Pavement Preservation from the Concrete Perspective

Larry Scofield
IGGA Director of Engineering
and Research

Concrete For Heavy Loads Only

And It Works Well For Heavy Loads

The Original Definition of Sustainability– First Concrete Pavement 1891 (120 yrs)

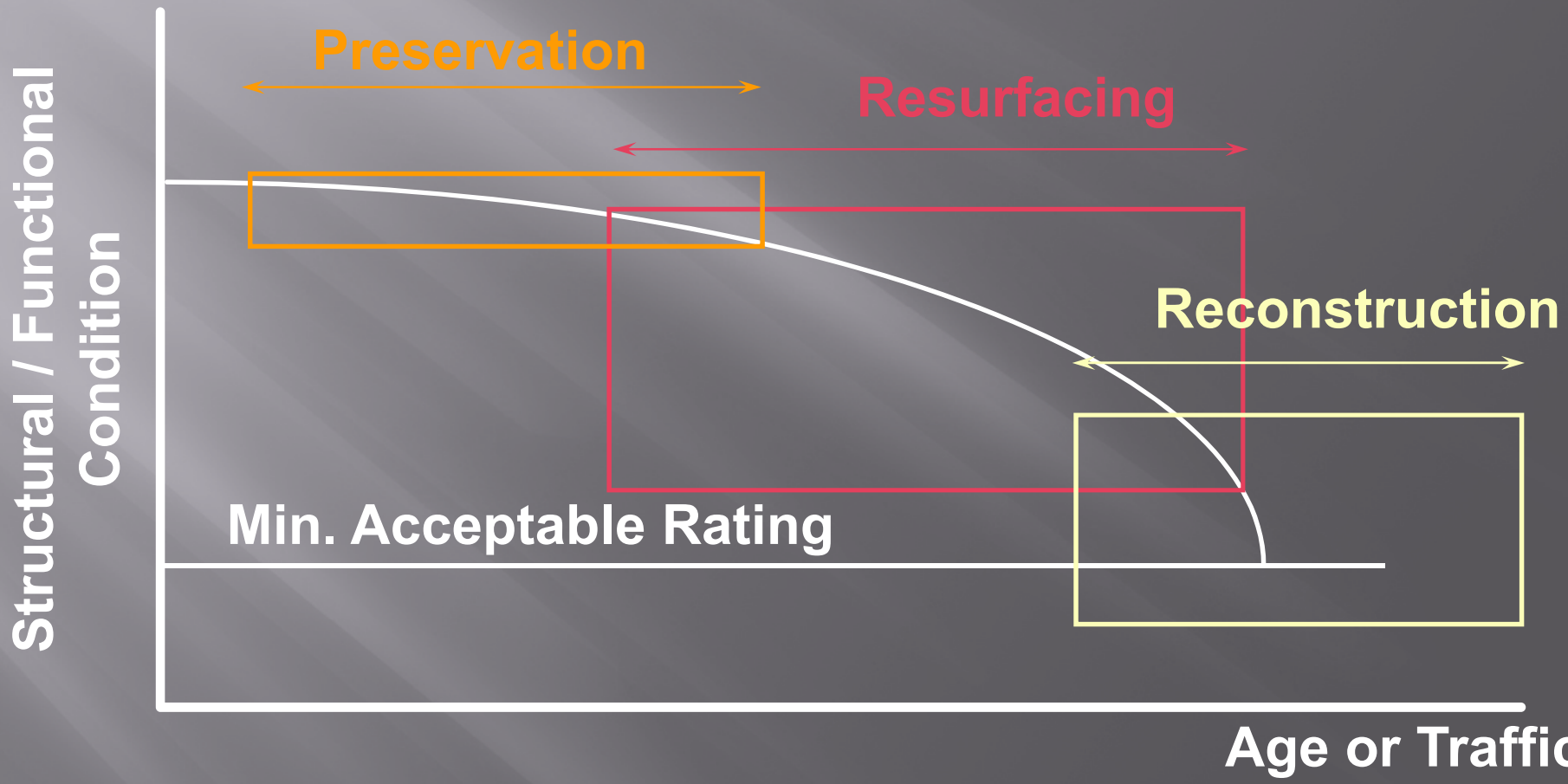
Motorist Training

Officer Training

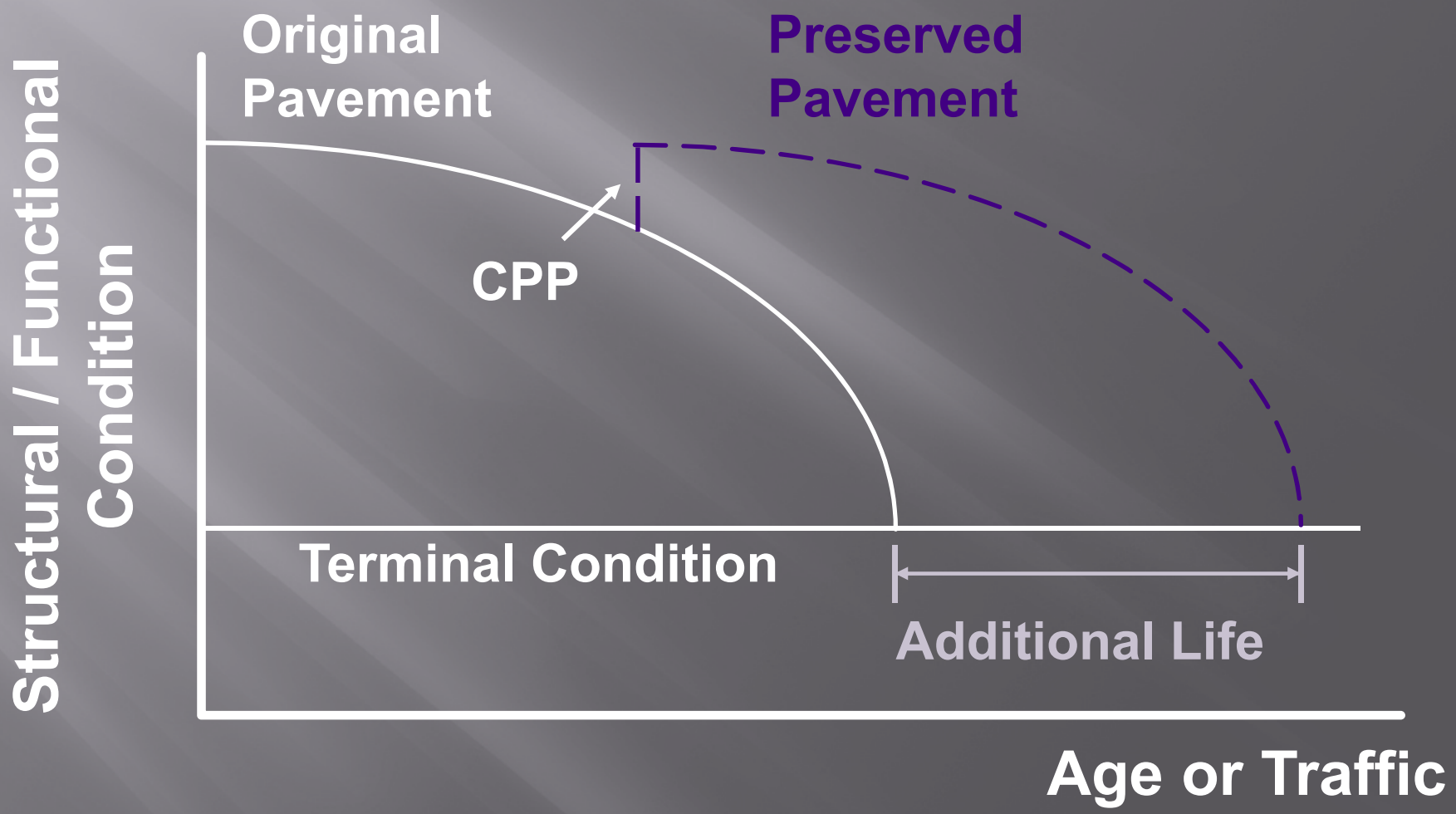
Purpose of Concrete Pavement Preservation

- Used early when pavement has little deterioration and consistently throughout its life if needed.
  - Repairs isolated areas of distress.
  - Repairs some construction defects.
  - Manages the rate of deterioration.

Rehabilitation Timing



Increased Traffic Carrying Capacity



Well Designed and Managed Concrete Pavements Don't Fit the Traditional Curves

Typical Concrete Preservation Activiites

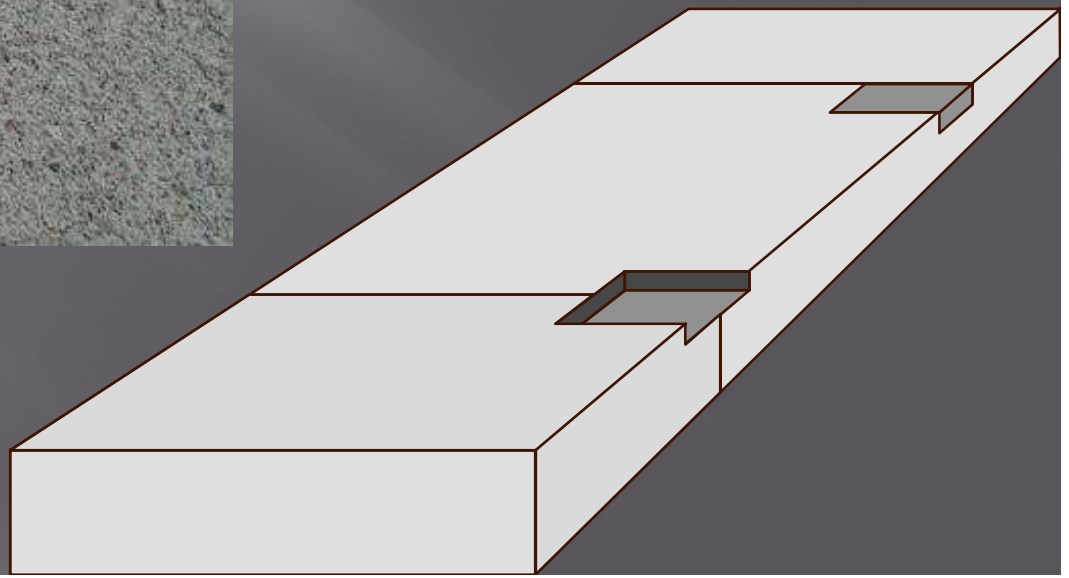
- Diamond Grinding or Diamond Grooving
- Partial Depth or Full Depth Patching
- Dowel Bar Retrofit
- Joint Sealing or Resealing
- Slab Jacking
- Slab Replacement
- Longitudinal Crack Stitching

Diamond Grinding

- Removes Faulting
- Improves Ride
- Improves Friction
- Reduces Noise

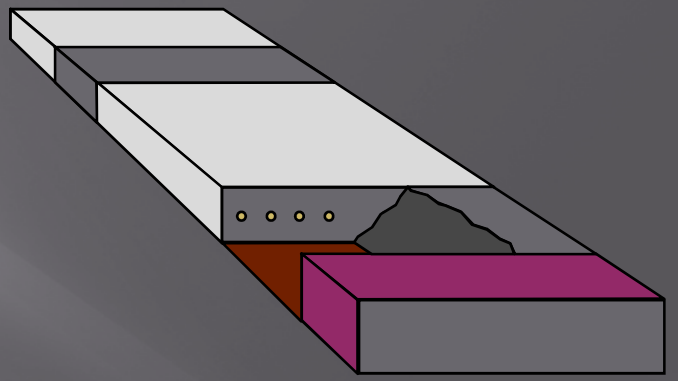
Partial Depth Repairs

If distress less than 1/3 D

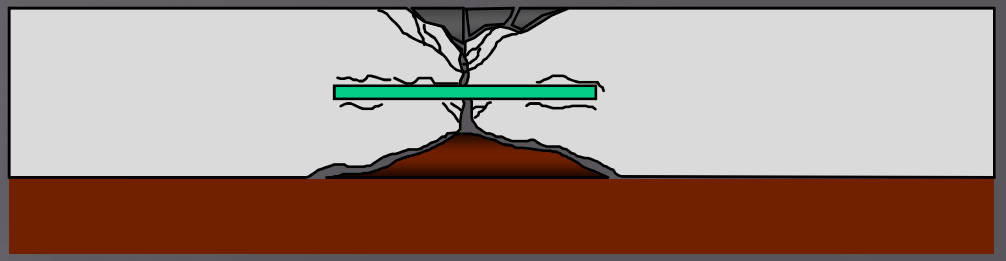


Full Depth Patches

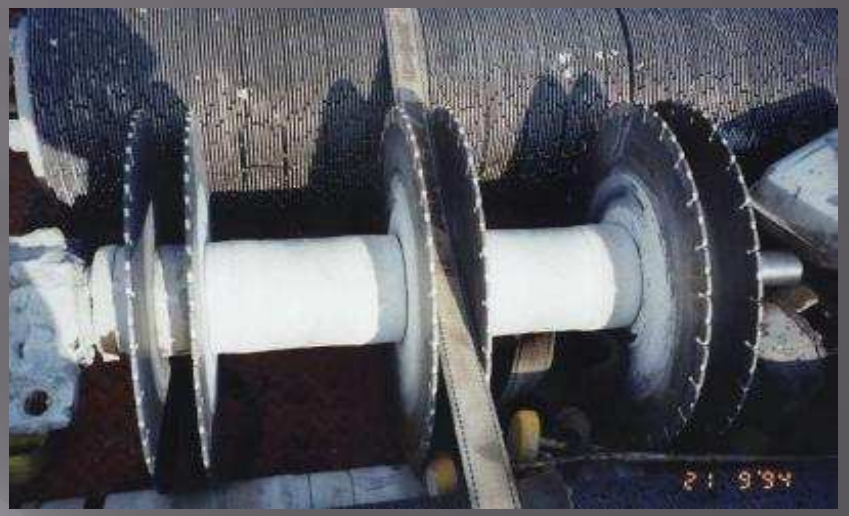
May also need to:
Slab Stabilize
Base

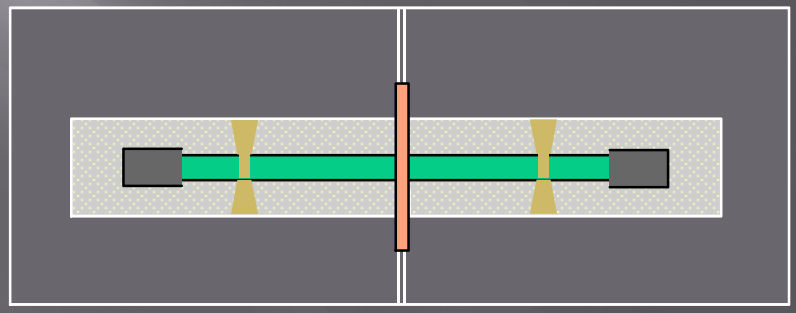


If distress greater than 1/3 D



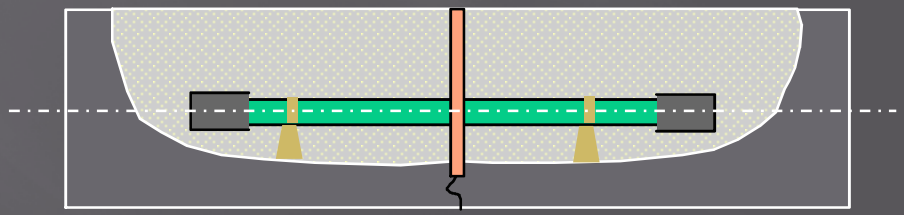
Dowel Bar Retrofit



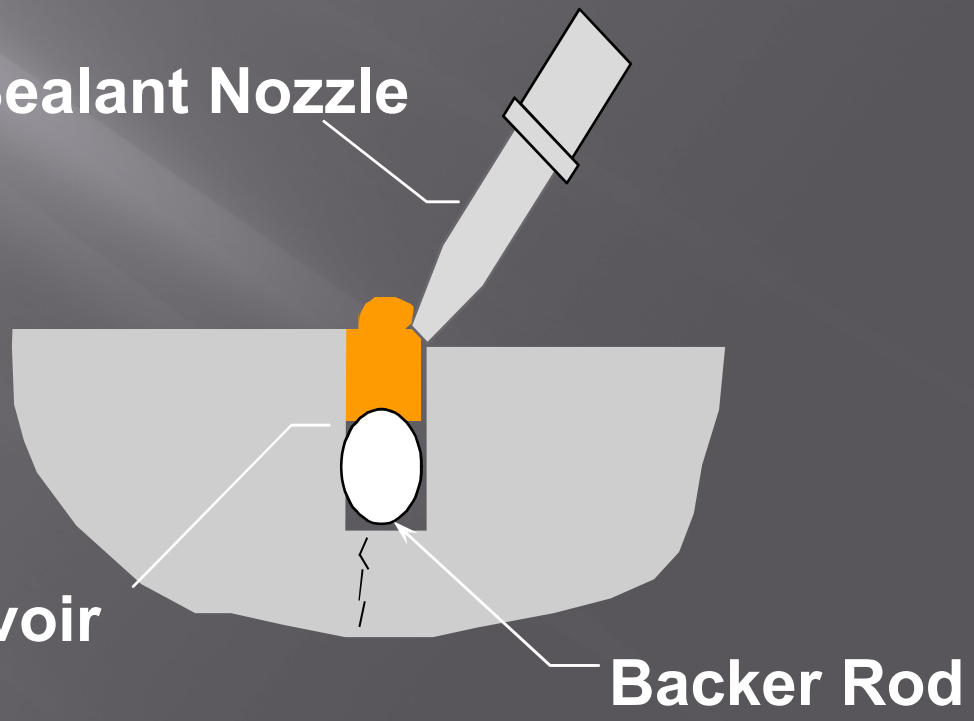


Also need to:

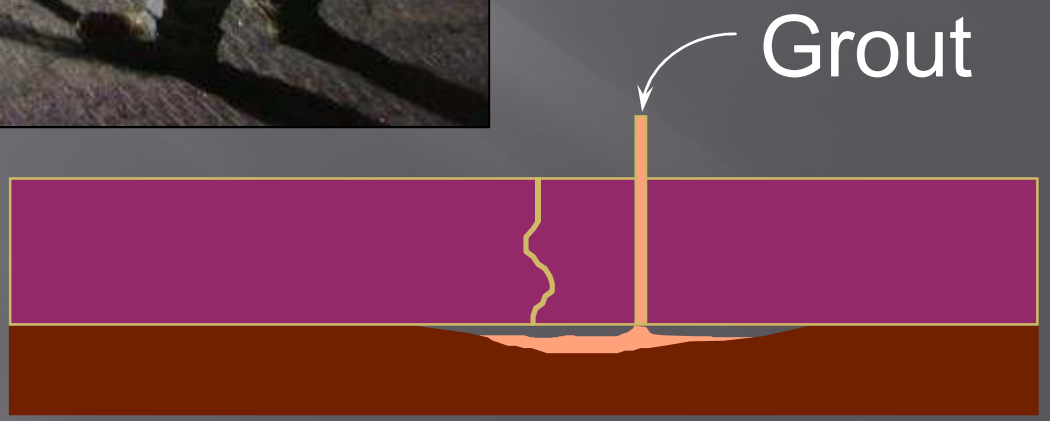
Reseal Joints



Sealing and Resealing



Slab Stabilization

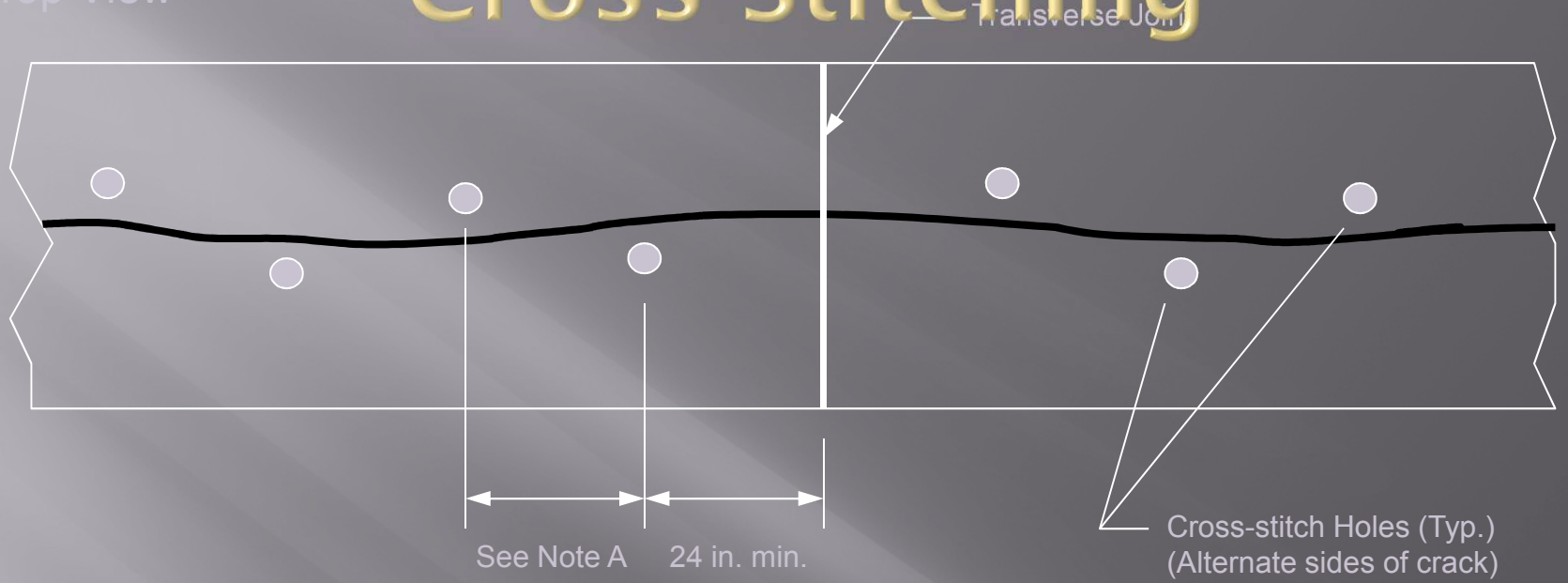


Fill Void or Level Slab

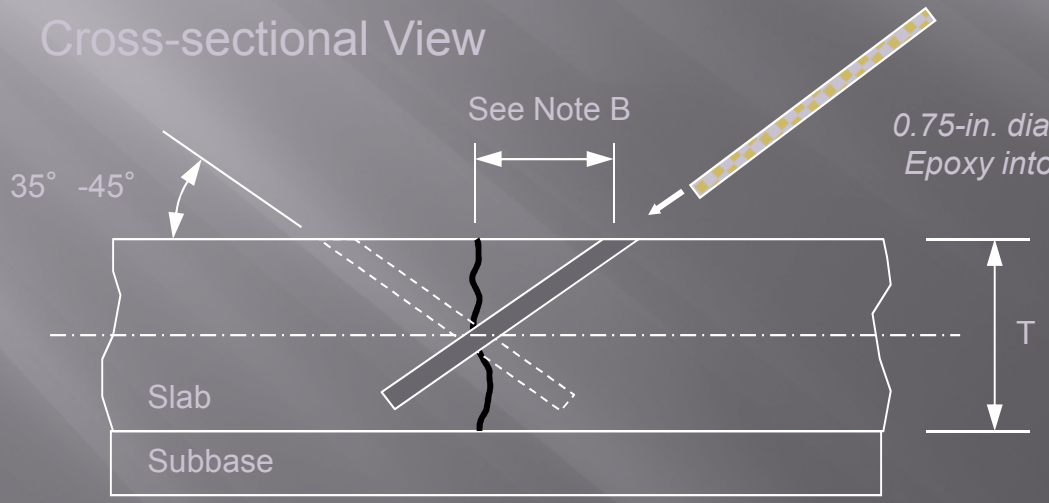
Slab Replacement

Cross Stitching

Top View



Cross-sectional View



Note A: *Distance between holes is 24 in. for heavy traffic; 36 in. for light traffic*

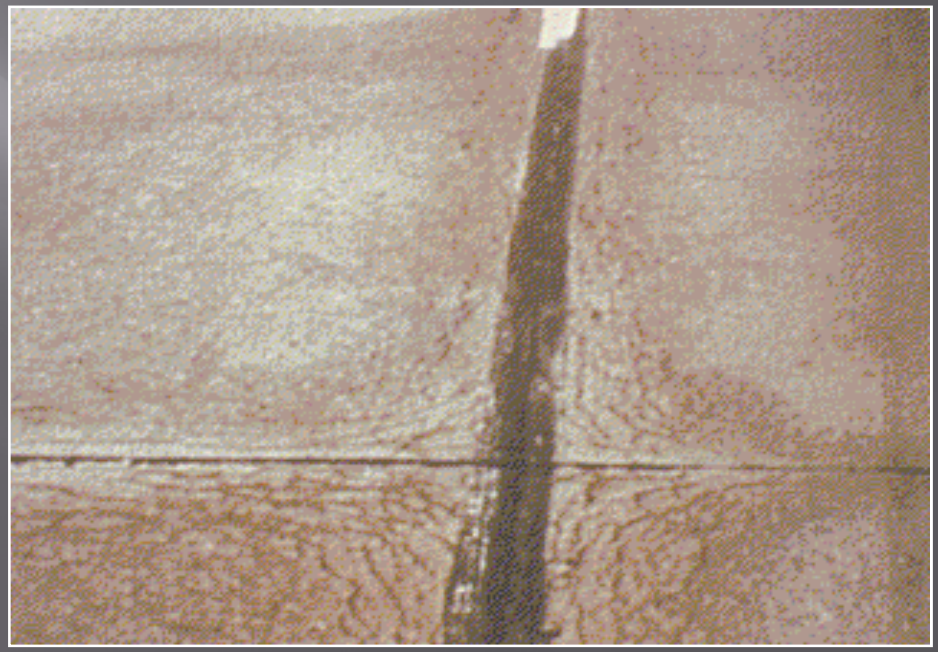
Note B: *Determine distance from longitudinal crack to hole based on slab thickness T and drill angle. Slabs less than 12 inches thick require a 35° insertion angle.*

Cross Stitching

Some Other Not So Common Problems

CRCP PUNCH OUTS

AGGREGATE RELATED DISTRESSES



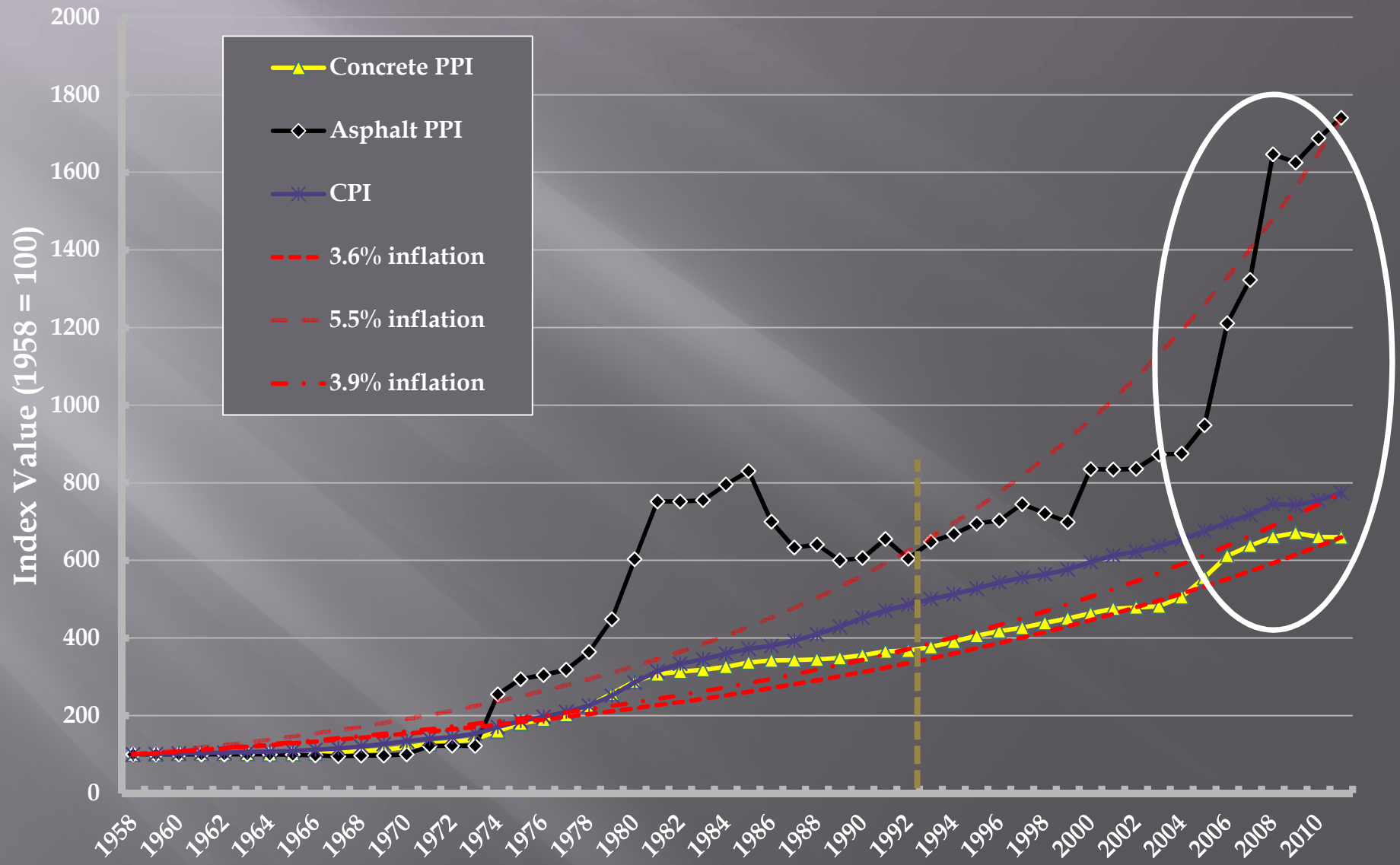
Some Other Preservation Actions

- Buried Treasure
- White Topping

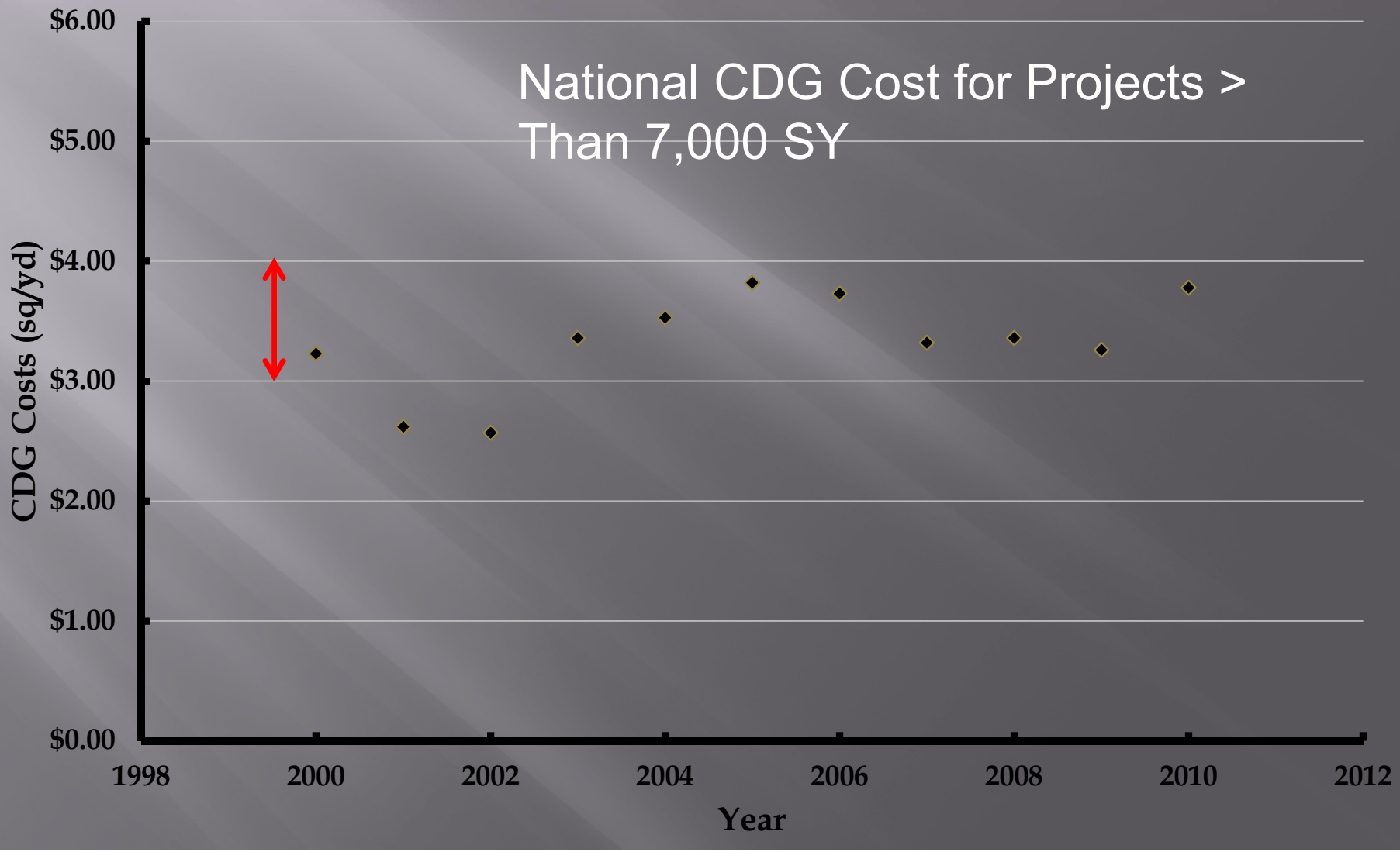
Conventional Diamond Grinding through AC and PCCP

Finished Buried Treasure

Commodity Price Increases



Its Cost Effective and Predictable



White Topping

Incorporating Safety into CPP Strategy

- Safety generally assessed through use of ASTM locked-wheel skid tester
- Typically friction improvement is not a preservation activity and the effect of the selected activity is not always properly considered
- Owner/agency needs to determine best way to measure and manage safety
- When selecting preservation activities, their impact on safety should be considered

Most Current Reach

The Second

STRATEGIC HIGHWAY RESEARCH PROGRAM

SHRP 2 REPORT S2-R26-RR-2

Guidelines for the Preservation of High-Traffic-Volume Roadways

D. PESHKIN, K. L. SMITH, A. WOLTERS, AND J. KRSTULOVICH
Applied Pavement Technology, Inc.
Urbana, Illinois

J. MOULTHROP AND C. ALVARADO
Fugro Consultants, Inc.
Austin, Texas

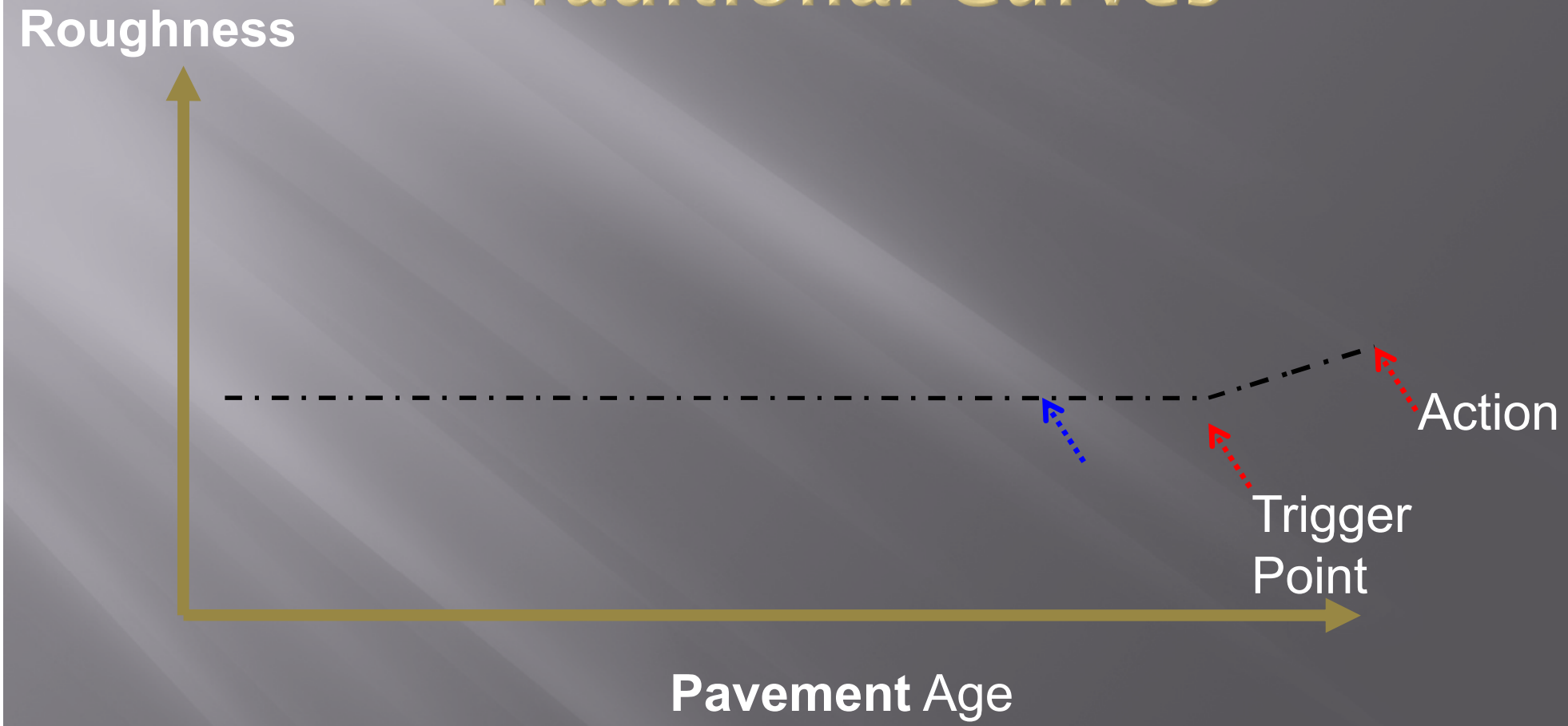
Traditional Concrete Preservation (120 yrs Later)

Treatment	Expected Performance	
	Treatment Life (yr)	Pavement Life Extension (yr)
Concrete joint resealing	2–8	5–6
Concrete crack sealing	4–7	NA
Diamond grinding	8–15	NA
Diamond grooving	10–15	NA
Partial-depth concrete patching	5–15	NA
Full-depth concrete patching	5–15	NA
Dowel bar retrofitting	10–15	NA
Ultra-thin bonded wearing course	6–10	NA
Thin HMA overlay	6–10	NA

Sources: Peshkin et al. 1999; Smith et al. 2008; Peshkin et al. 2007; Caltrans 2008; NDOR 2002.

Note: NA = Not available.

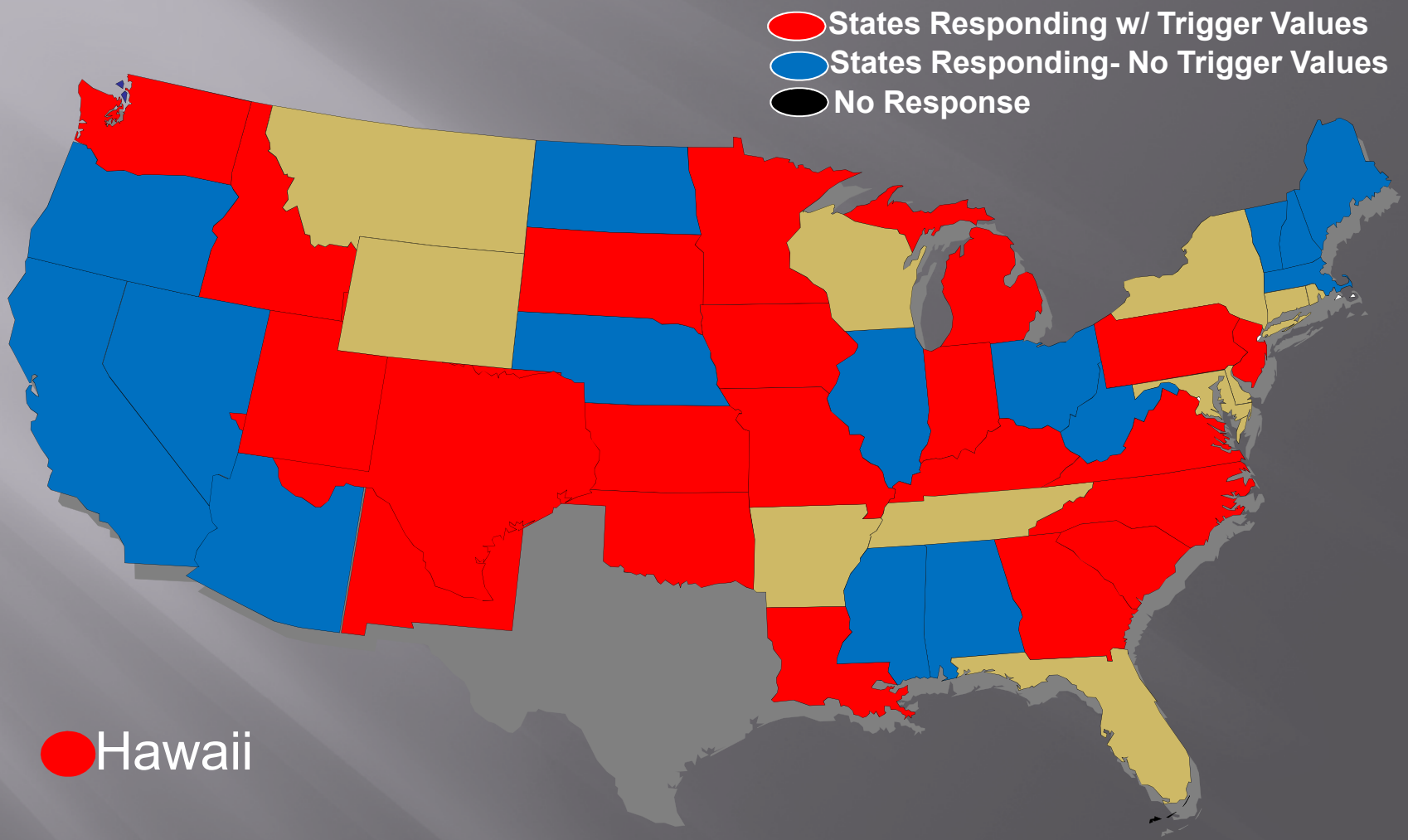
Well Designed and Managed Concrete Pavements Don't Fit the Traditional Curves



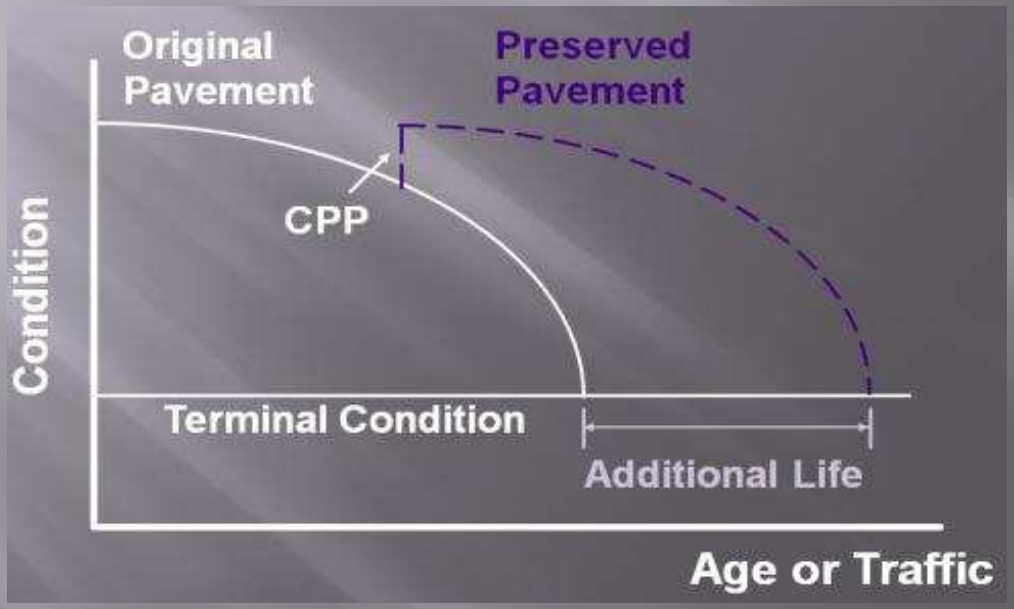
Trigger/Limit Values for Pavement Preservation (JPCP)

Performance Indicator	Trigger Value	Limit Value
Trans. Cracking	1.5-2.5% of slabs cracked	5-15% of slabs cracked
Joint Spalling	1.5-2.5% of joints	15-20% of joints
Joint Faulting	0.10 inches	0.50-0.70 inches
Roughness	63-90 in/mi	160-220 in/mi

Results of Survey on State Practices



Traditional Pavement Managment



- Shape of Curve is a Result of Composite Distress Analysis
- Concrete Pavements are more linear and should be managed on individual attributes

A Different Way of Thinking about the Performance Curve

Performance Enhancements from Improved Design/Construction Practices

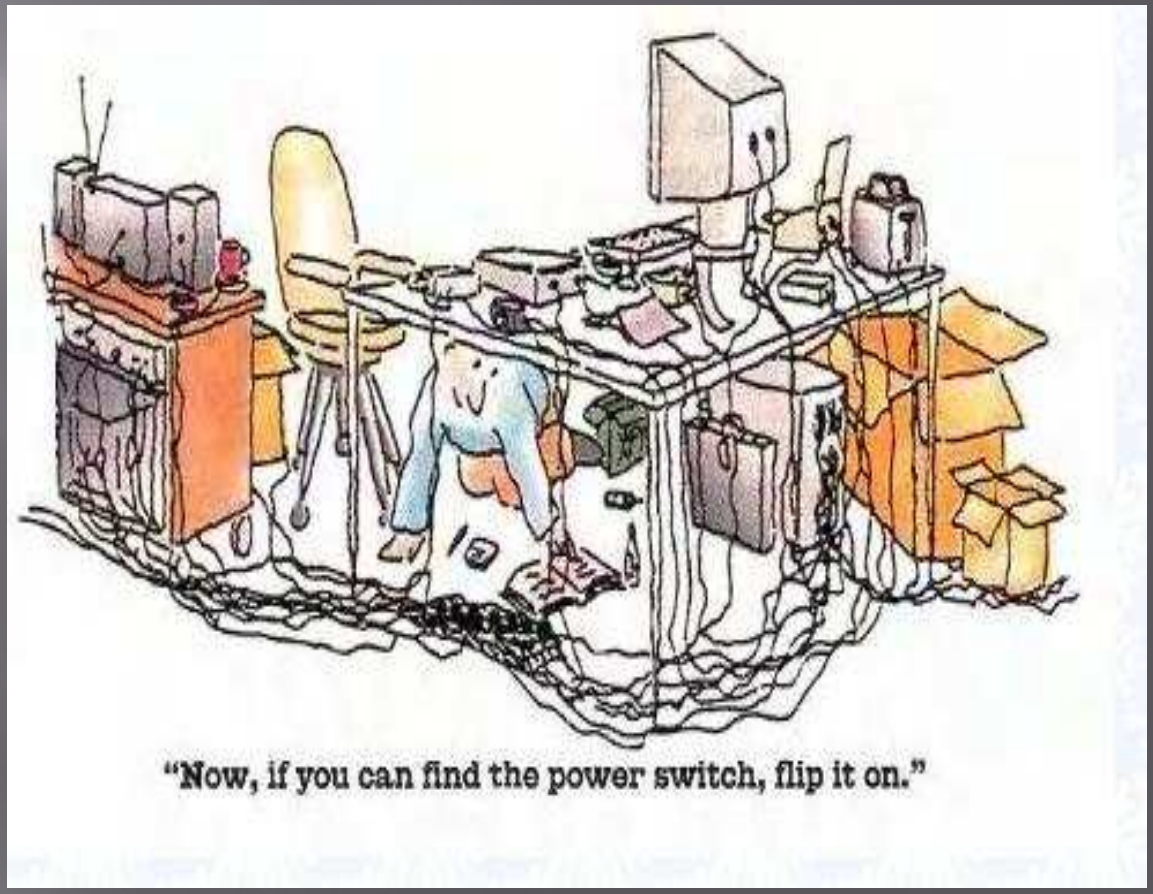
- Most CP^2 activities are determined after the fact
- Little opportunity to prevent poor performance created by design or construction
- Better built PCCP lasts longer
- Must identify features that cause these differences and attempt to extend pvmt life from the onset

An Alternative Preservation Approach

- Must select preservation strategies A-priori, cradle to grave
- Must allocate funding for planned preservation cycles from concept
- Must develop feedback loop between design, construction, maintenance and administration

The Preservation Concept Defines How Process Must Be Accomplished

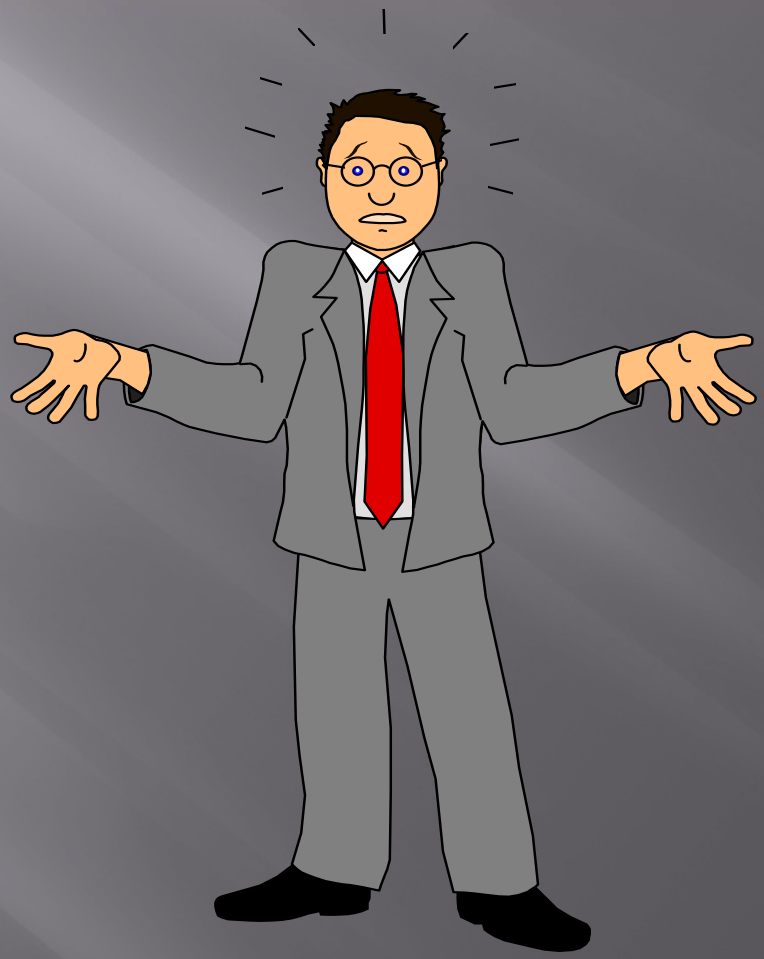
- Through Long-Term Network Approach
- Using Integrated, cost-effective practices



In Summary

- Develop Designs and Preservation Strategies A-priori
- Stick to the Plan!!!!!!!!!!!!
- Develop PMS Tools to Track, Analyze, and Manage Concrete Pavements
- Do not Manage Distresses…….
- Consider Long Term Economics and Alternative Solutions to Preservation
    - Buried Treasure
    - White Topping

Questions



Thank You

and

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