SOUTHEAST PAVEMENT PRESERVATION PARTNERSHIP

Deep Hot in Place Asphalt Recycling

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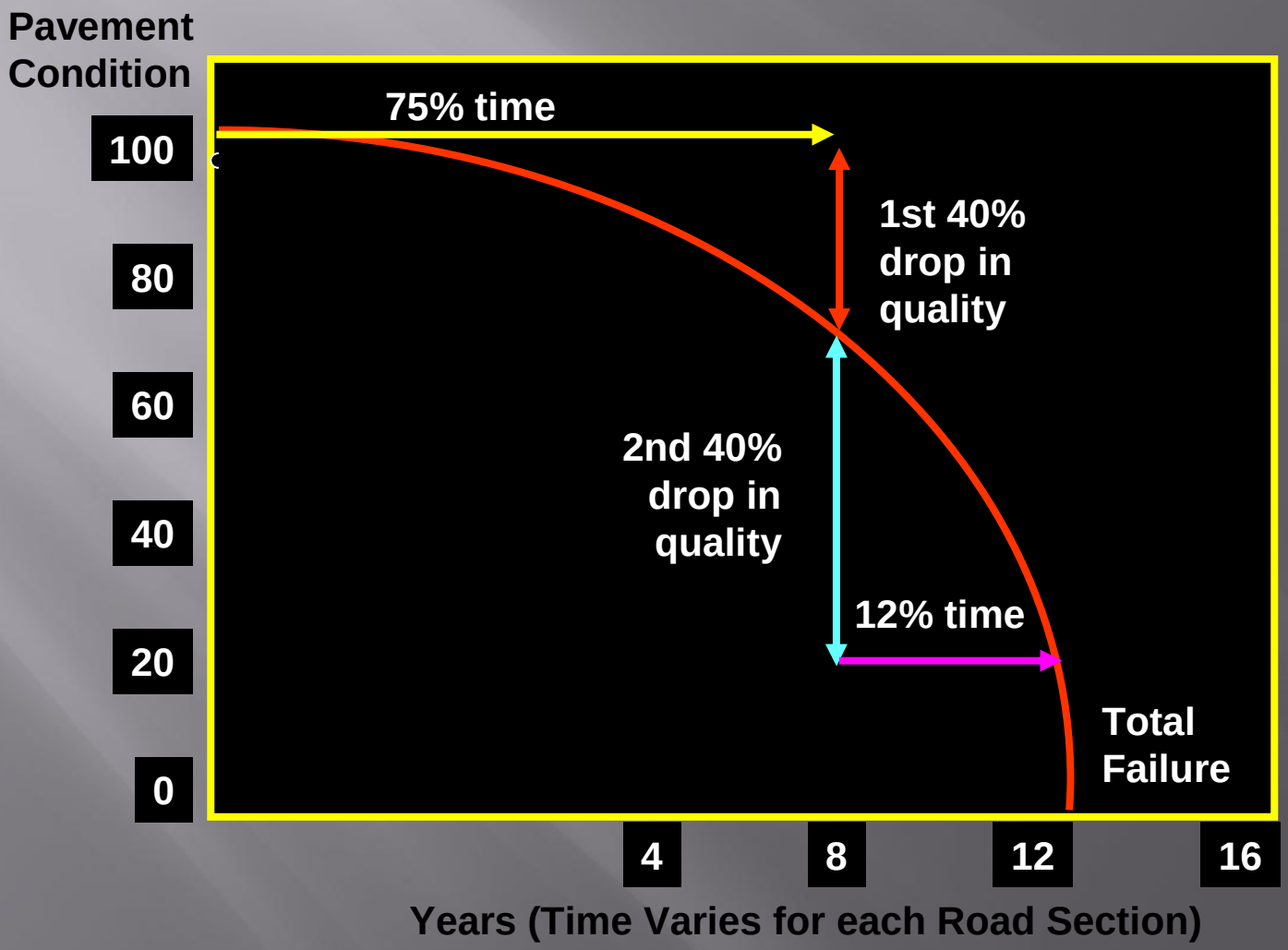
Dustrol, Inc.
Towanda, Kansas
Thursday May, 8th 2008

HOT IN-PLACE RECYCLING

ASPHALT
100% RECYCLABLE
"IN-PLACE"

The Savings of Timely Maintenance



Each $1 spent during the first 40% drop in quality will cost $4-5 if delayed until pavement loses 80% of its original quality.

The 3 Types of HIR

- Surface Recycling:

  Heating, reworking and rejuvenating the top one inch of an existing asphalt pavement in preparation of either a seal coat, micro-surfacing or overlay

- Repaving:

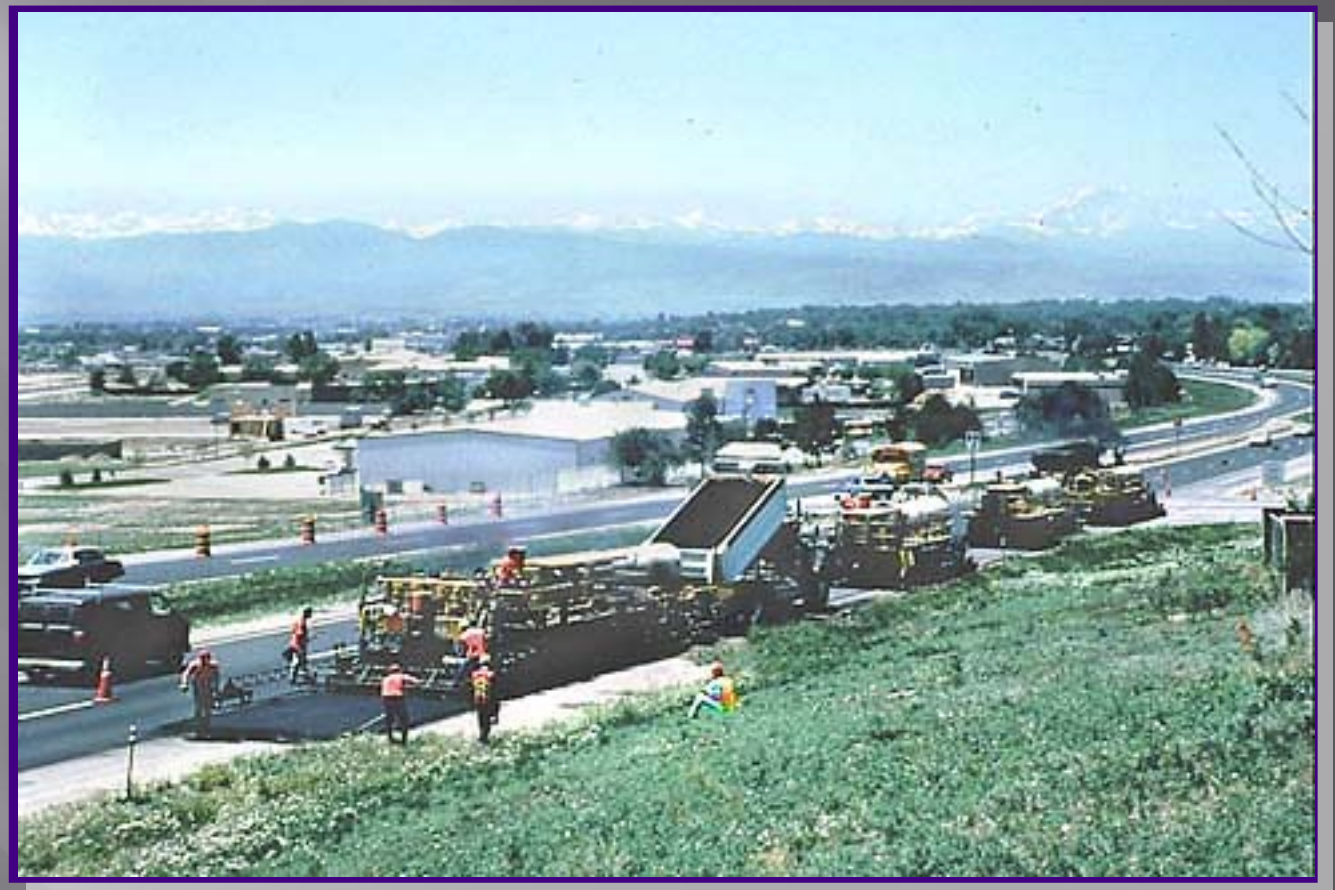
  Heating, reworking and rejuvenating the top one inch of an existing asphalt pavement and simultaneously applying an overlay while the temperature of the recycled layer is 200°F

- Remixing:

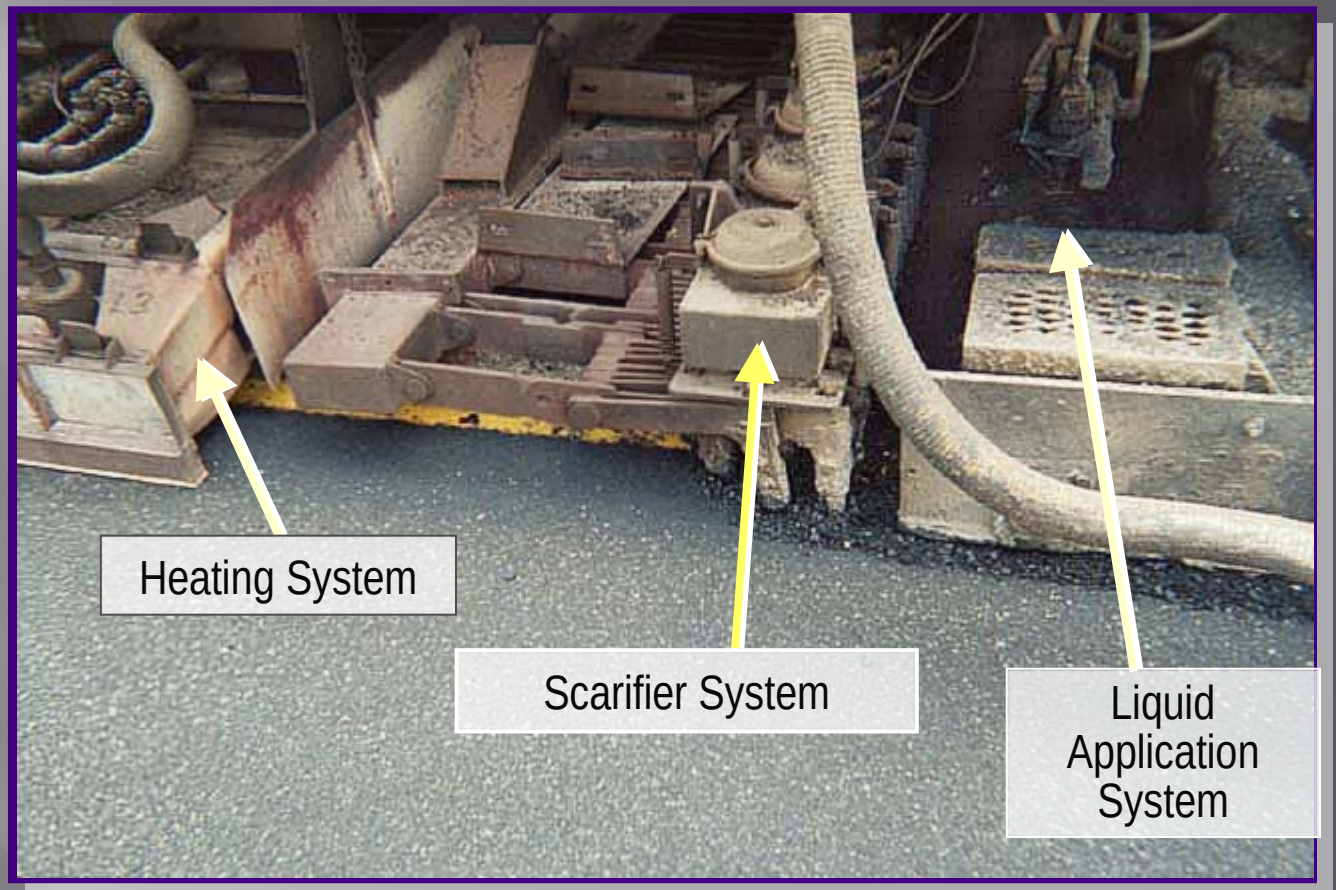
  Heating, reworking and rejuvenating the top 1 to 2 inches of an existing asphalt pavement adding virgin aggregate and/or admix and mixing the newly recycled material in a pug mill or drum mixing plant prior to laying, either as a binder or surface course

Repaving

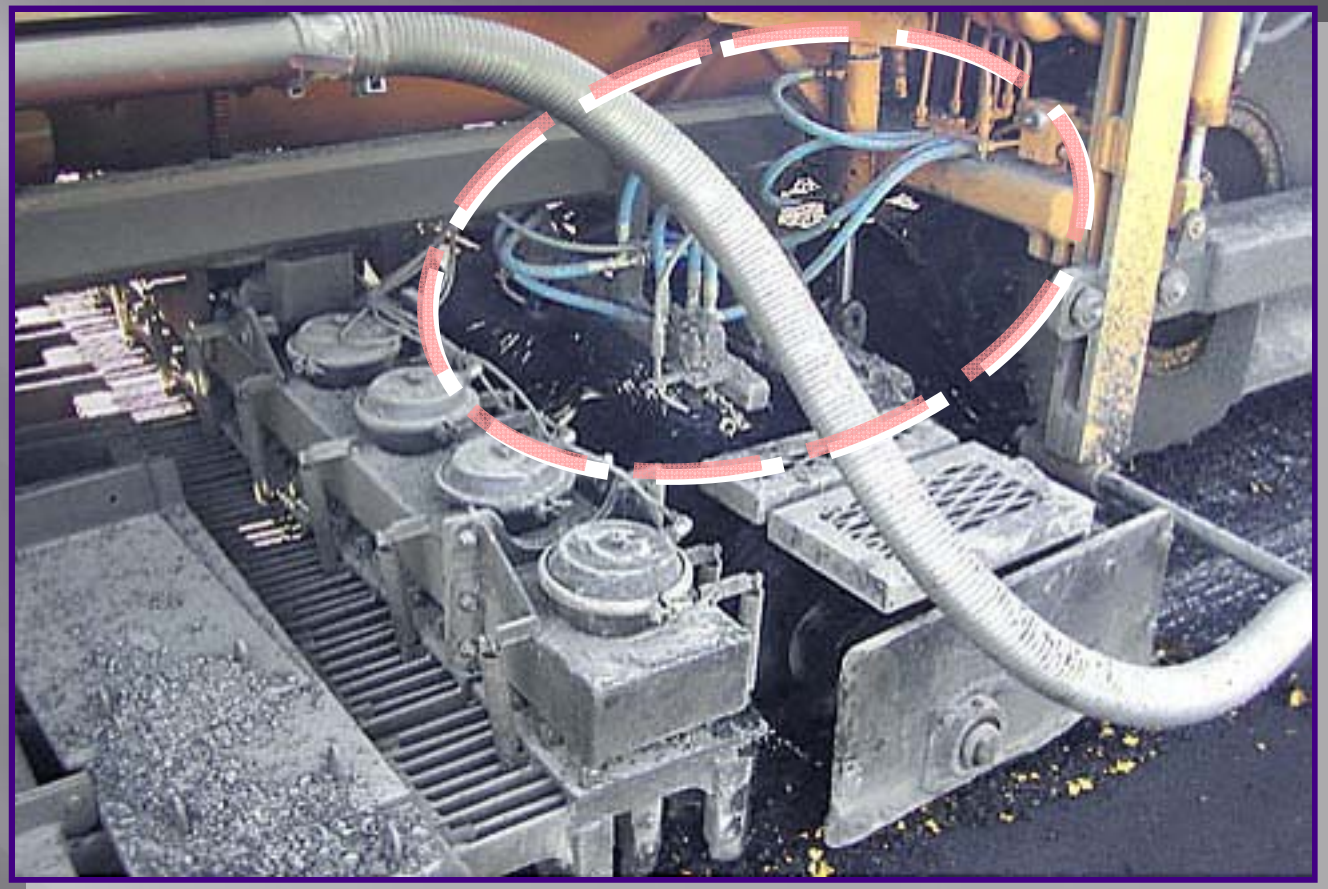
Using Multiple Pre-heaters



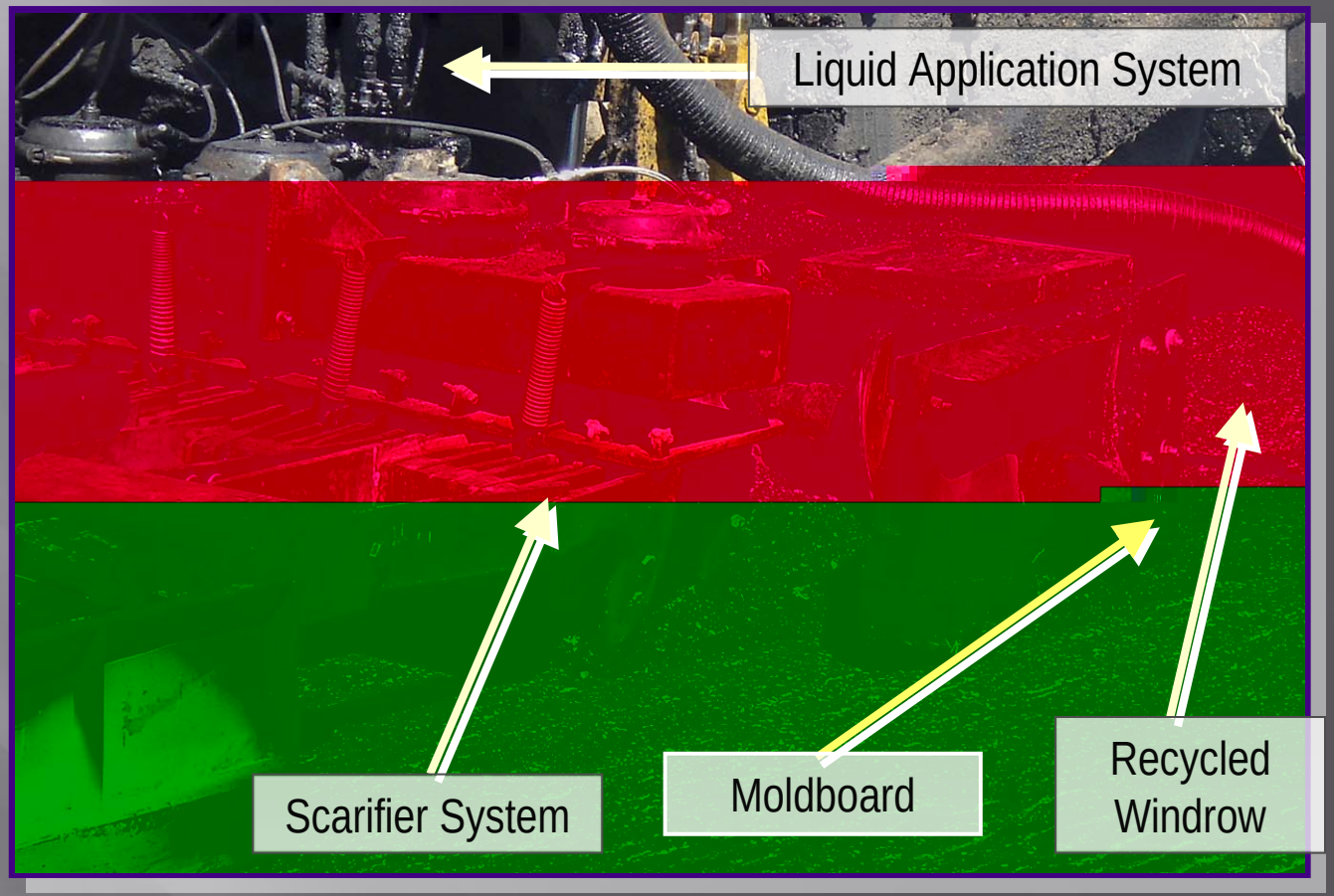
Scarifier System



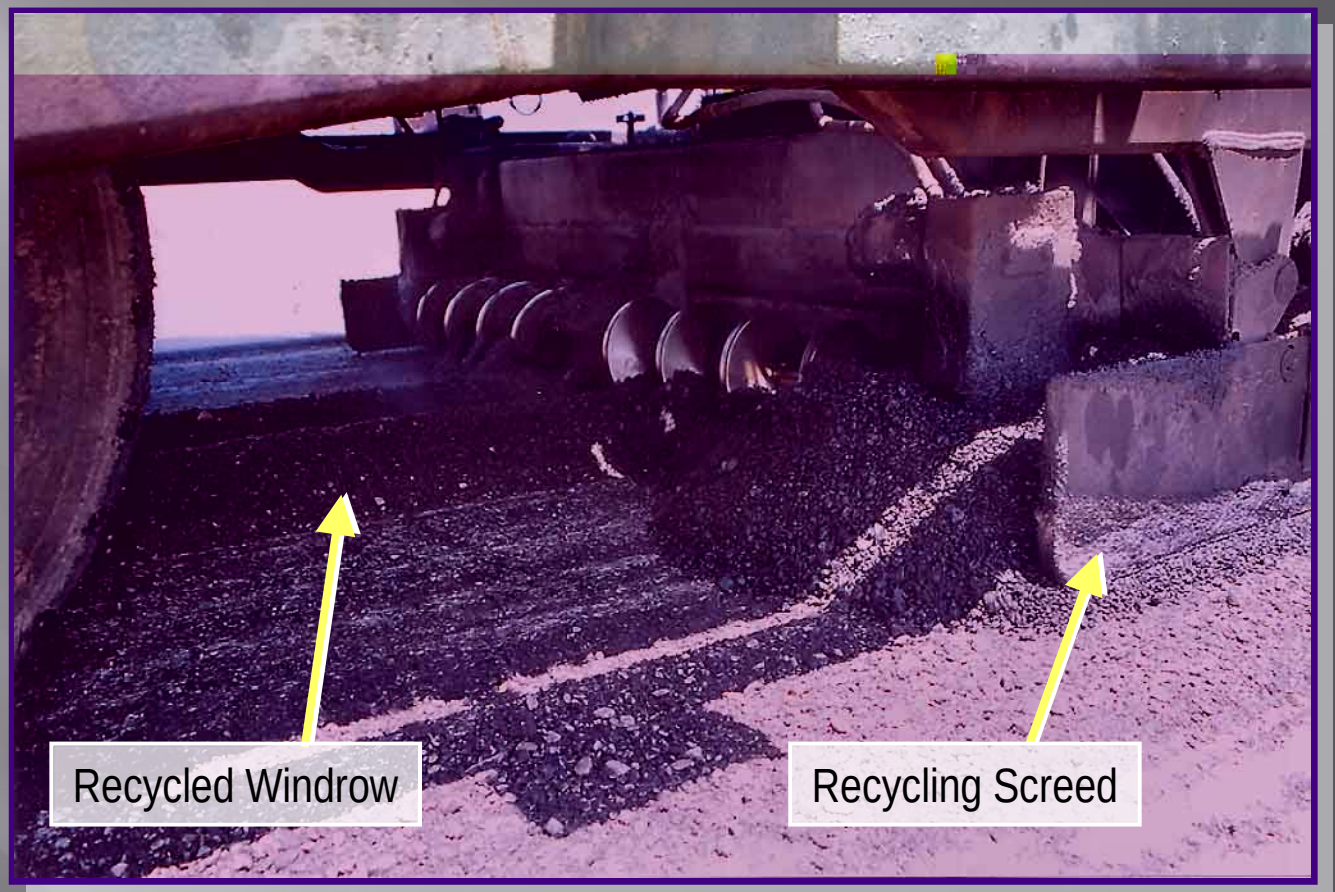
Liquid Application System



Moldboard Gathers Recycled Material Into Recycled Windrow

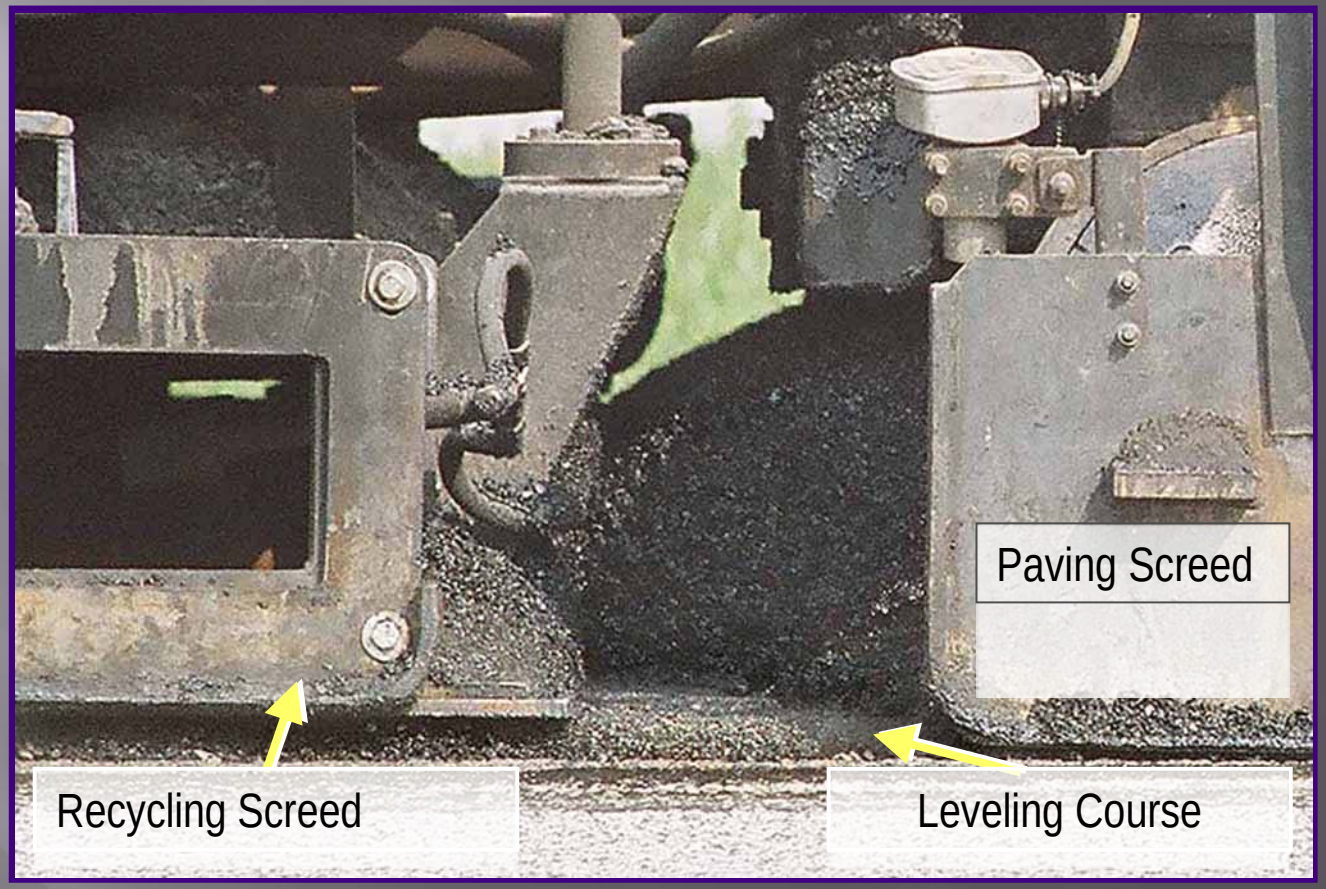


Recycled Material Distributed



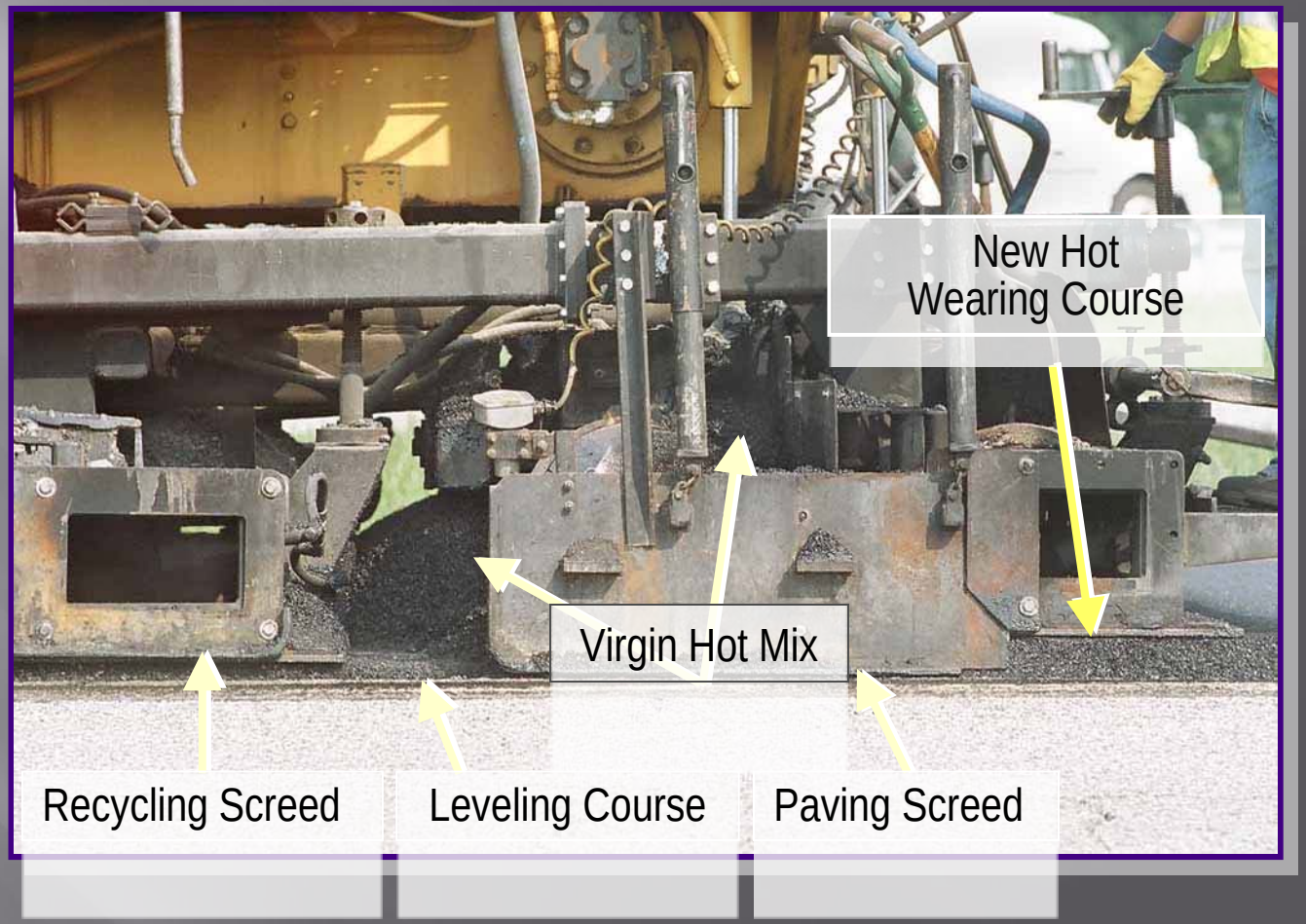
Fourth Step: Lay Recycled Material With Recycling Screed

Recycled Material Laid



Fourth Step: Lay Recycled Material With Recycling Screed

New Hot Wearing Course Laid



Final Compaction

Remixing


'93 10 4


'93 10 7


CATERPILLAR

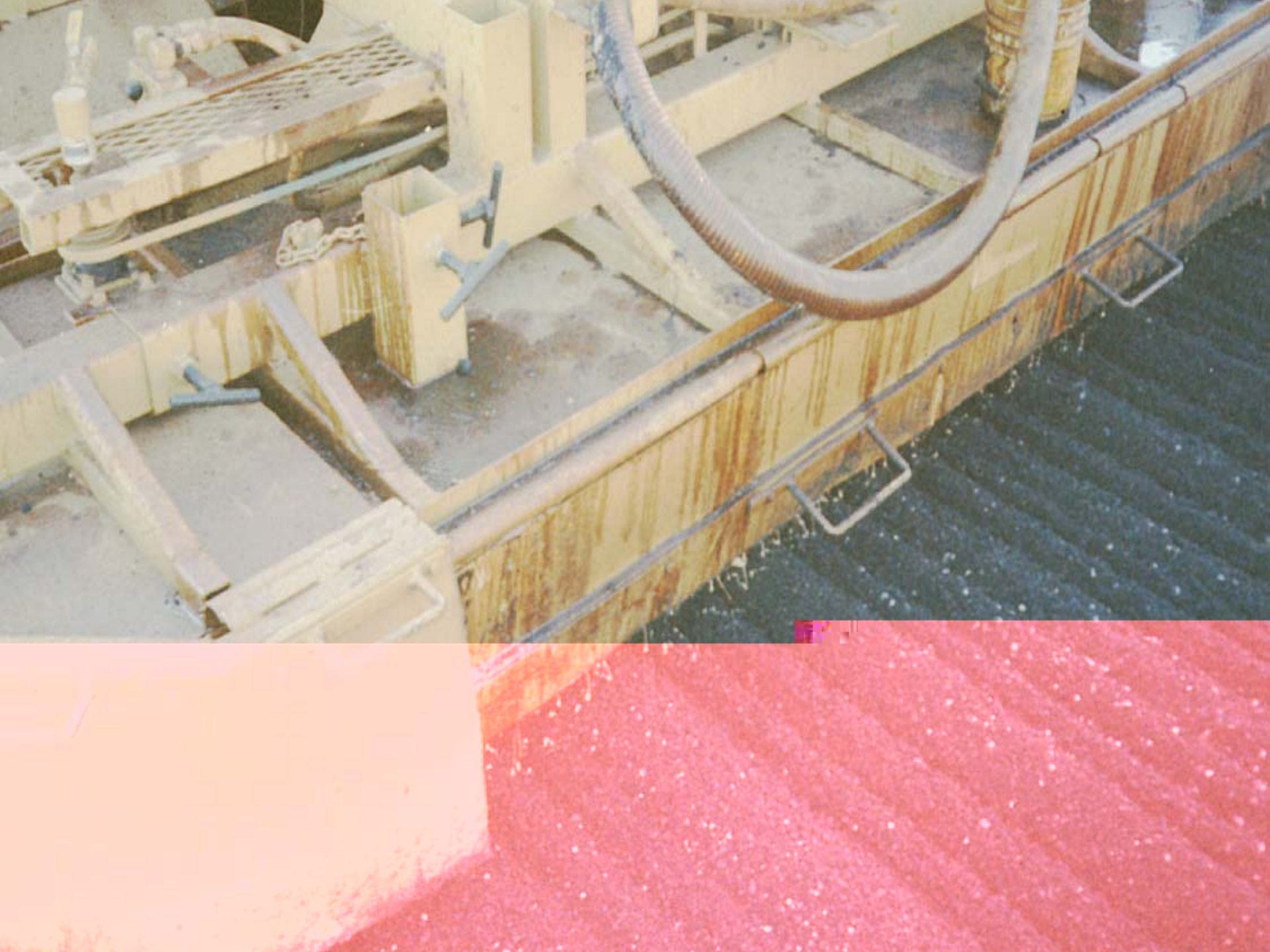
Surface Recycling 1 inch

The 1” HIR Process

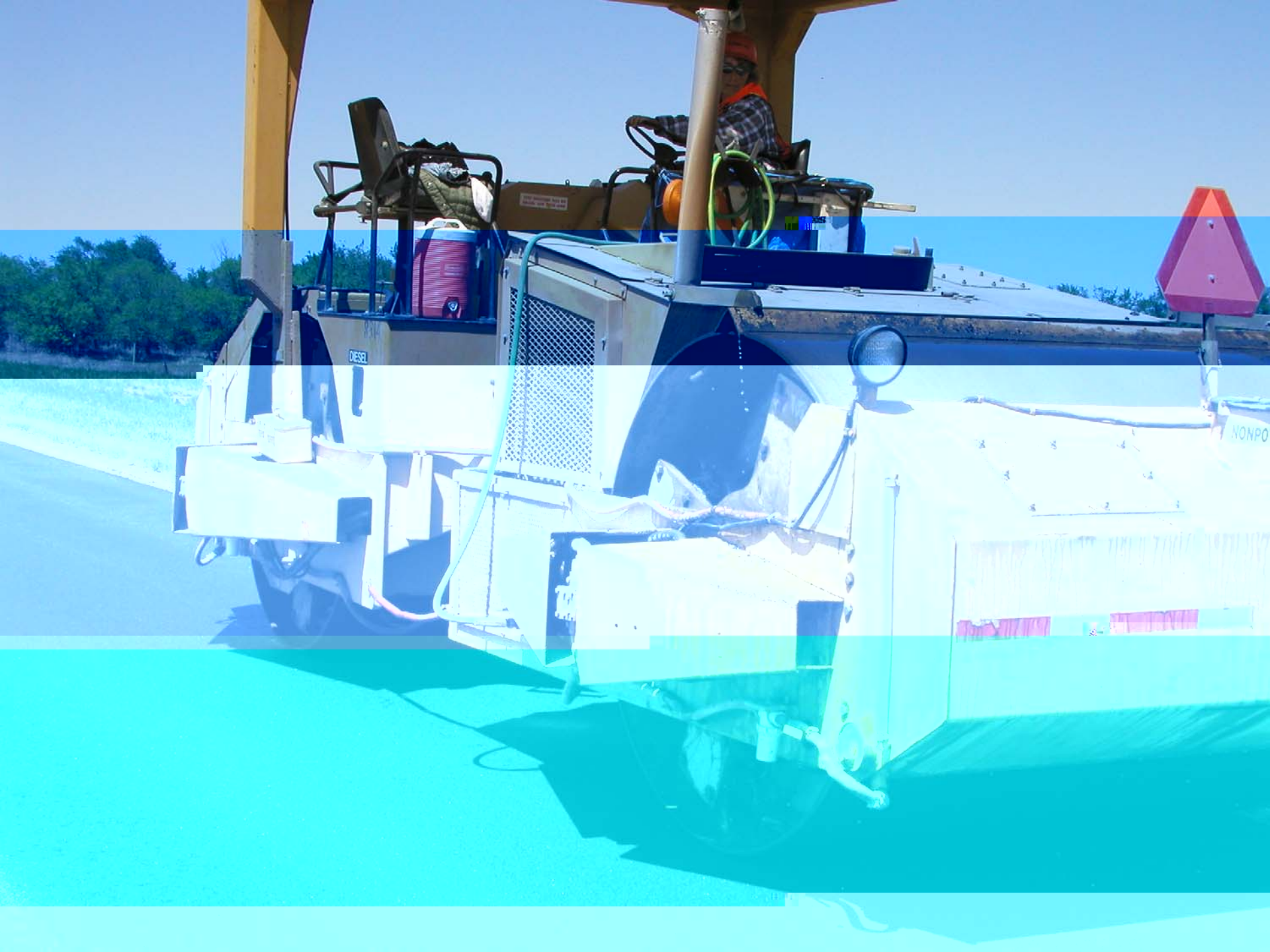
- Surface heated to approximately 300°F

The HIR Process

- Softened pavement scarified to depth of 1”



Milling Drums


DIESEL

US 183
GREENSBURG, KS

1997

1998

1999

KANSAS

Juarez, Mexico 1,375,000 sm one inch recycling and rubberized chip seal, 2007

DUSTROL, INC.

Deep Hot in Place Recycling 2″+

- Continuous Process with Self-Contained Train
  - Asphalt Surface Heated
  - Heated Pavement Milled in ½" to ¾" increments
  - Engineered Emulsion Added at Design Content
  - Materials Mixed and Windrowed
  - Recycled Mix Placed by Paver with Vibratory Screed
  - Mat Compacted
  - Surface Applied
    - Such as UBAWS, Micro, Polymer Chip Seal, Thin HMA overlays

The Process

DEEP HIR SYSTEM

Continuous with Self-Contained Train

Mobile Asphalt Recycling Train

- Asphalt pre-heaters and milling heaters working in front of the asphalt recycling unit. Several pre-heaters and heater millers can be used to achieve the specified heating depth

Pre-heaters and milling heater

Milling Heater

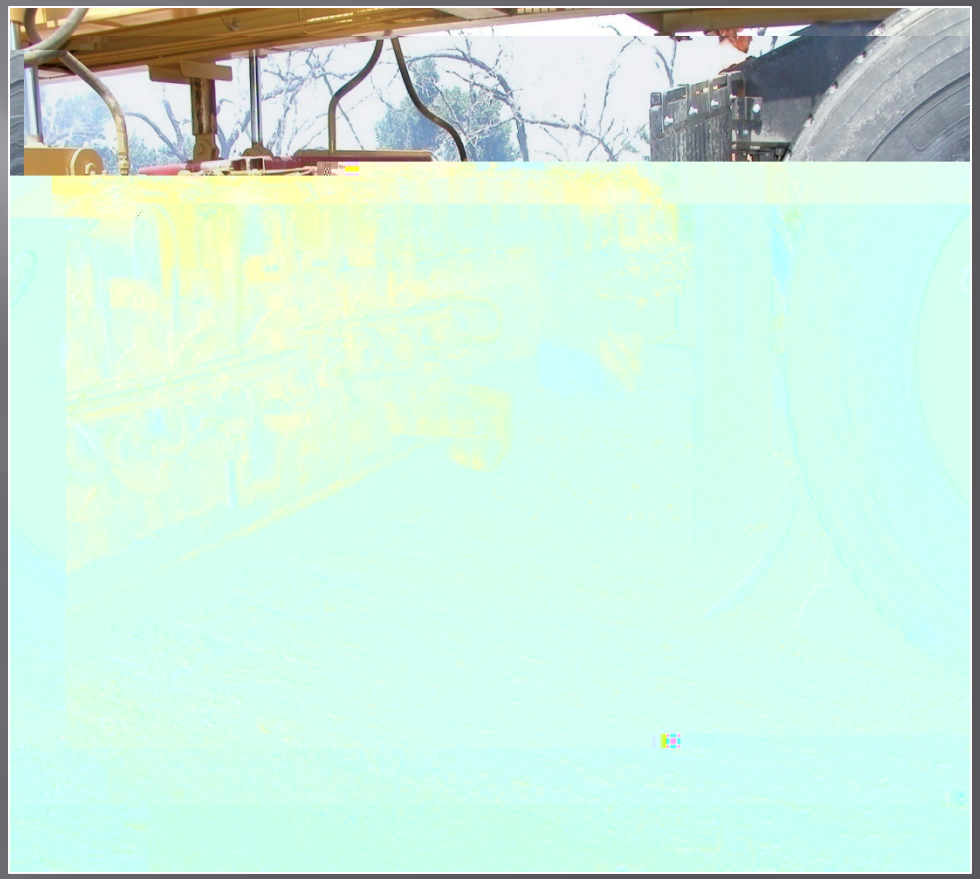
- Milling Heater cutting 3/4" of heated material. The milling heads are capable of milling 15' wide.

Milling Heater

- Milling heater's windrow of material. This material is being processed between 200 and 275 degrees F.

Tunnel Heater

- Windrow of material from milling heater going under a tunnel heater. Heat is transferred into underlying pavement and into windrow.



The Process

- Combo Heater and Milling Unit

The Process

DEEP HIR SYSTEM

- Heater Tunnel Unit

Milling, Mixing Heater

Milling drum on main unit mills additional depth and adds emulsion. The milling drums extend to process width up to 15 feet

The Process

- Combination – Heater Unit and Milling Section
- Engineered Emulsion Metered at Design Content

The Process

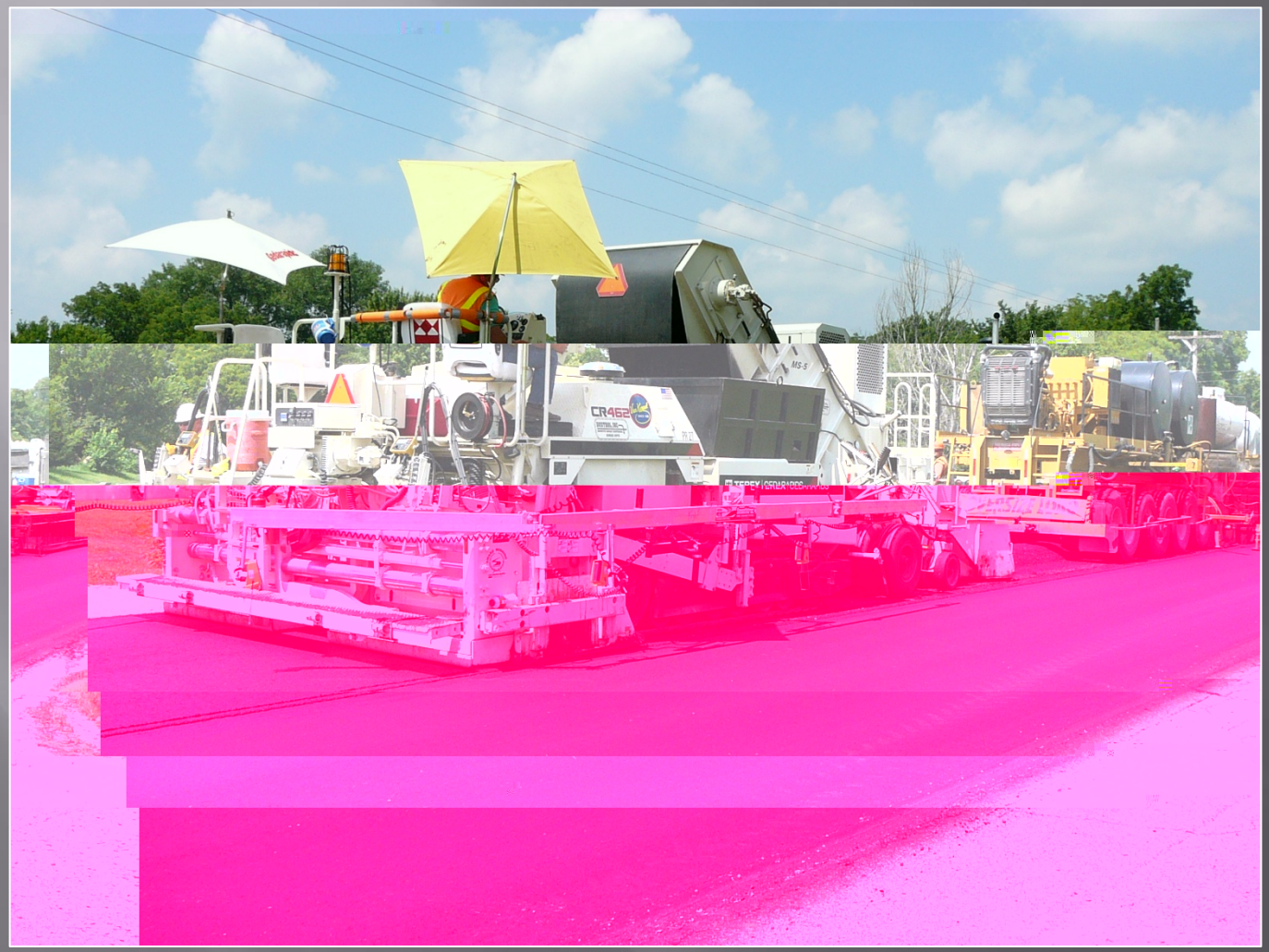
- Side view of "Wind Row"

Recycled Asphalt Laydown

- Windrowed 100% recycled material is picked up and paved in a conventional paver to the specified width

The Process

DEEP HIR SYSTEM



- Recycled Asphalt Mix Placed with Paver and Vibratory Screed

Recycled Material Compaction

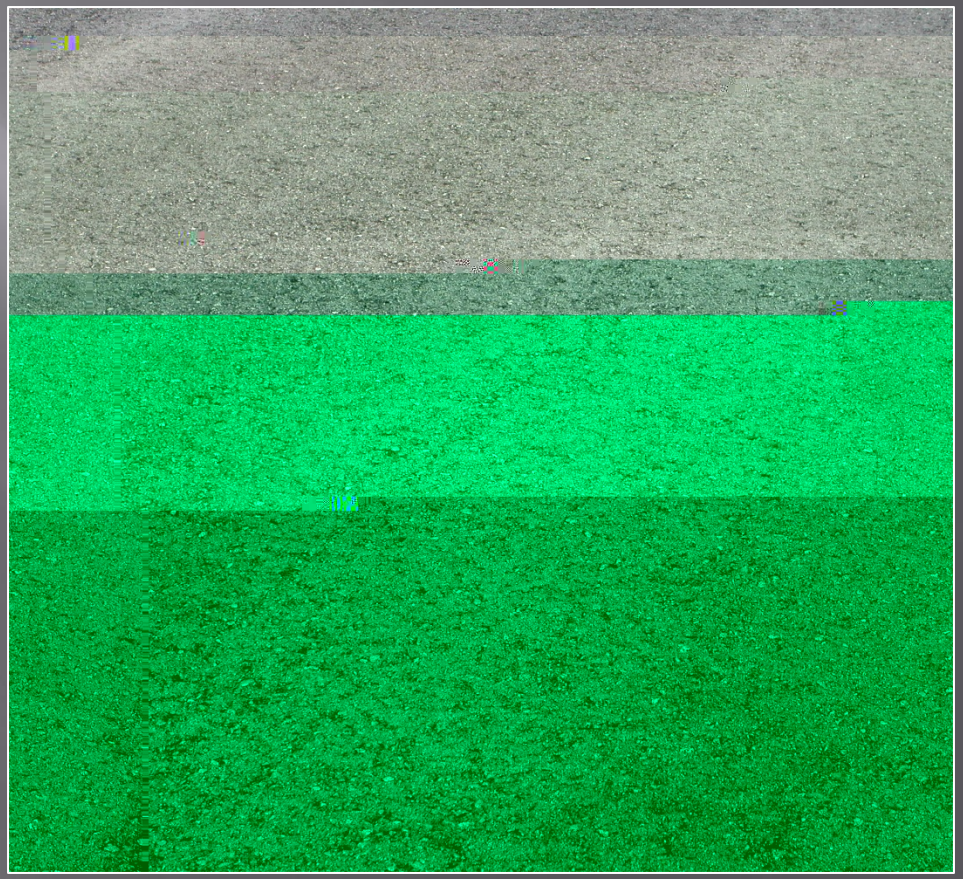
- The blended recycled material is compacted using conventional rollers.

Pavement Distress

- Pavement surface cracking eliminated by deep hot in-place recycling

Finished Mat

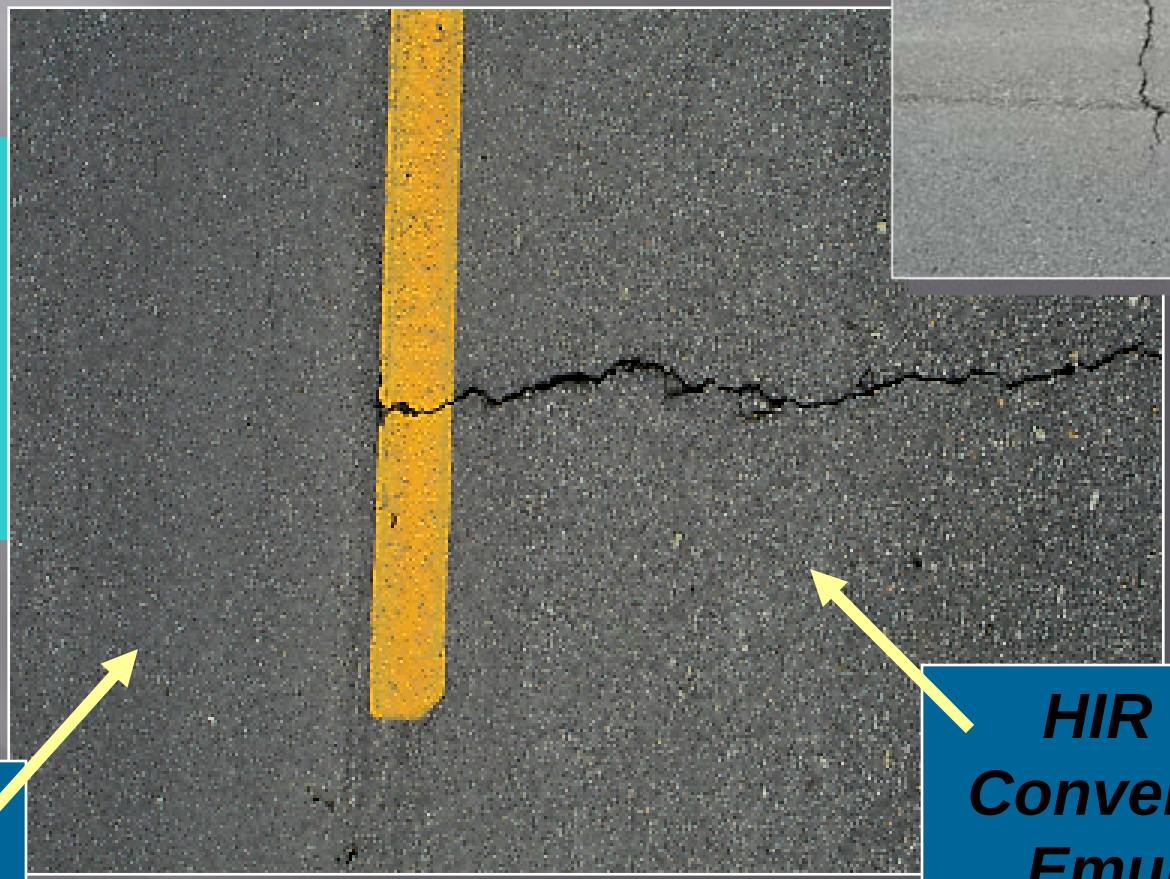
- Finished material after lay-down and compaction. The road can be opened to traffic after a cool off period similar to an asphalt paving operation.



ARA-1P

This safe, water-based emulsion replaces the chemical constituents of the asphalt that have oxidized. ARA-1P (Encore) emulsion also contains SemMaterial's Stylink polymer modified asphalt, which further improves elasticity and coating. Moisture, rutting, and crack resistance are also improved.

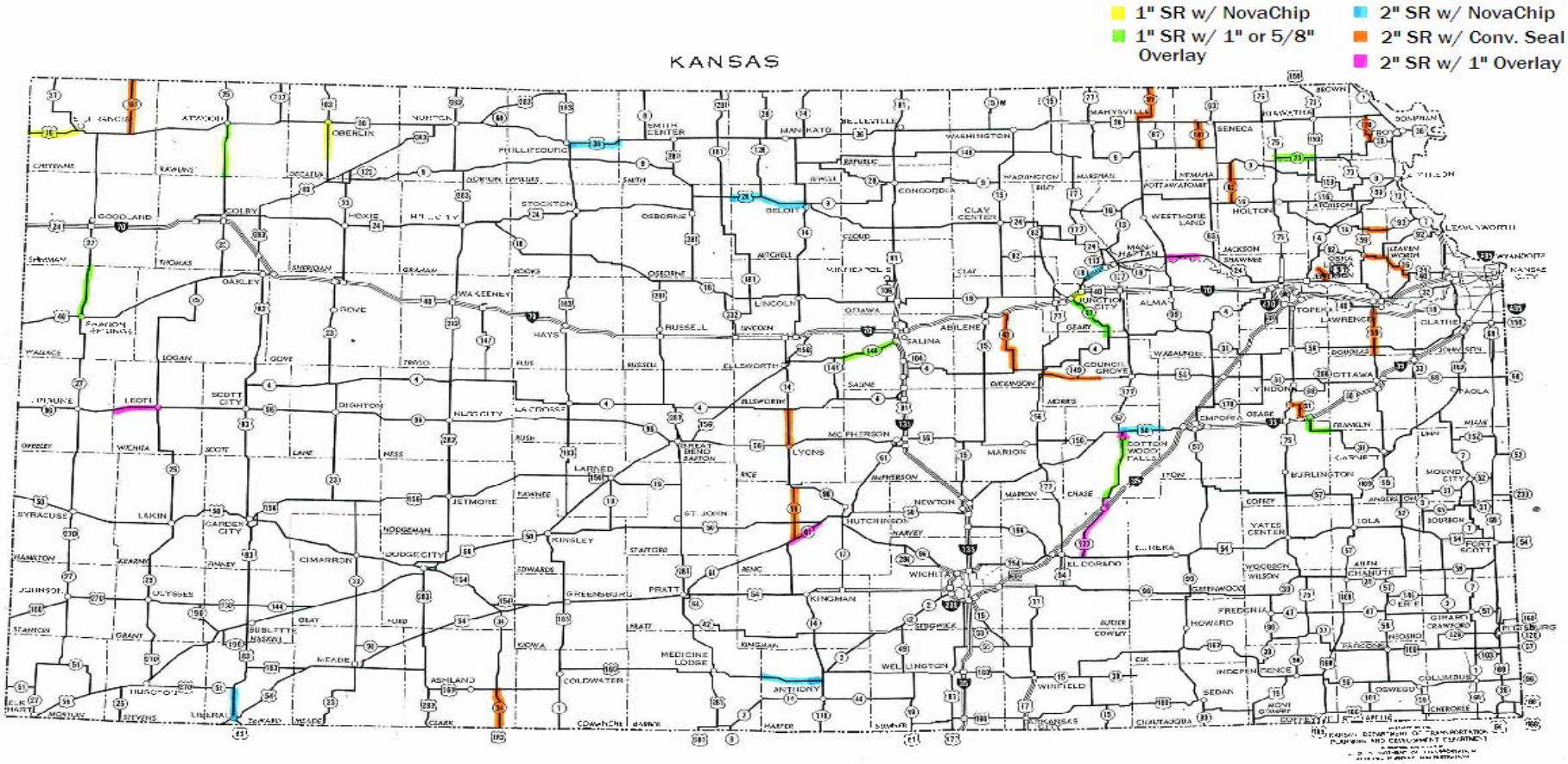
K-170
Reading, KS
Construction:
HIR + 1” HMA overlay



HIR with Encore™ Emulsion

HIR with Conventional Emulsion

KS 2007 Surface Recycle 1”& 2”



Hot in place recycling train on K-16 near Tonganoxie 2007

US 59 near Lawrence 2007(Tom Deddens, Federal Highways)

Project Details

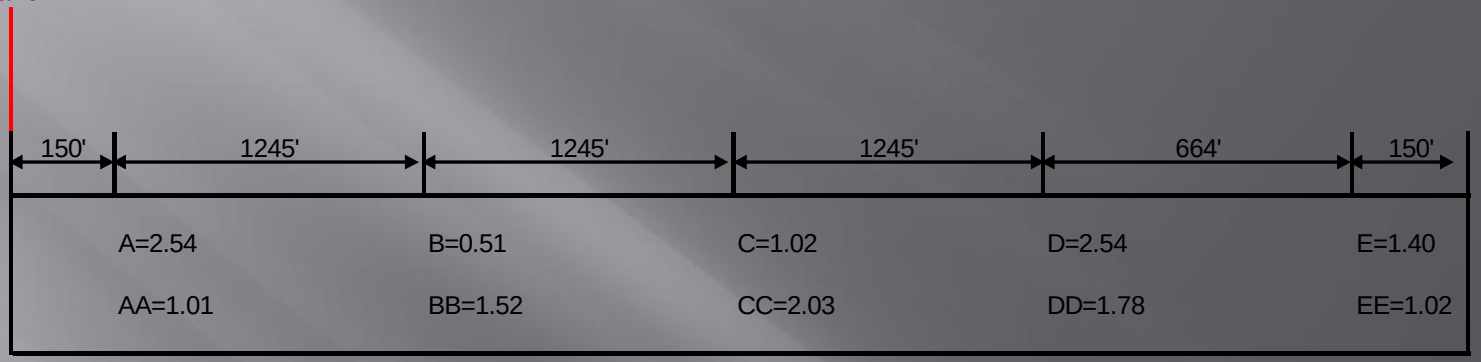
- Constructed July 17, 2006
  - WB driving lane
  - 1 mile in length
  - Near Stroud, OK toll booth
- Open to traffic 28 days after recycling
  - 335,000 vehicles (total WB)
  - 13,000 ADT
  - +/- 126,000 ESALs
- Surfaced with Bonded Wearing Course

High Temperatures While Open to Traffic

High Temperatures							
Stroud, OK*							
July 18 to August 12, 2006							
JULY	18	100		**AUGUST**	1	98	
	19	102			2	100	
	20	102			3	98	
	21	100			4	98	
	22	89			5	100	
	23	87			6	102	
	24	91			7	96	
	25	98			8	98	
	26	96			9	102	
	27	96			10	104	
	28	96			11	89	
	29	96			12	100	
	30	98					
	31	98					
Average temperature = 97.5°F							
*Source: www.wunderground.com							

Rut Depth Measurements

Mile Marker 194
Westbound Outside Lane



***Each Rut was measured within the wheel path; approximately 3' off the centerline and 3' off the outside edge of pavement

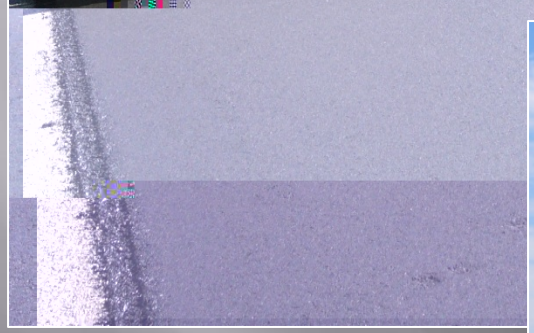
Rut Depths	mm
A	2.54
AA	1.01
B	0.51
BB	1.52
C	1.02
CC	2.03
D	2.54
DD	1.78
E	1.40
EE	1.02
Average Rut Depth	**1.54**

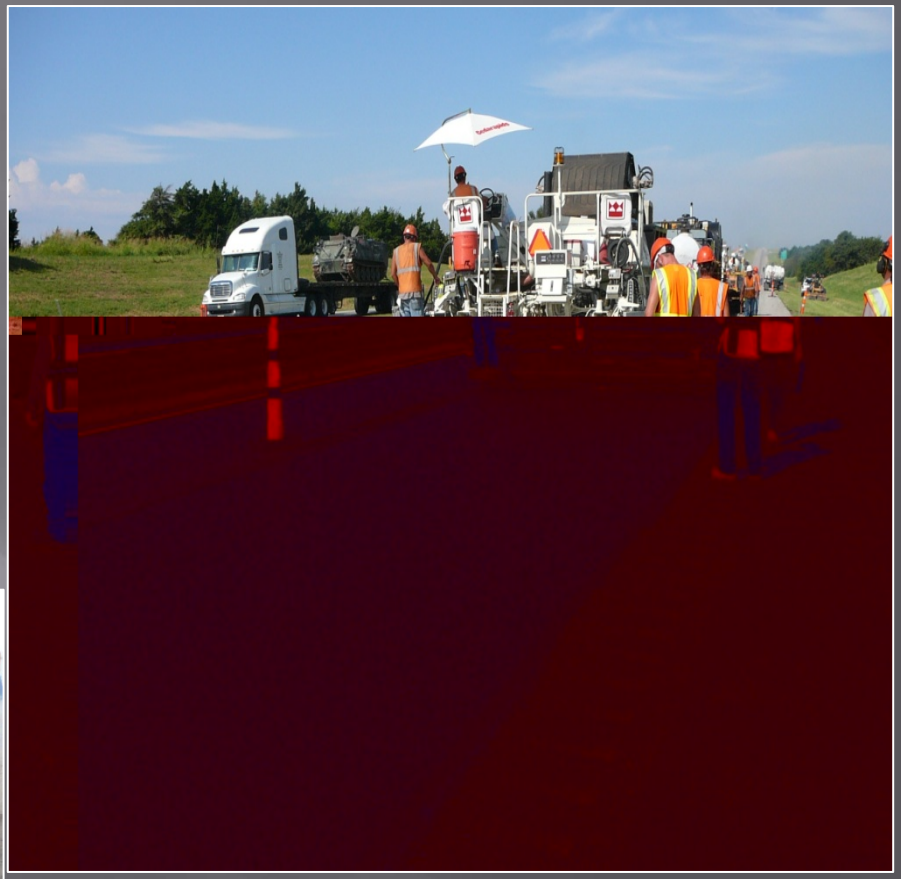
Maximum Rut Depth
(0.1 inch)

Average Rut Depth
(0.06 inch)


TEREX | CEDARAPIDS


PROPANE






CAUTION!
OVERSIZE LOAD


ASPHALT
RECYCLE
SYSTEM II


SWIFT

Recycling Benefits

- Aged, distressed surfaces replaced with new surfaces
  - Deformations leveled
  - Surface cracking removed
  - Crowns re-established
  - Clearances, curb heights maintained
  - Reuses existing materials
  - Can, itself, be recycled

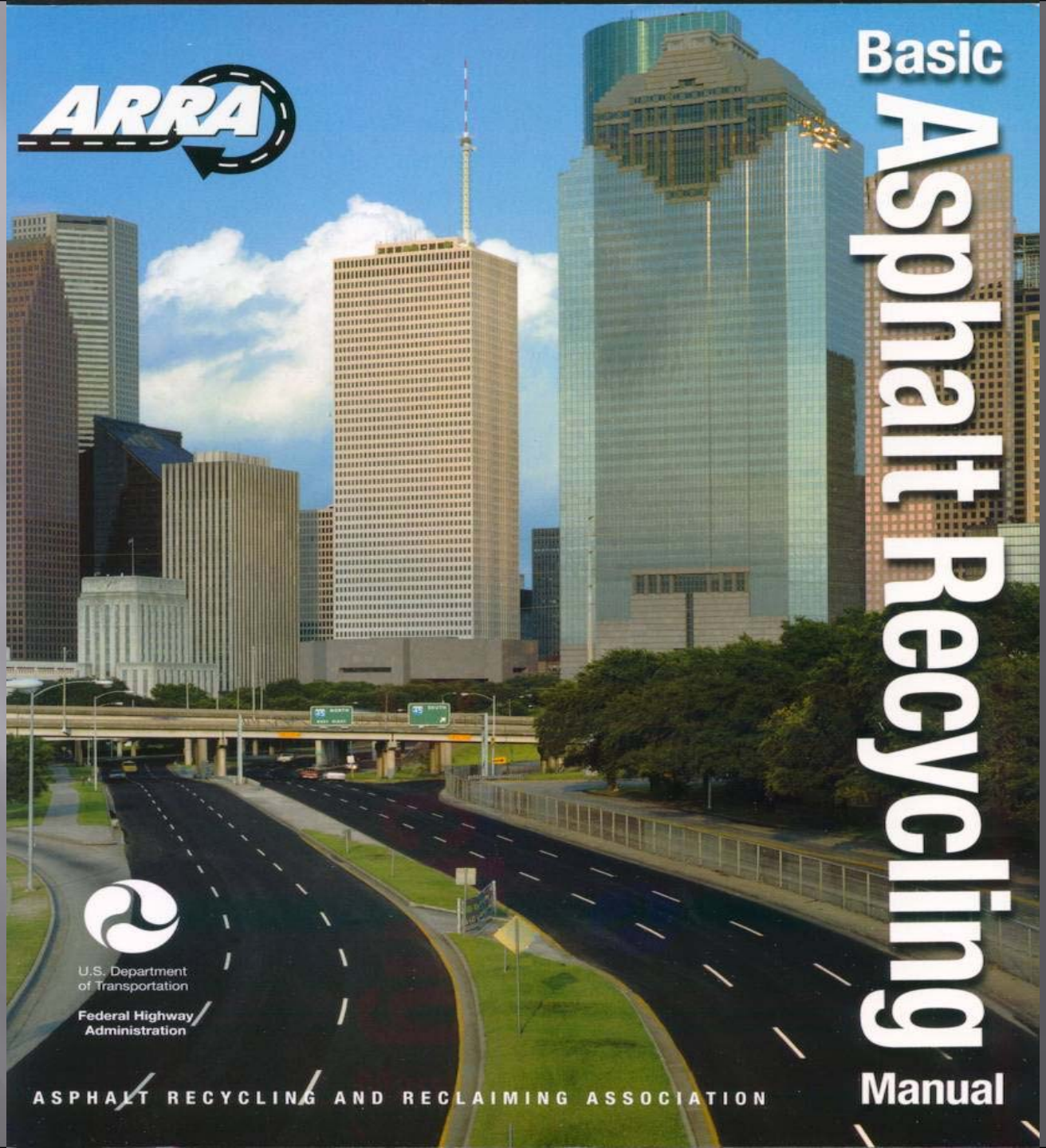
SUMMARY

- Gentle phased heating and removal does not degrade aggregates and existing AC
- Retards cracks, restores flexibility, and levels the road
- Quick-high production
- Minimal traffic delays
- Allows surfacing contractor to pave with his own forces and at his own production rate consequently reducing overall costs
- Cost effective
- Environmentally friendly


ARRA

ASPHALT RECYCLING AND RECLAIMING ASSOCIATION

WWW.ARRA.ORG

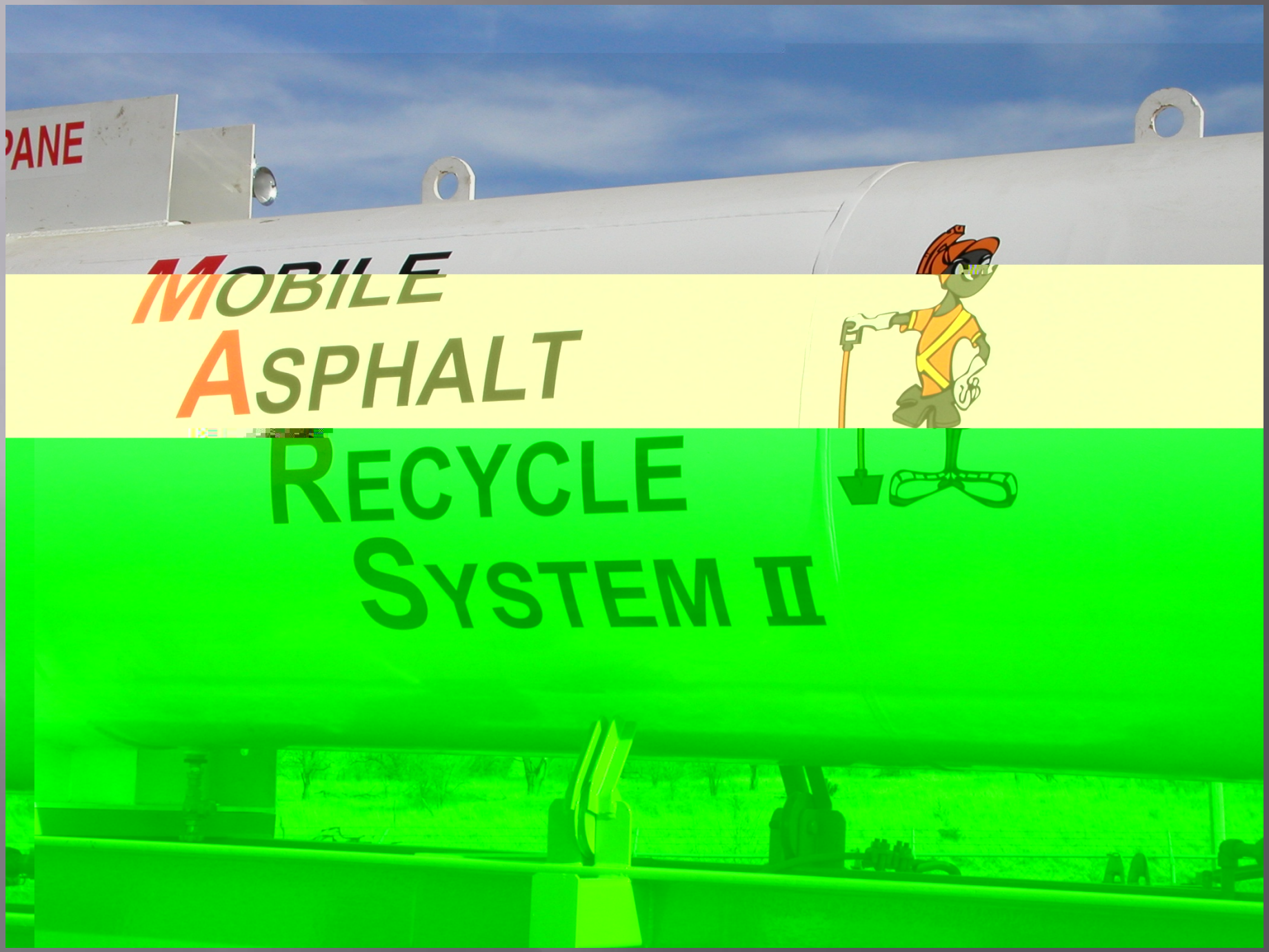

ARRA
Basic
Asphalt Recycling
Manual
U.S. Department
of Transportation
Federal Highway
Administration
ASPHALT RECYCLING AND RECLAIMING ASSOCIATION

ASPHALT

100% RECYCLABLE

“IN-PLACE”

LOOKING FOR A BETTER PAVEMENT?


PANE
MOBILE
ASPHALT
RECYCLE
SYSTEM II

Celebrating successful project completion

THANK YOU.

QUESTIONS?