



2024 Nebraska Asphalt Paving Workshop

Best Practices of Inspection and Construction for
Asphalt Paving, Compaction, and Plant Operations

Resource for You



NEBRASKA

Good Life. Great Journey.

DEPARTMENT OF TRANSPORTATION

<https://capriasphalt.us/>

Current CAPRI Members



Completed Research Study

CAPRI-Brief

Asphalt Longitudinal Joint Current and Best Practices

Construction Methods, Materials, & Acceptance



Learning Objectives

- Understand the Risk associated with and with longitudinal joint specifications
- Describe various approaches for rolling a joint
- Understand Methods and Materials used
- Explore maintenance approaches

Longitudinal Joints



**End-result
Specifications**



Methods



Materials

State Agency Specification Approaches



INCREASING INNOVATION

No L.J.
Spec

- High Agency Risk
- No Incentive for Quality

Method
Spec

- One size fits All
- Agency assumes some Risk
- No Incentive for Innovation
- Requires On-site Oversight by Agency

Density
Spec

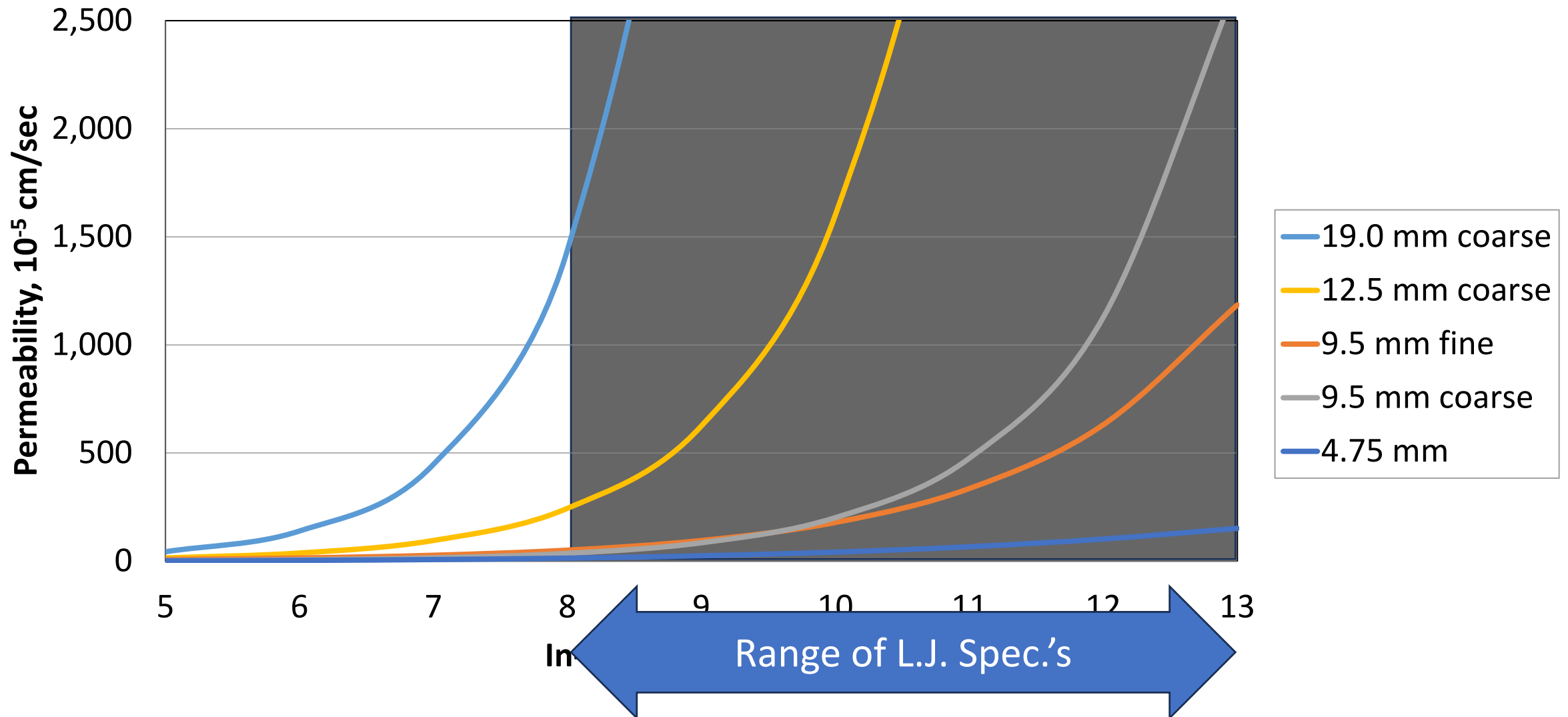
- Allows Innovation for Contractor
- Balanced Risk, Includes Incentives & Disincentives
- May Have Triggers (e.g., Sealing)
- Not Appropriate for Small Jobs

Tiered
Spec

- Small jobs: Contractor follows Method Spec or Submits compaction plan
- Larger Jobs: PWL Density Spec

INCREASING RISK

NCAT Report 03-02



LJ Methods for Construction & Maintenance



Butt Joint & Roller Patterns

Notch Wedge & Tapered Joint with vertical offset (CO)

Maryland Joint

Edge Restrain Device / Joint Maker

Joint Heaters

Partial & Full Depth Crack Repair, with and with Joint Heater

LJ Materials for Construction & Maintenance

- Joint Adhesives (aka Rubberized Asphalt Tack Coat)
- Joint Sealers
- Fog Sealer
- Crack Sealing & Filling
- Micro-surfacing
- Rapid Penetrating Emulsion (RPE) & Rejuvenating Seals
- VRAM – Void Reducing Asphalt Membrane

Poor Longitudinal Joint Performance











Longitudinal Joints: Paver Best Practice



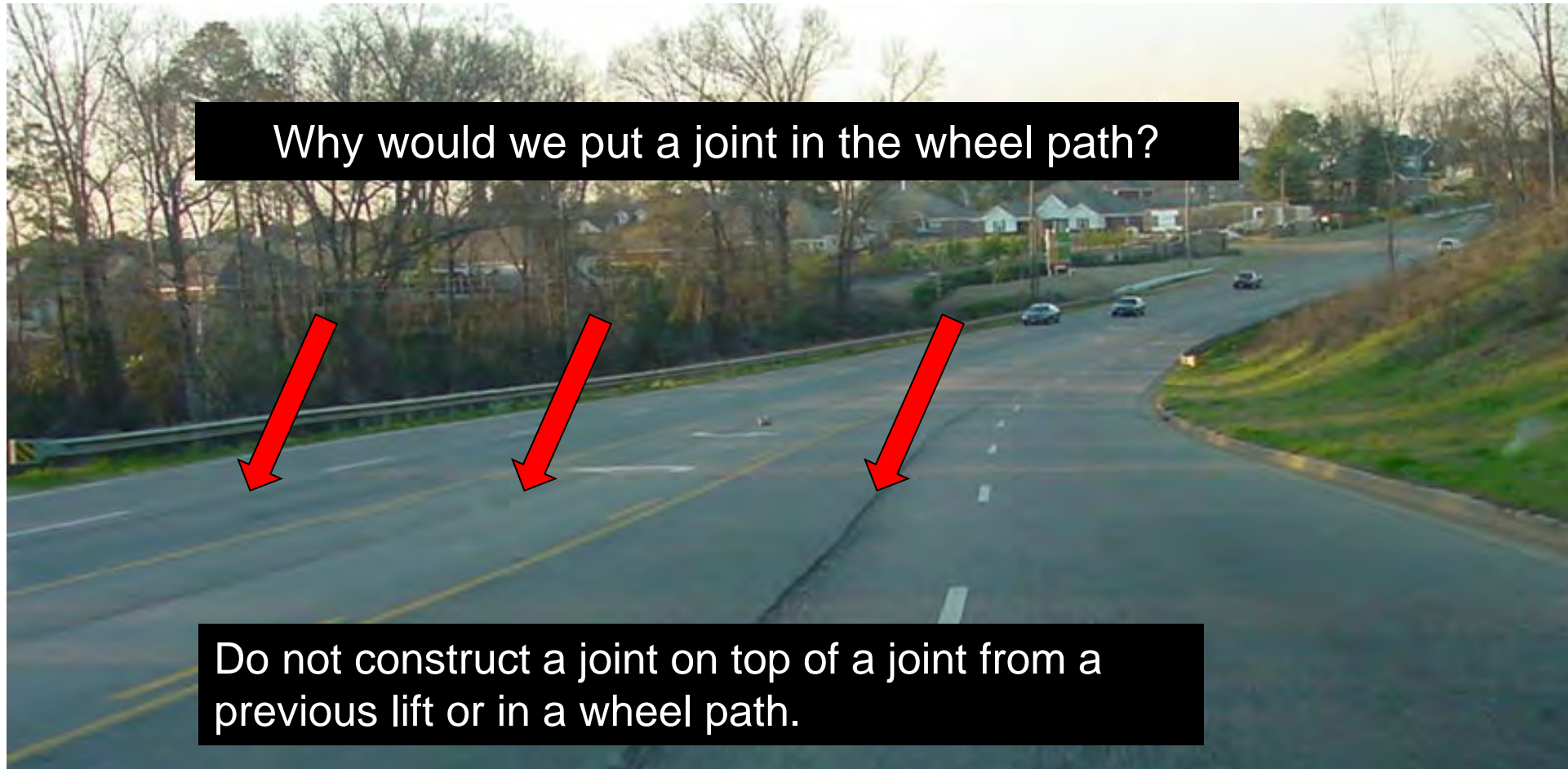
- Place and follow markings to guide the paver.
- Don't vary from the intended location of the joint by more than 2 inches
- Construct joints with tight seams and no visible segregation.

Poor Joint Construction

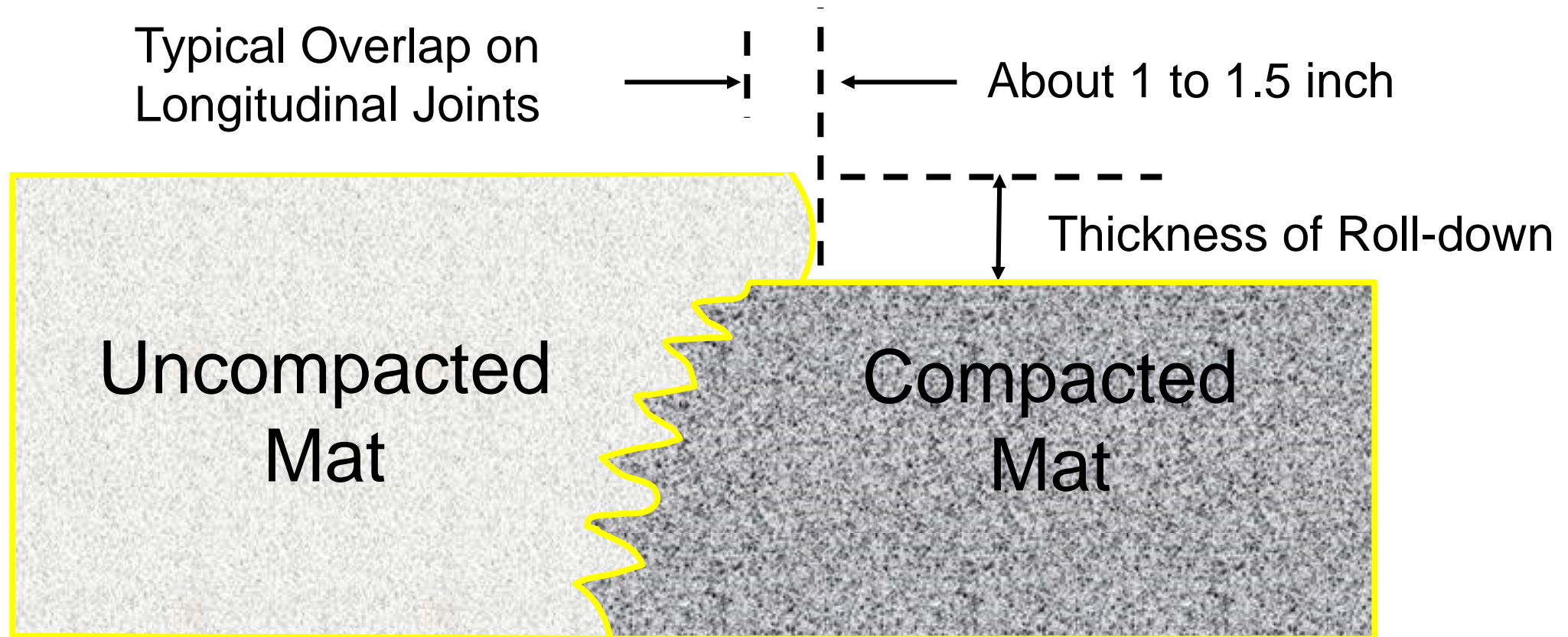


How do you match this with the second pass?

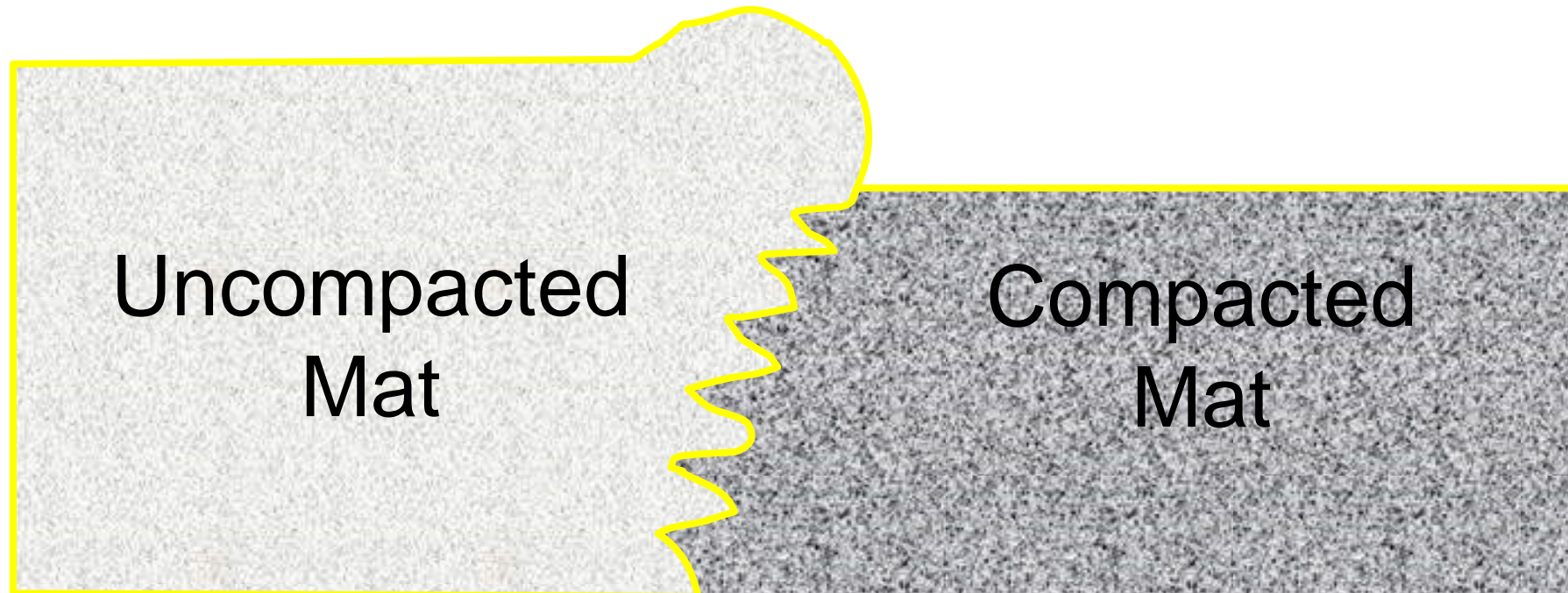
Longitudinal Joints in the wrong place!



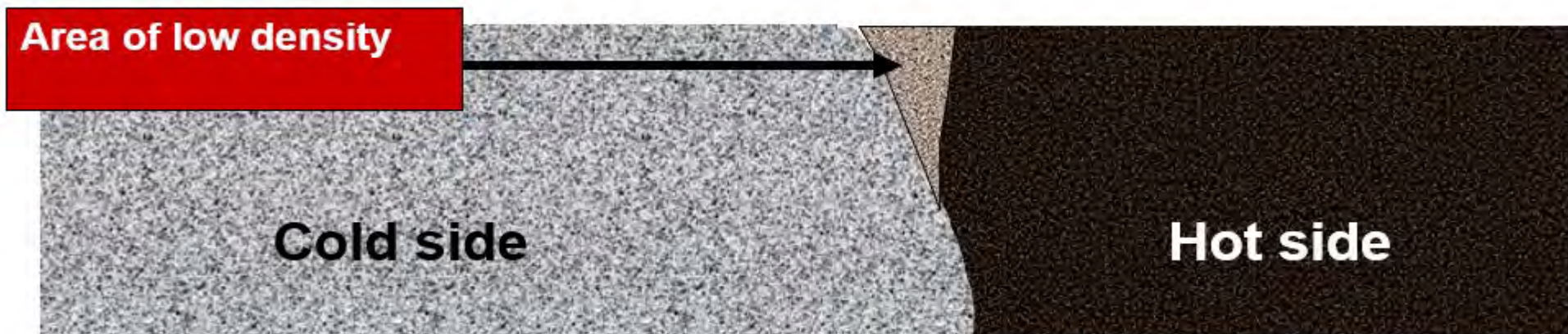
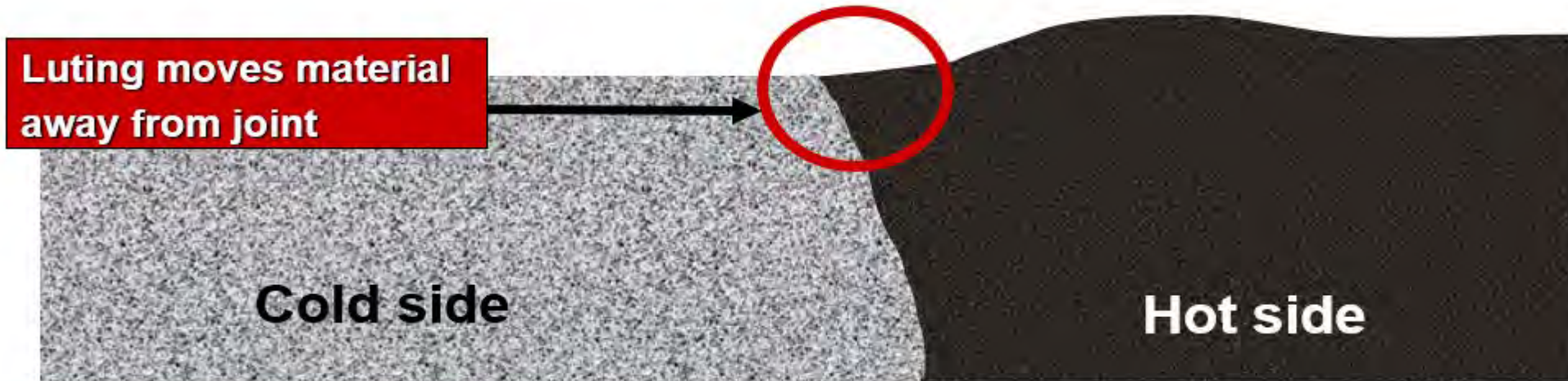
A Joint Without Luting is Preferred



Mix Bumped Back Method



Low Density at Joint after Luting?



Is the Lute Raker Doing His Job?



Lute Raker Doing His Job





Joint without luting





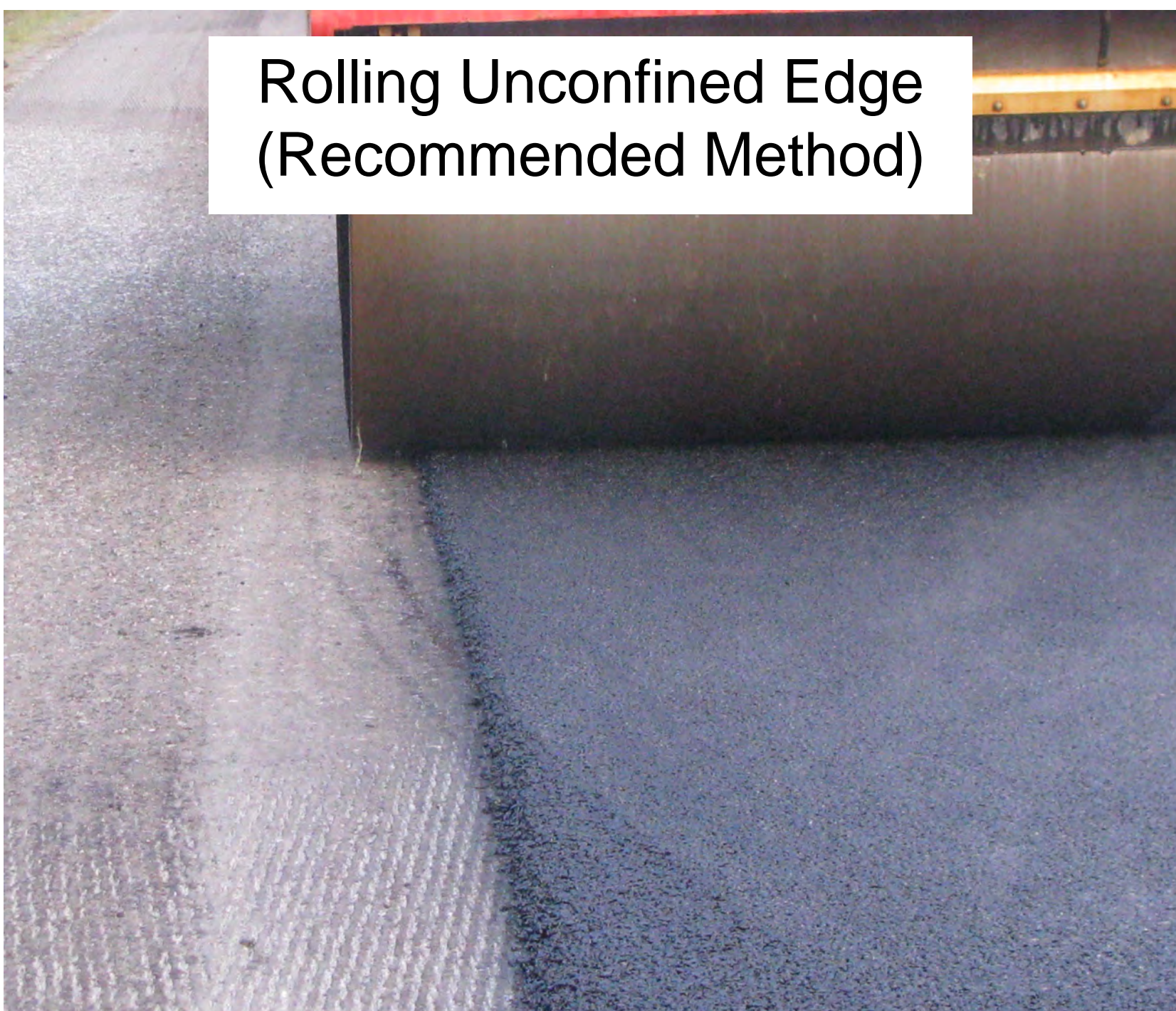
Joint without luting

Compaction of the Joint

- Unconfined edge
- Asphalt joint to an existing joint or against a vertical edge such as a milled edge or curb edge



Rolling Unconfined Edge (Recommended Method)





Unconfined edge
can be a problem

Confined Edge

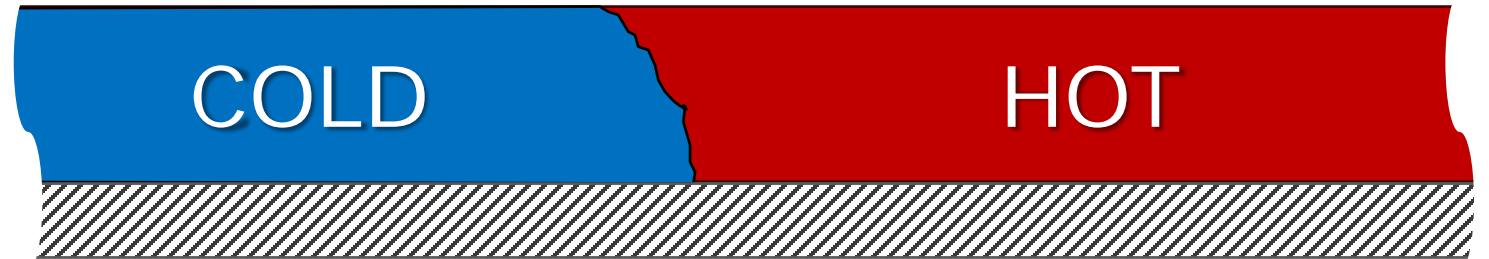


What is the best way to roller a longitudinal joint?

- 1. Joint Type Selection:**
e.g. Notched Wedge Joint:
- 2. Use of Joint Adhesive:**
- 3. Rolling Techniques:**
- 4. Paver Operation:**
- 5. Material Placement:**
- 6. Compaction and Mixture Management:**
- 7. Consideration of Environmental Factors:**
- 8. Incorporation of New Technologies:**



Vertical Edge Conventional Butt Joint





6-inch
overhang on
the 1st Pass

Unconfined Edge



Common Roller Patterns



Unconfined Edge

1st Pass: 3 to 6-inch
inside unsupported
edge.

2nd Pass: 3 to 6-inch
overhang.

Common Roller Patterns

6-inch on **Cold Side** on the first pass



Cold Side

Hot Side

Common Roller Patterns

6-inch back on
Hot Side on the
first pass



Cold Side

Hot Side

Common Roller Patterns



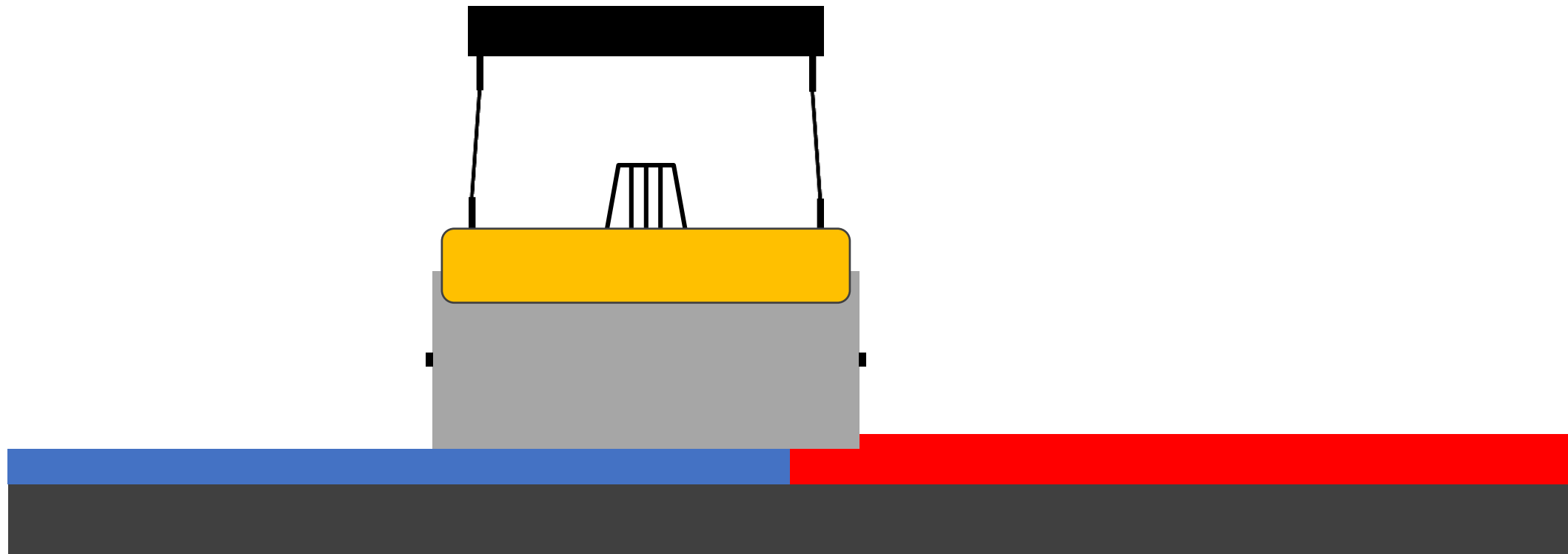
Has
to be
Clean

Common Construction Practice Mill and Fill one lane at a time



Image: <https://www.wirtgen-group.com/>

Roll from Cold Side





Confined edge



Confined edge



This Avoids Lane-Edge Joint



What are the advantages? Disadvantages?

Tacking of Joints

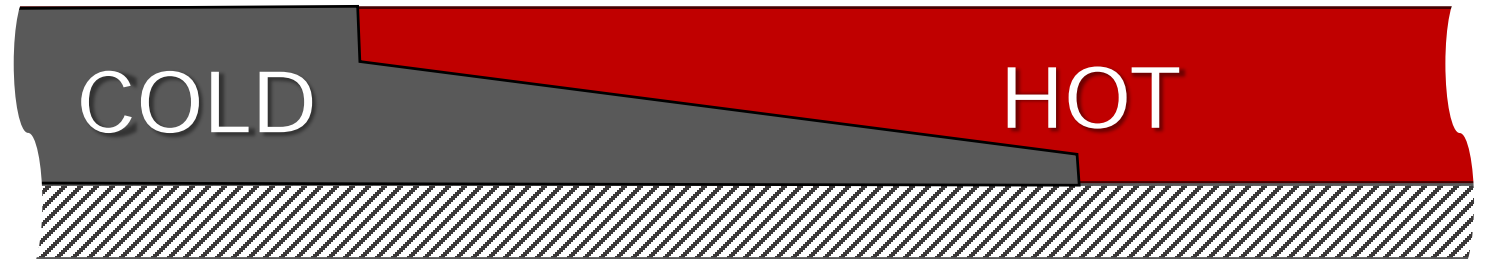
- Apply a tack coat to the surface and to the exposed edges of longitudinal and transverse joints before placing bituminous pavement.
- Apply a double application of tack coat to longitudinal joints at a minimum of one inch on either side of the joint.



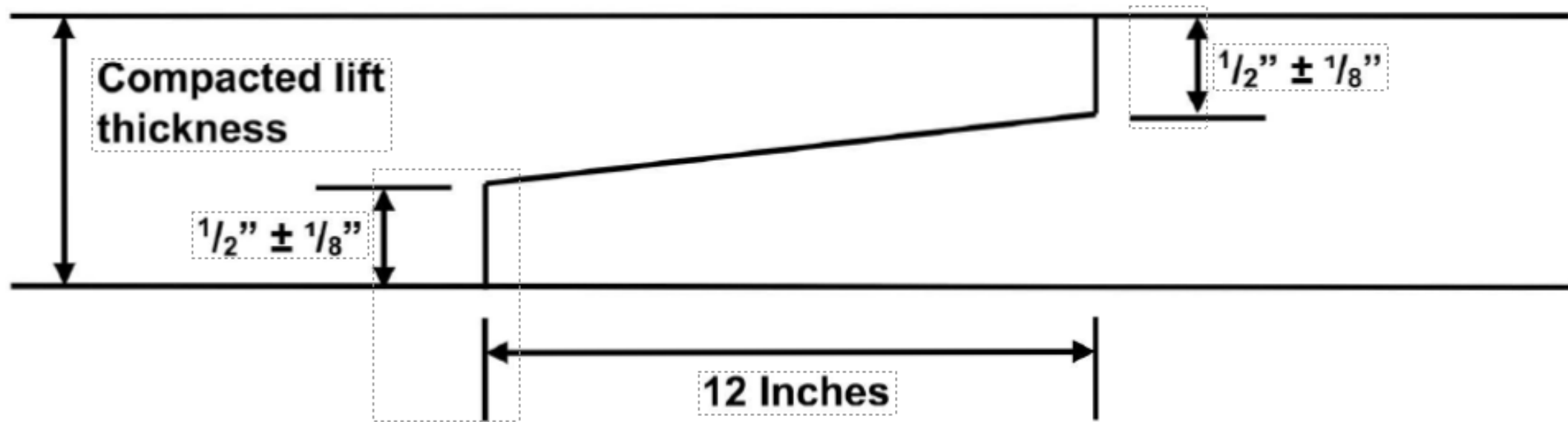
Notched Wedge Specification

- The Contractor has the option of constructing a notched wedge joint. If the Contractor chooses to construct this joint, it shall be built as shown in the contract. [...] The notched wedge joint shall consist of a vertical notch $1/2$ the thickness of the asphalt lift and an 8-inch to 12-inch uniform taper extending into the adjoining lane.

Notched Wedge Joint



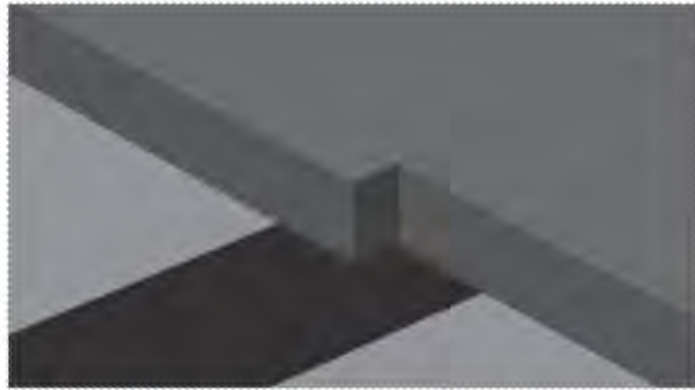
Long. Joint Density and Notch Wedge Joints



Long. Joint Density and Notch Wedge Joints



Void Reducing Asphalt Membrane (VRAM) With or without Asphalt Emulsion Top



VRAM is applied, cools quickly,
paved over



Without VRAM in a permeable mix,
water over time damages the mix



HMA softens VRAM, melts, filling
voids in bottom part of the lift



With VRAM, voids in lower portion
of mix are sealed, protecting mix



Void Reducing Asphalt Membrane (VRAM) With or without Asphalt Emulsion Top



VRAM



Emulsion Top (WI)



J-Band™

Asphalt-Materials, Inc.

States/Others with VRAM Experience



INDI
2004 VRAM
2021 RPE

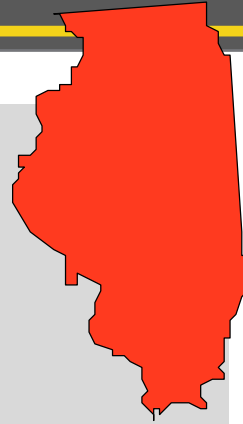
 3 Airfields

 Experience



VRAM (LJS) Estimated ROI

Illinois DOT



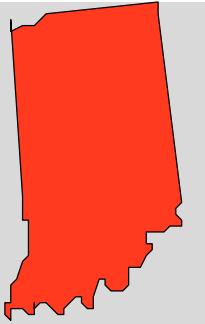
- Since 2002
- \$2.29 / 1-ft Avg. Unit Price
- IDOT expects 3-5 yrs increase life with VRAM
- **Benefit 3-5 x Initial Cost**

Lift Thickness (in)	Application Rates (lbs/ft)		
	Coarse-graded Mixes	Fine-graded Mixes	Gap-graded (SMA) Mixes
0.75	0.88		
1.00	1.15		
1.25	1.31	0.88	
1.50	1.47	0.95	1.26
1.75	1.63	1.03	1.38
2.00	1.80	1.11	1.51
≥ 2.25	1.96		

VRAM Estimated Return on Investment

Indiana DOT

- Estimated ROI ~ 2 x Initial Cost
- Design Memo No. 23-02 “VRAM for Asphalt Paving”
 - ESAL category 4 ($\geq 10M$) with more than 300 tons
- POC: Nathan Awwad
Asphalt Engineer
IN DOT





Montana DOT

Chad DeAustin

- July/Aug 2020 MT 83
- 9" + 9" VRAM 1.67 lb/ft
- Mill / Pave / Chip Seal

Measure of Effectiveness:

- Construction - constructability, time, cost, etc.
- Durability



Sept 2021 -
VRAM has
begun to
bleed
through the
chip seal.

Montana DOT, Constructability



Montana DOT, May 2022

- Site visit
- **Bleeding noted.**
- MDOT feels product working to fill the voids.
- Also noted, bleeding is not causing chip loss.



Cutback Longitudinal Joint

Cutting Wheel

Best method to obtain density at longitudinal joints.







Joint Heaters



Joint Adhesive (e.g., CRAFCO)





Micro-surface

Rejuvenating Seals

TN DOT



Application



Jointbond[®]

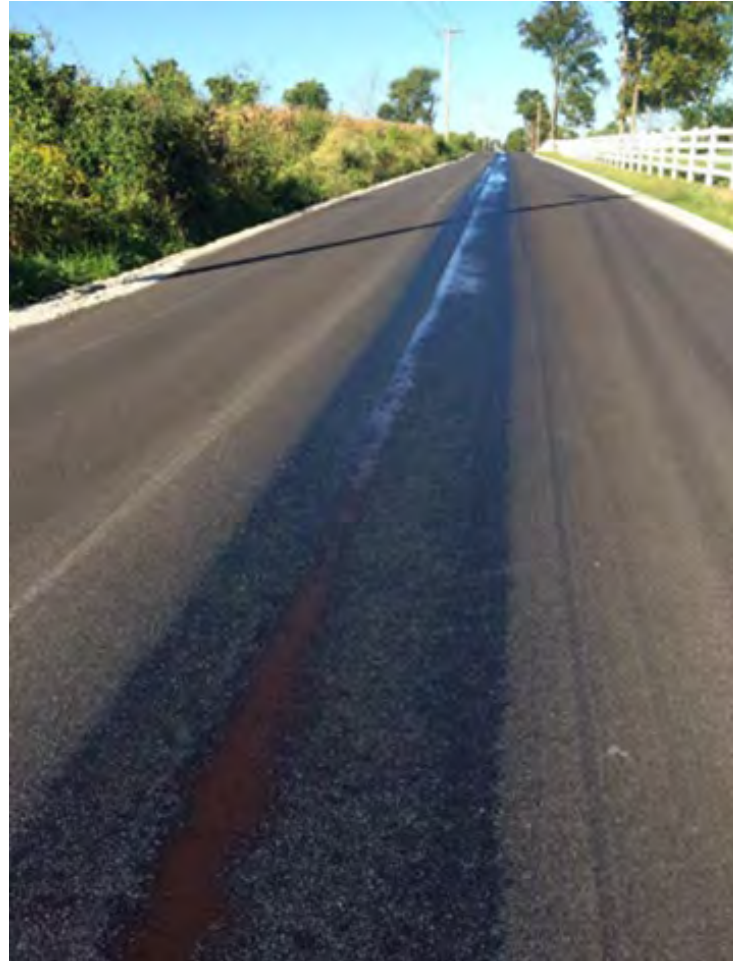


RePlay[™]

Rejuvenating Seals -- Jointbond®



Rapid Penetrating Emulsion (RPE)



longitudinal joint preventative treatment

RPE treated joint
during Spring melt
event showing water
resistance

PennDOT



RPE Remedial Application (Wisconsin)



Importance of Longitudinal Joint Density

- Reduced maintenance
- Longer pavement life
- DOT pays incentive for better joint density

1082.05 -- Basis of Payment

1. The pay factor shall be computed according to the following table:

Joint Density Test Lot Pay Factor			
Joint Density	SPS	SPR	SPH
93.0 or greater	102%	102%	102%
92.0 to 92.9	100%	102%	102%
91.0 to 91.9	98%	100%	102%
90.0 to 90.9	98%	98%	100%
89.0 to 89.9	98%	98%	98%
88.9 or Less	98%	98%	98%

Thank You!





— Questions —

