Cold Central Plant Recycling

March 11, 2019

Mark Stahl

We see traffic like this..

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and like this..

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Pavement Condition

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Pavement Condition

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Why Recycle?

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- Past conventional overlay stage
- Produces flexible pavement retards cracking
- Utilize already paid for materials
- Make maximum use of tight budgets—typically 40% less cost
- Fast process—shortened construction time
- Responsible construction practice—IT'S GREEN

Pavement Condition

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Recycling Specs

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Illinois Department of Transportation

LR400-4	FDR with emulsified asphalt
LR400-5	CIR with emulsified asphalt
LR400-6	CIR with foamed asphalt
LR400-7	FDR with foamed asphalt
LR1000-1	Mix design procedures for CIR & FDR with emulsified asphalt
LR1000-2	Mix design procedures for CIR & FDR with foamed asphalt

Cold Central Plant Recycling

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Another Tool in the Tool Box

Allows road owner to:

- Stretch funding or # of miles
- Address the cause of failure not symptom
- Re-utilize the good material
- Utilize jobsite material OR Stockpile RAP

Cold Central Plant Recycling

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Similar to FDR and CIR

- Road Evaluation and Sampling
- Mix design principles
- Emulsion or Foam with cement

Differences

- Engineering controls during production
  - Time to see gradation, material quality
  - Evaluate finished product before laid
  - Allows for stepped up testing if desired
- Increased trucking
- Need for material yard

Cold Central Plant Recycling--CCPR

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Typical Candidate

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Typical Candidate

CCPR

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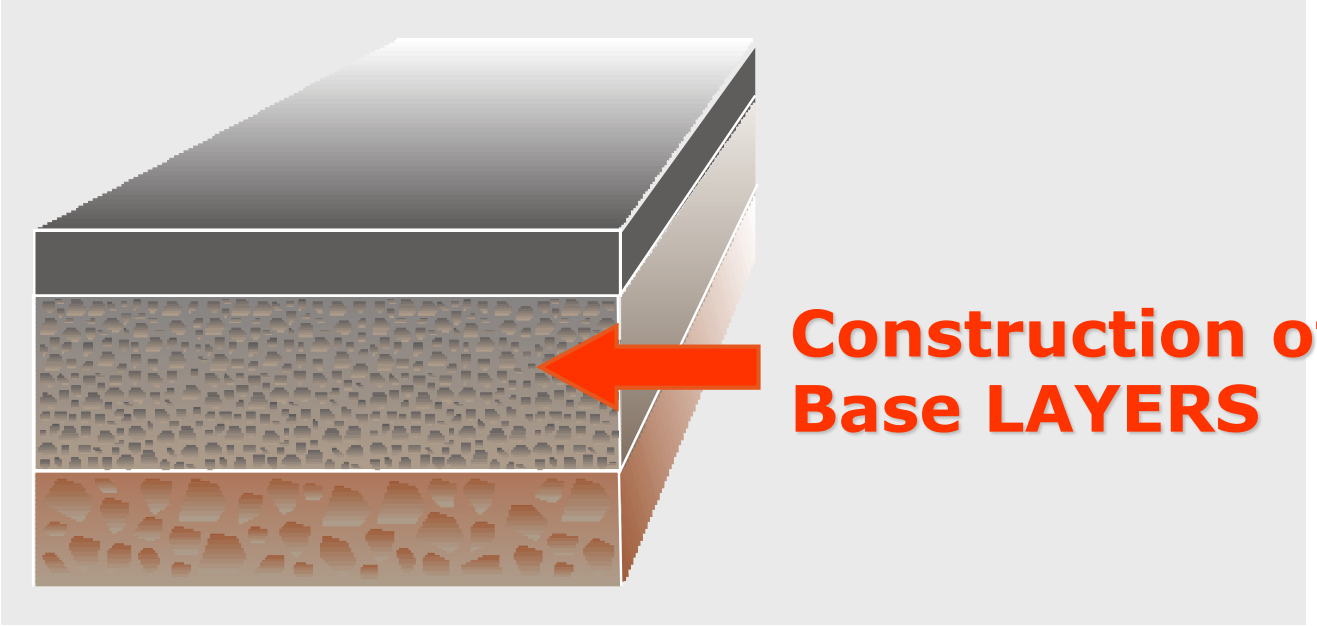

- Typical CCPR layer is 6”-8” of compacted base
- Can be on a stabilized subbase

Cold Central Plant Recycling--CCPR

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3 Processes:

1. Use stockpiled RAP
   Utilize as original base in roadways, private lots
2. Remove and stockpile RAP
   Recycle RAP through CCP
   Pave recycled RAP in removal area
   Install wearing course
2. Remove and stockpile RAP
   Stabilize subbase in removal area
   Recycle RAP through CCP
   Pave recycled RAP in removal area
   Install wearing course

Cold Central Plant Recycling--CCPR

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Where it is being utilized

- Virginia—Interstates and state routes
- West Virginia—State routes
- Indiana—State routes
- Michigan—county highways
- California, New Jersey, New York—private lots

CCPR Animation

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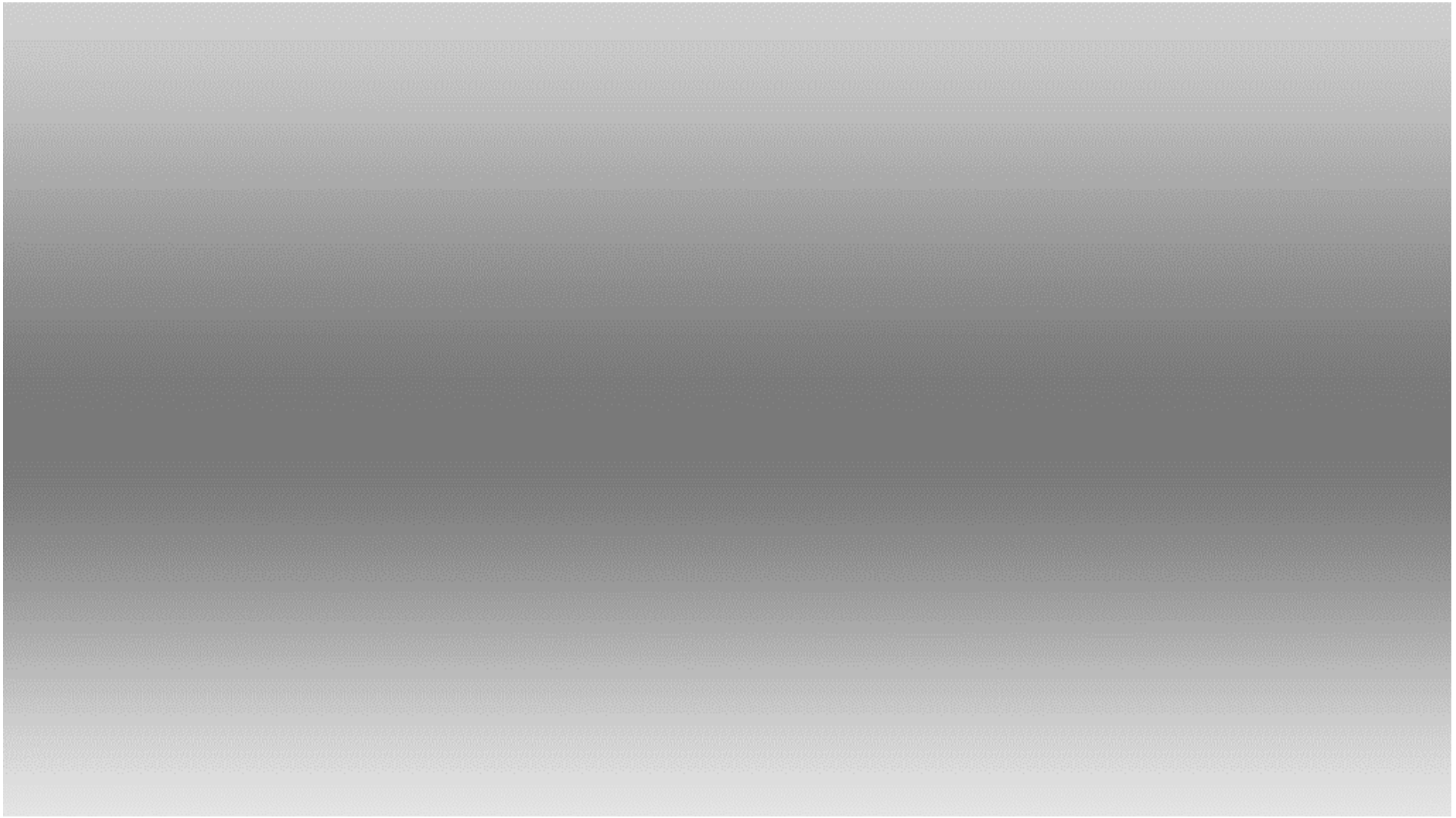

Material Source – Milling Direct from Job Site

Material Source – Millings from multiple sites

Use of impact crusher to regulate sizing

Materials—control gradations

Use screening plant to fractionate
RAP or aggregate

Cold Recycling Mixing Plant

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Wirtgen KMA 220i

- **Twin-shaft mixer:**
  220 t / h
- **Aggregate Hopper:**
  2 x 7 cu yd
- **Transport:**
  44ft x 8ft x 13ft
- **Power Output:**
  174 HP Deutz

No Permits Needed

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It is a Cold Process

No Burner– Aggregate stays at ambient

No Baghouse

Cold mixing plant - Components

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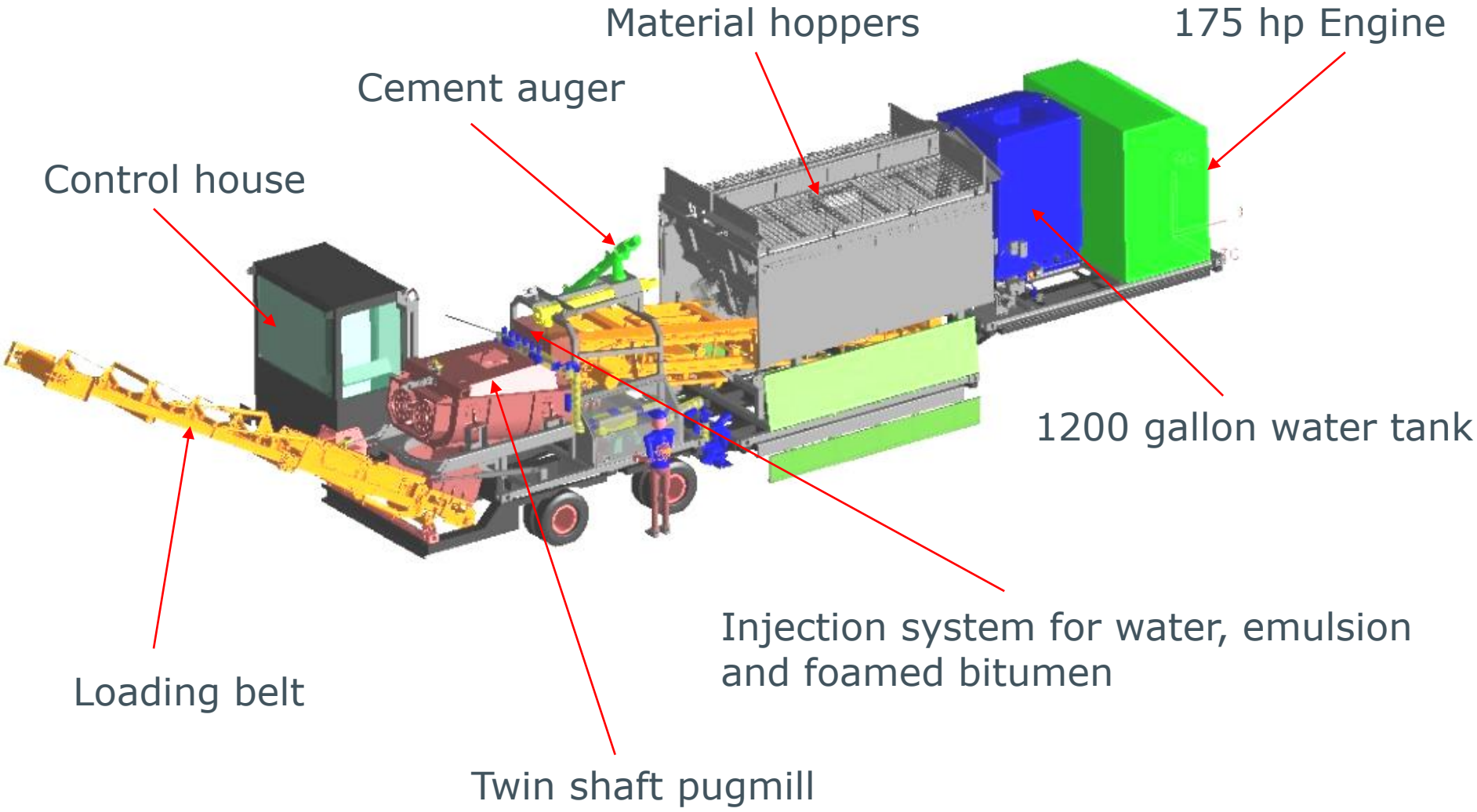

Material flow

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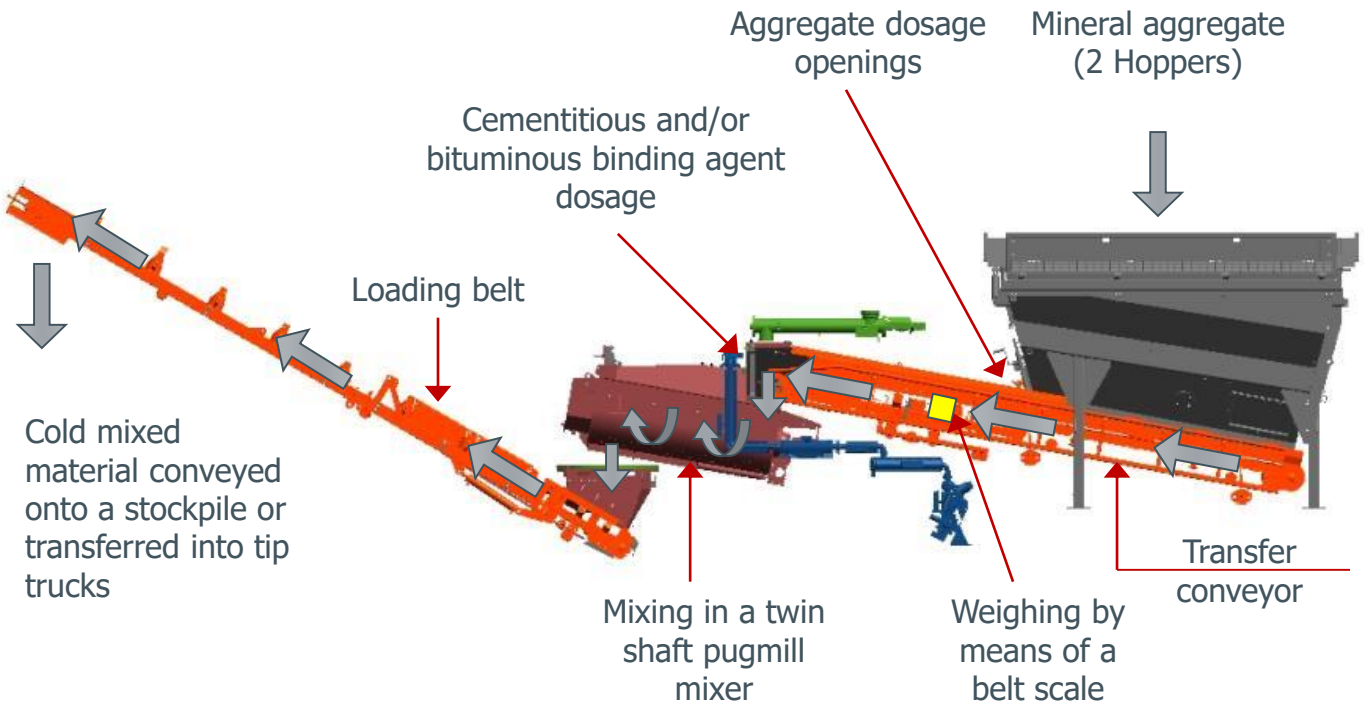
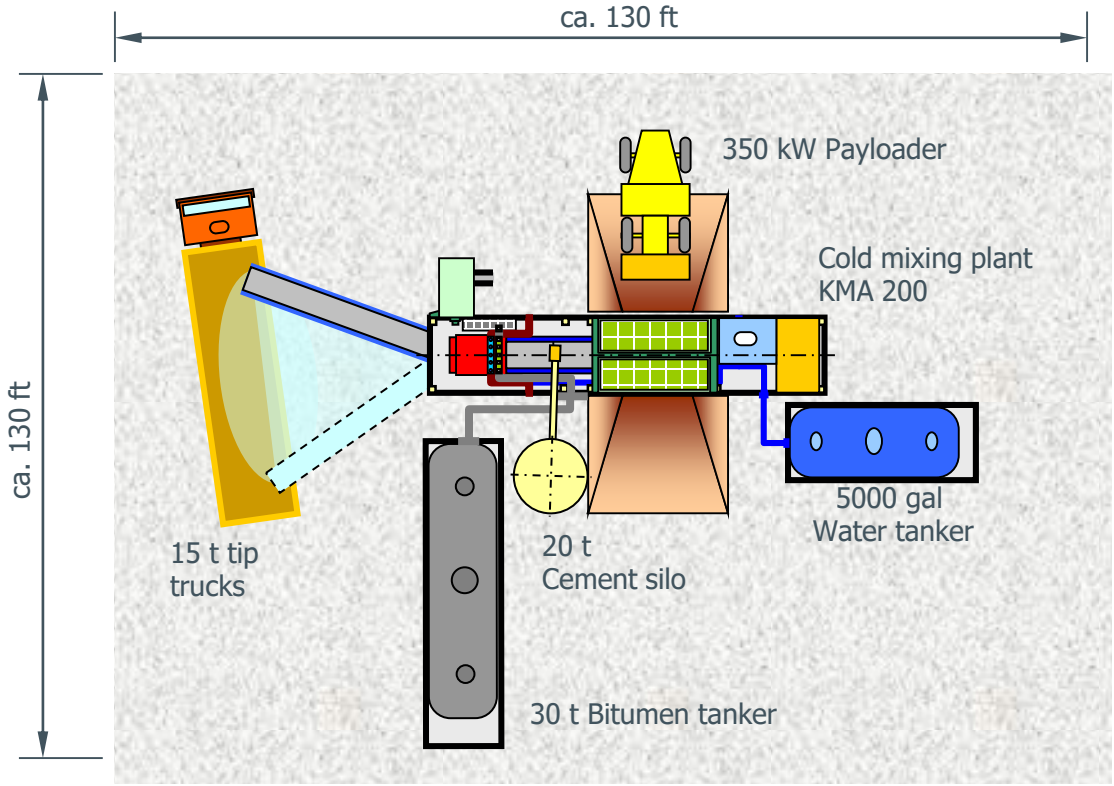


Typical Site Setup



Convenient for small material yards or Interstate interchanges

Material Loading

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Aggregate loaded into left hopper

Sand loaded into right hopper

Aggregate / Sand Blend

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Proportional Gate Openings at Bottom of Hoppers

Allows for different Blends

Example:

65% Aggregate

35% Sand

Common Materials Produced by the KMA:

100% RAP

RAP + New Aggregate

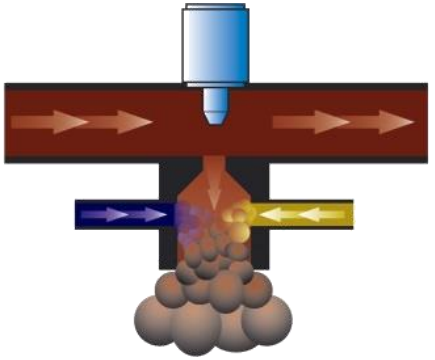
Cement Treated Base material (CTB)

Roller Compacted Concrete (RCC)

Bitumen emulsion

Bitumen

Foamed bitumen



KMA – Site Setup actual

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KMA Plant load out

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Loaded into trucks
Transported to jobsite
Laid in milled out area

CCPR Projects

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- Interstate 81 in VA—2011
- Interstate 64 in VA—ongoing

- NCAT US280 CCPR Section-2015
- US460 in West Virginia--2016

I-81 VDOT

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Utilized FDR, CIR, CCPR

4 miles

I-81 VDOT

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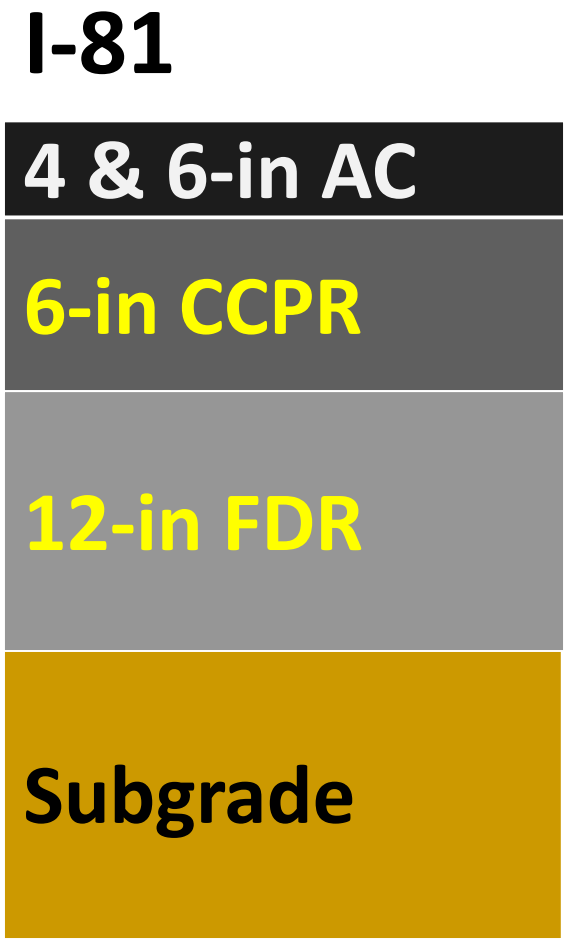
Process:

- Passing Lane
  - Removal of 2” and stockpile RAP
  - CIR 4” with 1% cement and foam
- Driving Lane
  - Removal 10” and stockpile RAP
  - Stabilize subbase 12” with 5% lime
  - Install 6” CCPR material at 2.2% foam
- Both Lanes
  - 2” IM 19.0 lift
  - 2” SMA surface course

Performance Examples of Similar Sections

I-81, Augusta County, 2011

- Right lane
  - FDR, CCPR, asphalt surface layers
- **Summer 2016**
  - 10 million ESALs
  - 0.10 inches rutting
  - IRI 44 inches per mile



Source: Brian Diefenderfer

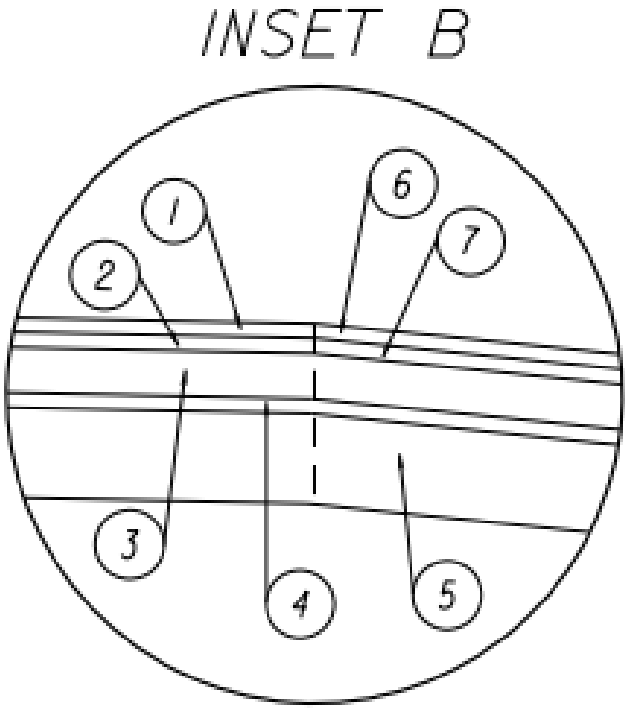
I-64 Project Scope

- Newport News, James City, and York Counties
- Approx. 1 mile west of Exit 242 to 0.5 miles east of Exit 247
  - 7.08 miles, both directions (~56 lane miles)
    - 3,000+ trucks per day (in each direction)
  - Add a travel lane and a 12ft shoulder to the left
  - Reconstruct existing lanes
  - $189.7 Million

Project Scope

- Construct new travel lane and 12ft shoulder
  - CTA foundation
  - CCPR base
  - Asphalt surface layers
- Reconstruct existing lanes
  - Remove existing concrete
  - FDR foundation
  - CCPR base
  - Asphalt surface layers

Project Scope



PAVEMENT DESIGN (RECONSTRUCTED

1. 2" Asphalt Concrete SMA-12.5 PG76-22
2. 2" Asphalt Concrete SMA-19.0 PG76-22
3. 6" Cold Central Plant Recycling Material (CCPRM)
4. 2" Open Graded Drainage Layer - Asphalt or Cement Stabilized
5. 12" Full Depth Reclamation (FDR) Existing Aggregate and Stabilized Subgrade
6. 2" Asphalt Concrete, SM-12.5D
7. 2" Asphalt Concrete Type IM-19.0A

} Shoulder only

Why Use Pavement Recycling

- 30 to 50 percent cost savings
- 50 percent less greenhouse gases emitted
- Fix deterioration causes rather than symptoms
- Can be quicker than full reconstruction

- **I-64 Segment II**
  - **RAP use could exceed 200,000 tons**
  - **Cost savings of about $10 Million**

NCAT US280 CCPR Section

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CCPR Section Pre-milled to depth of
5”
Millings taken off site to stockpile

NCAT US280 CCPR Section

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Source Material Pre-Screened RAP, ¾" minus

Job Mix Formula

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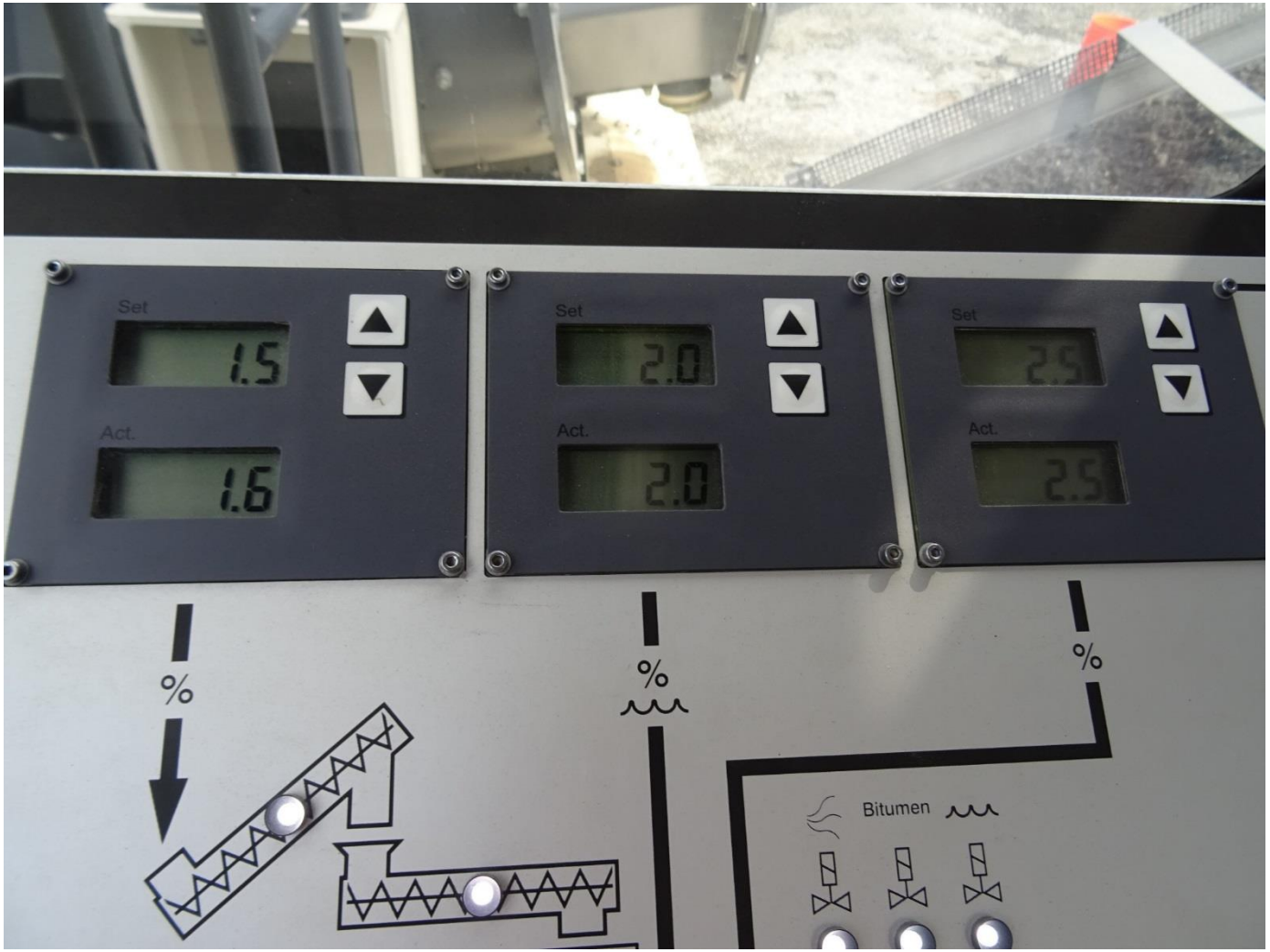

1.5% cement
2.0% water
2.5% foam

NCAT US280 CCPR Section

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Well graded fine mix loaded directly to trucks

20 tons batches

NCAT US280 CCPR Section

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Load recycled millings directly to paver hopper

NCAT US280 CCPR Section

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Pave Processed RAP at 5 ½" to
finish compacted finish depth of 4"

NCAT US280 CCPR Section

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NCAT US280 CCPR Section

WIRTGEN

NCAT US280 CCPR Section

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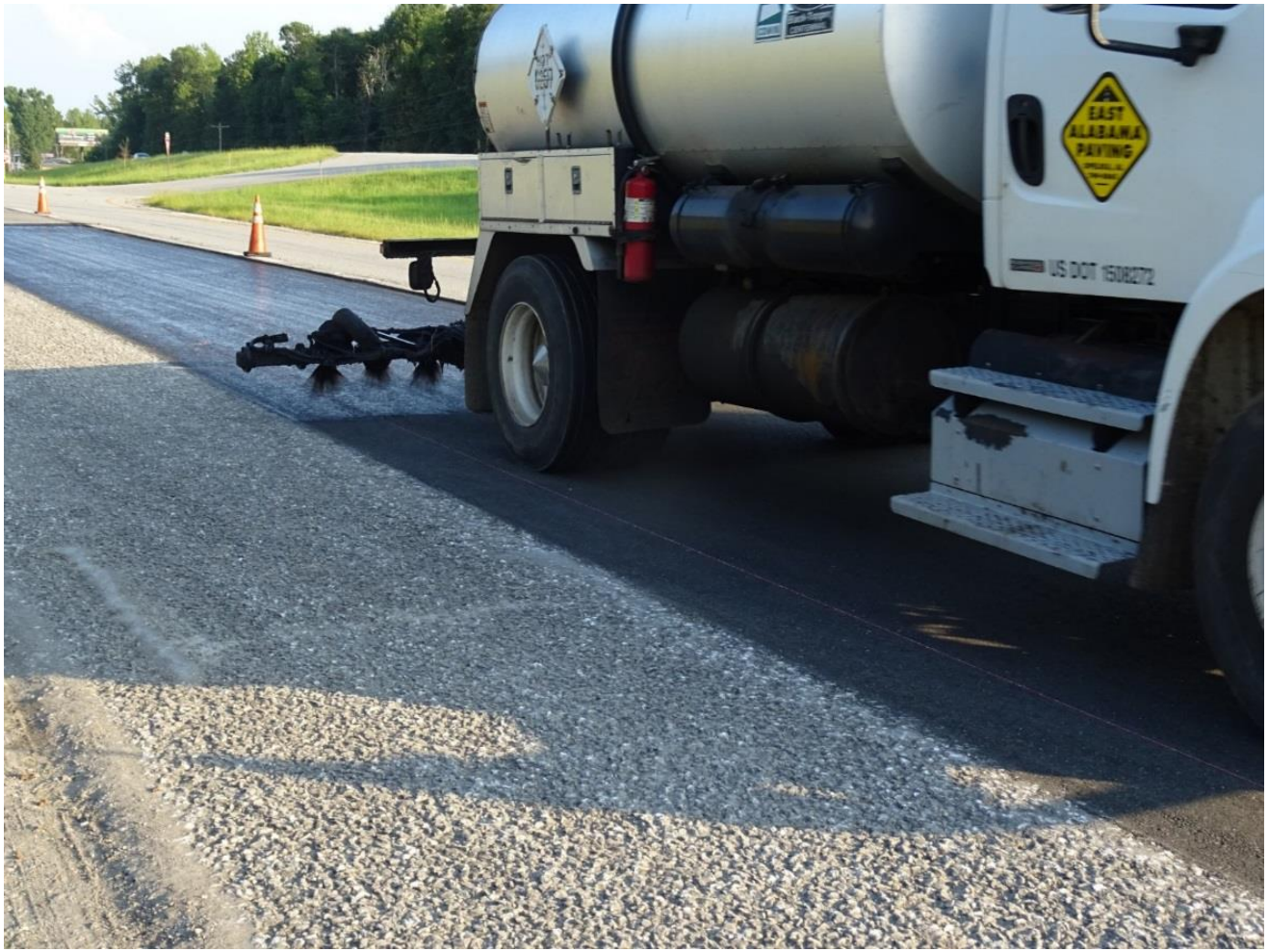

Apply fog seal at rate of 0.05 gal/sy

Cure – open to traffic

1" Fine graded surface course

US 460 West Virginia

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Scope:
Remove 8” asphalt
Install 6” CCPR with foam
Install 2” surface course

16,000 tons of foamed base

US 460 West Virginia

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Laid nominal 8” lift with RAP with foam

Compacted to 6” finished lift

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Compacted with a 14-ton double drum vibratory and a 12 ton pneumatic

US 460 West Virginia

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US 460 West Virginia

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Finished:
6” foamed CCPR
2” surface course

Benefits:

- Produces a flexible pavement that retards cracking
- Allows engineering controls with material quality and consistency
- Utilizes jobsite material or stockpiled RAP
- Contactor can use normal paving equipment
- CCP do not need permits

Summary:

- Another tool in your recycling tool box
- Can easily be coupled with other recycling disciplines
- Adaptable process—DOT or private
- Proven process that other states are utilizing

Thank you for your Attention!

WIRTGEN GROUP

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