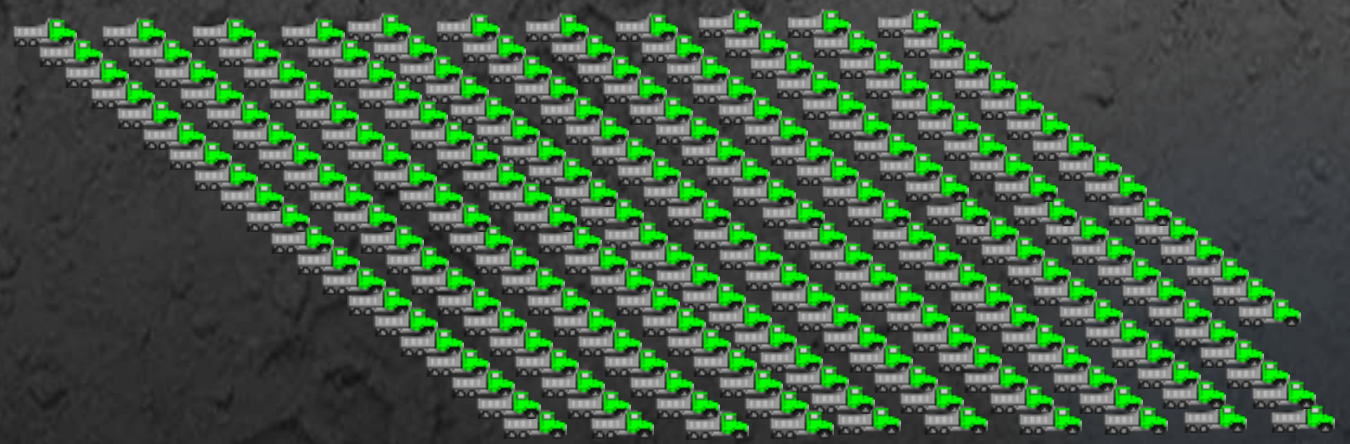
	Hot in Place Re-HEAT	Hot in Place SCARIFY
Need for Surface Treatment /Overlay	No	Yes
Materials Added During Process	Asphalt Rejuvenator	Asphalt Rejuvenator
SYs per Day	4,000	9,000
Pavement Penetration Depth	Up to 2" (Depending on Surface Course Thickness)	Up to 1.5" (Depending on Surface Course Thickness)
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	$13.50 Total	~ $4.50 plus Surface Treatment/Overlay

So What Have We Done?

Comparison: # of Truck Trips / Mile

Standard 2 ¼ " Mill & Overlay

(215 trucks)



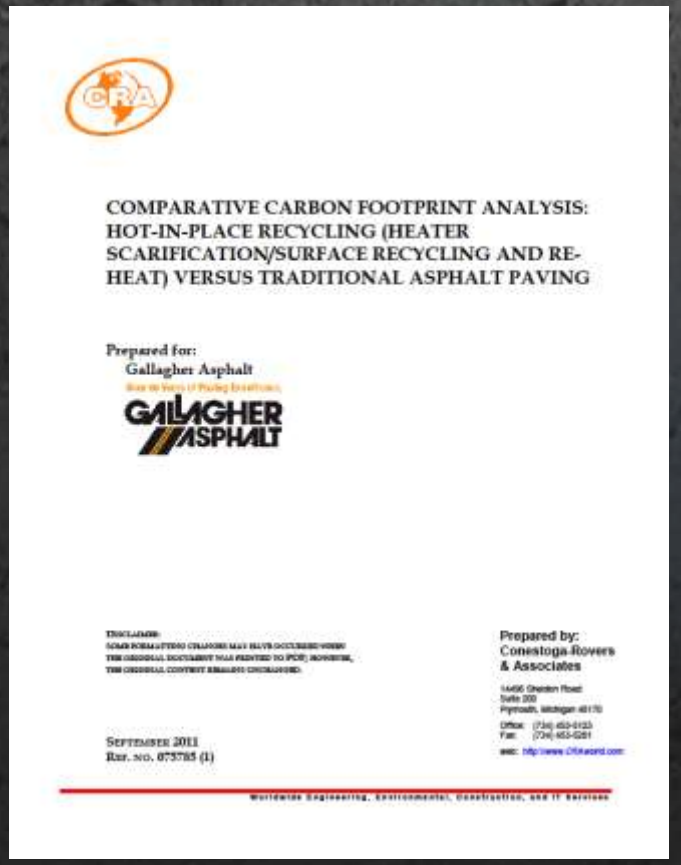
HIR w/ 1" Hotmix Overlay

(53 trucks)

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 carbon footprint by 28-63%
- Uses propane – a cleaner energy source
- Uses a dual stage incineration system to protect air quality during operation

Conestoga-Rovers Carbon Footprint Analysis



COMPARATIVE CARBON FOOTPRINT ANALYSIS: HOT-IN-PLACE RECYCLING (HEATER SCARIFICATION/SURFACE RECYCLING AND RE-HEAT) VERSUS TRADITIONAL ASPHALT PAVING

Prepared for:
Gallagher Asphalt

GALLAGHER ASPHALT

Prepared by:
Conestoga-Rovers & Associates

SEPTEMBER 2011
REF. NO. 075785 (1)

Conestoga-Rovers Carbon Footprint Analysis

- Versus Conventional asphalt paving with 20% RAP Hotmix:
  - Heater Scarification emits 28% less GHGs
  - Re-HEAT emits 62% less GHGs

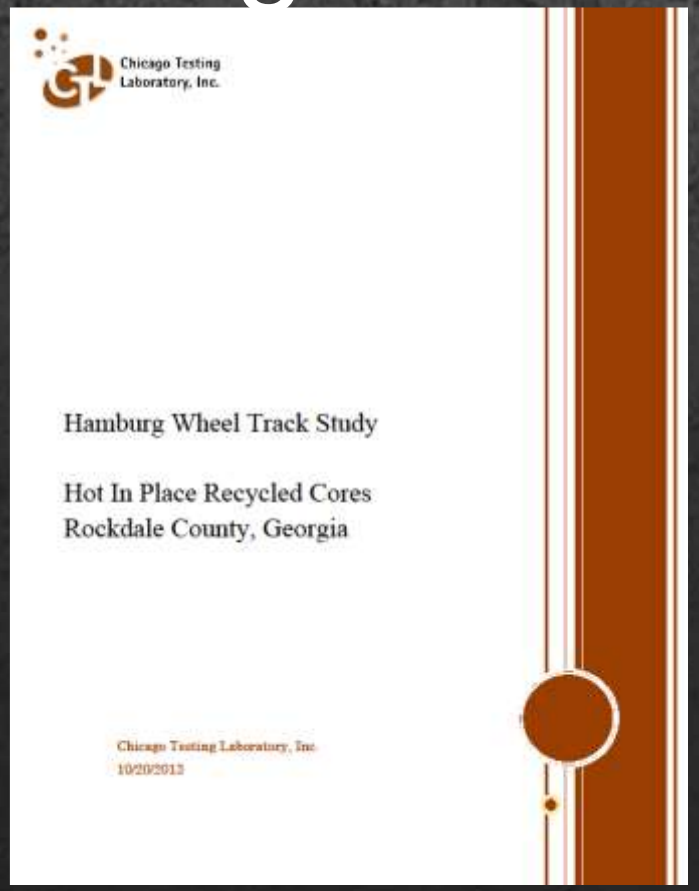
CTL Rejuvenator Study

CTL Rejuvenator Study

- Samples where taken from an HIR project to represent existing material after the heating process and material after the rejuvenation process

- Results:
  - Air voids improved from 10.1% to 4.9% (3-5% is acceptable)
  - Viscosity & penetration improved over 21%
  - Total bitumen content increased from 4.8% to 5.9% after addition of rejuvenating agent
  - Stability & flow of the compacted material after treatment was statistically the same as prior to treatment
  - Tensile Strength Ratio (TSR) of the material improved nearly 8% and increased the stripping resistance of the pavement from a typically failing test to a passing one
  - Hamburg Wheel Analysis of the rejuvenated sample resulted in a 3.56mm average rut depth (a very rut resistant pavement)

CTL Hamburg Wheel Study



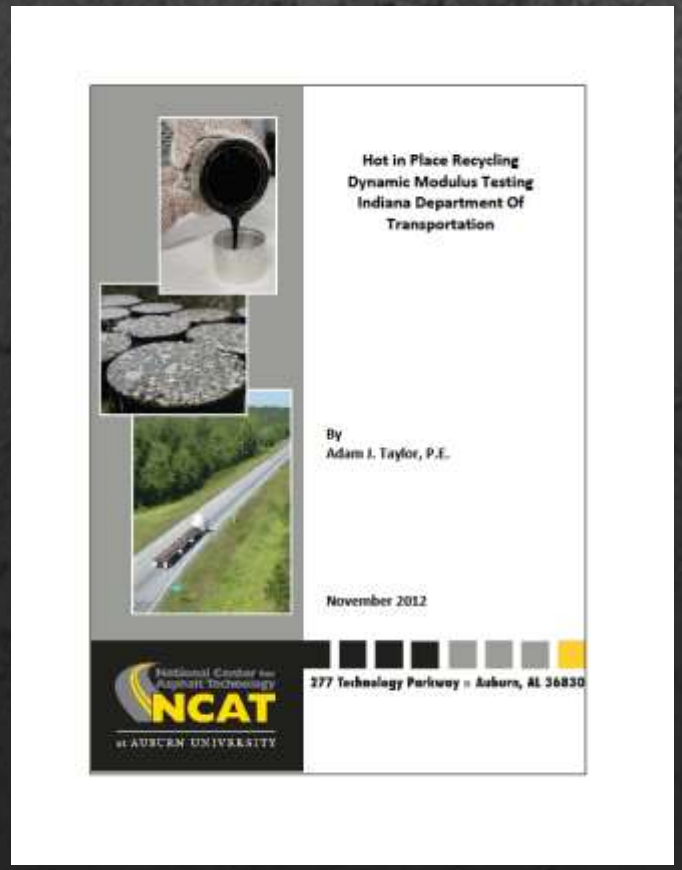
CTL Hamburg Wheel Study

• Three sets of core samples were tested per AASHTO T324. Sample A is identified as "IRWIN BR CONTROL", sample B is "IRWIN BR HIR" and sample C is "OLD COVINGTON HIR."

• Each set tested to the 20,000 pass duration. The maximum rut measured during the test was measured and is summarized in table 1 below:

Sample Number	Maximum Impression	Number of Passes
Irwin Control	-4.73 mm	20,000
Irwin Bridge Overlay	-12.26 mm	20,000
Old Covington	-6.44 mm	20,000

NCAT Dynamic Modulus Test



Used by Many DOTs:

AQMD

South Coast
Air Quality Management District
Cleaning the air that we breathe...

Thank You!

Any Questions?

www.hotinplacerecycling.com

Edge Grind/Scarify


STOP


E6401

City of Milwaukee, WI

- Process: Re-HEAT
- Timing: Summer 2012
- Quantity: Approximately 67,000 SYs


GALLAGHER ASPHALT


SPEED
LIMIT
20


BENEDETTI

Cobb County, Georgia

- Timing: Summer 2006
- Quantity: Approximately 50,000 SYs

Washington County, Minnesota

- Timing: Summer 2010
- Quantity: Approximately 60,000 SYs


GALLAGHER
ASPHALT
E40


SAKAI
SW90G

Waukesha County, Wisconsin

- Process: Heater Scarification
- Timing: 2006 – 2012
- Quantity: 1 million+ SYs

City of Manistee, Michigan

- Timing: 2009
- Quantity: 63,000 SYs

00

Seminar


R87
R87


R87
HYPAC
R87

What is the Conventional Heater Scarification **SURFACE METHOD?**