

## **Module 3-10**

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### **Hot Mix Asphalt Overlays**

## **Objectives**

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- List deficiencies which can be corrected
- Identify conditions that are best suited and most cost-effective
- Determine if need is functional or structural
- Determine feasibility and extent of pre-overlay repair
- Describe thickness design approaches

## **Introduction**

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**Most popular method**

**Relatively fast and cost-effective means for:**

- Correcting deficiencies
- Restoring user satisfaction
- Adding structural capacity

**Poor performance is NOT uncommon**

## **Definitions**

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**Functional performance - Ability to provide a safe, smooth riding surface**

**Structural performance - Ability to carry traffic without distress**

**Empirical - Design based on past experience or observation**

**Mechanistic - Design based upon engineering mechanics**

## **Purpose and Applications**

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**General (HMA and PCC)**

- Improve functional and/or structural characteristics
- Factors to consider in comparing HMA and PCC overlays

## **Purpose and Applications**

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**Specific (HMA)**

- Wide range of applications  
Road surface categories  
Climate and support conditions
- Typical characteristics  
Dense graded HMA  
Flexible or rigid surface  
25 to 200 mm thickness
- Mill and Fill

## Limitations and Effectiveness

General - Recognize why many overlays fail prematurely

- Improper selection
- Wrong type
- Inadequate design
- Insufficient preoverlay repair
- Lack of consideration of reflection cracking

## Limitations and Effectiveness

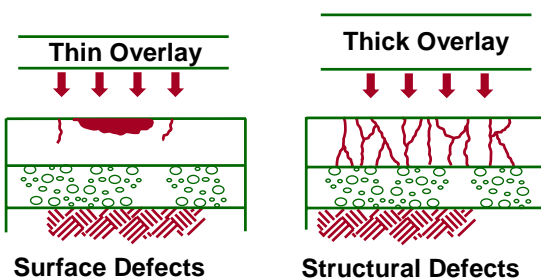
Specific are defined by:

- Distress exhibited
- Intended design life
- Availability of quality materials

Ways to improve effectiveness

- Pre-overlay treatments
- Better materials and practices
- Sound engineering judgement

## Selection of an Overlay to Correct Deficiencies



## Considerations in Overlay Selection

Construction feasibility

- Traffic control
- Constructibility
- Vertical clearances

Performance period

Funding

## Preoverlay Treatment and Repair

Dependent upon:

- Type of overlay
- Structural adequacy of existing pavement
- Existing types of distress
- Future traffic
- Physical constraints
- Cost

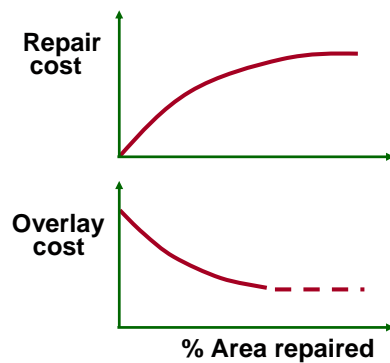
## To Repair or Not to Repair



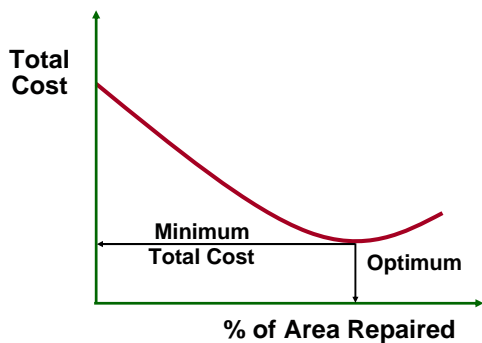
### Types of Preoverlay Treatments

- Localized repair (patching)
- Surface leveling
- Controlling reflection cracking
- Drainage improvements

### 1. Localized Repair



### 1. Localized Repair



### 2. Surface Leveling

- Cold milling
- Leveling course to fill ruts
- Leveling course to improve longitudinal profile

### 3. Controlling Reflection Cracking

- Geotextiles or fabrics
- Stress relieving or stress absorbing membrane interlayers
- “Band aid” type crack sealants

### 4. Drainage Corrections

- Drainage survey
- Identify moisture / drainage related distresses
- Develop solutions that address moisture problems

## Two Aspects of Overlay Design

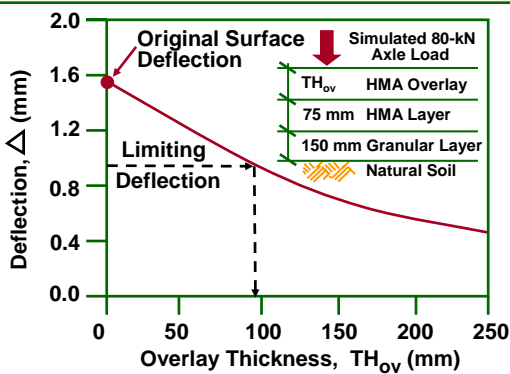
### Asphalt mixture

- Fatigue cracking
- Permanent deformation
- Thermal cracking
- Moisture susceptibility

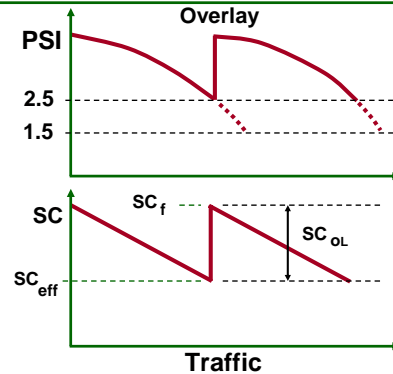
## Overlay Thickness

- Engineering judgement
- Deflection approach
- Structural deficiency
- Mechanistic approach

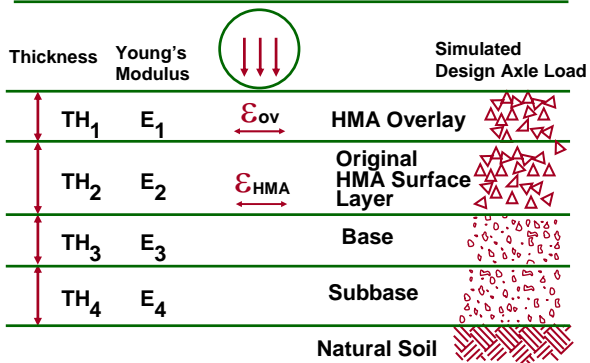
## Deflection Approach



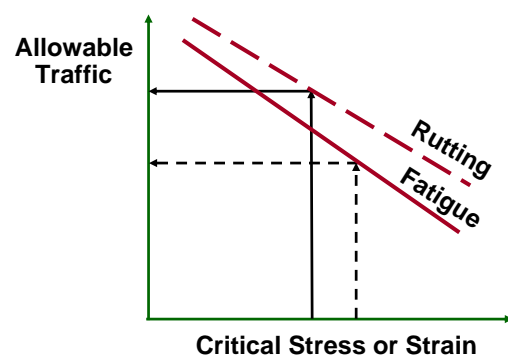
## Structural Deficiency Approach



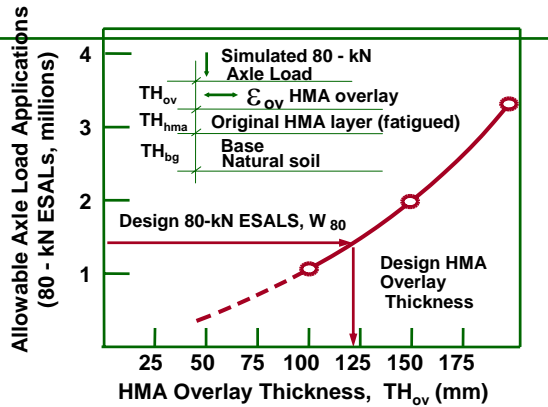
## Structural Deficiency Approach



## Mechanistic - Empirical Approach



### Design Thickness vs. Design Load



### Structural Requirement Varies Along Roadway



### Summary

- Functional vs. structural
- Applications, limitations and effectiveness
- Preoverlay repair issues
- Approaches to overlay thickness design