North Central Asphalt User/Producer Group

NCAUPG

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Longitudinal Joint Construction

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Good Performing Longitudinal Joints are Not an Accident

What Makes a Joint Perform?

- Density (***Impermeability***) = Durability
  - Water and air intrusion leads to raveling and cracking
  - Joints are often the main entry point for **“roof”** water into the **overall** pavement structure
- Strong bond to minimize cracking
- Sufficient smoothness across joint to provide safety for users

Low Density at Joint (Age 1 yr)

Have You Seen This Before?

Definition and Types

- A Longitudinal joint occurs when HMA is placed against something, such as an adjacent HMA mat
- There are two types:
  - **Hot** joints (**Hot** HMA against **Hot** HMA)
  - **Cold** joints (**Hot** HMA against ?)

Hot Joints

- Created by echelon paving (i.e. side-by-side with a slight offset)
- Matched in thickness **before** compaction
- Develops the best bond
- Provides the best opportunity for acceptable, uniform density across the joint

- Traffic control concerns

Echelon Paving

Cold Joints - Most Common

- First lane completed **before** second lane
- *Typically* less dense on **unconfined** side

- Does not create the traffic control concerns

Joint Location / Alignment

- Vertical
  - Avoid vertical alignment of joints (e.g. base, intermediate and surface)
  - Offset joints 6-12” from underlying joint
  - On parking lots, consider paving lifts perpendicular to previous course
- Horizontal
  - Owners typically require longitudinal joints in surface to coincide with lane lines

Mix Temperature

- Just as important for the joint as it is for the rest of the mat!
- Edges cool **quicker** because of exposure
- Joint heaters have been tried….success?

Paver Operation - Augers

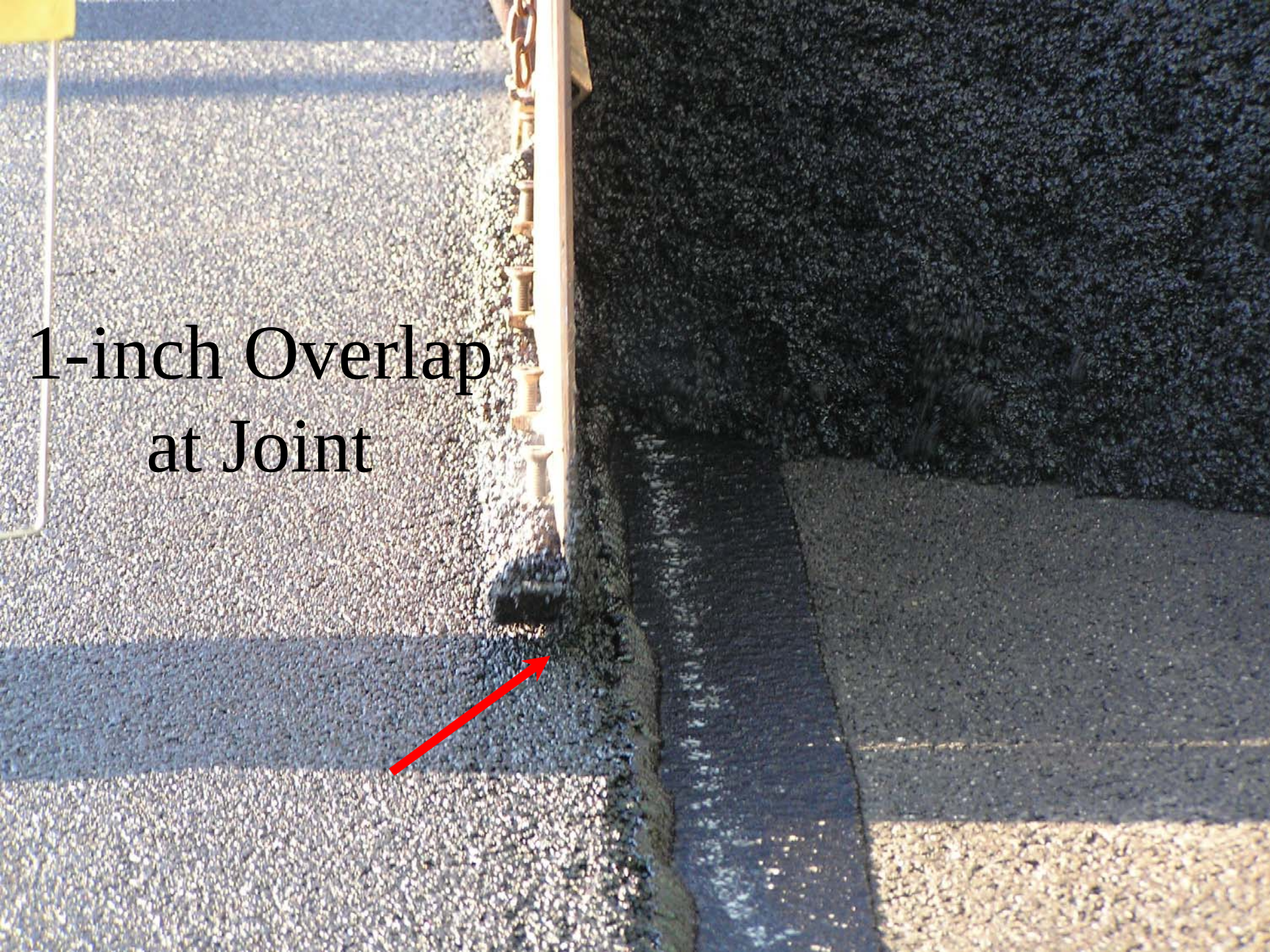
- Auger operation can cause segregation
  - Mix tends to segregate to the outside
- Auger extensions within 12” of end
  - Reduces opportunity for segregation
- Auger speed should be slow/constant
  - Mix can be thrown and segregated
  - Stationary augers allow mix to roll

Augers Too Fast

Paver Operation - Screed Overlap

- Screed Overlap affects density
  - Need the proper amount to be compacted into joint
- Should be ~1” depending on mix size
  - Too much leaves joint uneven
  - Too little results in low density
- Consistency is important
- Straight edges help!


Difficult to
Match
Uneven
Edges


1-inch Overlap
at Joint

Hide the Lute!

- Don’t scatter the mix, just bump it and only if absolutely necessary
- Scattering causes surface segregation and reduces the volume of mix at the joint
- Adjust the amount of overlap so constant luting isn’t needed

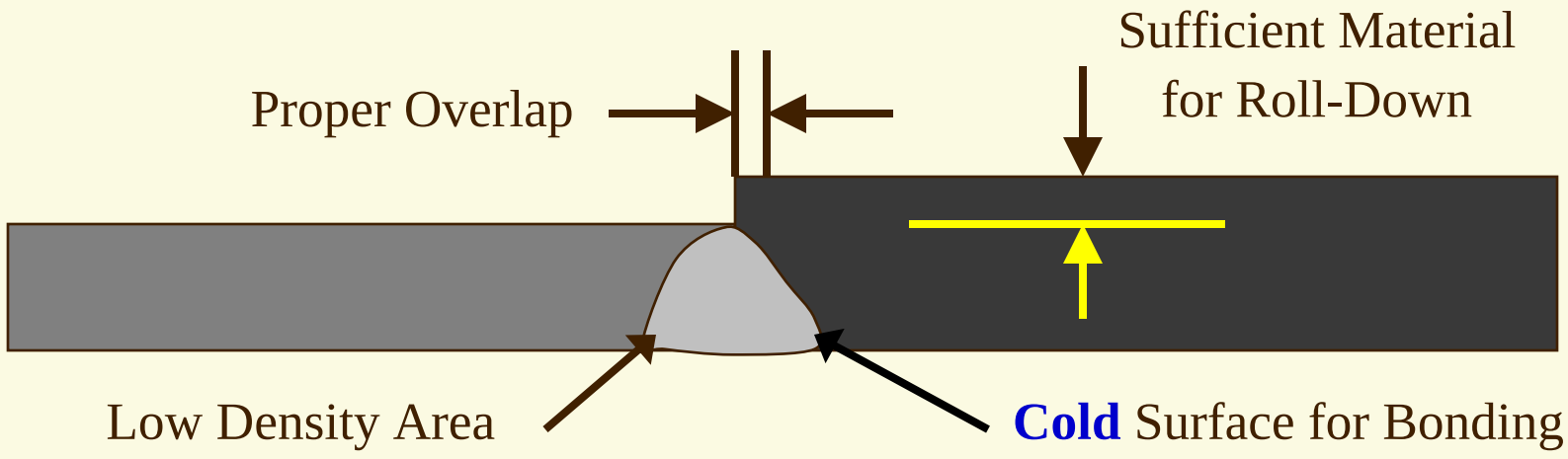
Scattering Causes Low Joint Density

“Bump” the Joint
Or “Leave it be!”

Proper, Consistent Overlap (1”?)
Compact Without Luting

Uncompacted Mat

- Loose thickness must account for roll down
  - Too little = low density (roller bridges joint)
  - Too much = an uneven joint




Insufficient Mix for Roll Down


No Compaction at Joint

Breakdown Rolling - Steel Wheel

- Shearing forces highest at drum edges
- Unconfined edge – overhang ~6”
- Confined edge:
  - Initial pass on **hot** mat overlapping ~6” onto **cold or**
  - Initial pass entirely on **hot** mat, ~6” away from joint
  - Do not “pinch” the joint from the **cold** side
- Roll the joint first to retain the maximum amount of **heat**


Unconfined Edge – Don’t Stay Away from the Edge

Unconfined Edge – Overhang ~6”

Confined Edge – Pinch the Joint or Overhang It

Pinching the Joint

Inefficient Rolling

Breakdown Rolling - Pneumatic

- Decrease tire pressures to prevent excessive movement of “loose” mix
- Edges are either rolled over and rounded off or the roller has to be held away from the edges, which lessens compaction

Intermediate Rolling-Steel Wheel

- Apply the same method of overhanging an unconfined edge or joint ~6”
- When overhanging the joint, the operator must be careful not to damage the **cold** mat

Intermediate Rolling - Pneumatic

- Can increase density along joint or unconfined edge by additional orientation of particles
- Unconfined edge – roll as close to edge as possible without rounding off

Can Density Be Achieved?

- Requires attention to details
- Results often considered good if within 2% of the main mat
- Difficult to measure with a nuclear gauge since the joint usually isn't flat
- Cores better determine the actual in-place density
- Density vs. Low In-Place Permeability?

Possible Alternatives…

- Remove low density mix from the unconfined edge before matching up to it
- Joint compaction device attached to screed
- Edge restraining device on steel wheel roller
- Notched wedge joint
- Application of AC type material, centered beneath or above the joint at a width of ~12-18”
- Joint adhesive applied to vertical face to increase joint bond

Questions or Comments?

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