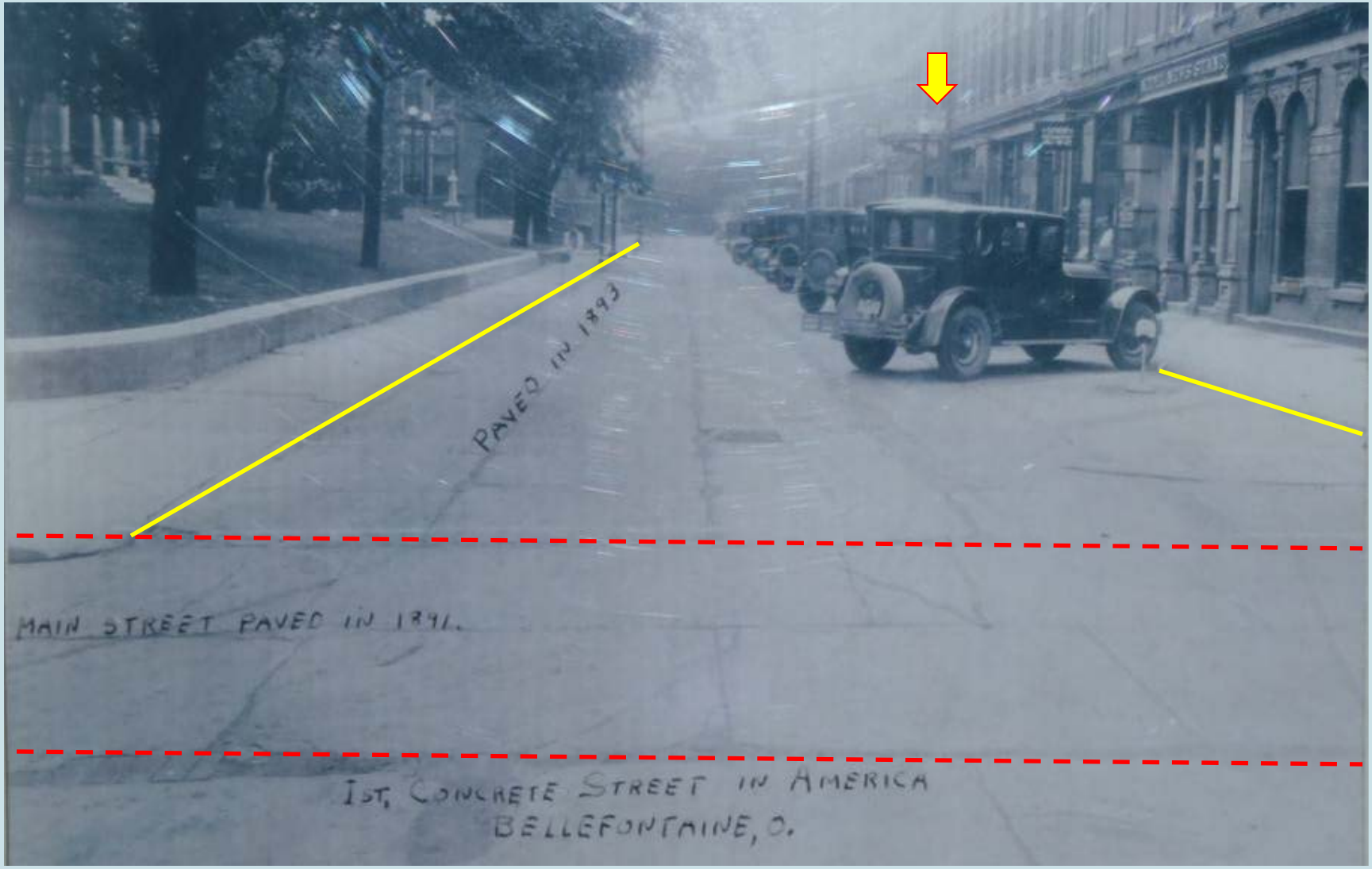
Concrete Pavement Preservation

Larry Scofield
IGGA

IGGA
International Grooving & Grinding Association
Your Pavement Preservation Resource® since 1972

Why Preserve Concrete Pavement! Bellefontaine, Ohio



Bellefontaine, Ohio 2012

119 Years Old

Preservation Can Work (122 Years)

Washington -1919

Iowa --1910

Trends We May Want to Start: the JFK Example

- A Nation of Doers
- Compelling Vision
- Funding, Funding, Funding, Funding

The IBM 7090

A dual 7090 system at NASA in about 1962.

Could store 32,768 36-bit words.

That's about .00015 gigabytes.

Cost:

about $3,000,000.

or $19,794,000
2005 dollars

….Doers….

- Kennedy Challenges the Nation to put a Man on the Moon—Sept 12, 1962
- Neil Armstrong Walks on the Moon—July 20, 1969 ……. Seven Years Later…….

….Doers….

"Those who came before us made certain that this country rode the first waves of industrial revolution, the first waves of modern invention, and the first wave of nuclear power, and this generation does not intend to founder in the backwash of the coming of the age of space. We mean to be part of it. We mean to lead it."—John F. Kennedy

…Compelling Vision…

…"We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others too.". John F. Kennedy

…Funding…

"…To Be Sure, all this costs us all a good deal of money. This year's space budget is three times what it was in January 1961, and it is a greater than the space budget of the previous 8 years combined. That budget now stands at $5,400 million a year-a staggering sum, thought somewhat less than we pay for cigarettes and cigars every year. Space Expenditures will soon rise some more from 40 cents per person per week to more than 50 cents a week for every man, woman, and child in the United States, for we have given this program a high national priority even though I realize that this is in some measure and act of faith and vision. .." John F Kennedy

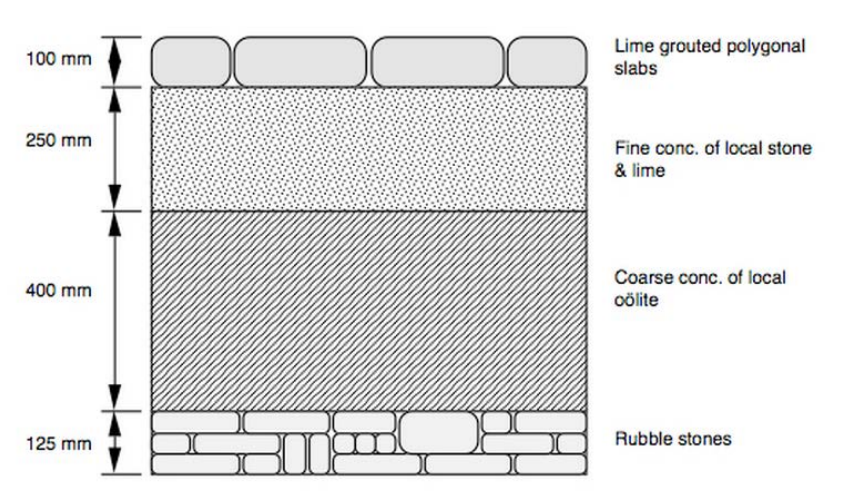
….Doers???....

- AASHTO New Design Guide: 1996: 19 years Later…
- FHWA Performance Measures: 3 Years +
- Concrete Pavement Strategy Life Extension (?????)

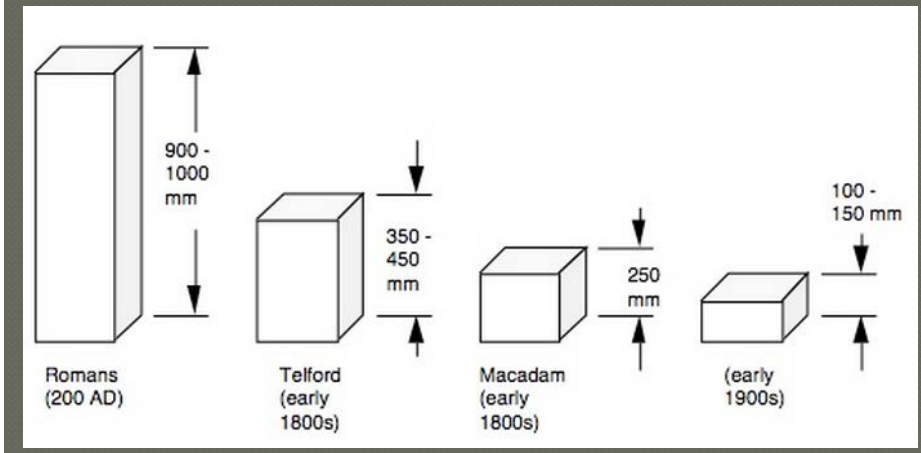
Returning to the Old Ways

- Lets Talk Implementation not Innovation
- Lets Talk Every Dollar Counts
- Lets Preserve the Greatest Transportation System in the History of Mankind

Everybody Wins When it is Funded



Roman Road – Network Approximately Equal to the US Interstate System-- Cost $3.2 Million per Mile



Trends in Road Building Over Time

FHWA Performance Measures

Measure	Surface	Assessment					
IRI (in/mi)	**All Pavements**	Population Consideration					
		Population < 1 Million			Population ≥ 1 Million		
		Good	Fair	Poor	Good	Fair	Poor
		<95	95 - 170	>170	<95	95 - 220	>220
		No Population Considerations					
Cracking Percent	**Asphalt Jointed PCCP**	Good	Fair	Poor			
		<5	5 - 10	> 10			
Rutting (in)	**Asphalt**	No Population Considerations					
		Good	Fair	Poor			
		< 0.2	0.2-0.4	> 0.4			
Faulting (in)	**Jointed PCCP**	No Population Considerations					
		Good	Fair	Poor			
		< 0.05	0.05-0.15	> 0.15			
Cracking Percent	**CRCP**	No Population Considerations					
		Good	Fair	Poor			
		< 5	5 - 10	> 10			

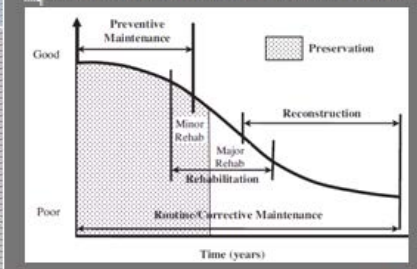
Filling In the Gaps

2011¶

Development·of·an·SPS-2·Pavement·Preservation·Experiment¶

Preliminary·Draft—Not·for·Distribution¶

This·report·provides·a·concept·to·develop·a·pooled·fund·effort·targeted·at·developing·and·implementing·a·pavement·preservation·experiment·for·extending·the·service·life·of·the·LTPP·SPS-2·projects.·The·report·contains·general·information·regarding·the·original·experimental·design·and·presents·potential·pavement·preservation·opportunities.·The·appendix·contains·more·detailed·information·regarding·the·original·experimental·design·and·the·supplemental·sections·constructed·by·the·14·states·that·participated·in·the·SPS-2·Experiment.¶



INTERNATIONAL GROOVING & GRINDING ASSOCIATION

IGGA¶
Larry Scofield¶
12/12/2011¶

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. Kestulovich
Applied Pavement Technology, Inc.
Urbana, Illinois

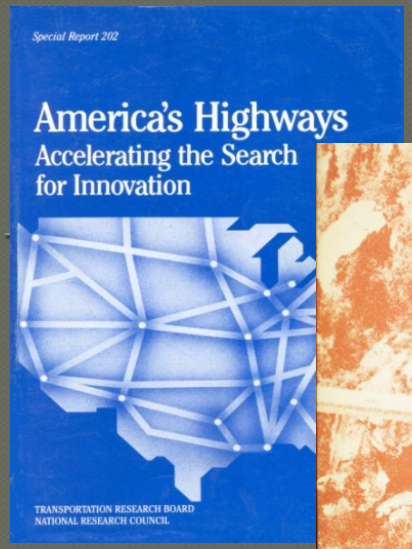
J. Moulthrop and C. Alvarado
Pavia Consultants, Inc.
Austin, Texas

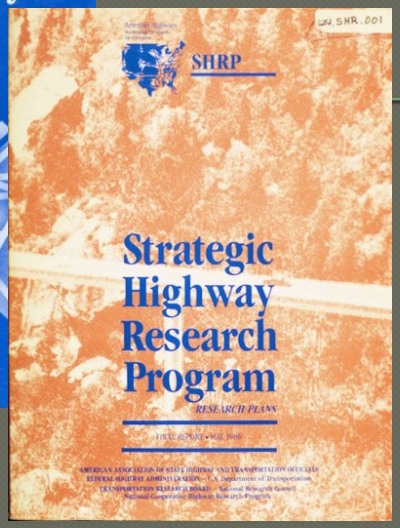
TRANSPORTATION RESEARCH BOARD
WASHINGTON, D.C.
2011
www.TRB.org

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

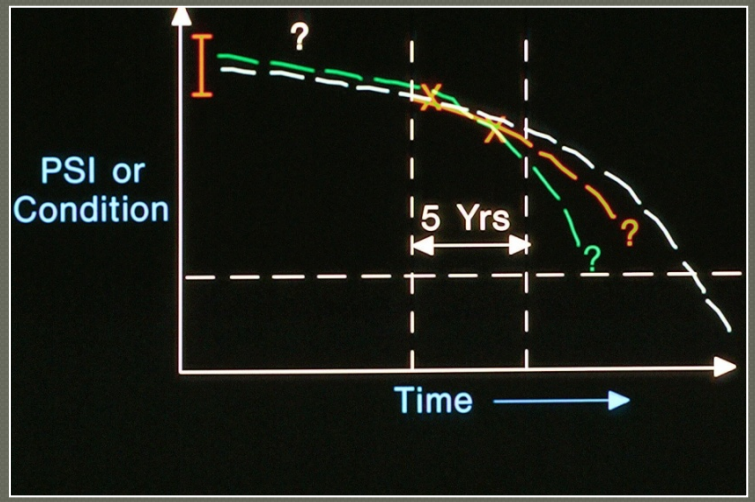
The LTPP SPS-2 Experiment **The Nations Largest Concrete Research Effort**

Pooled Fund On SPS-2 Pavement Preservation





LTPP's GOAL is…



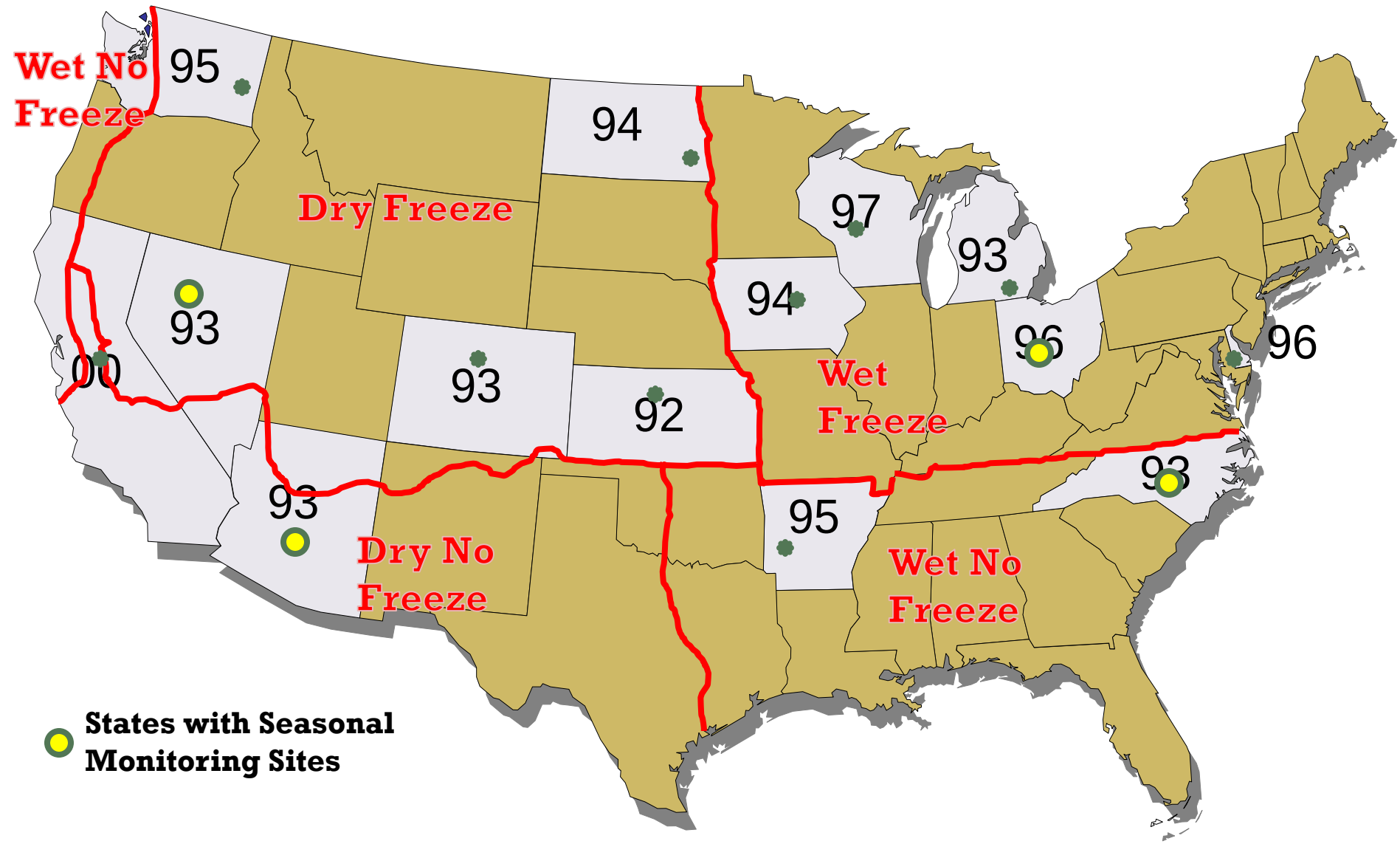
to provide answers to ***HOW*** and ***WHY***

pavements perform as they do!

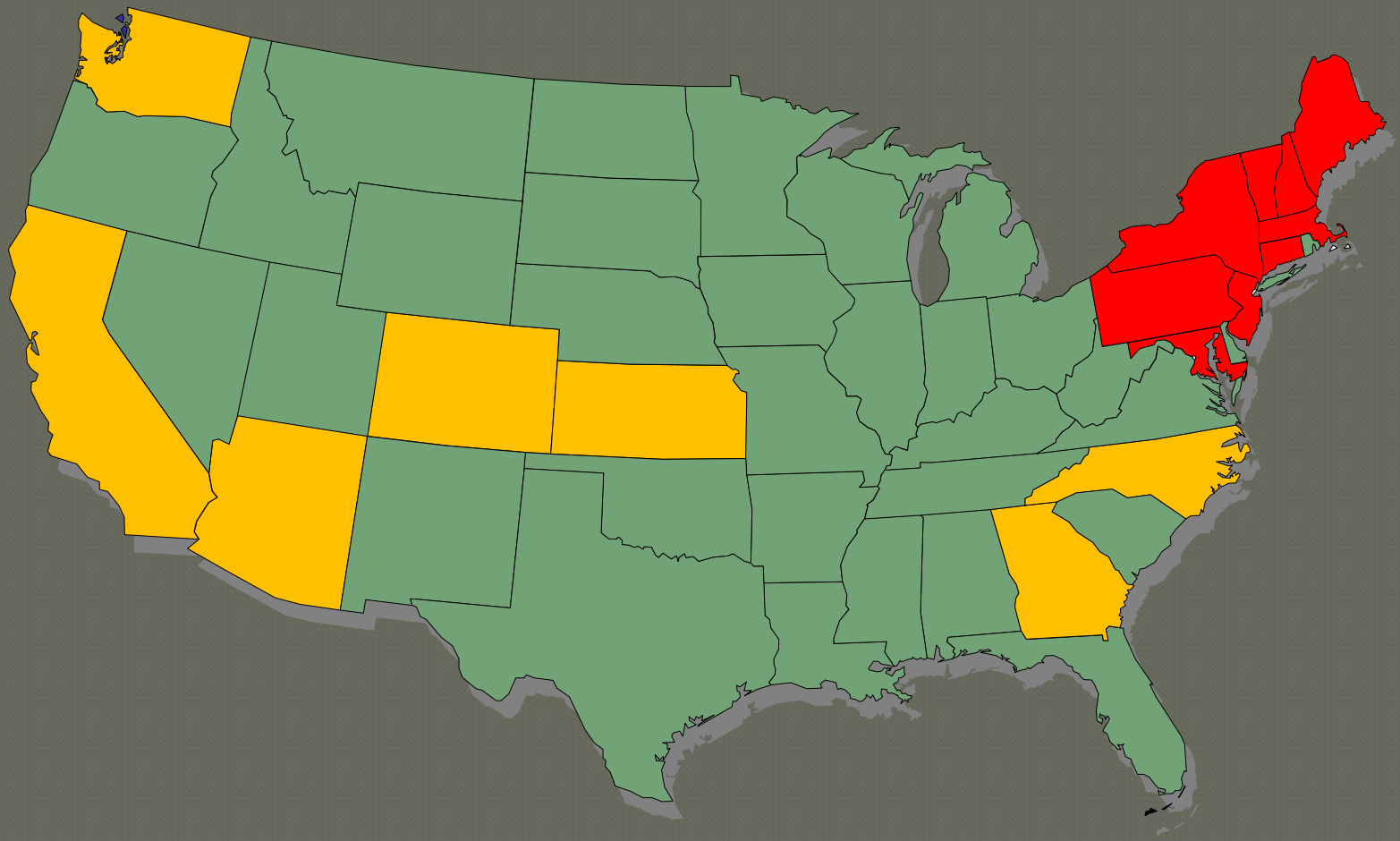
Designed to Evaluate Relative Influence of 5 Design Factors and 3 Site Factors on Long Term Performance

- Concrete Thickness (8" & 11")
- Base Type (LCB, DGA, PATB/DGA)
- Flexural Strength (550 & 900)
- Lane Width (12' & 14')
- Drainage (with and without)
- Site Factors
  - Temperature
  - Precipitation
  - Subgrade

States Constructing SPS-2 Projects



Map of SPS-2 Pooled Fund States



What are Potential Opportunities

- Life Extension of Concrete Pavement Preservation Treatments
- Development of PMS Triggers for Concrete Preservation
- Improved Ride Quality
- PCCP Design Life Verification
- Sealant Research

Is Sealant Cost Effective?

FHWA Sealant Effectiveness Study

CONCRETE PAVEMENT
CPTP
TECHNOLOGY PROGRAM

TechBrief

The Concrete Pavement Technology Program (CPTP) is an integrated, national effort to improve the long-term performance and cost-effectiveness of concrete pavements. Managed by the Federal Highway Administration through partnerships with State highway agencies, industry, and academia, CPTP's primary goals are to reduce congestion, improve safety, lower costs, improve performance, and foster innovation. The program was designed to produce user-friendly software, procedures, methods, guidelines, and other tools for use in materials selection, mixture proportioning, and the design, construction, and rehabilitation of concrete pavements.

www.tfhrc.gov/pavement/concrete

U.S. Department of Transportation
Federal Highway Administration

Performance of Sealed and Unsealed Concrete Pavement Joints

This TechBrief presents the results of a nationwide study of the effects of transverse joint sealing on performance of jointed plain concrete pavement (JPCP). This study was conducted to assess whether JPCP designs with unsealed transverse joints performed differently from JPCP designs with sealed transverse joints. Distress and deflection data were collected from 117 test sections at 26 experimental joint sealing projects located in 11 states. Performance of the pavement test sections with unsealed joints was compared with the performance of pavement test sections with one or more types of sealed joints.

BACKGROUND

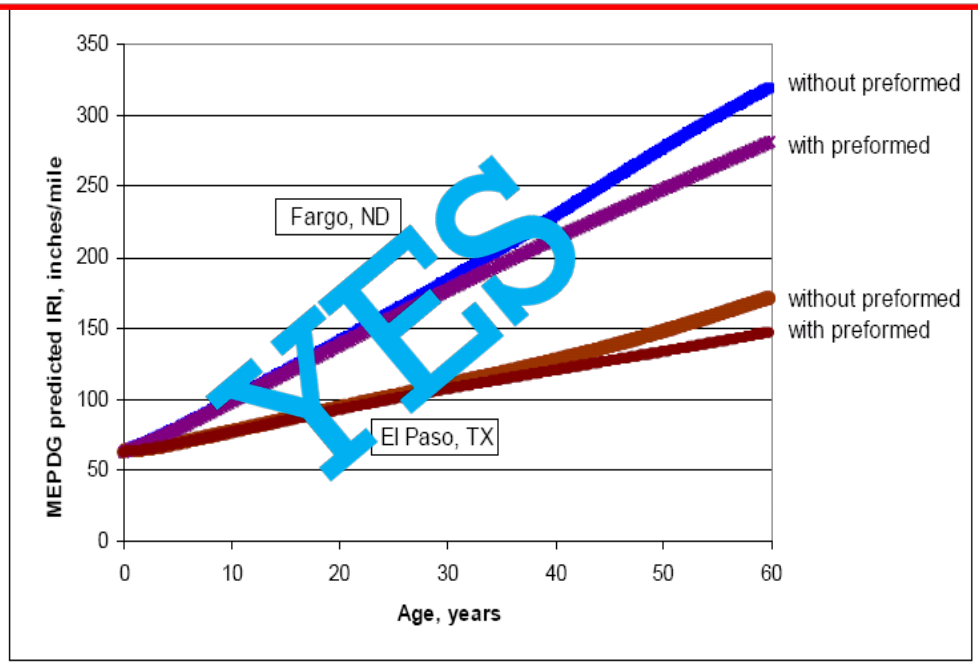
The sealing of transverse joints in JPCP has been standard practice throughout much of the United States for many years. Its widespread use is due to the common belief that sealing joints improves concrete pavement performance in two ways: by reducing water infiltration into the pavement structure, thereby reducing the occurrence of moisture-related distresses such as pumping and faulting, and by preventing the infiltration of incompressibles (i.e., sand and small rocks) into the joints, thereby reducing the likelihood of pressure-related joint distresses such as joint spalling and blowups. Transverse joints in jointed concrete pavement (JPCP) are typically created by sawing an initial cut to force controlled cracking, followed by a second, wider saw cut to produce a reservoir for the joint sealant material. This traditional approach of sawing and sealing transverse contraction joints is estimated to account for between 2 and 7 percent of the initial construction cost of a JPCP. Moreover, these sealed transverse joints require resealing one or more times over the service life of the pavement, leading to additional costs in terms of labor, materials, operations, and lane closures.

Recently, several State departments of transportation (DOTs) have been questioning conventional transverse joint sawing and sealing practices. These agencies contend that the benefits derived from sealing do not offset the costs associated with the placement and continued upkeep of the sealant over the life of the pavement. As a result, they have been experimenting with different sawing and sealing alternatives, for example:

- Narrow unsealed joints, consisting of single saw cuts that are left unsealed.
- Narrow filled joints, consisting of single saw cuts that are filled with sealant that adheres to the sides and bottom of the saw cut.
- Narrow sealed joints, consisting of single saw cuts that contain a narrow backer rod and sealant material.

NO

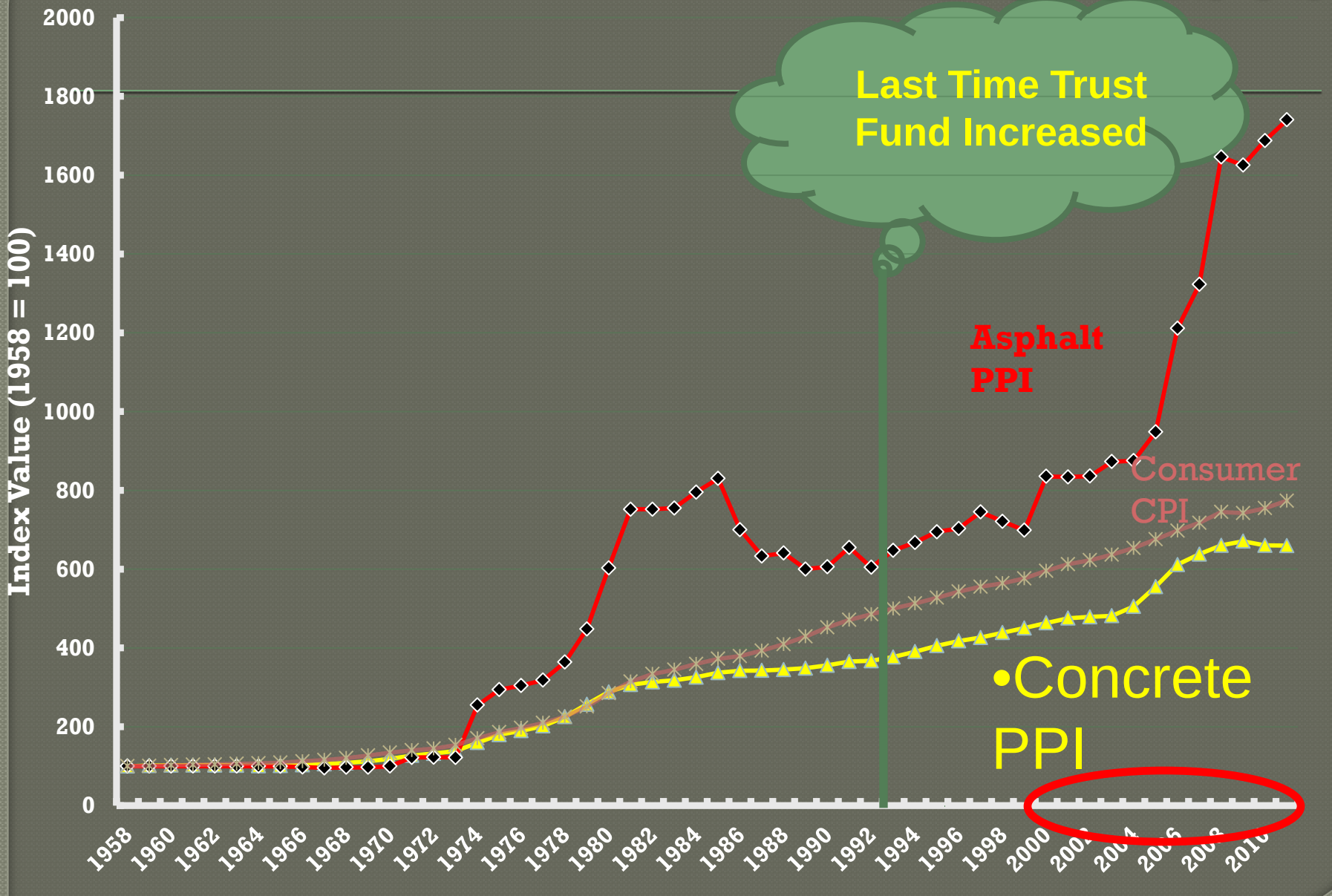
AASHTO New Design Guide



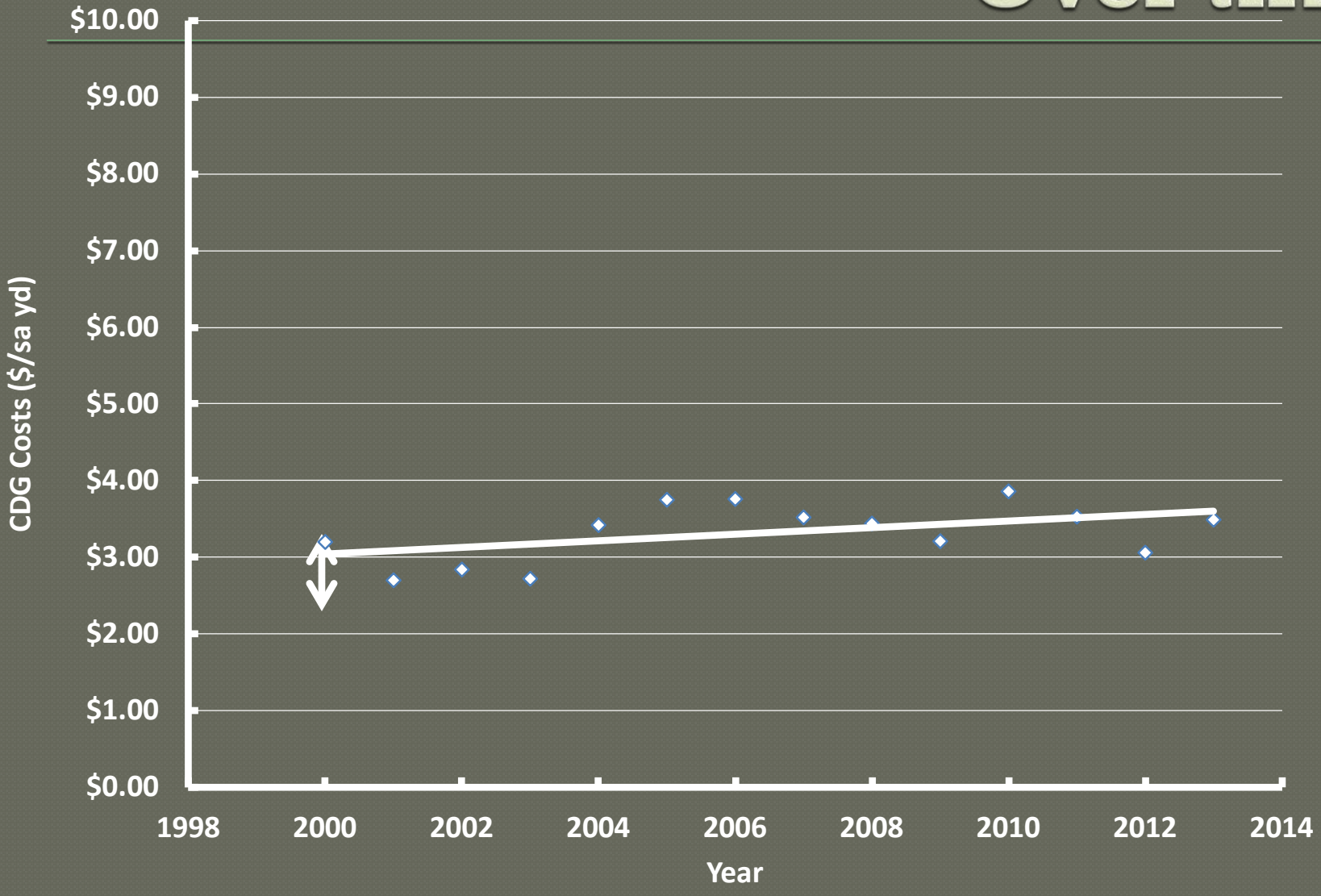
SHRP 2 Report: 5-6 years

20 Year Old Silicone Sealed Joint

Commodity Price Increases



National Average CDG Costs Over time



Road Building 1993 and 2014

- Funding

1993 Lets Build 100 Miles of Road

2014 Lets Build 67 Miles of Road

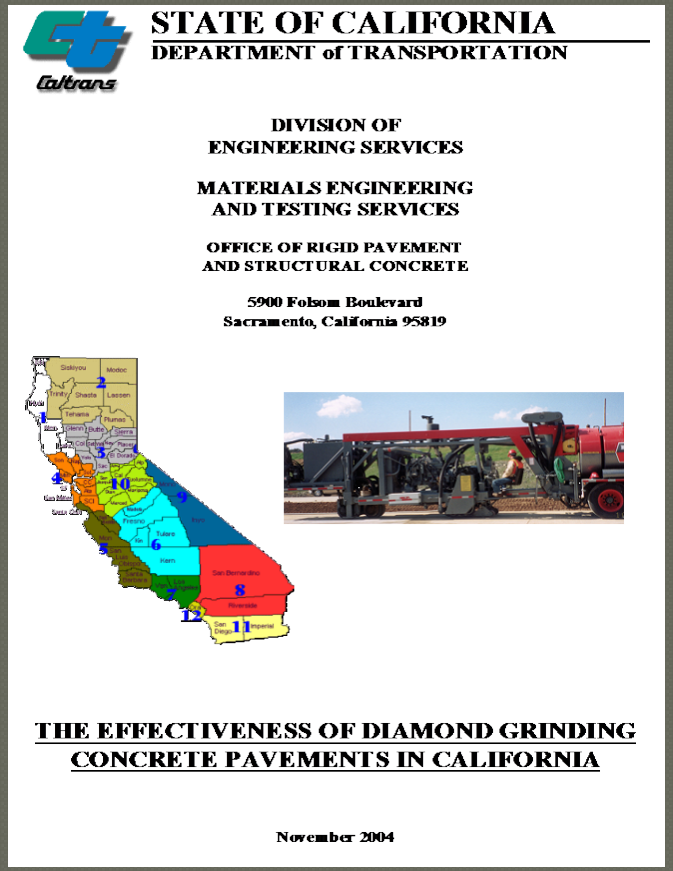
- Colorado Consumption Rate
  - 1995 Lets Drive 35.1 Billion VMT
  - 2012 Lets Drive 46.8 Billion VMT

The Value of Smooth Pavements

- Passenger Cars: Decrease in IRI of 63 in/mi results in approximately a 2% fuel savings (Chatti and Zaabar 2012)
- Trucks: Decrease in IRI of 63 in/mi results in a 1% fuel savings at highway speeds and 2% at low speeds (35 mph) (Chatti and Zaabar 2012)

Effectiveness of Diamond Grinding - CALTRANS

- CALTRANS has determined that the average life of a diamond ground pavement surface is 17 years and that a pavement can be ground at least three times without affecting pavement structurally. See ACPA-SW for full report



STATE OF CALIFORNIA
DEPARTMENT of TRANSPORTATION

DIVISION OF
ENGINEERING SERVICES

MATERIALS ENGINEERING
AND TESTING SERVICES

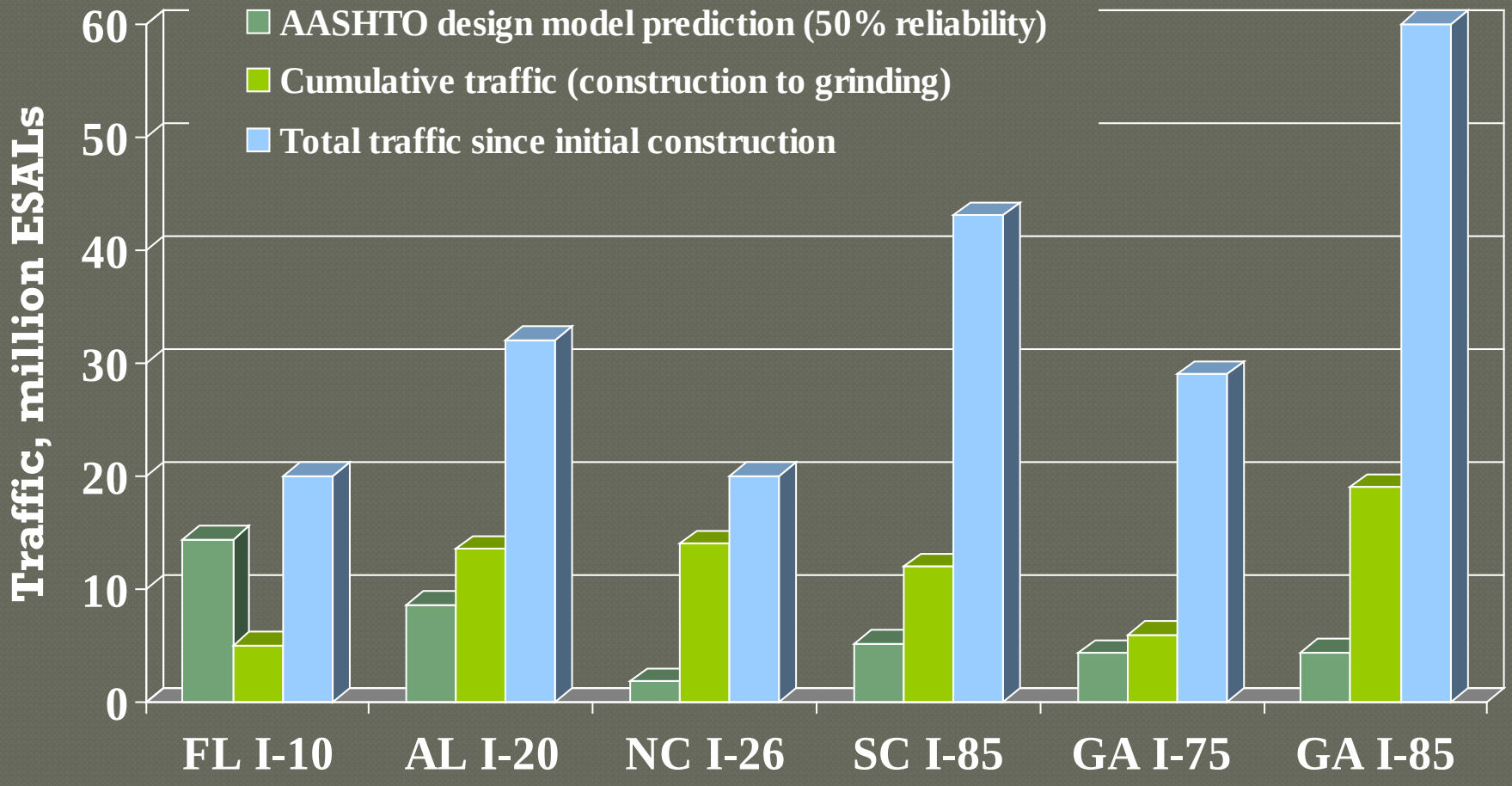
OFFICE OF RIGID PAVEMENT
AND STRUCTURAL CONCRETE

5900 Folsom Boulevard
Sacramento, California 95819

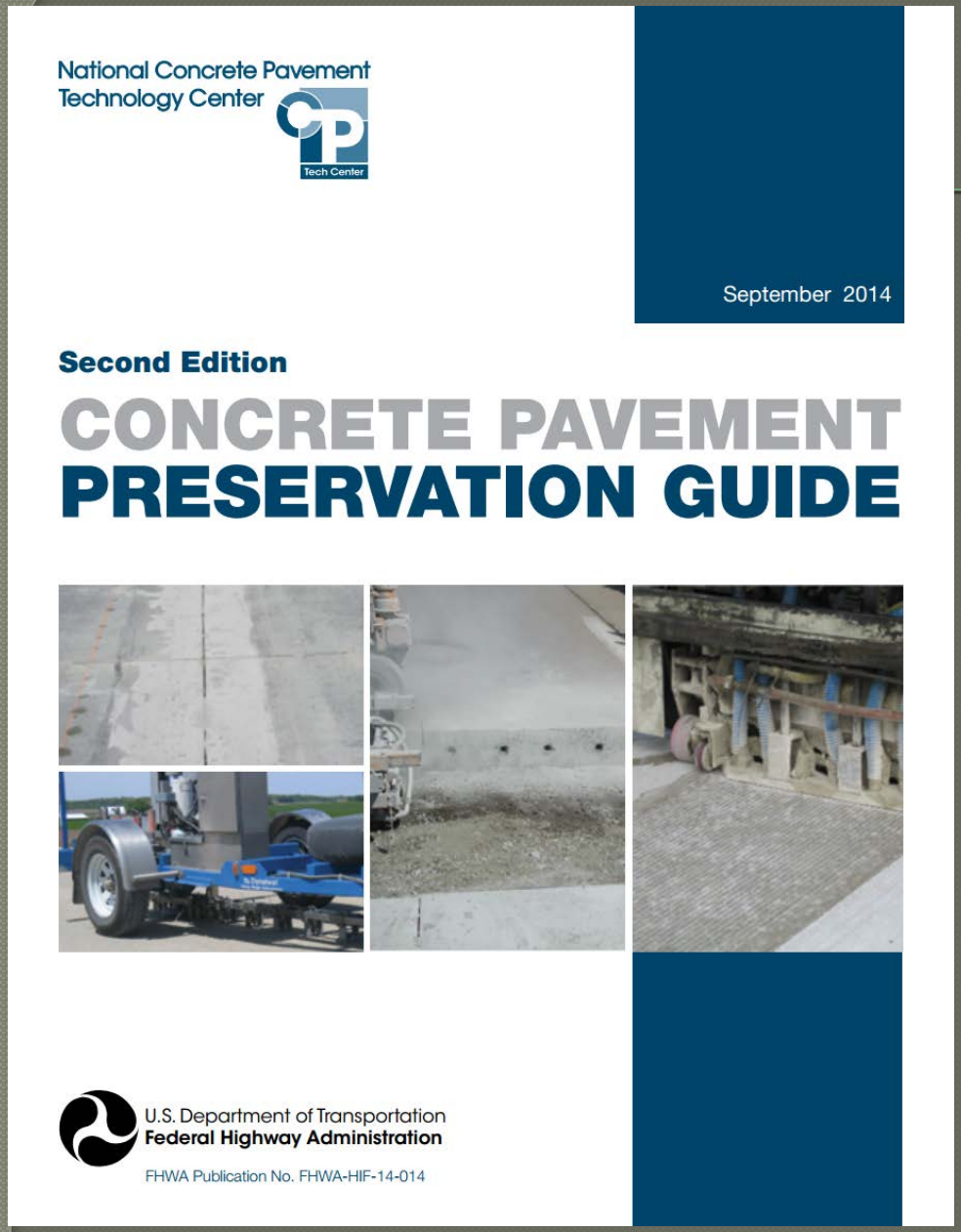
THE EFFECTIVENESS OF DIAMOND GRINDING
CONCRETE PAVEMENTS IN CALIFORNIA

November 2004

AASHTO Design Model Prediction vs. Actual Traffic



Concrete Pavement Preservation Manual



- Contains 12 Chapters on Preservation Techniques
- Added Overlay Chapter
- Working on 11 Training Modules and Instructor Guide
- Plan on 20 future workshops in next two years.
- Technical Assistance to State DOTs

National Concrete Pavement Technology Center

GUIDE FOR

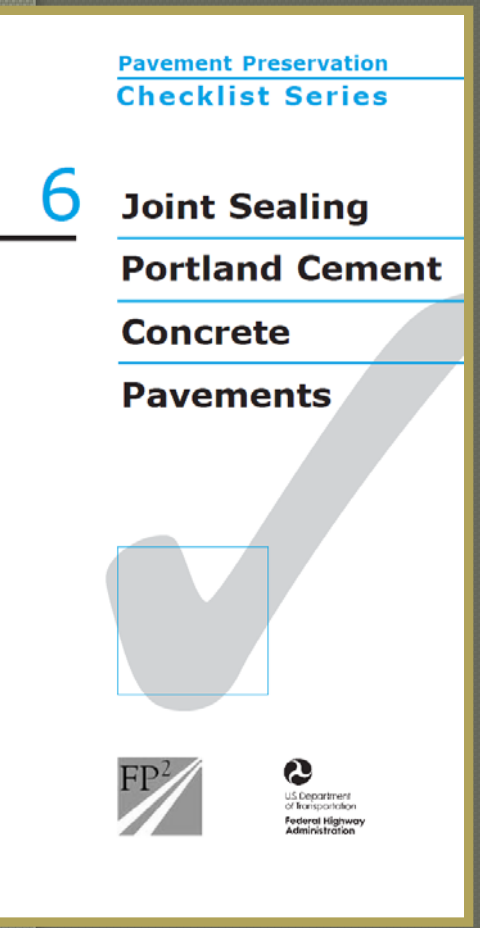
PARTIAL-DEPTH REPAIR OF CONCRETE PAVEMENTS

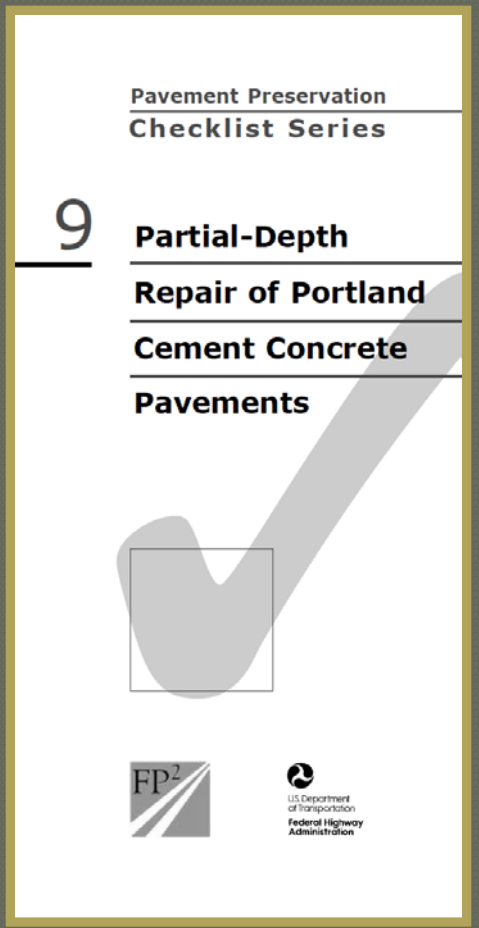
April 2012

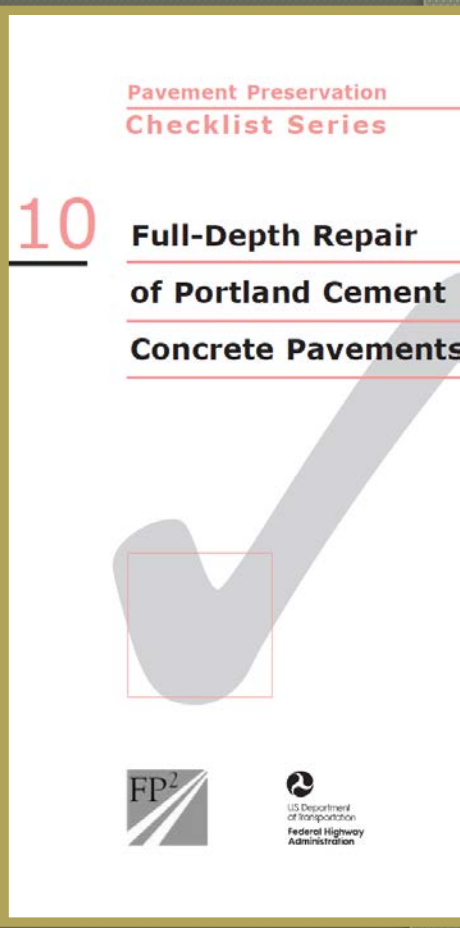
Iowa State University
Institute for Transportation

Tech Center

Preservation Checklists







In Summary

- We Need to Create a Data Rich Environment
- Life is Simple: Fund it and Build It
- We Need to Focus on Value
- We Need to Focus on Big History Sustainability, Not Short Term

Any Question?

Thank You

and

Visit Us on the Web

www.igga.net

IGGA
International Grooving & Grinding Association
Your Pavement Preservation Resource® since 1972