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Thick Lift Asphalt Paving Solution

TechBrief Overview
2026 Flexible Pavement Committee Meeting

FDOT

ACAF
Asphalt Contractors Association Of Florida, Inc.

HOT MIX ASPHALT - GENERAL CONSTRUCTION REQUIREMENTS – THICK LIFT (REV 1-11-22)

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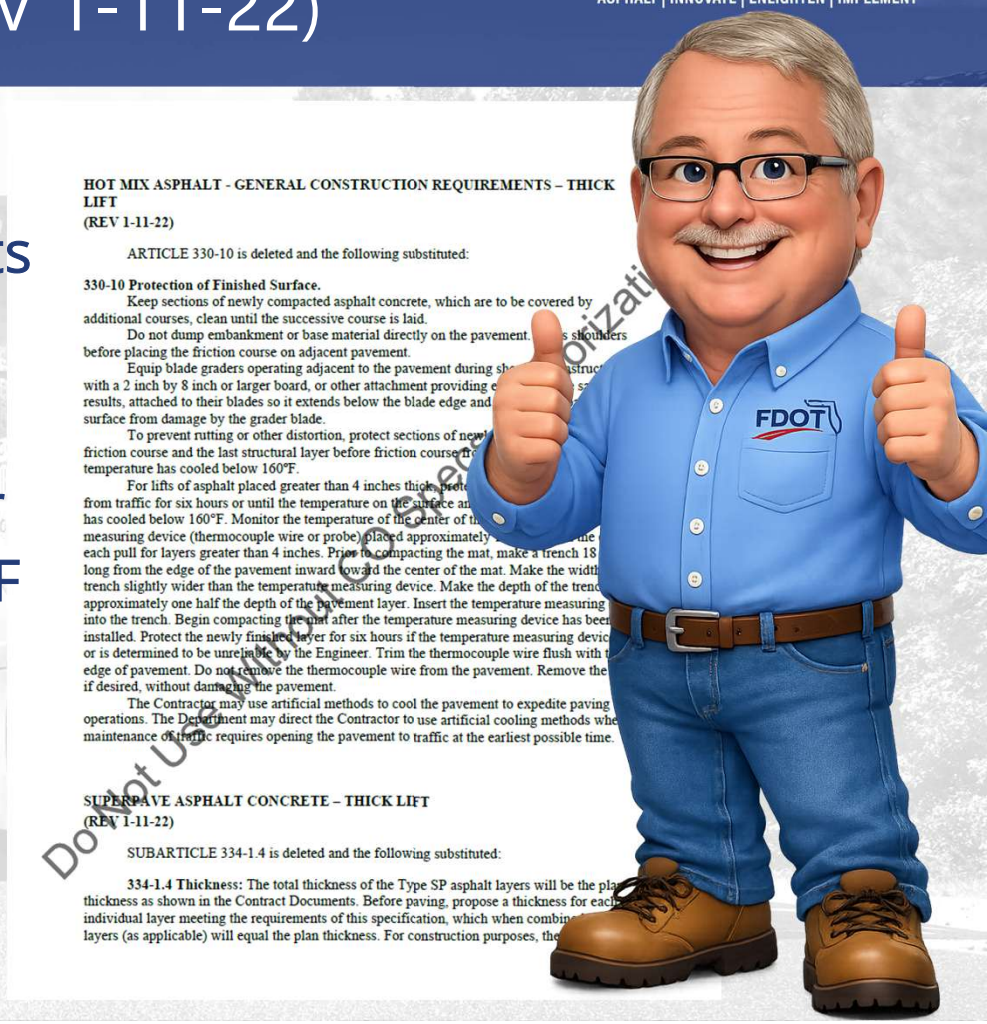
- Requires **Central Office Authorization**
- **SP-12.5 & SP-19.0 asphalt mixes in lifts up to 6 inches thick**
- Requires lifts greater than 4 inches to remain closed to traffic for **6 hours or surface & mid-depth falls below 160°F**
- Requires mid-depth temperature monitoring approximately…



HOT MIX ASPHALT - GENERAL CONSTRUCTION REQUIREMENTS – THICK LIFT
(REV 1-11-22)

ARTICLE 330-10 is deleted and the following substituted:

330-10 Protection of Finished Surface.

Keep sections of newly compacted asphalt concrete, which are to be covered by additional courses, clean until the successive course is laid.

Do not dump embankment or base material directly on the pavement. ...s shoulders before placing the friction course on adjacent pavement.

Equip blade graders operating adjacent to the pavement during sh... ...struc... with a 2 inch by 8 inch or larger board, or other attachment providing e... ...s s... results, attached to their blades so it extends below the blade edge and ... surface from damage by the grader blade.

To prevent rutting or other distortion, protect sections of new... friction course and the last structural layer before friction course is... temperature has cooled below 160°F.

For lifts of asphalt placed greater than 4 inches thick, prote... from traffic for six hours or until the temperature on the surface ar... has cooled below 160°F. Monitor the temperature of the center of th... measuring device (thermocouple wire or probe) placed approximately ... the ... each pull for layers greater than 4 inches. Prior to compacting the mat, make a trench 18 ... long from the edge of the pavement inward toward the center of the mat. Make the width ... trench slightly wider than the temperature measuring device. Make the depth of the trenc... approximately one half the depth of the pavement layer. Insert the temperature measuring ... into the trench. Begin compacting the mat after the temperature measuring device has been ... installed. Protect the newly finished layer for six hours if the temperature measuring devic... or is determined to be unreliable by the Engineer. Trim the thermocouple wire flush with t... edge of pavement. Do not remove the thermocouple wire from the pavement. Remove the ... if desired, without damaging the pavement.

The Contractor may use artificial methods to cool the pavement to expedite paving operations. The Department may direct the Contractor to use artificial cooling methods whe... maintenance of traffic requires opening the pavement to traffic at the earliest possible time.

SUPERPAVE ASPHALT CONCRETE – THICK LIFT
(REV 1-11-22)

SUBARTICLE 334-1.4 is deleted and the following substituted:

334-1.4 Thickness: The total thickness of the Type SP asphalt layers will be the pla... thickness as shown in the Contract Documents. Before paving, propose a thickness for each ... individual layer meeting the requirements of this specification, which when combin... layers (as applicable) will equal the plan thickness. For construction purposes, the...

TechBrief

https://www.fhwa.dot.gov/pavement/asphalt/designConstruction/

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Federal Highway Administration

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Asphalt Pavement Design and Construction

Informational Webpage

- In-place Pavement Density

Tech Briefs: Construction

- Tech Brief: Thick Lift Asphalt Paving Solution, Cooperative Agreement Mate 2026
- Tech Brief: A Review of Specifications and Measurement Methods for Asphalt ement Density, Cooperative Agreement Material 2025
  - 1-page Summary of In-Place Density in Asphalt Pavements
    Cooperative Agreement Material 2026
- Tech Brief: Advances in the Design, Production, and Construction of Stone Matrix Asphalt (SMA),
  FHWA-HIF-22-042 2022
- Asphalt Density:
  - Enhanced In-place Density Demonstration Projects (One Pager)
  - Tech Brief #1: Demonstration Projects and Related Specifications,

TECH BRIEF

UNR–TB–26–0603

AUTHORS

Thomas P. Harman (ORCID: 0009-0000-3741-8417), Travis Walbeck, National Center for Asphalt Technology (NCAT) at Auburn University

David R. Johnson (ORCID: 0000-0003-3156-6317), The Asphalt Institute.

Timothy B. Aschenbrener (ORCID: 0000-0001-7253-5504), Office of Infrastructure, Federal Highway Administration

JUNE 2026

THICK LIFT ASPHALT PAVING SOLUTION

State Departments of Transportation (DOTs) are increasingly challenged to rehabilitate pavements more quickly while maintaining long-term performance and minimizing disruption to the traveling public. Thick lift paving, placing asphalt concrete (AC) layers significantly thicker than traditional lift thickness guidelines, is a practical strategy to address these pressures. By reducing the number of paving lifts, agencies shorten construction schedules, limit traffic disruption, and improve operational efficiency without compromising pavement performance.

Several state DOTs have explored and implemented thick lift paving through research and field projects. Full-scale evaluations, including sponsored sections at the National Center for Asphalt Technology (NCAT) Test Track, demonstrate that properly designed and constructed thick lifts achieve target in-place densities and perform well under heavy traffic. Field experience from multiple states confirms that thick lift paving is particularly effective in structural layers, deep mill-and-fill applications, and rapid rehabilitation projects where reducing closure time is critical.

Agency experience also highlights the importance of thoughtful implementation. Thermal management, paving effective practices, compaction practices, and surface preparation require careful attention, particularly when eliminating intermediate lifts that traditionally help refine smoothness.

Spotlight: *Since 2015, the South Carolina DOT (SCDOT) has implemented thick lift asphalt on multiple major interstate reconstruction and widening projects. On its first large-scale application (I-85 in Spartanburg), crews placed more than 150,000 tons, including a 10-inch monolithic lift in the outside lanes. After a decade of service under heavy traffic, this project continues to perform satisfactorily.*

Figure 1. Driving Question.

Thick Lift Asphalt Paving offers a direct solution to the driving question posed in Figure 1 *"How can we reconstruct our full-depth asphalt pavements in less time?"* The following five primary benefits of thick lift asphalt paving represent the most significant drivers for agency adoption (Figure 2):

- Accelerated construction timelines.
- Enabled rapid full-depth reconstruction.
- Reduced interlayer bond issues.
- Extended the compaction window.
- Validated as a long-life solution.

Defining Thick Lift: Thick lift paving involves placing asphalt in a single layer significantly thicker than traditional limits. Lift thickness is commonly tied to the nominal maximum aggregate size (NMAS) of the asphalt mixture.

The National Asphalt Pavement Association (NAPA) *Mix Type Selection Guide* provides a general rule of thumb for fine-graded asphalt mixtures: the minimum lift thickness should be three times the NMAS (3×NMAS) of the mixture, while for coarse-graded mixtures it should be 4×NMAS. [1] The maximum lift thickness for traditional paving projects can be inferred from the *Guide* as four to five times the NMAS for fine-graded mixtures and five to six times the NMAS for coarse-graded mixtures. A notable exception is the 4.75mm fine-graded mixture, which traditionally utilizes an 8×NMAS. (Table 1)

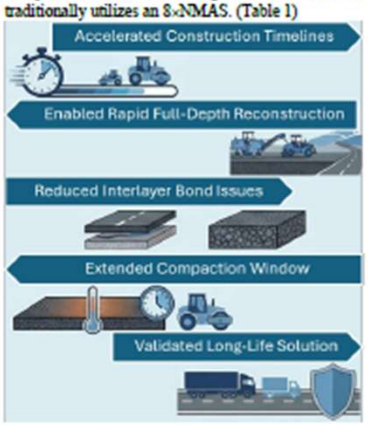

Figure 2. Primary Benefits of Thick Lift Asphalt Paving.

Table 1. NAPA Recommended Maximum Lift Thicknesses by NMAS for Traditional Paving Projects.

NMAS		Fine-Graded Mixtures		Coarse-Graded Mixtures	
(mm)	(inch)	Upper (inch)	Ratio	Upper (inch)	Ratio
4.75	0.19	1.5	8.0	–	–
9.5	0.37	2.0	5.3	–	–
12.5	0.5	2.5	5.1	3.0	6.1
19.0	0.75	3.5	4.7	4.0	5.3
25.0	1.0	4.0	4.1	6.0	6.1

– not applicable; Ratio = Upper Thickness / NMAS.

There is currently no universally accepted definition of what constitutes a *"thick lift."* In practice, the term refers to placement exceeding traditional NMAS-based thickness guidance. For thick lift paving, 12.5mm NMAS mixtures are commonly placed 5 to 8 inches thick, representing a ratio of 10× to 16×NMAS.

The Authors

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National Center for Asphalt Technology NCAT AT AUBURN UNIVERSITY

Travis Walbeck

Tom Harman

ASPHALT INSTITUTE

Dave Johnson

U.S. Department of Transportation Federal Highway Administration

Supporting Entity

Thick Lift Journey

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The Why	• Why Thick Lift?
Benefits	• Timelines to Haul Times
Challenges	• The 3 Perceived Challenges
Success	• 9 Keys to Success
R to P	• Research to Practice


HOW CAN WE RECONSTRUCT
OUR FULL-DEPTH ASPHALT
PAVEMENTS IN LESS TIME?

Build it…

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THICK

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- Thick lift paving involves placing asphalt in a single layer significantly thicker than traditional limits.
- Lift thickness is commonly tied to the nominal maximum aggregate size (NMAS) of the asphalt mix.

Why **Thick Lift**?

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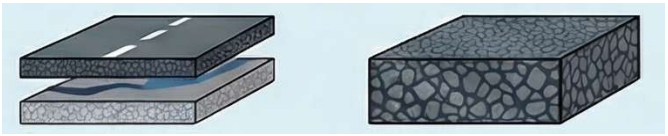
- Accelerated Construction Timelines

- Rapid Rebuild of Full-Depth Asphalt Pavement

- Reduce Potential Issues of Bond between Layers



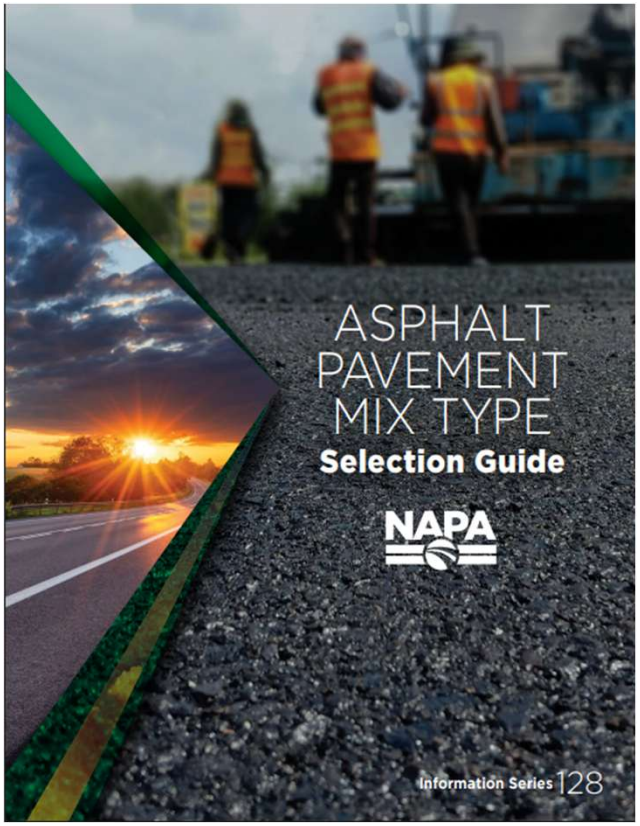
- Longer Time to Achieve Density

- Long-life Pavement

General Rule-of-Thumb

Minimum Lift Thickness:

- Fine-Dense-Graded Mixes
  - 3xNMAS
- Coarse-Dense-Graded Mixes
  - 4xNMAS



Typical Maximum Lift Thickness

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Table 3. Typical Ranges of Lift Thicknesses for Fine-Graded Mixtures

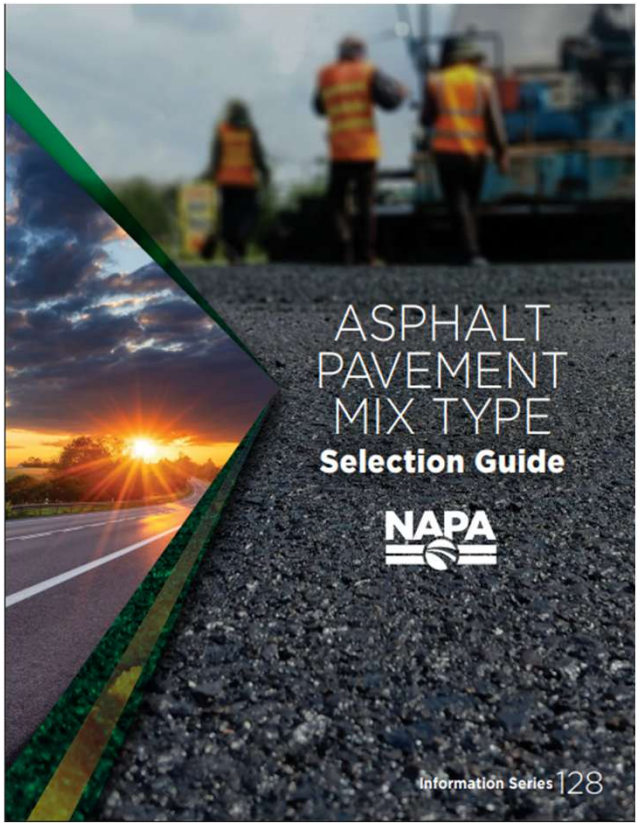
	Lift Thicknesses for Fine-Graded Mixtures (in.)				
NMAS	**4.75 mm**	**9.5 mm**	**12.5 mm**	**19.0 mm**	**25.0 mm**
Surface	0.75 – 1.5	1.25 – 2.0	1.5 – 2.5	*	*
Intermediate	*	*	1.5 – 2.5	2.25 – 3.5	3.0 – 4.0
Base	*	*	NA	2.25 – 3.5	3.0 – 4.0

* Not recommended for this layer

Table 4. Typical Ranges of Lift Thicknesses for Coarse-Graded Mixtures

	Lift Thicknesses for Coarse-Graded Mixtures (in.)		
NMAS	**12.5 mm**	**19.0 mm**	**25.0 mm**
Surface	2.0 – 3.0	*	*
Intermediate	2.0 – 3.0	3.0 – 4.0	4.0 – 6.0
Base	*	3.0 – 4.0	4.0 – 6.0

* Not recommended for this layer



Typical Maximum Lift Thickness

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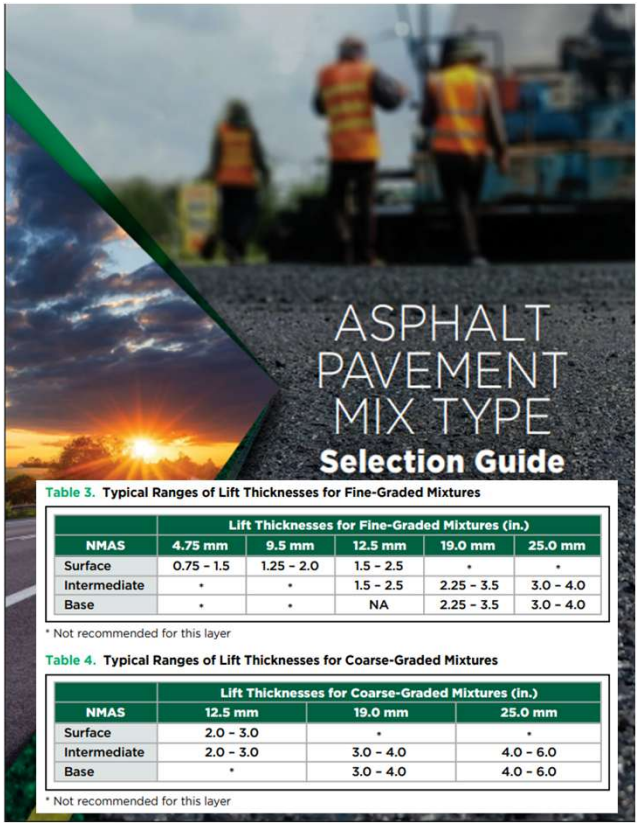
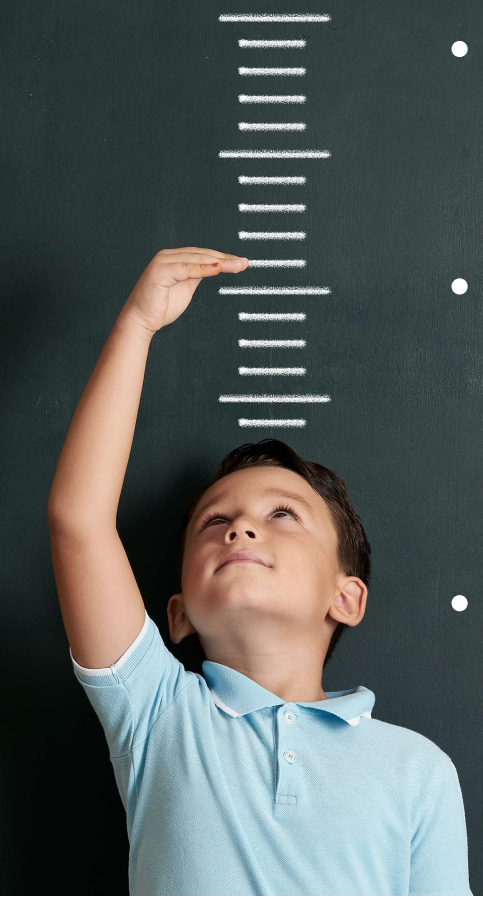
NMAS		Fine-Graded Mixes		Coarse-Graded Mixes	
(mm)	(in)	Upper (in)	Ratio	Upper (in)	Ratio
4.75	0.19	1.5	8.0		
9.5	0.37	2.0	5.3		
12.5	0.49	2.5	5.1	3.0	6.1
19.0	0.75	3.5	4.7	4.0	5.3
25.0	0.98	4.0	4.1	6.0	6.1

Upper - Upper Lift Thicknesses Range in inches.
Ratio - Upper/NMAS (in/in)



How Thick is **Thick Lift**???



- There is currently no universally accepted definition of what constitutes a "thick lift."
- In practice, the term refers to placement exceeding traditional NMAS-based thickness guidance.
- For example, 12.5mm NMAS mixes are commonly placed 5 to 8 inches thick, or 10x to 16xNMAS.

TechBrief: Definition

- **Thick Lift** is the placement of an asphalt mix at 8xNMAS or more.
- E.g., 12.5mm → 4-inches or greater.

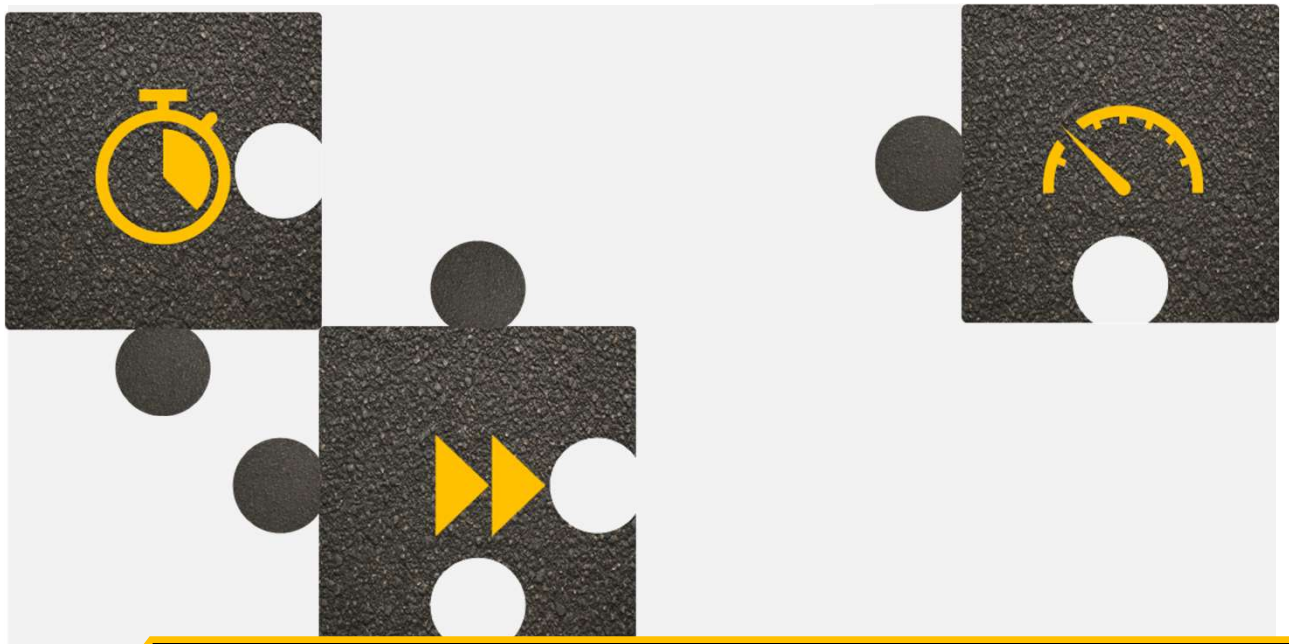
Benefits

Accelerated Construction Timelines:
Thick lift paving shortens project schedules by reducing the total number of paving cycles and limiting the time workers are exposed to and motorists are disrupted by traffic.

Benefits

Rapid Rebuild of Full-Depth Pavement:
Achieve the full required structural depth in a single placement, ideal for high-volume roadway reconstruction and emergency repairs. Particularly effective for deep mill-and-fill rehabilitation projects where reducing closure time is critical.

Benefits



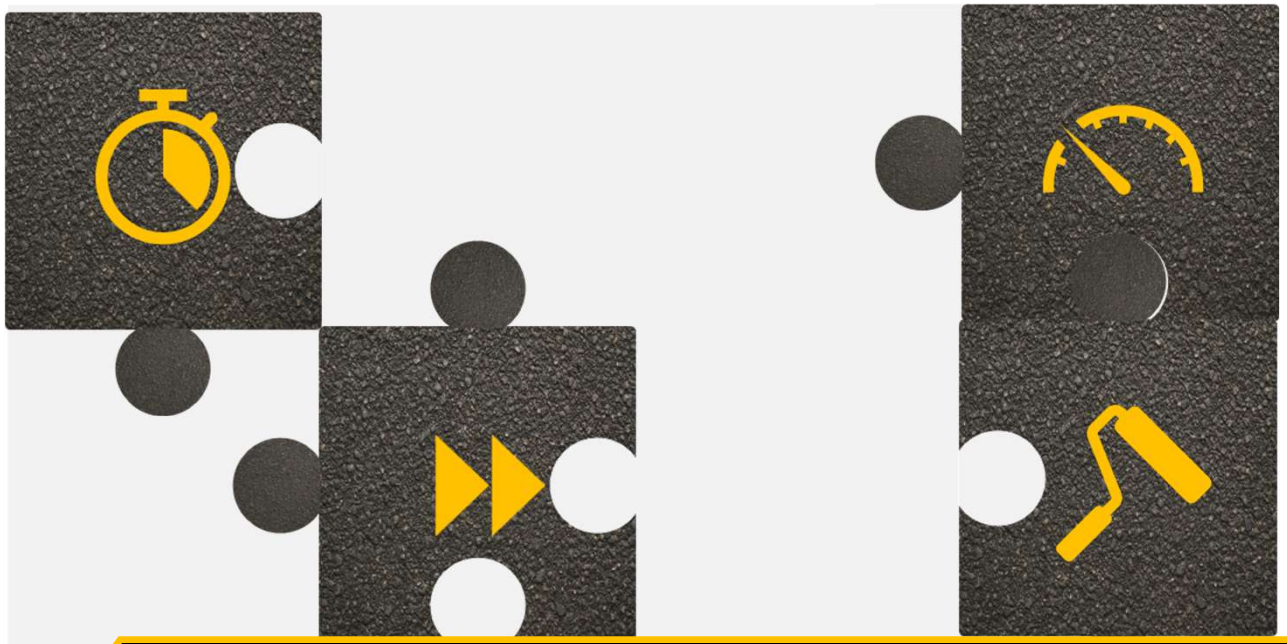
Reduce Interlay Bond Issues:
Eliminate intermediate lift interfaces that are sometimes susceptible to debonding or slippage. This removal of lift interfaces can improve the overall structural continuity of the pavement.

Tack Coat

Typical Application

Does this look okay?

Benefits



Extended Compaction Window:
Increased thermal mass of thicker lifts allows the asphalt to retain heat significantly longer than conventional thin lifts. Especially beneficial in challenging environments with longer haul distances.

PaveCool App
42°F 10 mph Wind in Gainesville, FL (30° Lat.)

Example:

- Conventional Lift
- 1 ½ inch Lift
- PG 67-22 Binder
- 275°F Mix Delivery Temperature

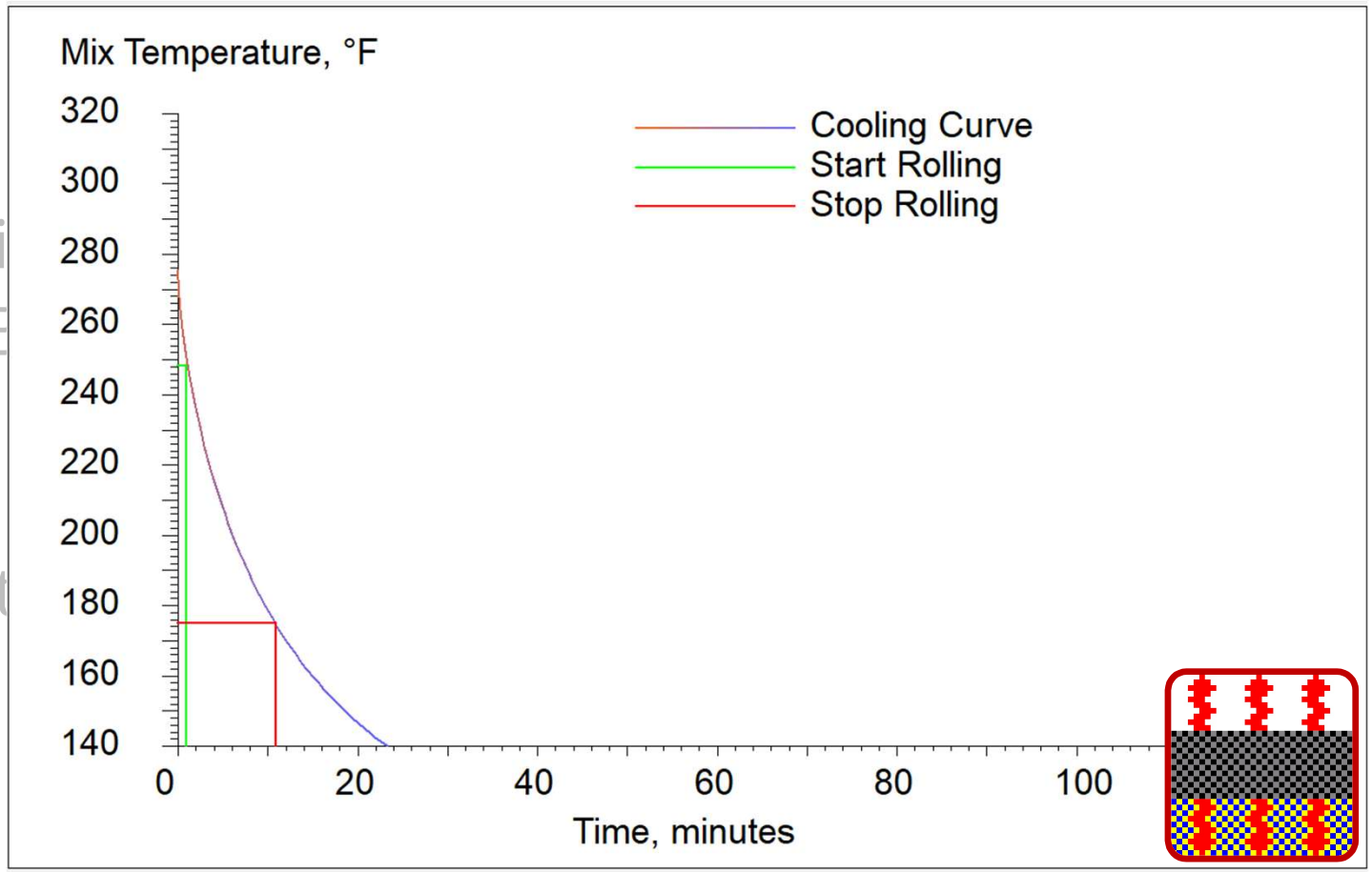
What's the estimate compaction window?

PaveCool App
42°F 10 mph Wind in Gainesville, FL (30° Lat.)

Example:

- Conventio
- 1 ½ inch Li
- PG 67-22 E
- 275°F Mix

What's the est



PaveCool App
42°F 10 mph Wind in Gainesville, FL (30° Lat.)

Example:

- Thick Lift
- 4 ½ inch Lift
- PG 67-22 Binder
- 275°F Mix Delivery Temperature

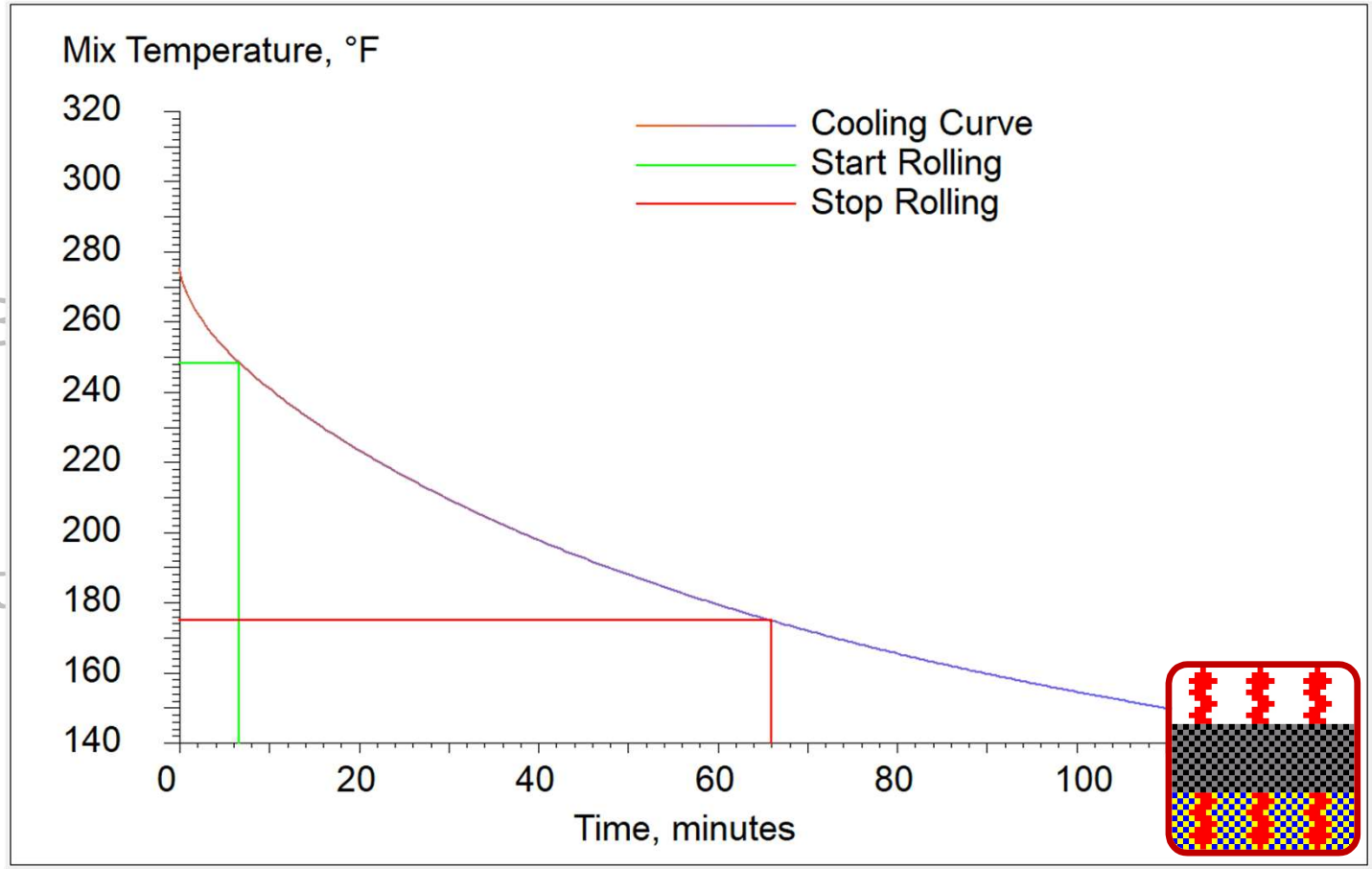
What's the estimate compaction window?

PaveCool App
42°F 10 mph Wind in Gainesville, FL (30° Lat.)

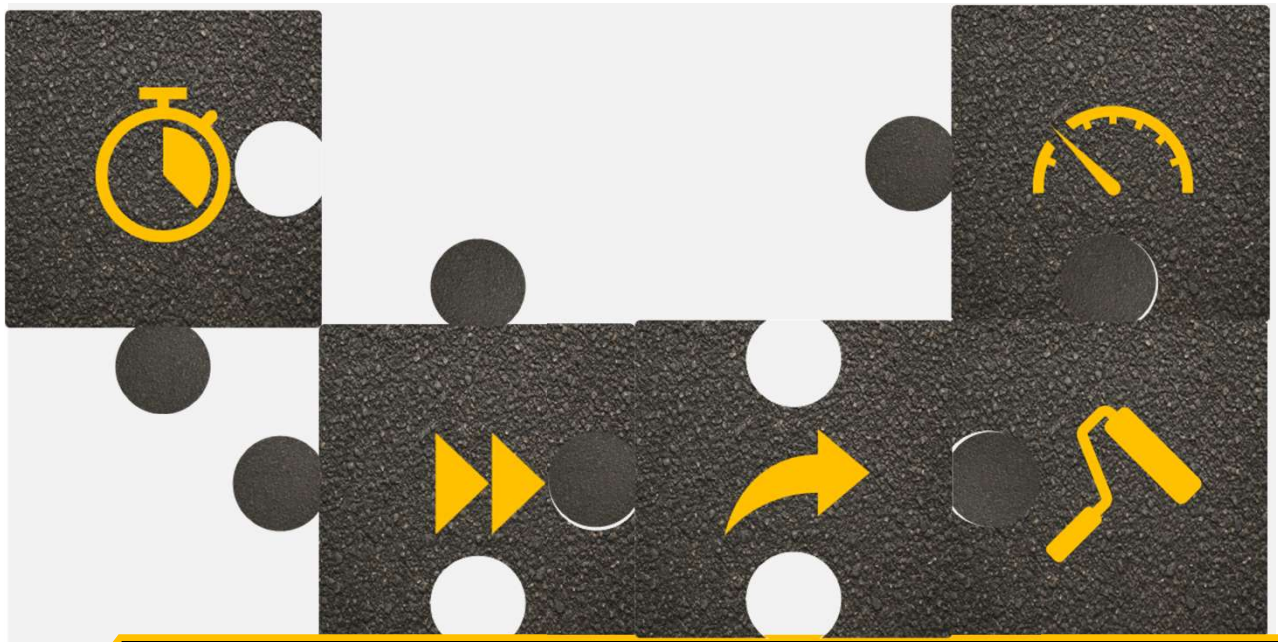
Example:

- Thick Lift
- 4 ½ inch Li
- PG 67-22 E
- 275°F Mix

What's the est

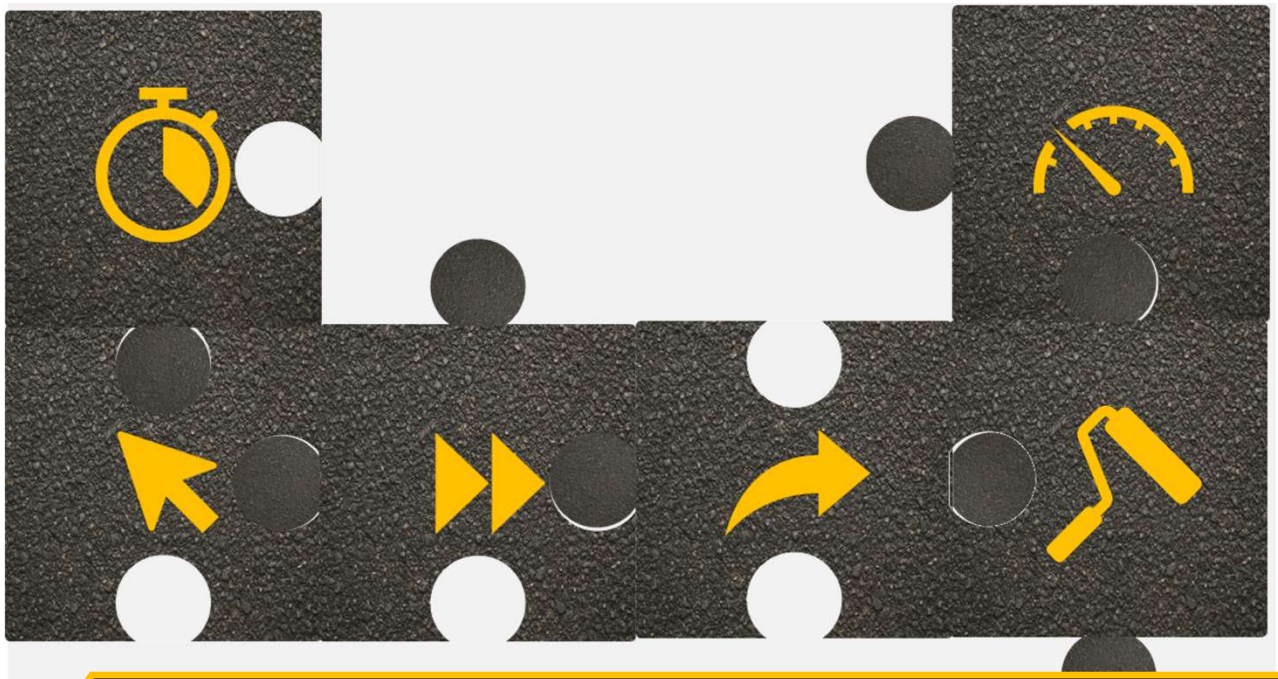


Benefits



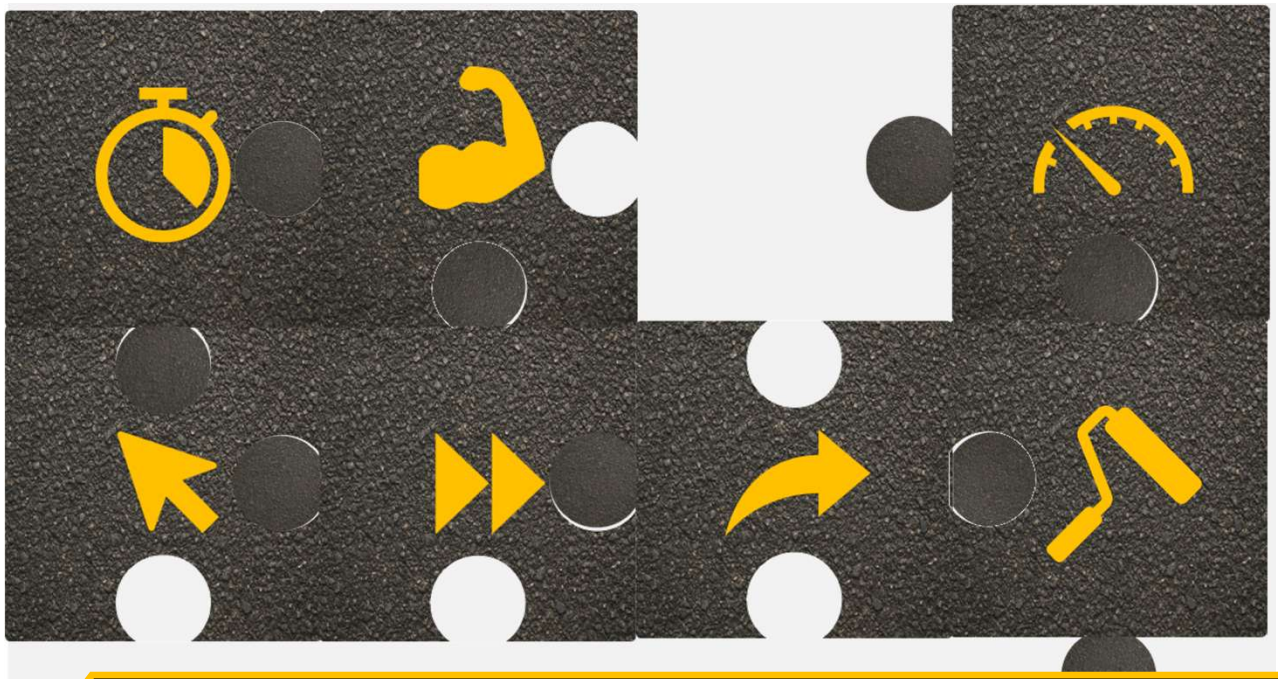
Return to Existing Grade Each Shift: An operational advantage… return the lane to the existing grade within a single work shift. Eliminates the need for temporary transitions or multi-day lane closures in deep rehabilitation projects.

Benefits



Easy To Compact: Thicker lifts improve compaction efficiency because internal confinement and extended heat retention allow aggregate particles to reorient more easily under rolling.

Benefits



Rut Resistant: Demonstrated excellent rut resistance to heavy interstate traffic. When density targets are met, these pavements remain stable and perform consistently with design expectations.

Benefits

Don’t Change Mixes During Shift:

What are the Benefits?

National Center for Asphalt Technology
NCAT
AT AUBURN UNIVERSITY

Benefits

Increased Lift Thickness and Production: Significantly increases daily production rates and improves overall construction efficiency.

Benefits

Accomplish Work During the Winter Months:
The substantial heat retention of thick lifts, often with WMA, enables successful paving at temperatures as low as 30°F.

Benefits

No Special Equipment Required:
Successfully executed using conventional paving and rolling equipment already available to contractors.

Benefits

Validated Long-life Pavement!!!

The Perceived Challenges

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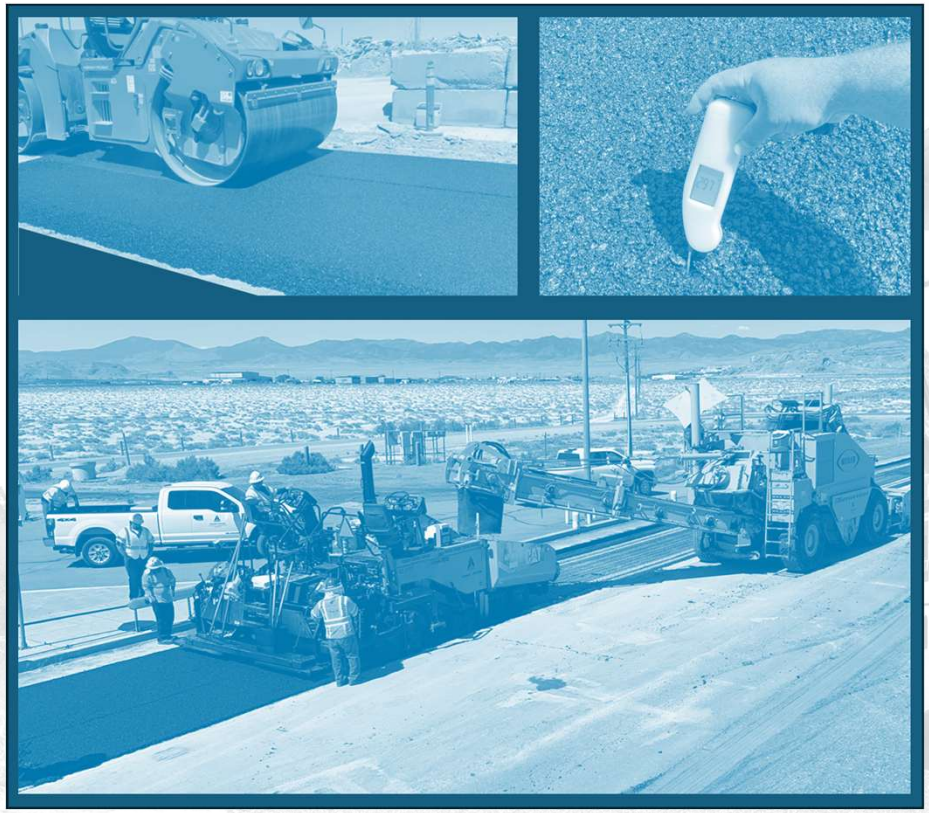

- Achieving Density
- Managing Temperature
- Achieving Smoothness

9 Keys to Success

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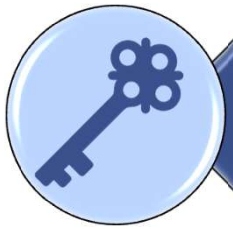
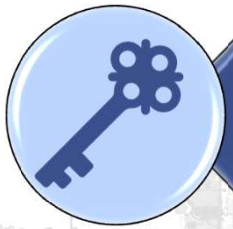
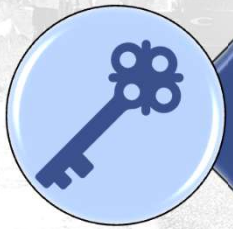


Understand Existing Conditions



Milling, Trucking, MTVs



Test Strip

9 Keys to Success

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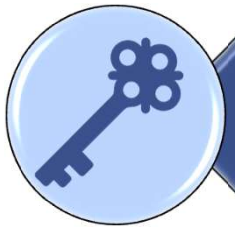
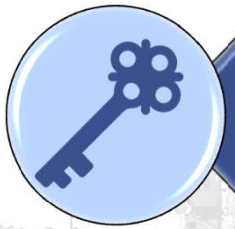
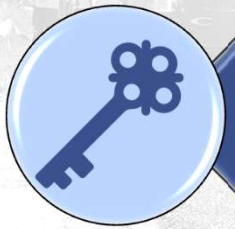


Compaction & Confinement



Tack/Lift Placement



Ambient Temperature

Confinement

- SC DOT, e.g.,
- Unconfined Edge resulted in a high cross-slope.
- Required additional asphalt mix to mitigate.

9 Keys to Success

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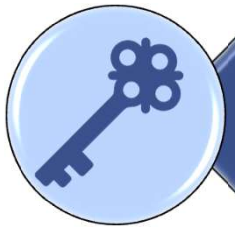
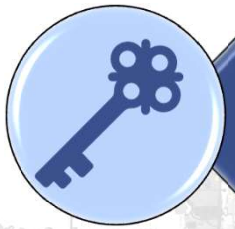
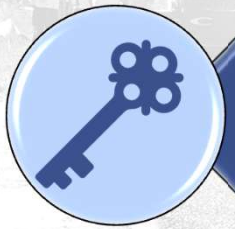


Warm Mix Asphalt (WMA)



Achieving Ride



Mixture Characteristics

WMA – Compaction and Temperature Aid

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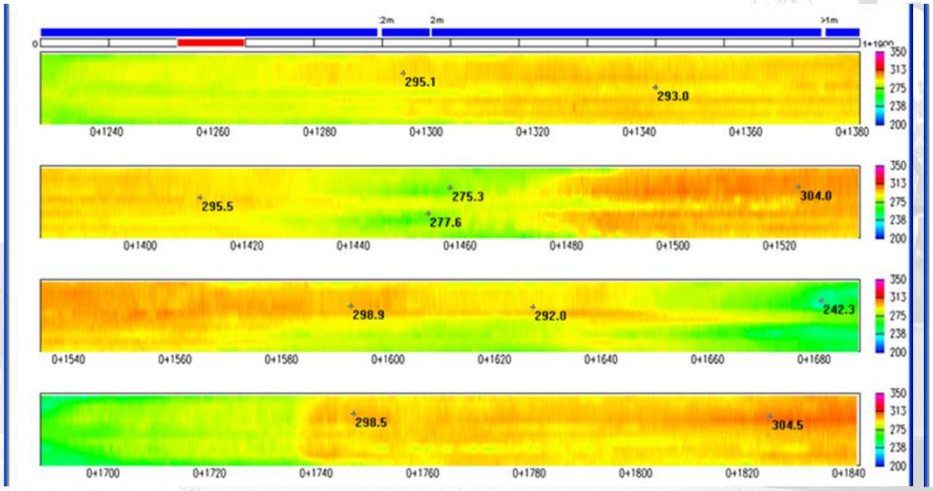
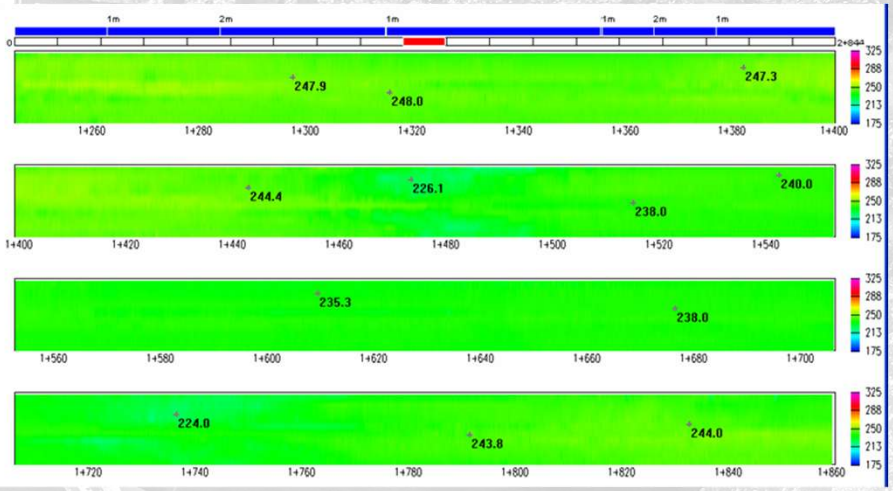
- Increased time for compaction window
- Better temperature uniformity
- Improved hauling characteristics



Without WMA - 62°F Difference



With WMA - 24°F Difference

THICK

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Best practices for achieving smoothness and compaction in thick lift paving are the same as for traditional paving, ***except that every best practice is amplified.***


Research to
Practice
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NCAT Test Track

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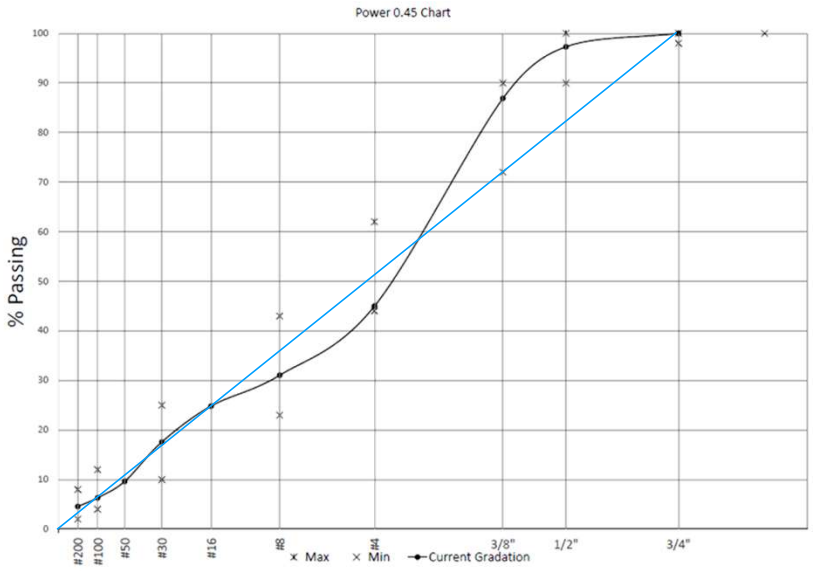
2018-2021: Section S9

- 8-inch single lift
- SCDOT Type-B Intermediate Special Mix

- Instrumentation embedded
  - strain,
  - stress,
  - temperature)

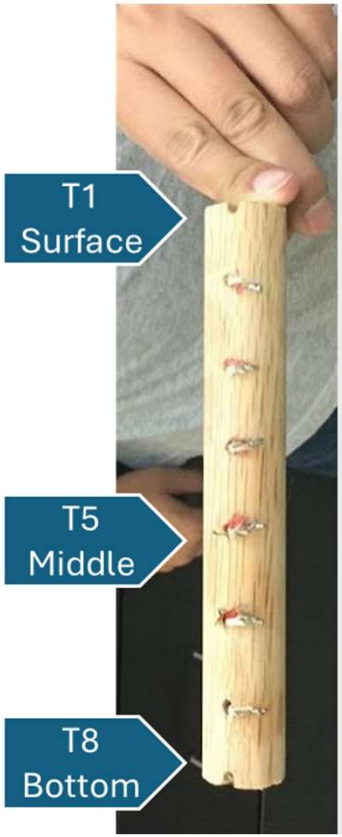
South Carolina Type "B" Intermediate Mix

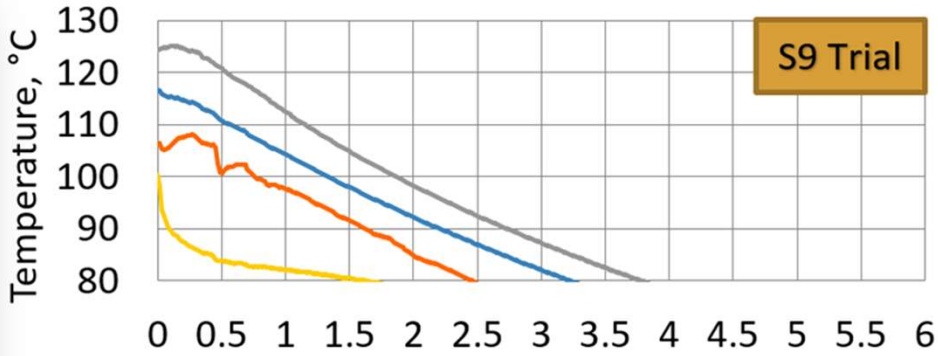
- "Type B Intermediate Special."
  - Rehabilitation Repairs, Interstates, High Volume Primary Routes
- 12.5 NMAS
- PG 64-22 with 25% RAP
- WMA (EVOTHERM M1 @ 0.5%)
  - Mixing @ 275–280°F
  - Compaction @ 245–250°F
- Design Air Voids = 2.5%
- N_{design} = 75 gyrations
- Asphalt Content = 5.75%
  - 4.37% Virgin
  - 1.38% RAP



Multi Depth Temperature Instrumentation

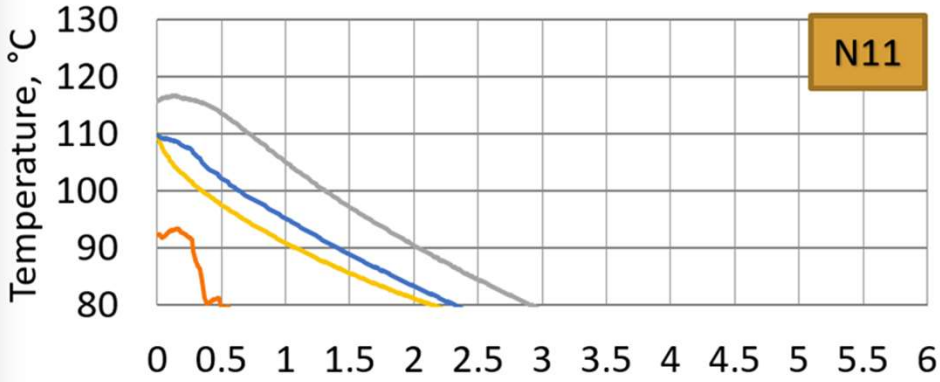
Temperature Probe





T1
T5
T8
Taverage

8/22/2018
3:02 PM
T(air) = 86°F



T1
T5
T8
Taverage

8/23/2018
6:01 PM
T(air) = 79°F

Contractor's Perspective

- Pneumatic Tire Rollers can be an effective tool in the compaction train.

Image Source:
pavement interactive

2018-2021: Section S9 Findings

- In-place density exceeded 95 percent of G_{mm}, with no significant density gradient observed through the depth of the lift.

- Rutting remained minimal under heavy trafficking, and no premature structural distress was observed…

Summary & Recommendations

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8 Recommendations

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1. Define Clear Application Criteria
2. Optimize Mixture Design for Workability and Durability
3. Require Test Strips to Establish Compaction Practices
4. Emphasize Thermal Management

8 Recommendations

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5. Maintain Continuous and Stable Paving Operations
6. Address Smoothness Proactively
7. Update Specifications to Support Thick Lift Implementation
8. Promote Contractor–Agency Communication

Thick Lift Journey

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The Why	• Why Thick Lift?
Benefits	• Timelines to Haul Times
Challenges	• The 3 Perceived Challenges
Success	• Keys to Success
R to P	• Research to Practice

Thank you!

Thomas Harman
NCAT
tom.harman@auburn.edu

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