

Minnesota HMA Longitudinal Joint Construction



CAPRI

Jerry Geib

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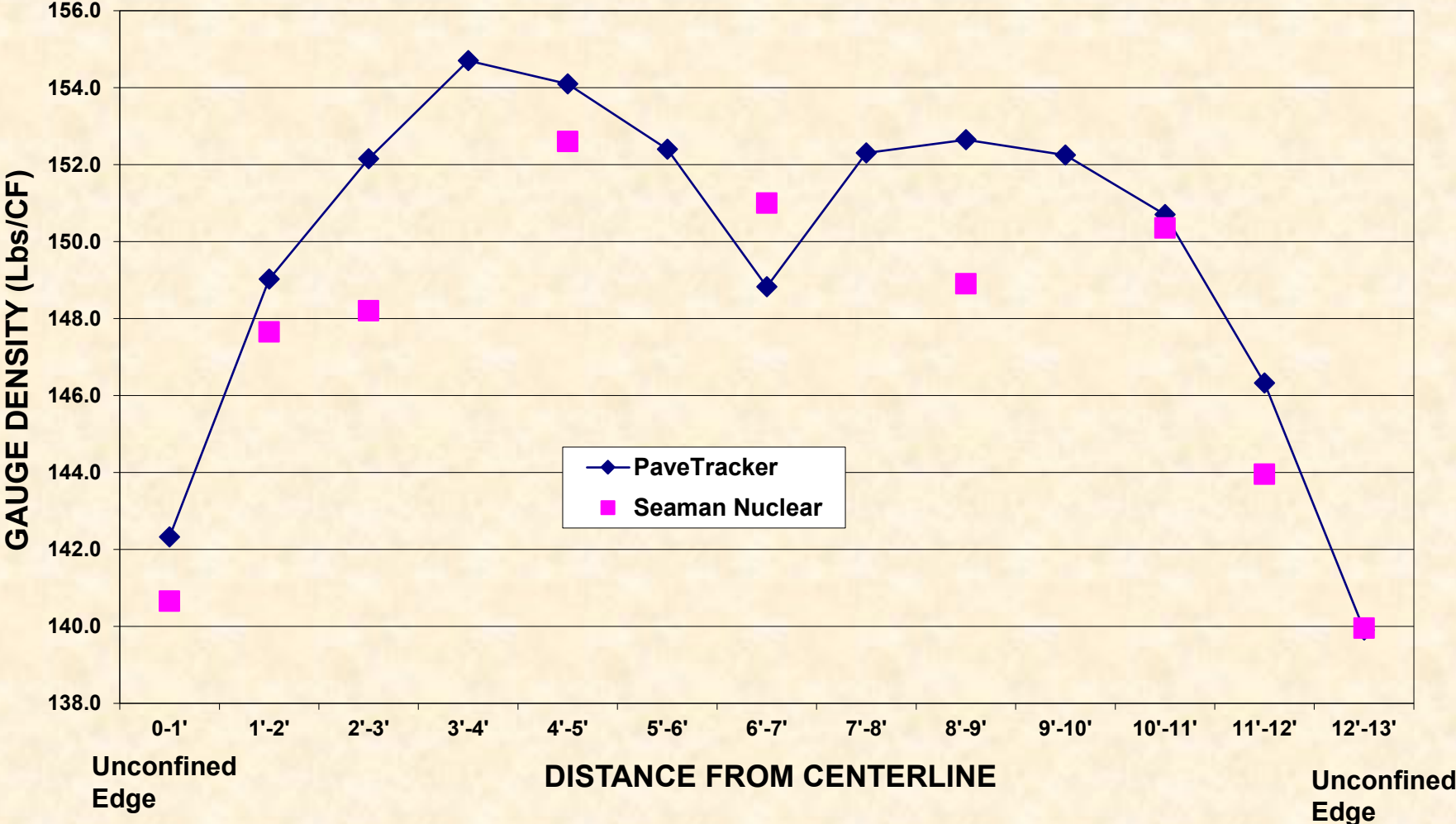
The Weak Link



Methods of Longitudinal Joint Enhancement

- Design actions
 - Echelon Paving
 - VRAM
- Joint Adhesives
 - Maryland Joint Construction Method
 - Fogging of the final LJ.

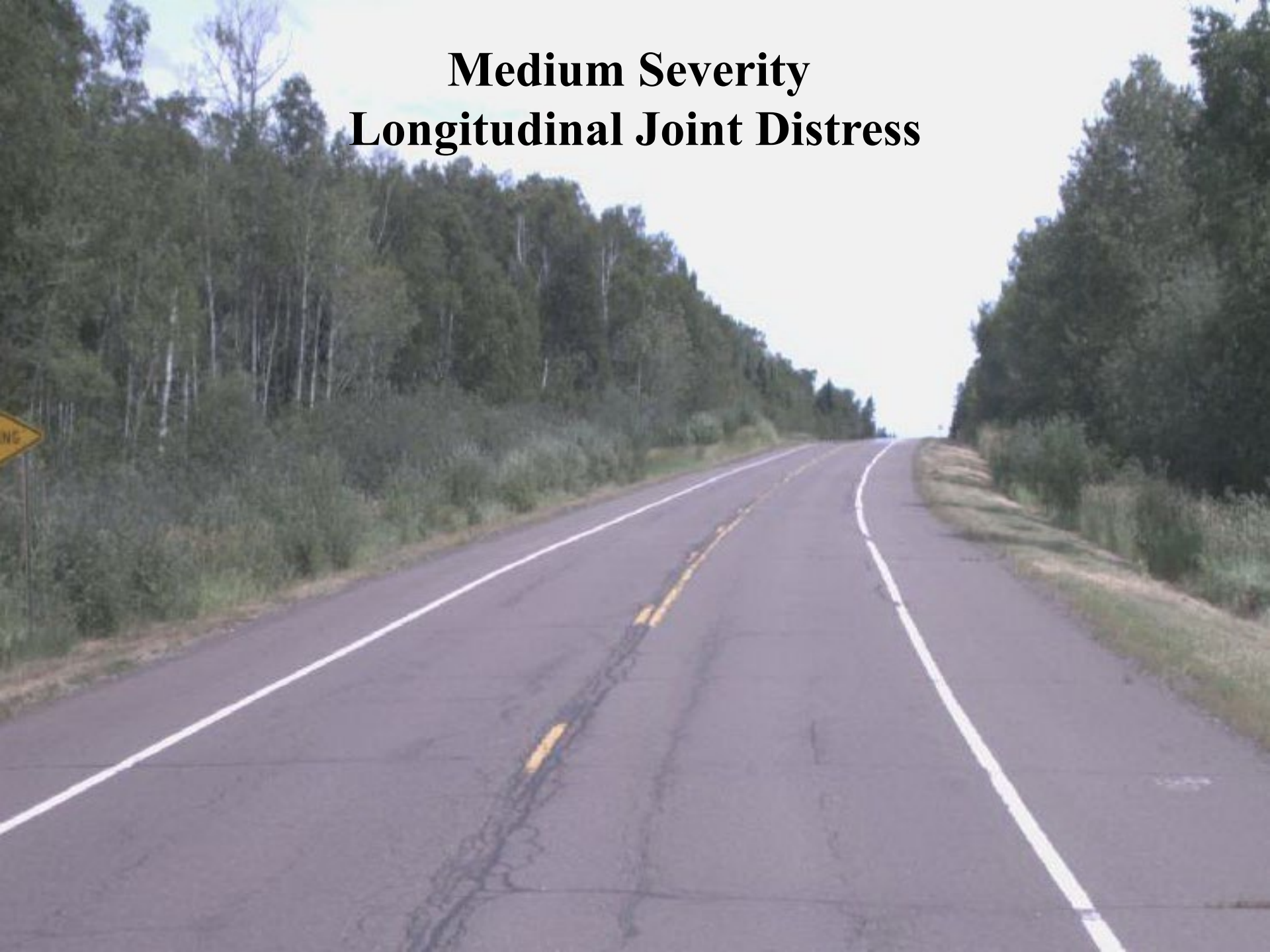
TYPICAL DENSITY VARIATION ACROSS LANE



MnDOT Longitudinal Joint Facts

- About 98% of all the bituminous roads rated in 2020 had at least some longitudinal joint distress, mostly Low Severity (11,503 miles).
- About 35% of all the bituminous roads rated in 2020 had at least some Medium and/or High Severity Longitudinal Joint Distress (4,137 miles).

Medium Severity Longitudinal Joint Distress



High Severity Longitudinal Joint Distress



Design Considerations

- Mixture aggregate size:
 - Specify -1/2” max. aggregate size in the final driving surface mixture.
- Mill and fill one lane at a time so both joints are confined.
- Longitudinal joint density requirement.

Construction Considerations

- Straight reference line for paver to follow.
- Proper roller placement.
- Construction Methods and Enhancements:
 - Echelon Paving
 - VRAM
 - Joint Adhesive
 - Maryland joint construction technique.
 - Fogging the joint

Longitudinal Joint Must be Straight



Stringline Placement



Echelon Paving Provision

-“The hot joint must be constructed by having the second pass of bituminous placed within 10 minutes from the time the first pass is placed.”



Echelon Paving Photos



I494 Echelon and Joint Heater

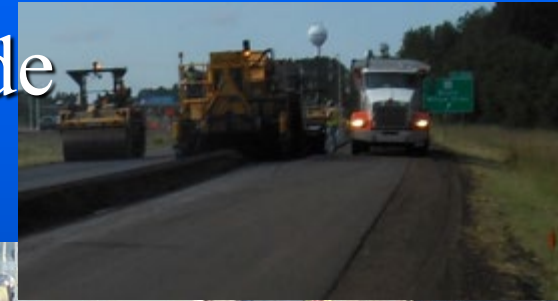


I494
Echelon vs Joint Heater on
cold joint today

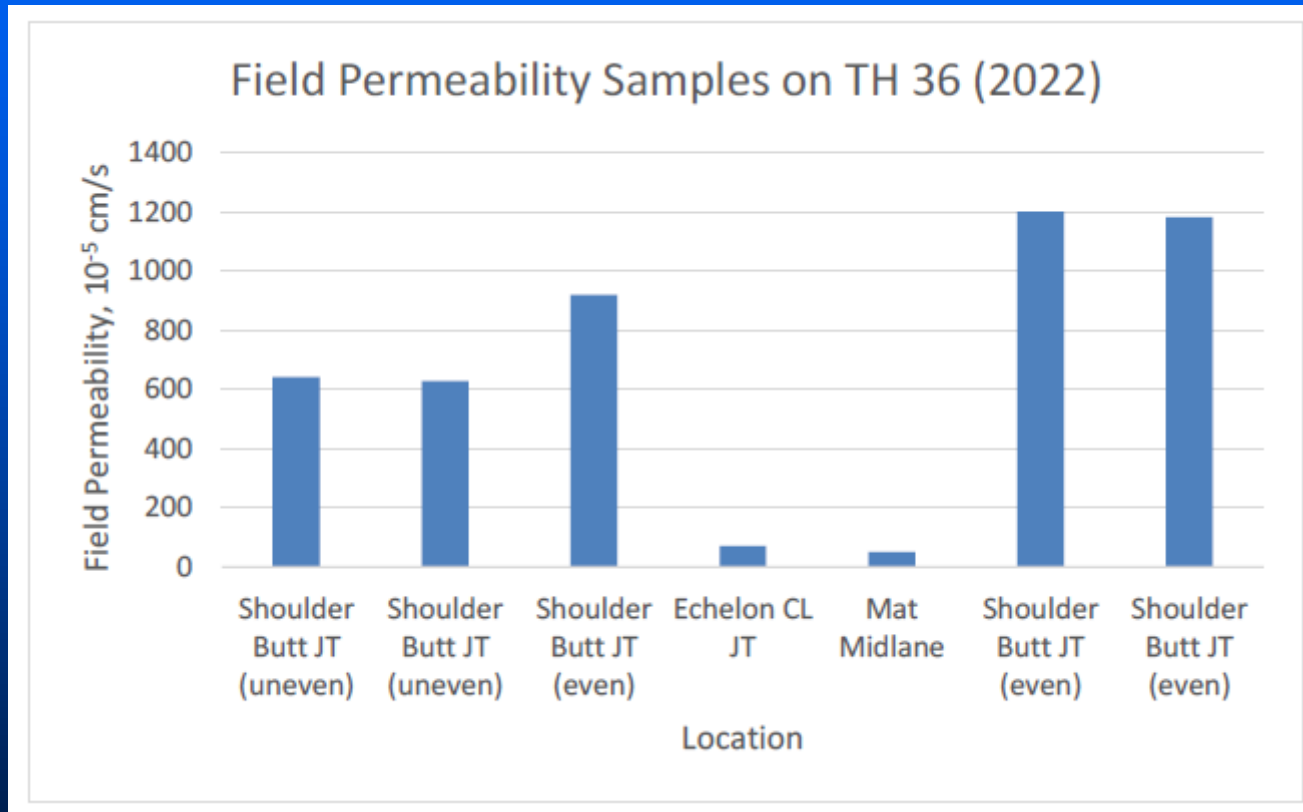
I494 being paved in 2013

Echelon Paving Considerations

- ❑ Shoulder width. Need to be wide enough for trucks to get around pavers.
- ❑ Contractor needs to be able to produce enough mix to feed 2 pavers.
- ❑ Need enough trucks to deliver mix.



Permeability of the Longitudinal Joint



2022 VRAM Project

□ VRAM

– Void Reduction Asphalt Membrane

- » A hot asphalt material that is applied at a width of 18” over the longitudinal joint on the 2nd to last lift of asphalt.
- » The heat of the lift placed over the VRAM re-activates the asphalt allowing it to “wick up” into the voids of the final wear course above.
- » The VRAM fills the voids in the asphalt above and creates a strong bond between the 2 lifts.

VRAM



Metro VRAM Project

- TH 55 (Hiawatha) from TH 62 to 32nd Street in Minneapolis.
 - Mill and overlay



VRAM Placement



VRAM Issues on TH 55



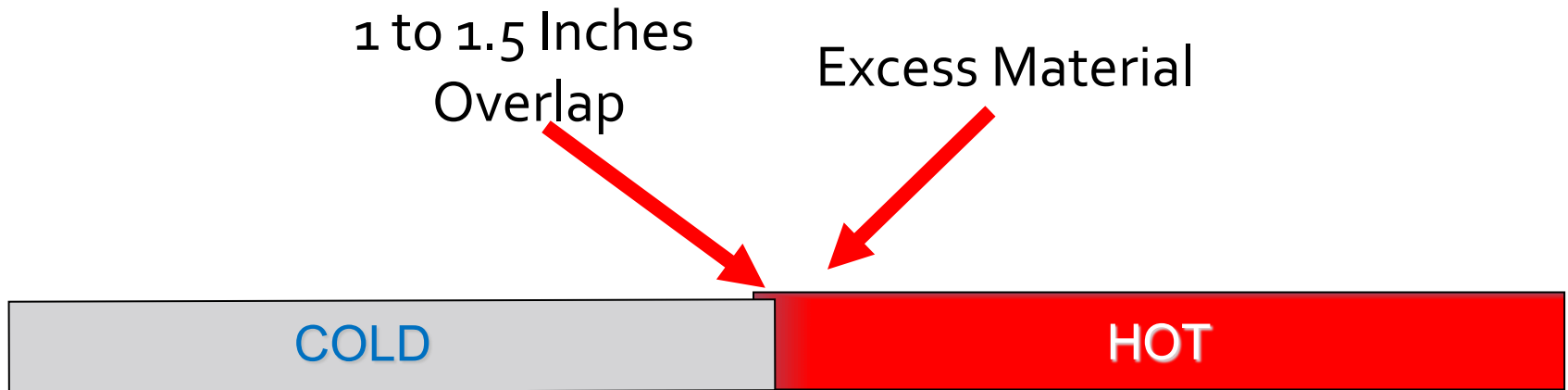
Maryland Joint Technique

Longitudinal joints constructed adjacent to the existing HMA pavements overlaps the existing pavement 1” to 1.5” and about 1/8” high.

Joint Overlap

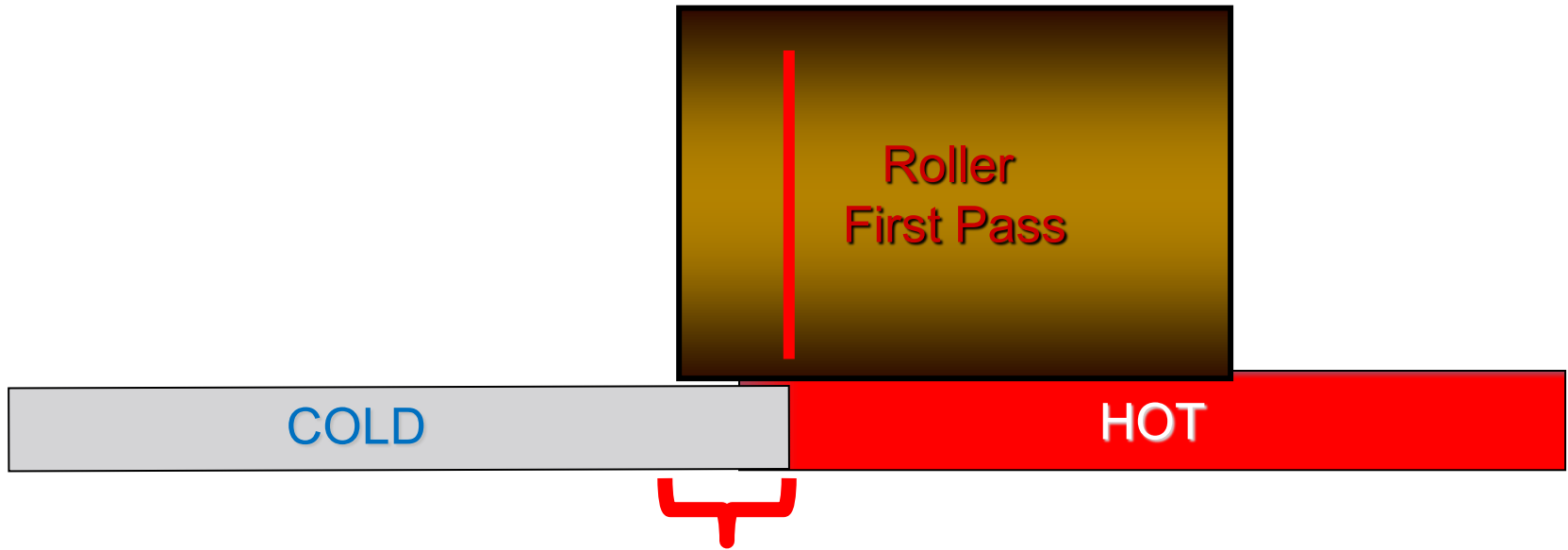


Maryland Joint Overlap



Joint Compaction

First Roller Pass



Approx. 6" Overlap

Roller Positioning: Roll from the HOT side with 6" overlap



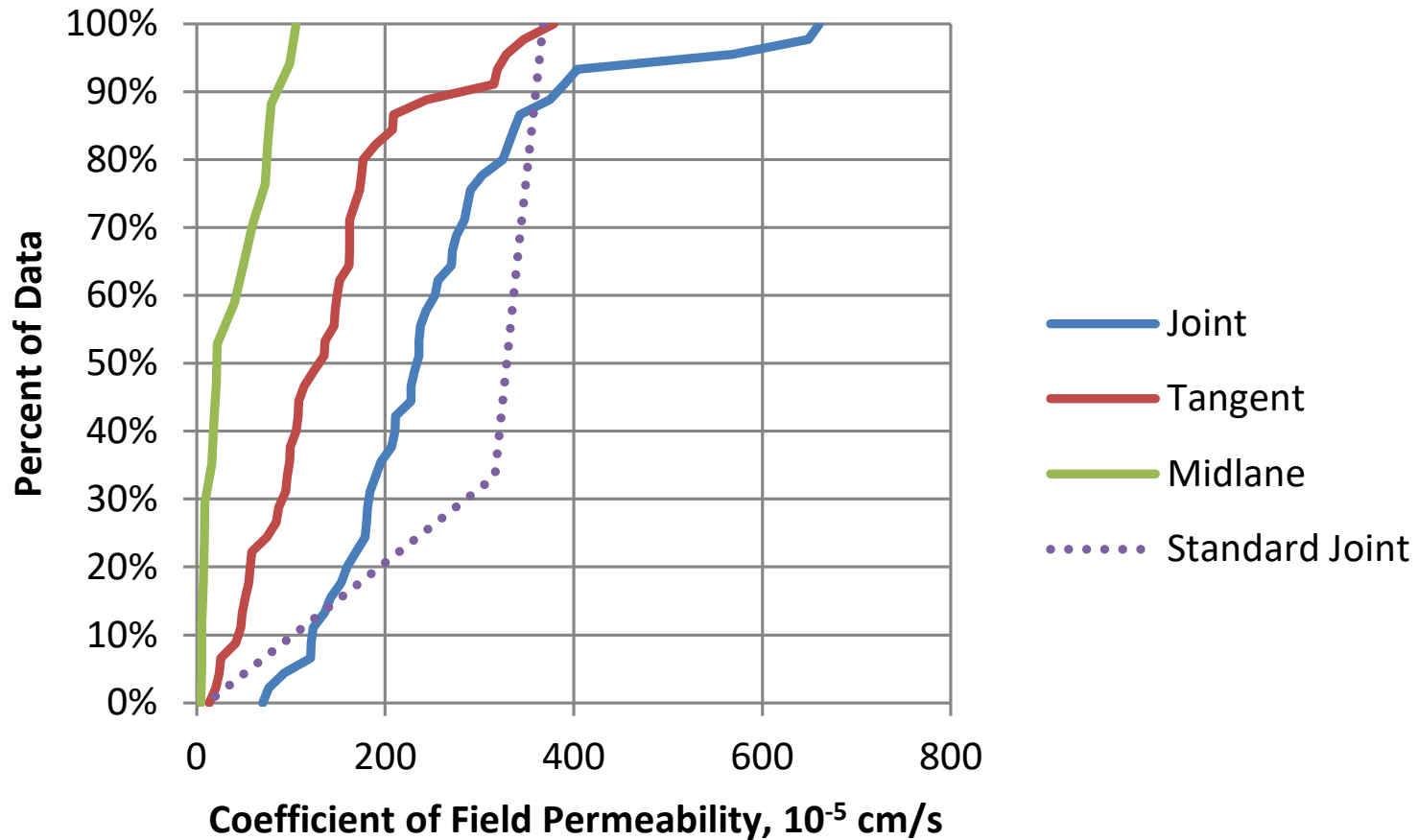
Coring & Permeability Testing



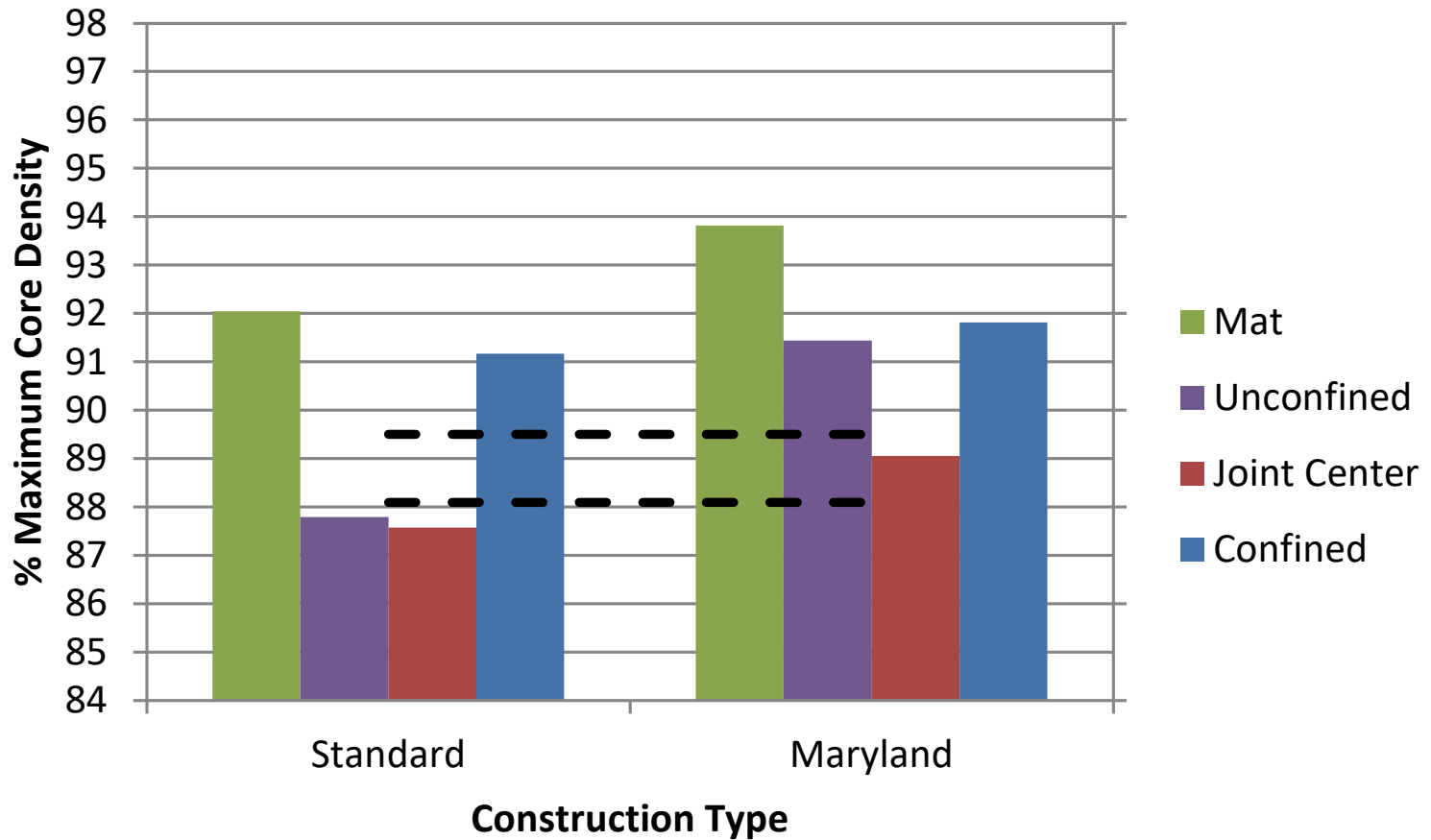
Permeability Testing



Permeability: Top Lift Locations



Average Density Comparisons



Longitudinal Joint Enhancements

- Joint Adhesives
- Fogging of longitudinal joint after construction.



Methods of Longitudinal Joint Enhancement

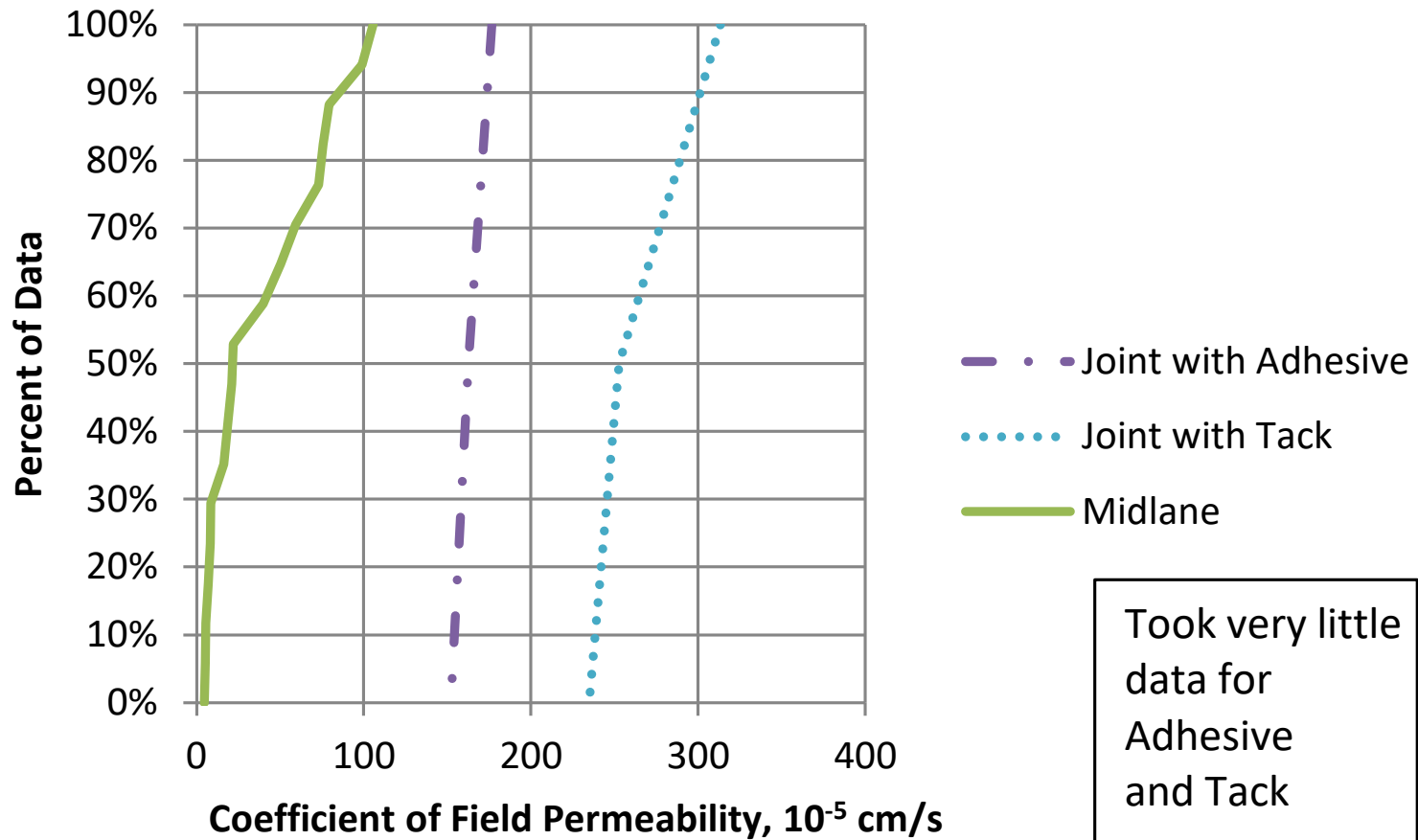
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Summary

- Longitudinal joint performance is essential for long-term pavement performance.
- Improving the design for and the construction of the longitudinal joint will improve density and decrease permeability.

Thank You

Permeability: Midlane versus Treated Maryland Joints



Took very little data for Adhesive and Tack

Considerations for Improved LJ Performance

- Proper design elements.
- Proper LJ construction considerations.