Bring It All Together

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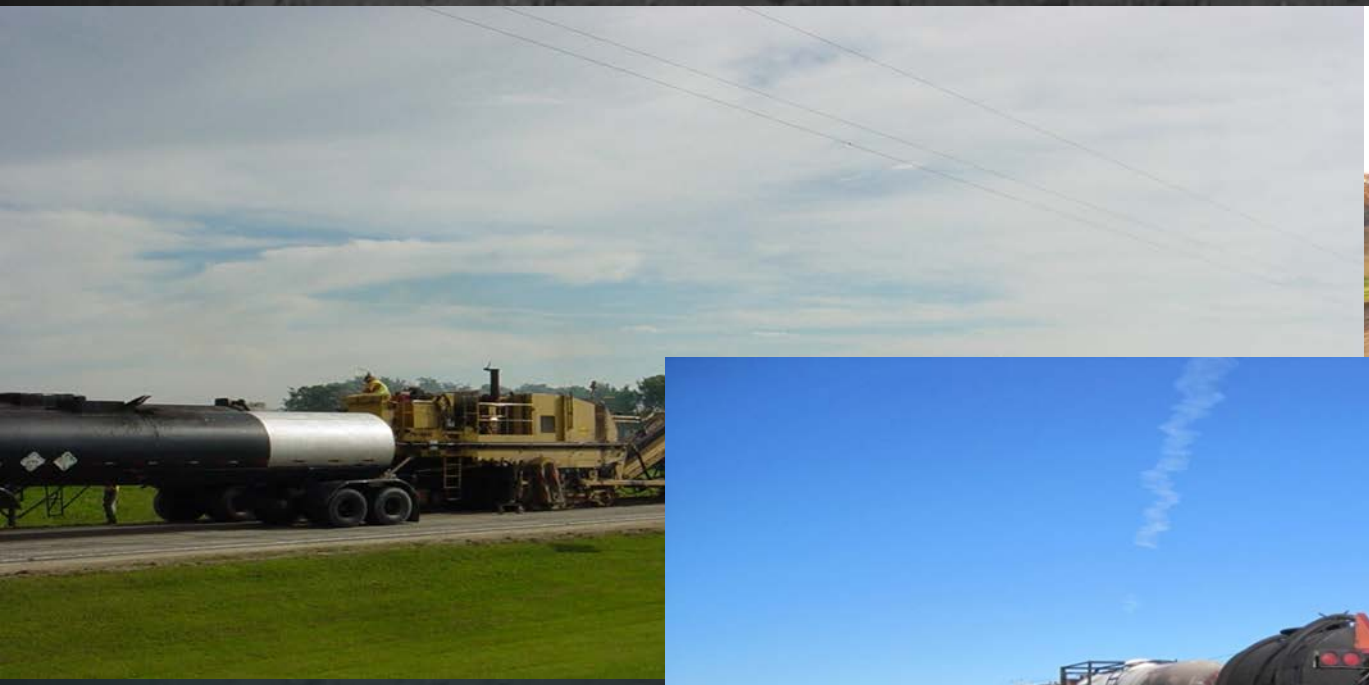
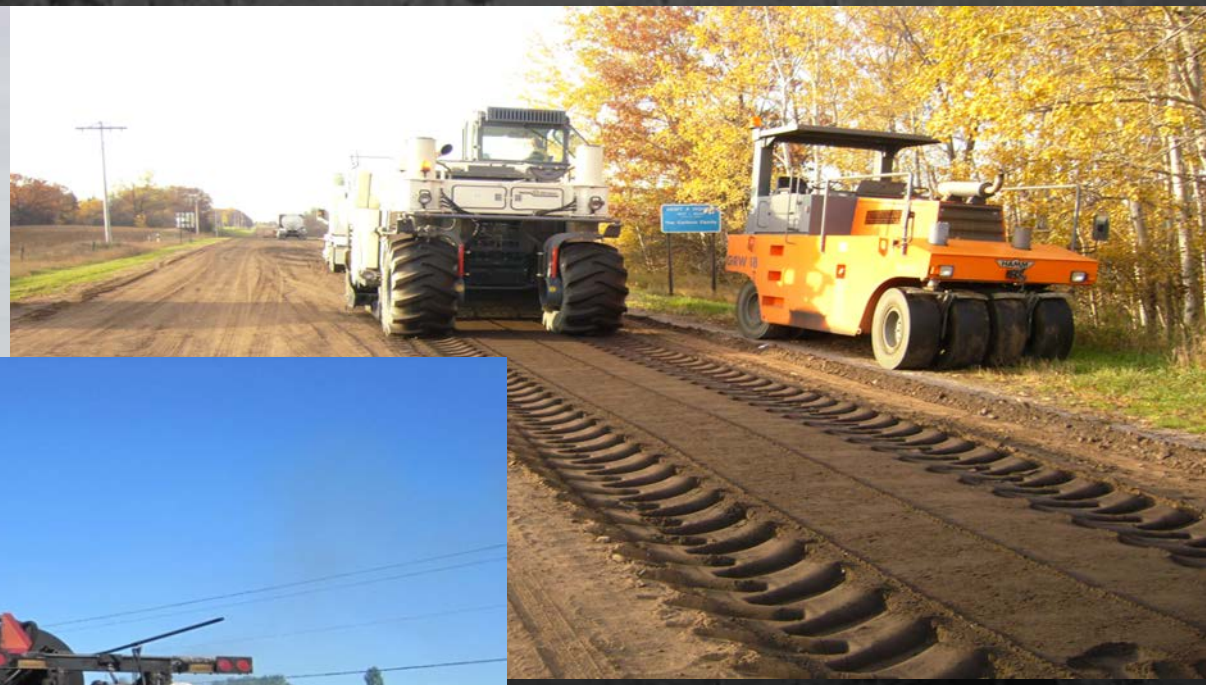
WSB & ASSOCIATES

Agenda

- Case Study
- Benefits
- Construction
- Performance examples

Bituminous Recycling Options





Why do FDR, CIR, or HIR?

- Cost effective
  - CIR cost 30 to 60 % less than reconstruction
  - FRD cost 20 to 50% less than reconstruction
  - HIR depends on cost of HMA and Availability

Why do FDR, CIR, or HIR

- Environmentally acceptable
- Reuse existing roadway materials
- Less energy used
- Less green house gases given off

Why do FDR, CIR, or HIR

- Add structure to pavement
- Limits grade change
- Can use other surfacing methods
- Fast
- Easy

What's Import for Agencies

- Proper project selection
  - What is the in place pavement like
  - Evaluation of existing road
    - Strength
    - Drainage
    - Safety

What's Import for Agencies

- What is the estimated future loadings
- What type of surface
  - HMA
  - Chip Seal
  - Other

What's Import for Agencies

- Planning
  - Specifications
  - Design
  - Additives
  - Pay items
  - Incentives
  - Contactor availability

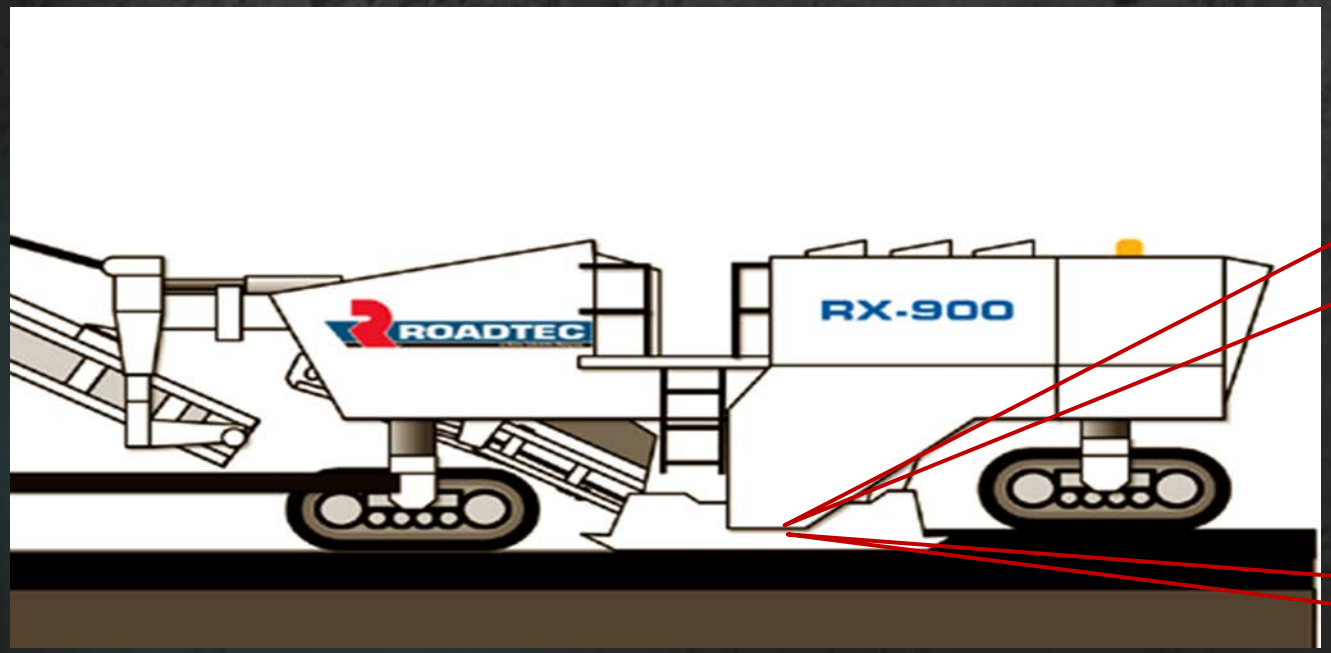
What's Import for Agencies

- Construction
  - Do you have trained inspectors
    - In house
    - Consulates
  - Numerous source for training
    - UGPTI
    - ARRA

What's Import for Agencies

- QC / QA plan
- Check depths
- Cross slope
- Compaction, Compaction, Compaction
- Drainage, Drainage, Drainage

Cold In-place Recycling (CIR)

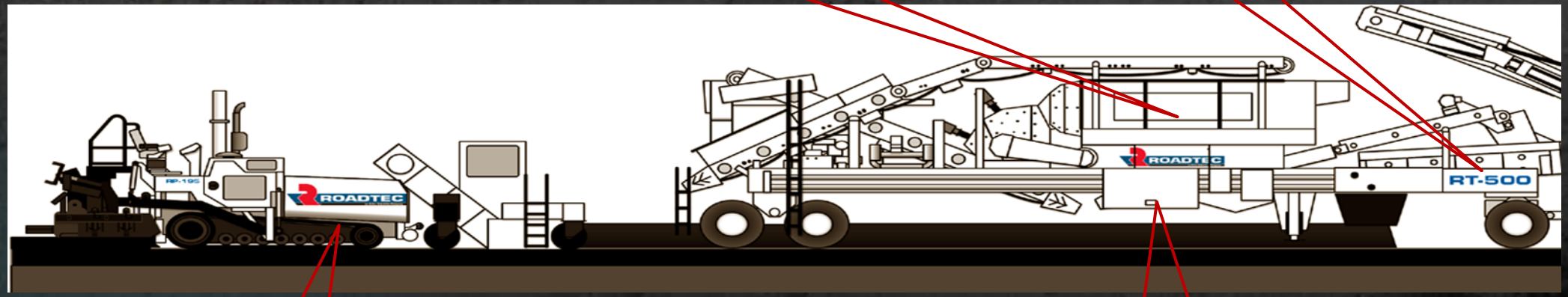


Check depth of cut & cross slope every hour

Check milling teeth often

Check Pug mill paddles for wear

No holes is screed deck or paving fabric



Keep paver close to train

Calibrate additive meters

Using CIR to Improve Ride


40’ ski on paver

Full Depth Reclamation


Re-mix for consistence

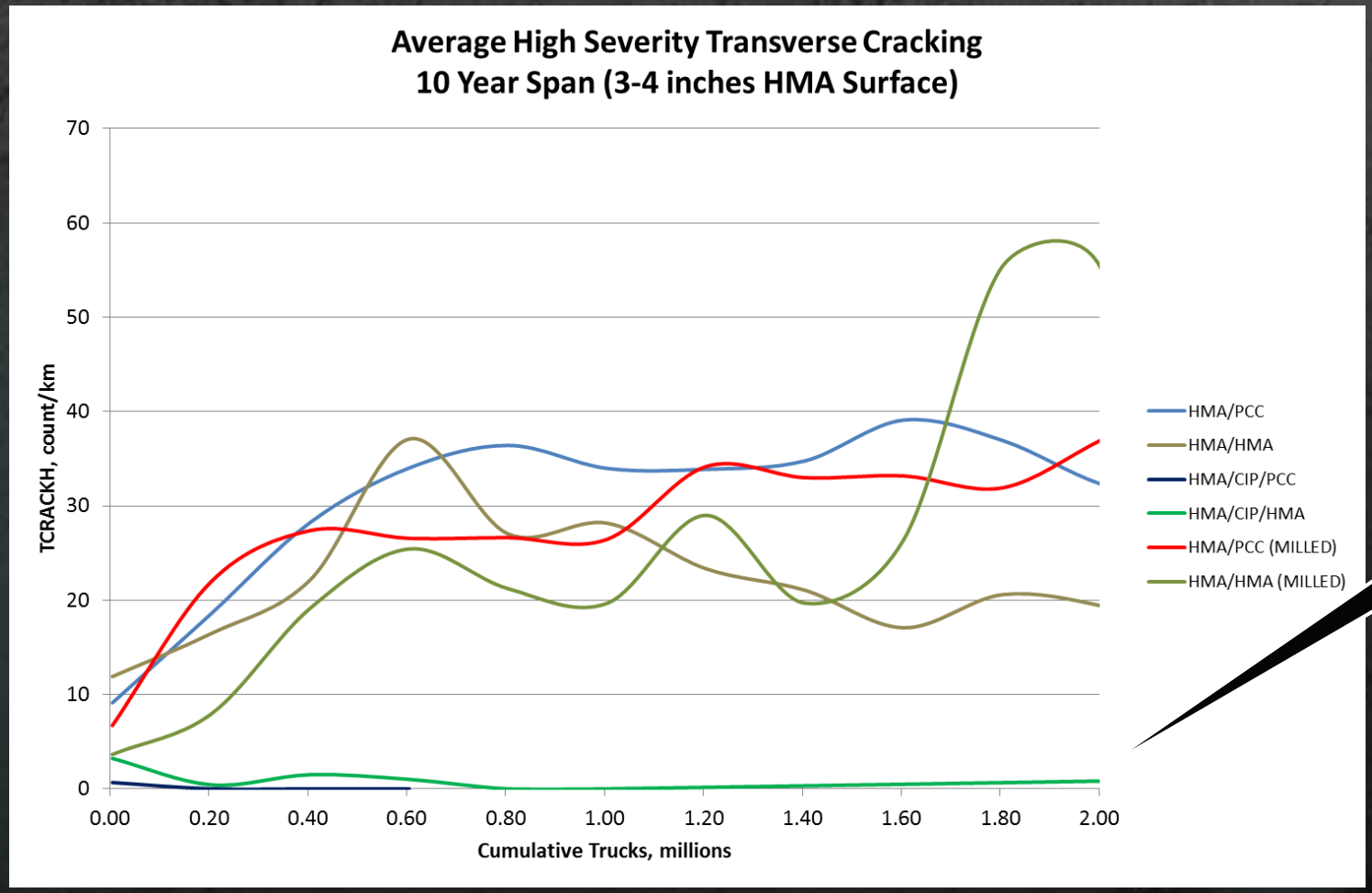

Compact until
walks out


CAT
140H
Watch width of roadway

Compaction, Compaction, Compaction

Some Interesting Uses for In-place recycling

Using CIR on BOC



CIR of BOC

FDR With Thin HMA Surfacing

- MnROAD Cells 2, 3, & 4 mainline
- 3.5 Million ESALS Design
- 5 years to reach design life
- 85% of pave road in MN > 3.5 ESALS design

Original HMA	Stabilized Full Depth Reclamation of Asphalt		
1	2	3	4
6" 58-28 75 blow	1" TBWC	1" TBWC	1" 64-34
	2"64-34	2"64-34	2"64-34
	6" FDR + EE	6" FDR + EE	8" FDR + EE
33" Class 4	6" FDR	2" FDR	
		2"Cl 5	9" FDR + Fly Ash
Driving Lane 1.5" 52-34 HMA inlay 2006	26" Class 4	33" Class 3	Clay
Micro Surface Aug 2012			
Clay	Clay	Clay	
Sep 92	Oct 08	Oct 08	Oct 08
462	500	454	500
t) 97	60	156	75

Performance Data

YEAR	CUMULATIVE BESALs	
2009	773,000	
2010	1,356,300	
2011	1,988,300	
2012	2,707,500	
2013	3,684,600	Reached design loadings
2014	4,507,600	
2015	5,258,800	
2016*	5,709,600	

* Estimated through June, 2016


07/27/2016

Using CIR to Widen Roadway


New 13’ Lane
11’ Lane

Alternate method for streets or county roads reconstruction

Emulsion Stabilized FDR

Double Chip Surface

70 + laps per day at 80K

Current Condition

Questions?

Thank You