

# Overlay Costs

**National Concrete Consortium  
TTCC**

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Representing

The National Concrete Pavement Technology Center



# Overlay Cost Tech Brief

TECH BRIEF

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## Concrete Overlay Field Application Program Concrete Overlay Cost Frequently Asked Questions

- Developed to address common questions we have received during our implementation efforts

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### Introduction

The need for engineered preservation and rehabilitation strategies for maintaining the nation's highway pavements has never been greater. To advance the use of concrete overlays as cost-effective solutions for a wide variety of pavement conditions, the Federal Highway Administration (FHWA) and the National Concrete Pavement Technology Center (CP Tech Center) are implementing the Concrete Overlay Field Application Program. The overall objective of this program is to increase awareness and knowledge and strengthen confidence in concrete overlay applications among state departments of transportation (DOTs), cities, counties, contractors, and engineering consultants.

### Types of concrete overlays

Concrete overlays are categorized as either bonded or unbonded, depending on how the existing pavement is considered in the thickness design procedure (see Figure 1). Both types of concrete overlays take advantage of the equity investment in the existing pavement structure. Comprehensive guidance on the selection, design, and construction of concrete overlays is provided in the *Guide to Concrete Overlays, 2<sup>nd</sup> Edition*, which is available from the National CP Tech Center.

#### Bonded Overlay Systems (Resurfacing/Minor Rehabilitation)

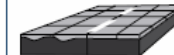
In general, bonded overlays are used to add structural capacity and/or eliminate surface distress when the existing pavement is in good structural condition.

Bonding is essential, so thorough surface preparation is necessary before resurfacing.

#### Bonded Concrete Overlays of Concrete Pavements —previously called bonded overlays—



#### Bonded Concrete Overlays of Asphalt Pavements —previously called ultra-thin whitetopping—



#### Bonded Concrete Overlays of Composite Pavements



#### Unbonded Overlay Systems (Minor/Major Rehabilitation)

In general, unbonded overlays are used to rehabilitate pavements with some structural deterioration.

They are basically new pavements constructed on an existing, stable platform (the existing pavement).

#### Unbonded Concrete Overlays of Concrete Pavements —previously called unbonded overlays—



#### Unbonded Concrete Overlays of Asphalt Pavements —previously called conventional whitetopping—



#### Unbonded Concrete Overlays of Composite Pavements

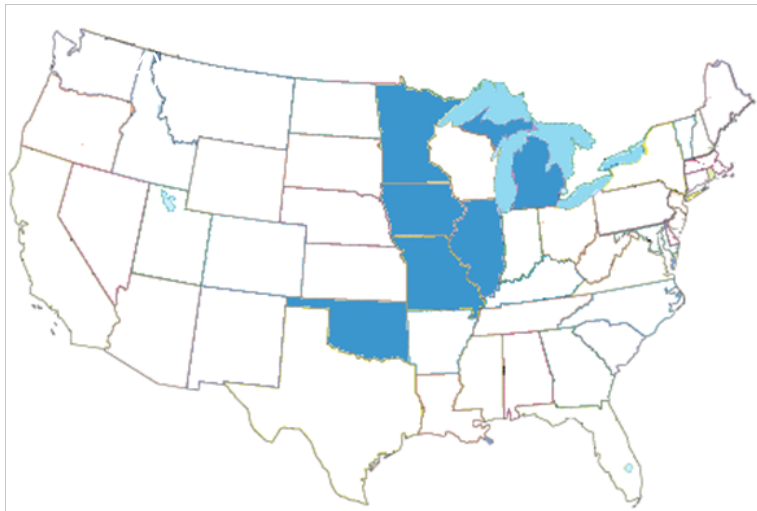


Figure 1. Type of concrete overlays (from *Guide to Concrete Overlays, 2<sup>nd</sup> Edition*)



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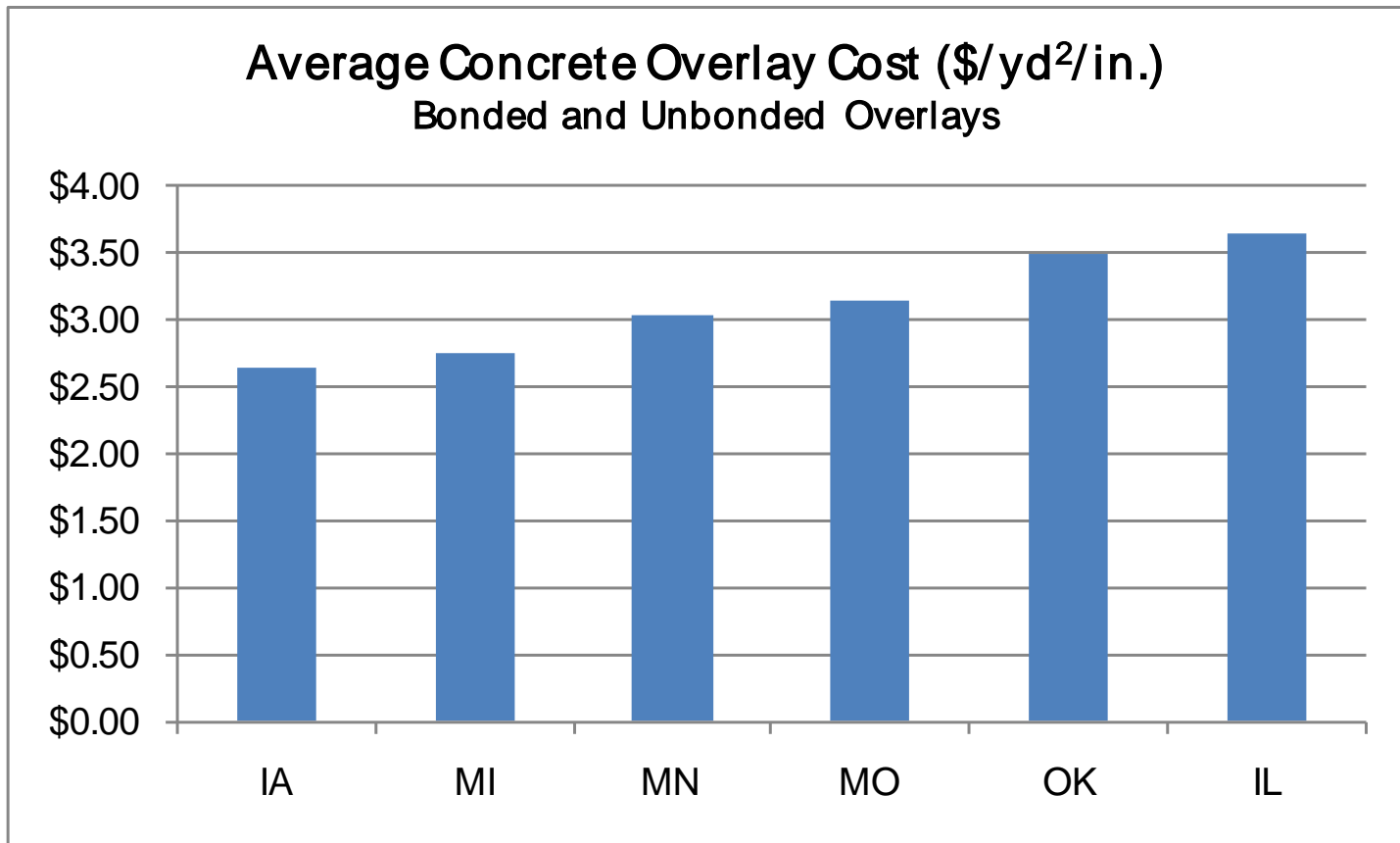
- Cost information is derived from representative bid tabulations
  - 6 states
  - 33 projects
  - All types of overlays
  - Overlay costs are inclusive of furnishing concrete, placing the overlay and all costs associated with joints
  - Costs exclude: pre-overlay repairs and separation layer for unbonded overlays



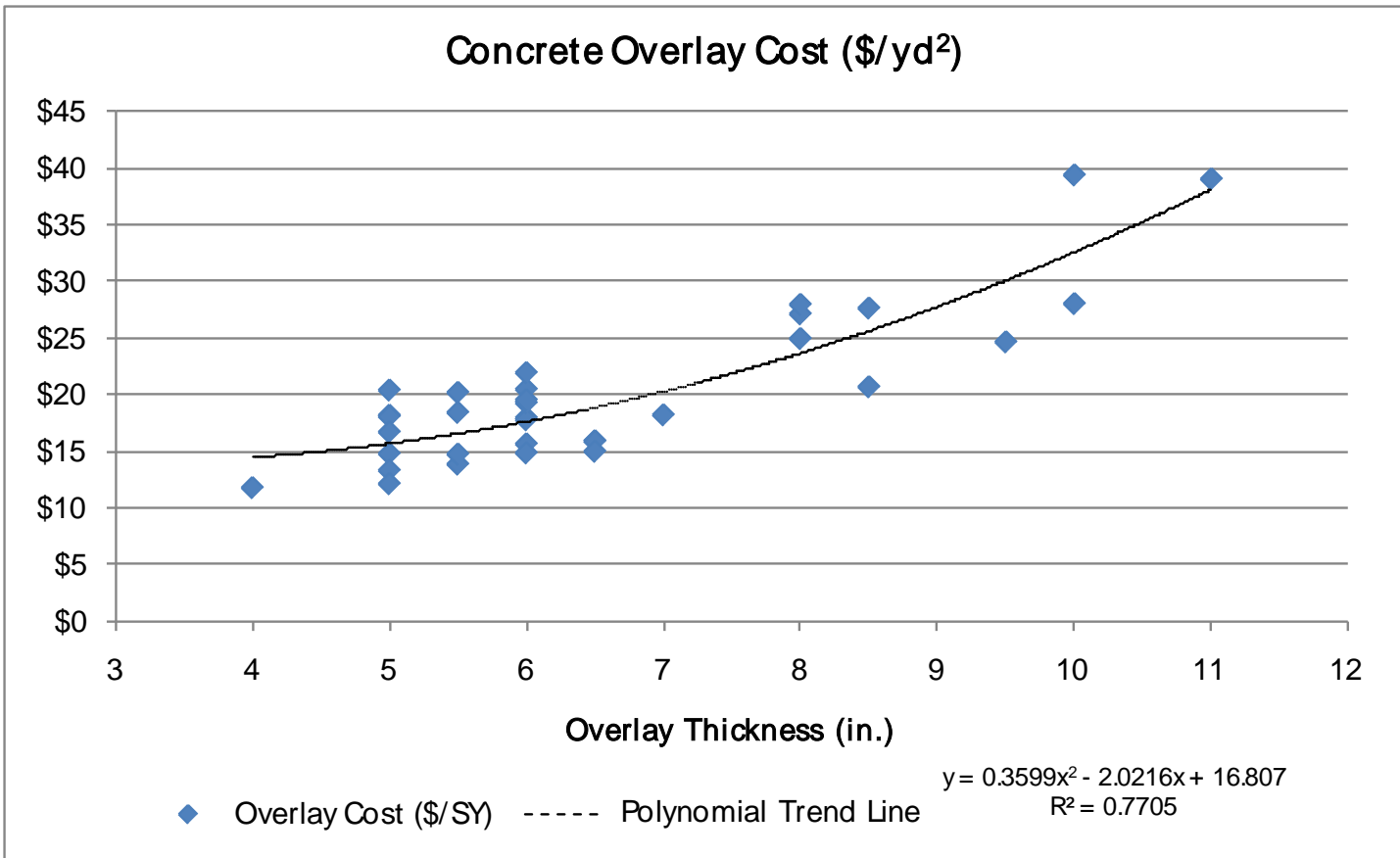
Overlay Type	Range of Nominal Thickness (in.)	Range of Project Size (SY)	Number of Projects
Bonded	5 to 7	40,759 to 117,952	4
Unbonded	4 to 11	21,155 to 279,940	29

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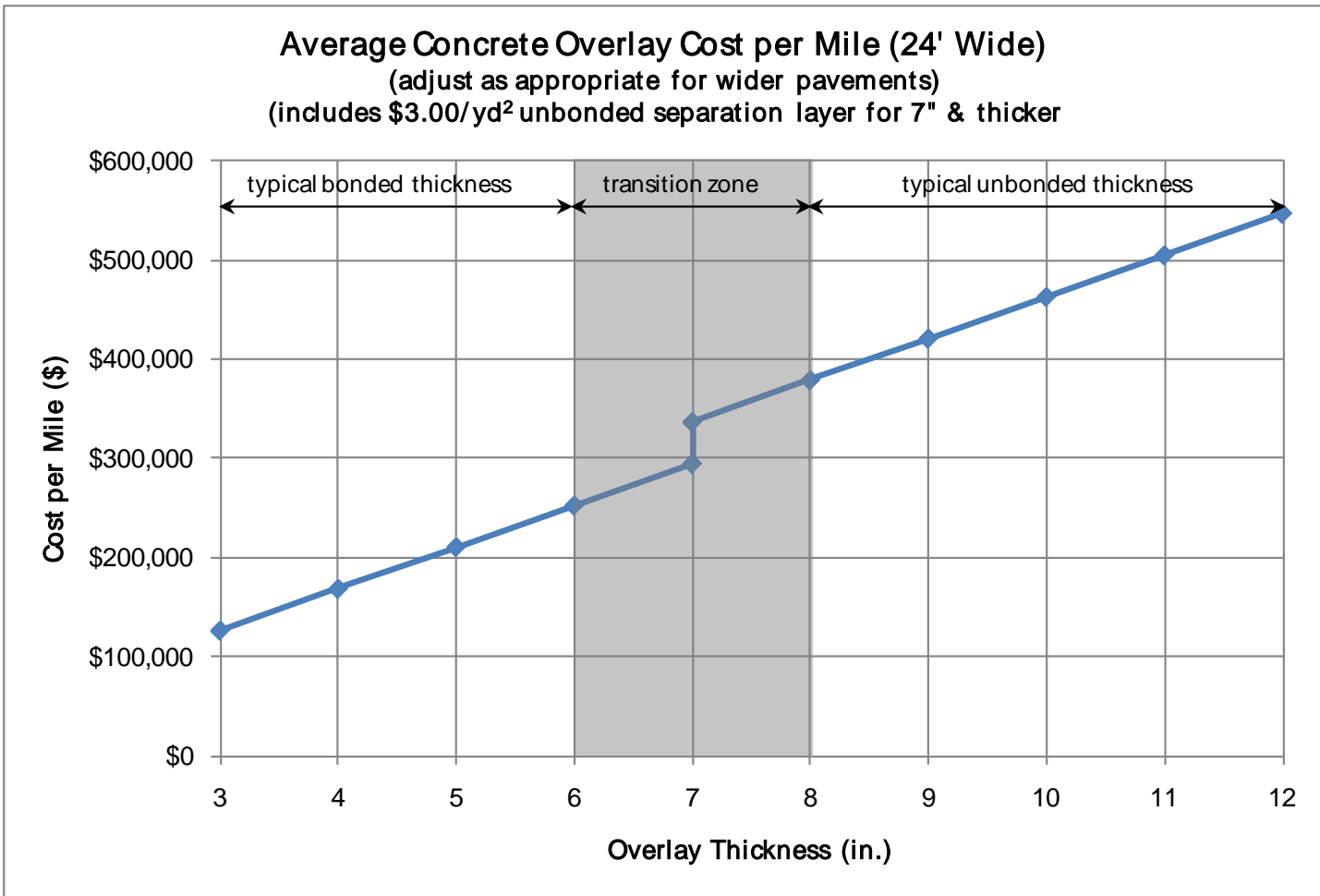
- **How much does a concrete overlay cost?**



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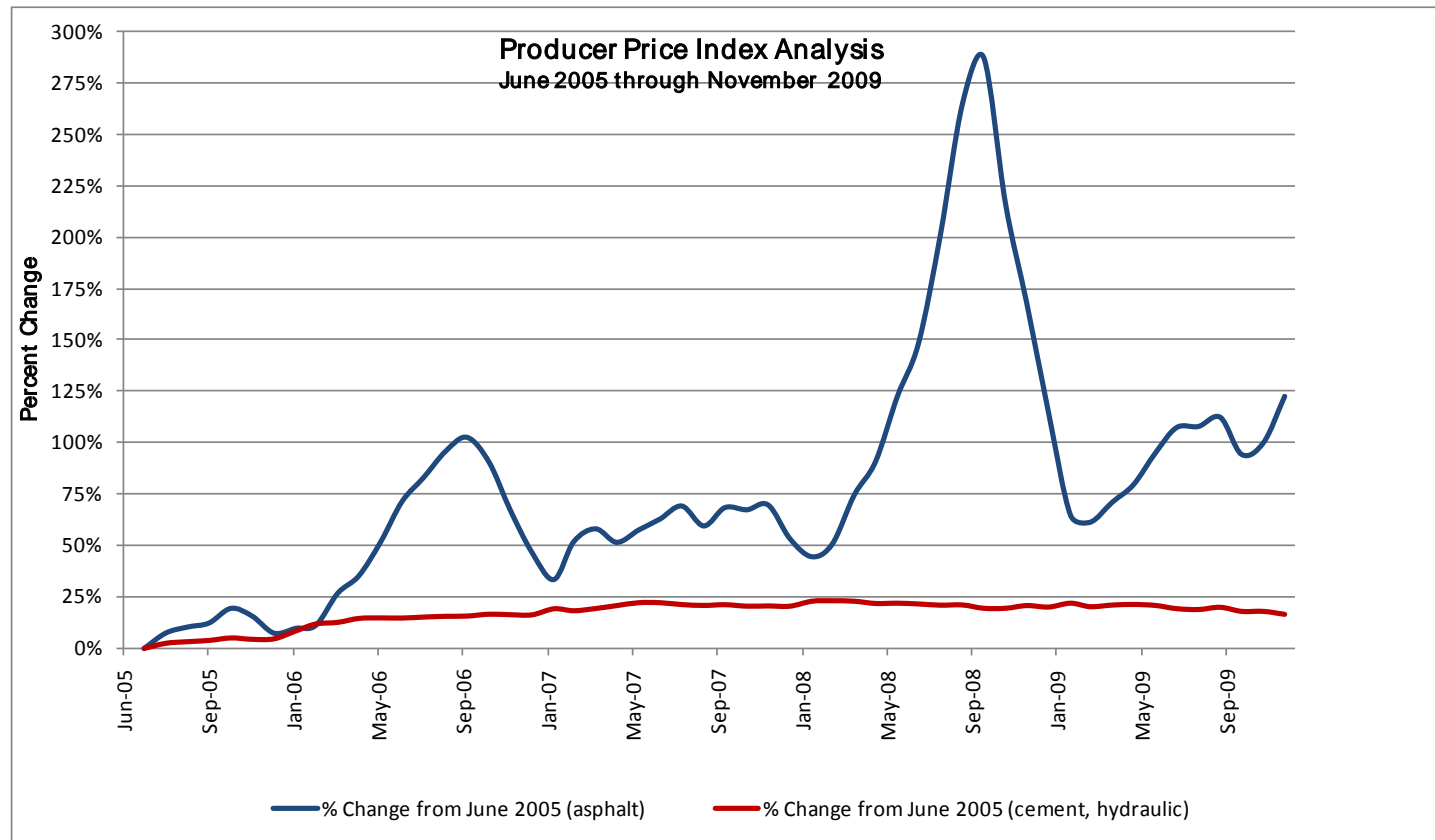


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- **How does the cost of concrete overlays compare to the cost of asphalt?**
  - **Assume asphalt has an in-place density of 112 lb/yd<sup>2</sup>/in**
  - **Convert the average concrete overlay cost to a per ton equivalent ⇒ \$54.54 per ton**
  - **As a comparison, IADOT's average price for an asphalt surface course during the same time frame was \$57.32 per ton**

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- **Have concrete prices increased at the same rate as asphalt prices?**





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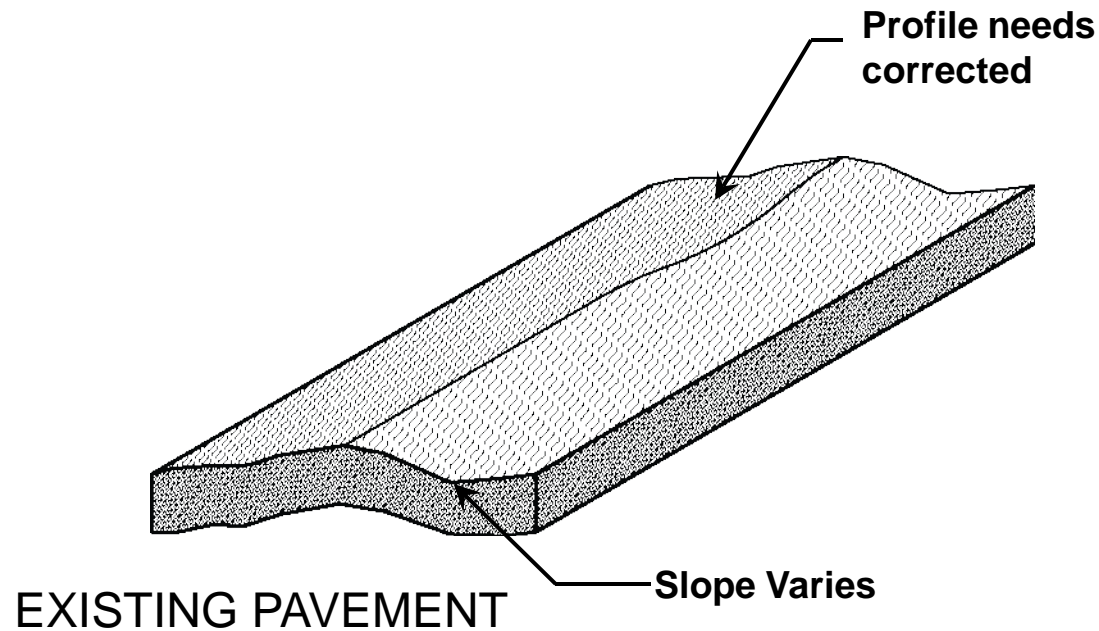
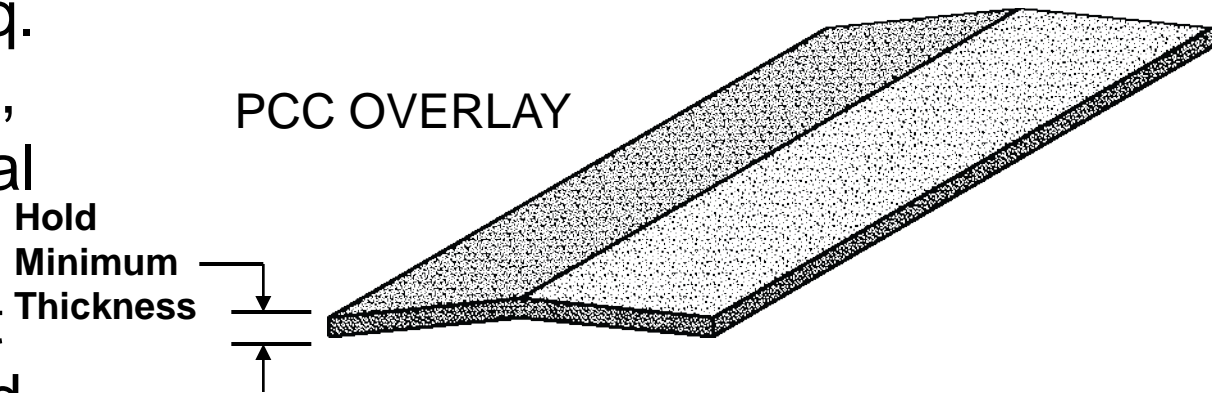
- Introduction of overlay types
- Brief discussions of cost variables – materials, labor handwork, etc.
- Explanation of measurement and payment by square yard **and** cubic yard



# Concrete Overlay Quantities

## -REALITY SITUATION-

- Concrete is bid in sq. yards for placement, cu. yards for material
- Profile is not perfect and needs corrected
- Cross slope needs correction



# Quantity Estimates

- Estimating plan quantity
  - Overlay cubic yard pay item is to adjust the theoretical volume by an appropriate factor that accounts for the non-uniformity of the existing surface

Concrete Overlay Thickness	½" Placement Tolerance as a % of Design Thickness	Additional % Adjustment for Gross Surface Irregularities in the Existing Surface	Total Adjustment Factor to be Applied to Theoretical Volume
4"	12.5%	5%	17.5%
6"	8.3%	5%	13.3%
8"	6.3%	5%	11.3%
10"	5.0%	5%	10.0%
12"	4.2%	5%	9.2%

# Cross Section or Grade Corrections with Interlayer

- Tendency to utilize the asphalt separation layer as the medium for correcting cross slope & profile
  - Results in variable asphalt thickness and can lead to very thin asphalt sections (less than 1")
  - When compacted creates variable roll down
  - The result being a non-uniform surface which still must be corrected
- Most effective way to make corrections is by utilizing a nominal thickness of asphalt (typically 1") as a separation layer
- Make cross-slope and smoothness adjustments in the concrete overlay



# Cross Section or Grade Correction by Milling

- Milling should be minimized to reducing structural support of the milled pavement.
- Purpose of Milling:
  - Remove distortions 2" or more
  - Reduce significant high spots
  - Increase bond of overlay
  - Meet vertical elevation requirements
- It is preferable to mill to a depth that will minimize the potential for delamination between lifts
- Grade corrections should be made in the thickness of the concrete overlay

# Minnesota Department of Transportation (MnDOT) Pay Method

- Set an initial plan quantity based on the theoretical cubic yards
- This quantity is used only for the purposes of bidding and awarding the contract
- After the separation layer has been placed or any milling has been performed, a physical survey is performed
- For a 24' wide crowned pavement section, lines of survey are taken at the crown point and both edges at 25' or 50' centers
- Using this survey information along with the proposed profile grade and design cross-slope(s), a revised cubic yard plan quantity is calculated
- Payment for cubic yards of concrete is then capped by specification at 102% of this revised plan quantity



# Engineering Survey

- Construction Survey
  1. Establish horizontal alignment control from the existing pavement edge, centerline, median drainage structures.
  2. Set two control stringlines at a uniform height (typically 2').
  3. Measure down to the surface of the existing pavement at multiple points to identify high points in the existing pavement.
  4. Adjust the two control stringlines so that the identified high point in the exiting pavement measures a uniform height (typically 2').
  5. Adjust the two control stringlines for smoothness between the high points by eyeballing. Periodically double check with a transverse string.

# Bonded Concrete Overlays of Asphalt Pavements

—previously called  
*ultra-thin whitetopping*—

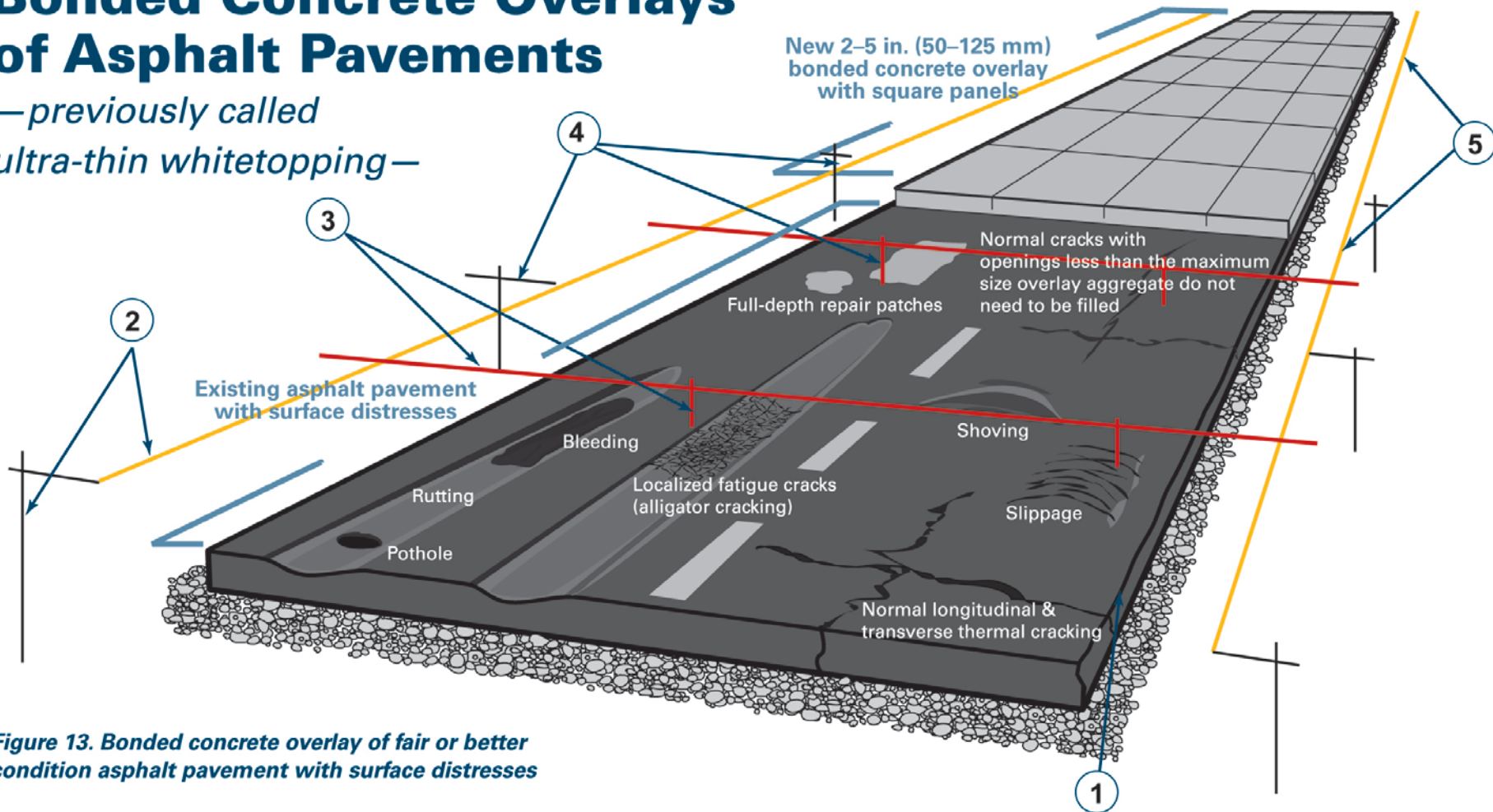


Figure 13. Bonded concrete overlay of fair or better condition asphalt pavement with surface distresses



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**Questions?**

