



Terminology

VRAM

Void Reducing Asphalt Membrane

J-Band[®]

Asphalt Materials, Inc.
Trade Name



Longitudinal Joint Improvement Plan

- Early 2000's timeframe
- Illinois DOT recognized need for improving joint performance
- Failure mechanism = **Permeability**
- **Concept** – How to fill a portion of the voids with an asphalt product from bottom up?
- Heritage proposed the development of a Void Reducing Asphalt Membrane (VRAM)

Falling head permeameter

HERITAGE
CONSTRUCTION + MATERIALS

3,000+ Employees 68 Locations 7 States

For more than 65 years, HC-M companies have been an integral part of building roads, bridges and commercial projects across the Midwest. You'd be hard pressed to find someone who isn't touched by our kind of work every day. From the roads they drive on to the household products they use, we take our impact on people seriously. That's why we never cut corners and give our all for the individuals, families and communities depending on us.

Our Brands

Preserving/Maintaining Centerline Joints At Time of Construction

Apply a heavy band of polymer-modified binder in the area where the new paving joint will be placed.

Fast acting, the road is ready for construction traffic, keeping the installation process efficient and traffic flowing.

Place the first paving pass over half the width of the band of polymer-modified binder.

Polymer-modified binder migrates into the HMA at the joint.

Slide 6

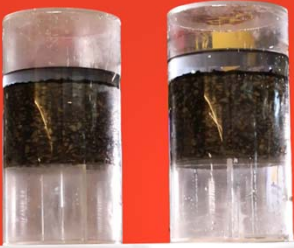
DH0 [@Jackson, Rachel] Can we swap the 3rd picture and words below with the 2nd? They seem out of order as just the band should be before the band with one pass???

Dave Henderson, 2024-07-30T20:09:43.458

RJ0 0 [@Henderson, Dave] all set!

Jackson, Rachel, 2024-07-31T12:03:36.607

Water Permeability Demonstration



- Time lapse is 6.5 minutes
- Cores built with 9.5mm Coarse-Graded HMA, 12% Air Voids
- Barrier created by VRAM prevents water from permeating
- Proven and reliable!
 - J-Band is a proven solution for more durable longitudinal joints

J-Band Control

Quiz Time:

_____ of fatal crashes are a result of lane or roadway departure.
 _____ of opposing direction crashes occur on undivided 2-lane roads.
 _____ of these crashes involve overtaking (passing) maneuvers.
 _____ of drivers *admitted* to "dozing off" while driving.

Centerline rumble strips reduce head on crashes by as much as _____.

Answer Bank

A 20% B 65% C 75% D 55% E <5%




J BAND Sustainability
 Social = Safety and The Economics


Rumble Strips Can Help Save Lives

In 2019:


- 7,389** Crashes in left of center accidents in Ohio
- 160** Fatalities in left of center accidents in Ohio
- 16,261** Roadway departure fatalities nationally



VRAM - Pillars of Sustainability

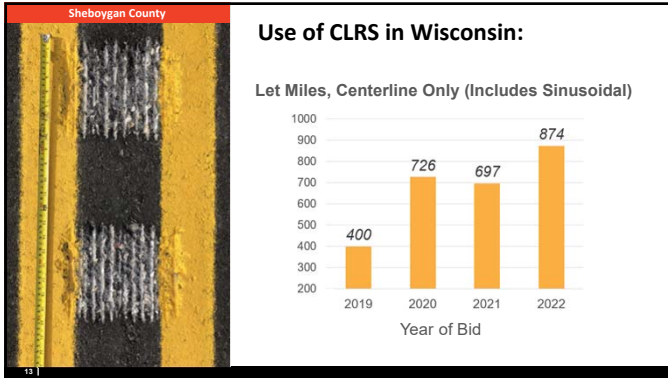


Achieve Engineering goals while achieving Sustainability goals



VRAM Under Rumble Strips

- Rumble strips/corrugations
 - Used on an increasing basis for safety (Distracted Driving)
 - Placed in the weakest area of the pavement, centerline joint or outside edge of paving creating early failure
- VRAM under centerline or edge rumble strips to reduce air/water permeability
- Sealed after milled in to reduce water penetration



CONCLUSIONS

- IDEAL-CT cracking results showed higher values for cores that contained VRAM compared to the complementary control section.
- Overlay test explored as a test method to evaluate cracking resistance of joint cores under cyclic loading.
- Route-1 cores containing VRAM showed similar crack resistance with and without rumble strips.
- Lowell CPR results indicate poorer crack resistance for a joint without VRAM, with or without rumble strips.
- VRAM was effective in reducing permeability in cores with and without rumble strips.

AGENCY EXPERIENCE: INDIANA - SR 26, Jay Co.

Constructed Nov. 2016
Reviewed Feb. 2024

CONTROL

VRAM

Control

- Cracking – 1/2"
- Some double crack filled

Majority of job crack filled VRAM

- Minor cracking ~1/8"
- Some crack fill – not needed

CONCLUSIONS

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- Route-1 cores containing VRAM showed similar crack resistance with and without rumble strips.
- Lowell CPR results indicate poorer crack resistance for a joint without VRAM, with or without rumble strips.
- VRAM was effective in reducing permeability in cores with and without rumble strips.

AGENCY EXPERIENCE : Wayne Co., New Pittsburg

Constructed Aug. 2017
Reviewed Dec. 2023

CONTROL

VRAM

Control

- Cracked 100% of length
- Multiple 1/2"-1" cracks

VRAM

- Cracked 100% of length
- 1/4" and some 1/2" cracks

National Road Research Alliance (NRR)

- Pooled fund, "cooperative implementation"
- 14 State DOTs, > 80 industry/academia
- "Materials-Based Methods to Improve Rumble Strip Durability"

Read the Project


Slide 18

RJ0 Do we need to keep the map?

Jackson, Rachel, 2024-03-08T21:08:14.511

RJ1 Add "read the study" in script font with arrow

Jackson, Rachel, 2024-03-08T21:08:25.652




HSIP. Get Them Home Safely.

The Highway Safety Improvement Program (HSIP) connects communities and transportation agencies with funding to make safety improvements that reduce fatalities and serious injuries on our nation's public roadways. The HSIP maximizes safety benefits for all modes by allowing agencies to accelerate the adoption of the most effective transportation safety practices. Put your HSIP funds to work and get everyone home safely.

HSIP. Invest in the future. Save lives today.

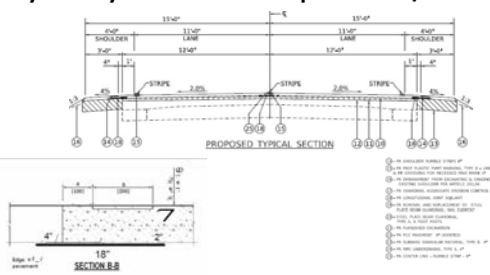
Photo Source: @Getty Images.

VRAM - Pillars of Sustainability



Achieve Engineering goals while achieving Sustainability goals

Jersey County HSIP Rumble Strips with LIS/VRAM




PROPOSED TYPICAL SECTION

SECTION B-B

1. The rumble strips shall be spaced at 12" on center.
2. The rumble strips shall be spaced at 12" on center.
3. The rumble strips shall be spaced at 12" on center.
4. The rumble strips shall be spaced at 12" on center.
5. The rumble strips shall be spaced at 12" on center.
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10. The rumble strips shall be spaced at 12" on center.
11. The rumble strips shall be spaced at 12" on center.
12. The rumble strips shall be spaced at 12" on center.

Longitudinal Joint Improvement Plan

- Early 2000 timeframe
- Illinois DOT recognized need for better joint performance
- Failure mechanism – permeability
- **Concept** – fill a portion of the voids with an asphalt product from the bottom up, a **Void Reducing Asphalt Membrane (VRAM)**




Falling head permeameter

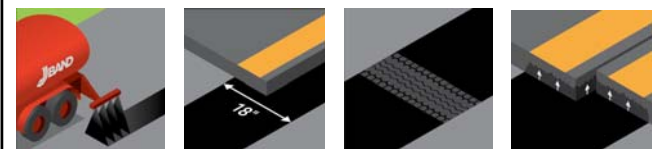
SUMMARY ~ VRAM - Safety (Social) Pillar

Far fewer estimated injuries and fatalities using J-Band than alternatives in joint construction

- No density checks at the centerline puts fewer workers at risk
- ClimeCo studied the reduction in maintenance for a road using J-Band, and calculated safety metrics
- Rumble strips and distracted driving



A Different Approach to Improve Joint Performance Video



1. Apply a heavy band of polymer-modified binder in the area where the new paving joint will be placed.
2. Place the first paving pass over half the width of the band of polymer-modified binder.
3. Fast acting, the road is ready for construction traffic, keeping the installation process efficient and traffic
4. Polymer-modified binder migrates into the HMA at the joint.

LJS Performance History

9 IDOT LJS Experimental Test Sections Placed in 2002 – 2003

Illinois DOT took cores for testing 3 of these in 2017

- District 7 US-51 Elwin
- District 1 US-50 Richton Park
- District 2 IL-26 Cedarville

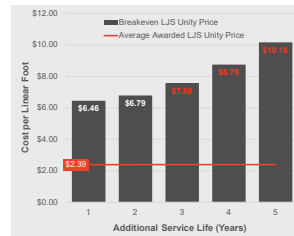


25 | Rumble Strips and VRAM

VRAM - Economic Pillar

IDOT's ROI: 3-5 times the cost of VRAM

IDOT VRAM Life Cycle Cost Analysis
2-lane roadway
15-year basis

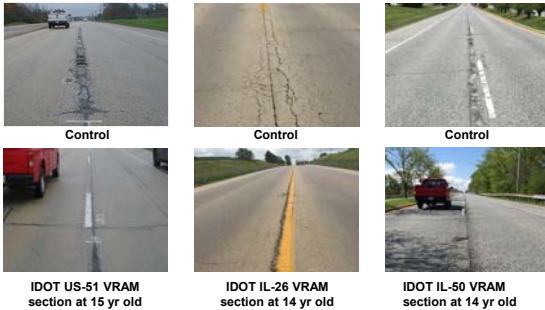


IDOT expects VRAM to provide a life extension of 3-5 years

The benefit of this technology is 3-5 times the cost, per IDOT

28 | Rumble Strips and VRAM

LJS Experimental Projects



IDOT US-51 VRAM section at 15 yr old

IDOT IL-26 VRAM section at 14 yr old

IDOT IL-50 VRAM section at 14 yr old

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J-Band Reliability

- When it's down, it's done
- More asphalt material is added
 - Fewer air voids
 - Less permeability
- Eliminates need for Joint Density Coring



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Indianapolis Motor Speedway



- Last resurfaced in 2004 using VRAM
- Prior to '04, resurfaced every 8 to 9 yrs
- Through 2024 Race – No resurfacings
 - Surface seals with RPE (Rapid Penetrating Emulsion)



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J-Band isn't an Expense it's an INVESTMENT

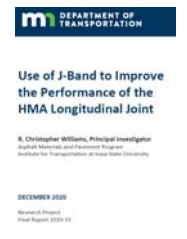
- \$1 invested saves *at least* \$2 in avoided and deferred maintenance
- Delivers 3-5 times life cycle savings



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Pavements are a Valuable Asset for DOTs

- Valued at \$29.5 billion, pavements have the largest replacement cost of all assets owned by the Minnesota Department of Transportation (MnDOT).
- Historically, hot-mix asphalt (HMA) pavements constructed in Minnesota typically have air void contents of about 7% to 8% in the mat and often approach or exceed air void contents of 10% at the longitudinal joints.
- Higher air void contents at the longitudinal joints can expose the pavement to premature deterioration and, as a result, compromise pavement integrity and performance.
- In Minnesota, the primary concern during asphalt pavement construction is the achievement of high density in the mixture, especially at the longitudinal joints.



31 | Rumble Strips and VRAM

Summary: VRAM's Value

- Rumble Strips increase safety
 - VRAM Reduces or eliminates the need for joint maintenance, which increases safety
 - The presence of CLRS compounds importance
- VRAM adds Economic Sustainability Benefits
 - Agency Calculated Life Cycle Cost Savings
 - Documented long-term performance



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Ohio DOT Quantifies Road Performance and \$ Impact by Year. By Mile.

"A year of pavement performance costs ODOT \$65 million.

Our annual budget is \$650M and we're on a 10-year resurfacing cycle.

If I can get every mile of pavement to last one year longer, I save \$65M."



32 | The Financial Case for VRAM

JJBAND

Questions about VRAM?



For more information go to <https://www.thejointsolution.com>

Or Reach out to me Directly:
303-218-8058 | dhenderson@thgrp.com

35 | Rumble Strips and VRAM

JJBAND

Value of LJS

- What if you pave 100 miles of HMA with LJS per year as part of your Pavement Management System?
- Extend life of each mile of those overlays 3 years
- You realize an annual Life Cycle Cost savings of \$3,890,000 for an initial investment of \$1,250,000
- Utilize those savings to improve the overall system
 - Example – would mill and pave an additional 36 miles of 1 1/2" HMA at 24' wide. (Assumes: \$80/ton HMA and \$1.00/SY milling)

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J-BAND® APPLICATION - OTTERVILLE RD
Jersey County, IL



Asphalt Materials, Inc.

Resources Available To Help You Apply For HSIP

- USDOT Federal Highway Administration trainings
- Your state DOT
- Consulting engineers



Scan for USDOT Resources

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VRAM & Sustainability Summary

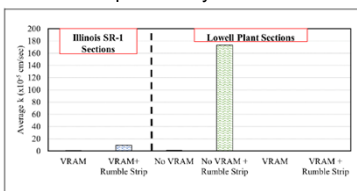
- Economic Pillar – life extension = life cycle cost savings
- Environmental Pillar – Quantified reduction in energy during construction and in maintenance compared to alternatives
- Social Pillar – reduced exposure at centerline = reduced social impact & safer alternative.



38 | Rumble Strips and VRAM

DeCarlo et al. (2023): Impact of Rumble Strips on Longitudinal Joint Pavement Performance

- Evidence that rumbles *at least* change water dynamics at the joint
- Need to expand study



DeCarlo et. al (2023)

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