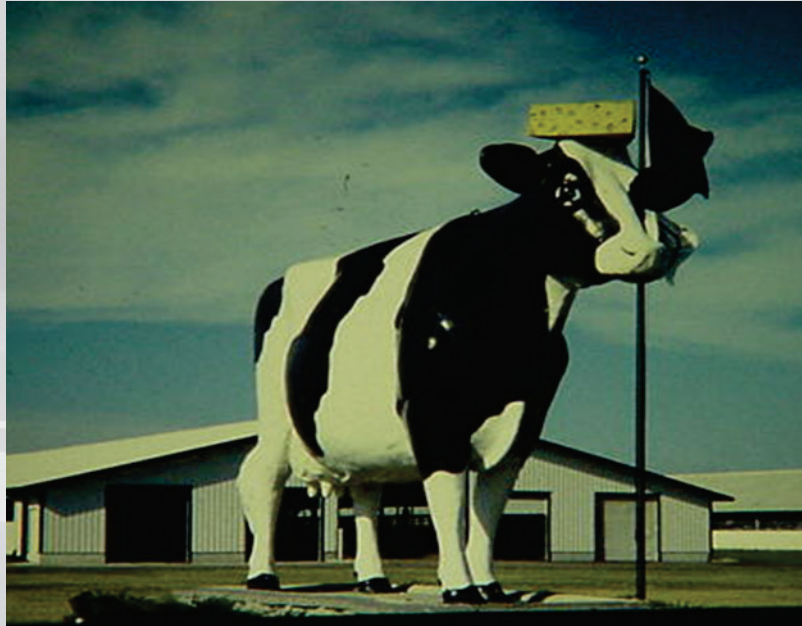


WISCONSIN
**CONCRETE
PAVEMENT**
ASSOCIATION

Moving forward with concrete results

Welcome to Wisconsin !!!



Wisconsin Unsealed Joint Performance

**Kevin W. McMullen, P.E.
President**

Wisconsin Concrete Pavement Association



JOINT EFFORT

- What happened to Jim Parry?



What this presentation is.....

- A history lesson
- Educational



What this presentation is not.....

- An endorsement or promotion of a policy of sealing or not sealing
- WisDOT position
- WCPA position

- Wisconsin urges you to research and make the proper decision for your individual state and/or agency



HISTORY LESSON



In the twenties hundreds of miles of concrete highway had been laid..., and people had sat back and said, “there, that’s permanent...”. But it wasn’t so ... and a crack developed and a little ice in the winter spread the crack, ...



Then the county maintenance crews poured tar in the cracks to keep the water out, and that didn't work, ...

*John Steinbeck, 1947
The Wayward Bus*



NATION

“From the ACPA Database”



Joint Sealants

History & Background

- Accepted definition:
Sealants minimize infiltration of surface water & incompressibles into the joint system.
- Erroneous definition:
Sealants prevent infiltration of surface water & incompressibles into the joint system.



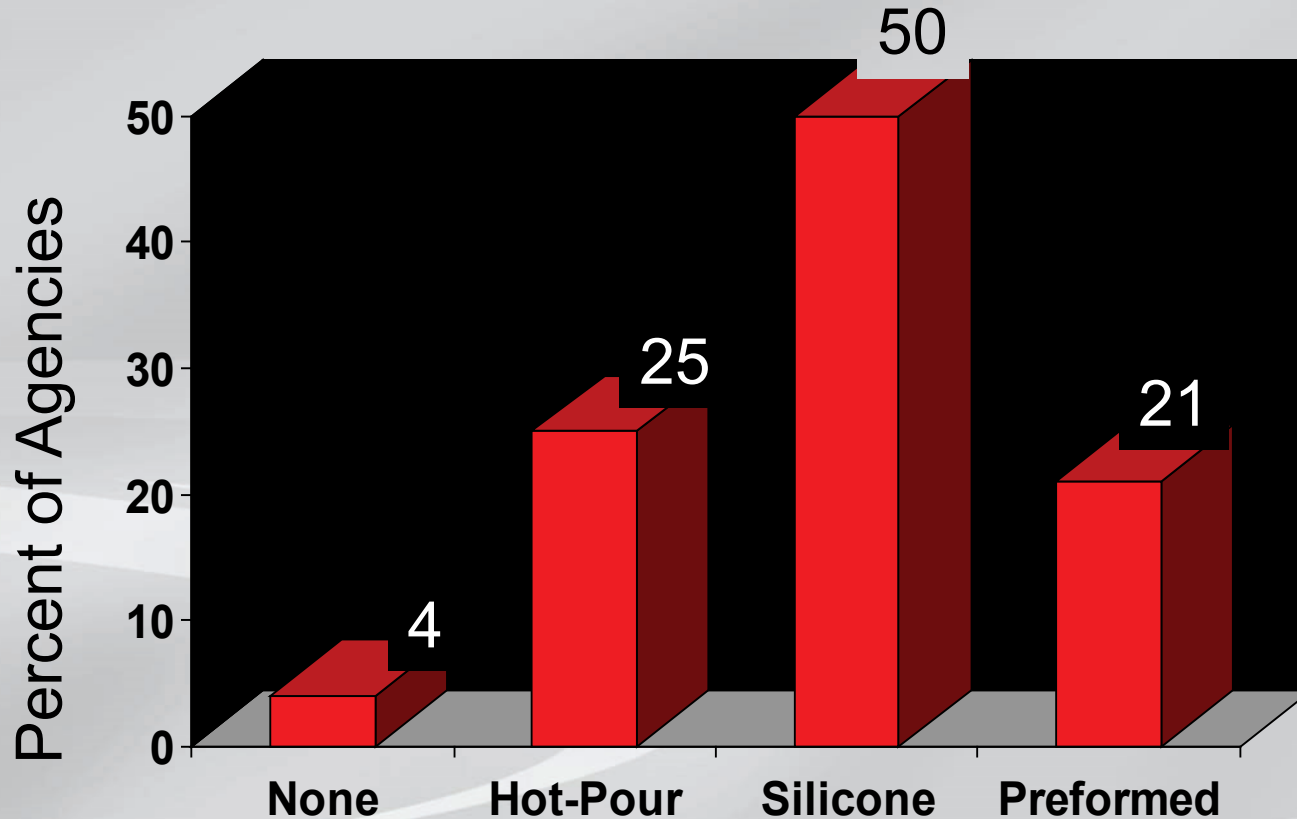
Joint Sealants

History & Background

- 1970's brought change in expectations
- Joint filler (old definition)
 - Emphasis on incompressibles
- Joint Sealants (current definition)
 - Emphasis on water



Current Sealant Use in Highways



Relative Cost of Sealants

SEALANT	Relative to Hot-pour	Differential from No-seal
None	97.8%	0%
Hot-pour	100.0%	+2.2%
Silicone	102.3%	+4.5%
Preformed	104.8%	+7.0%

Data from design features survey of contractors



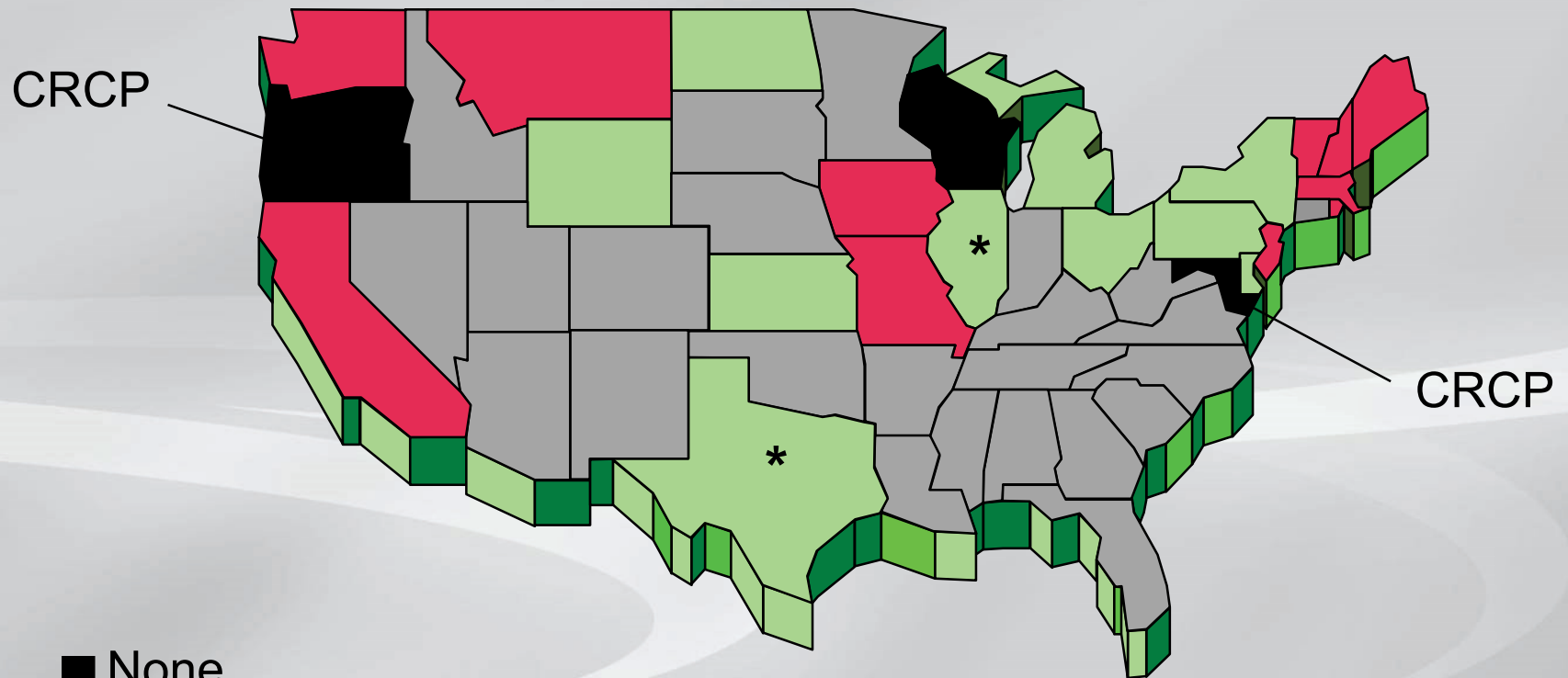
Performance of Sealants

Roadways

Hot-pour	3-5 yr.
Silicone	8-12 yr.
Preformed	15-25 yr.



Predominate Joint Sealants for Concrete Highway Pavements



* Illinois also regularly uses hot-pours in hinge joints.

All sealants are regularly used in Texas.



WISCONSIN



Wisconsin No Joint Seal Policy

- History
- Conclusions of the research
- Update on performance
- WisDOT Policy
- WCPA Official Policy



**WisDOT Research on Joint Sealing
Indicated that:**

PCC JOINT SEALING

MUST ADDRESS THESE

CUSTOMER DRIVEN FACTORS



WHAT ARE THE IMPORTANT ISSUES?

1. DOES JOINT SEALING ENHANCE PAVEMENT PERFORMANCE?
2. IF SO, IS IT COST EFFECTIVE?
3. IF SO, WHICH SEALANT / SYSTEM?



PAVEMENT PERFORMANCE

- DISTRESS PERFORMANCE
- RIDE (SUMMER / WINTER)
- MATERIALS INTEGRITY



WisDOT expressed the opinion that:
Research has gotten sidetracked on
the “**How To’s**” of Sealing,
but the “**Why do we Seal**”
issues are ignored.



1953-66 WIS built
several test areas
and evaluated them for
11-19 years



In 1967, S.E. Hicks (Wis.) addressed HRB concerning 20 years of observations which clearly showed the lack of benefits from joint sealing. He urged agencies to compare sealed test sections with unsealed control sections. The urgings on S.E. Hicks were ignored.



CHALLENGING THE ACCEPTED



Unproven Assumption:

**You must keep water and
incompressibles out of the joint.**



USH 51 STUDY - JRCP

- Started in 1974
- 22 test sections
- 20', 40', 60', 80' Joint spacings
- Sealed & Unsealed sections
- Sandy Subgrade

- **At 15 years of age, how were they performing?**

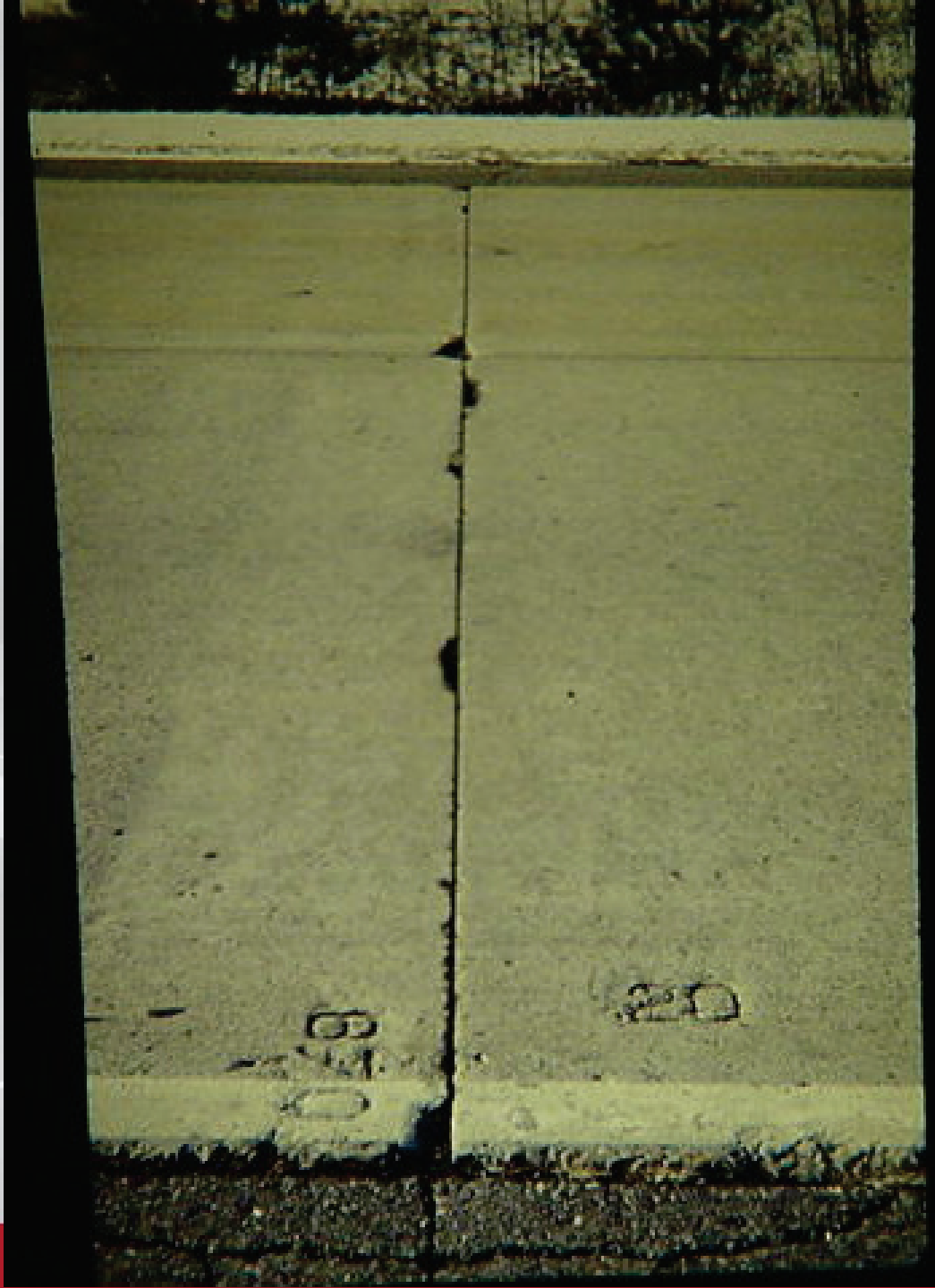






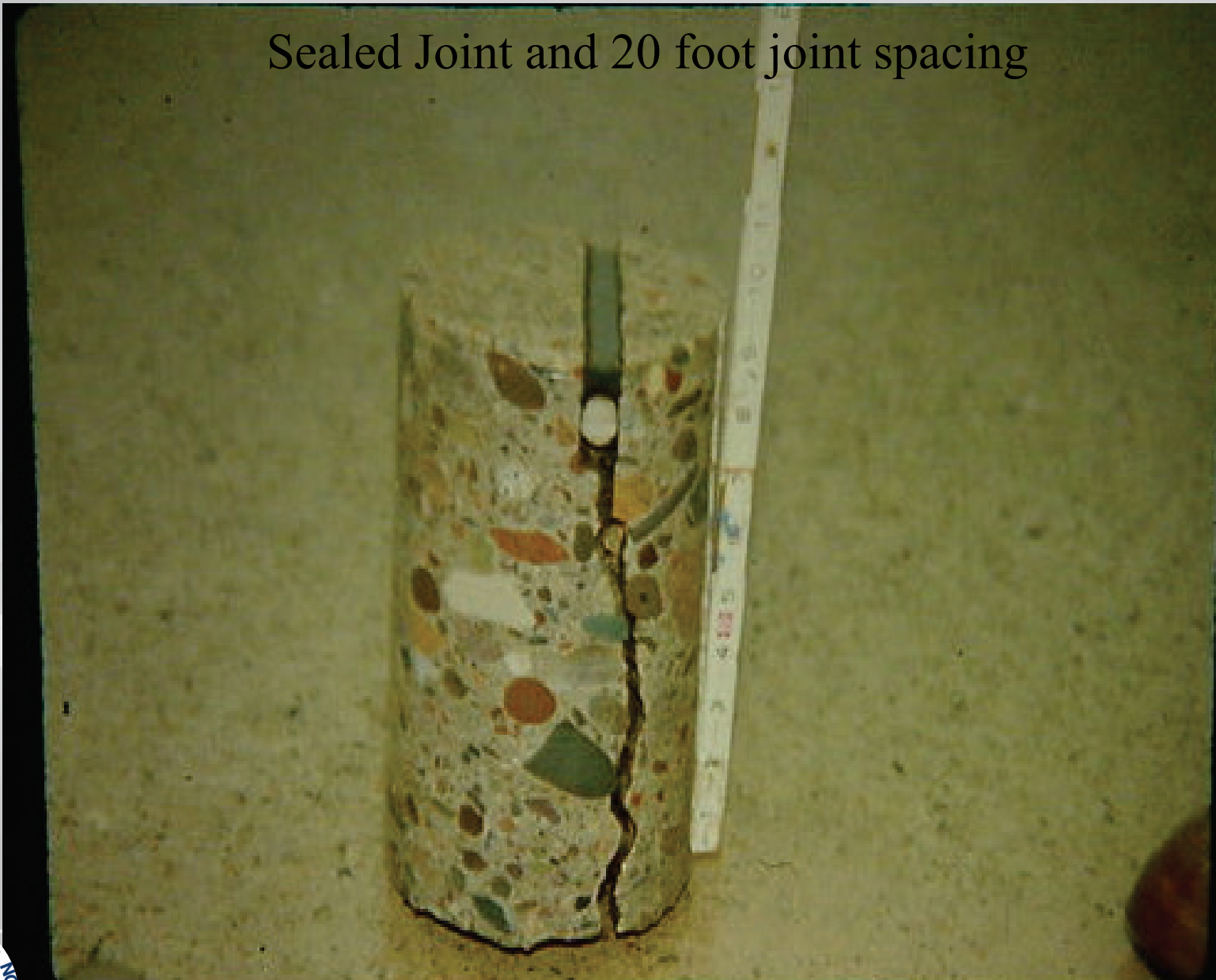


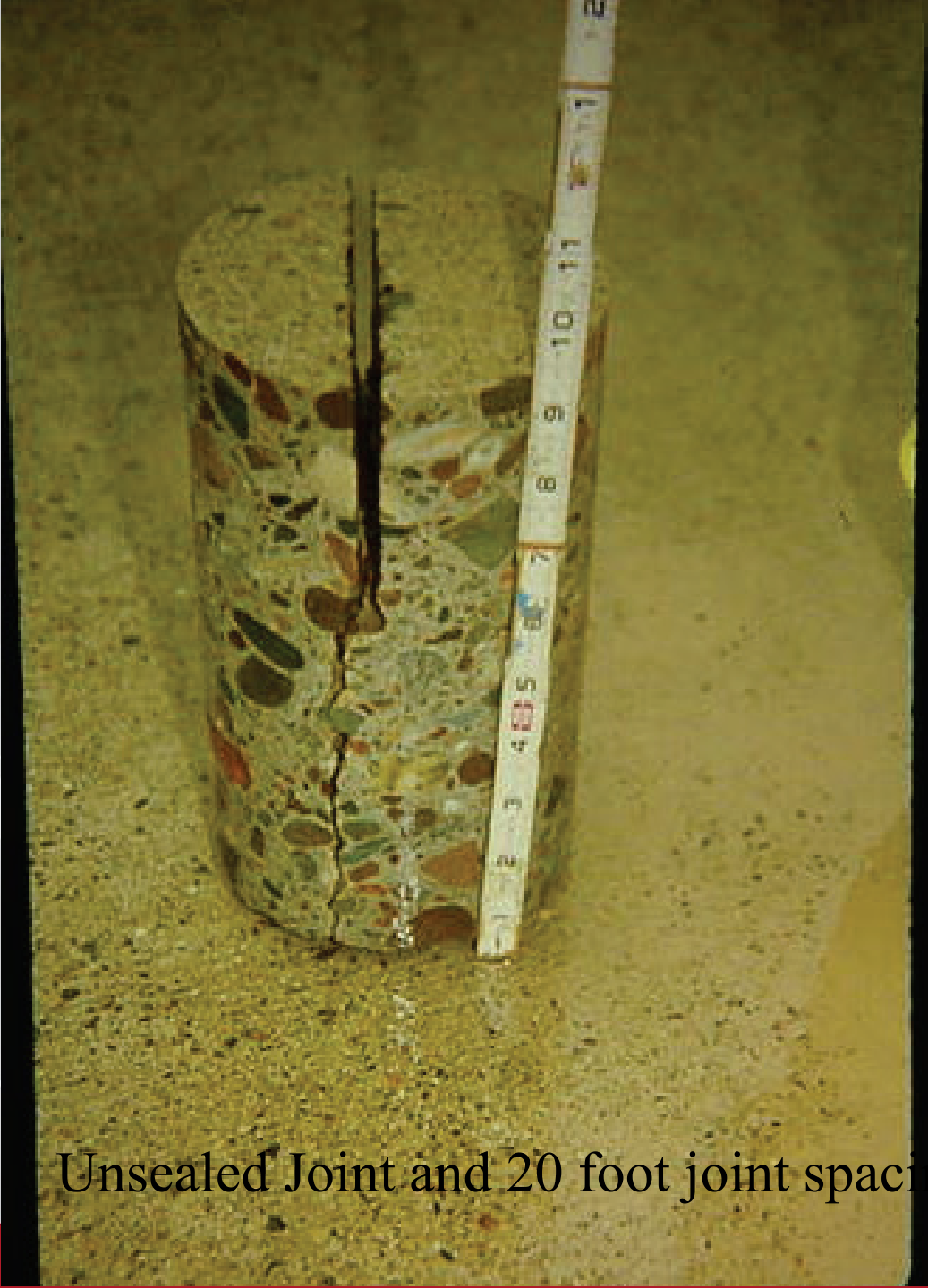






Sealed Joint and 20 foot joint spacing

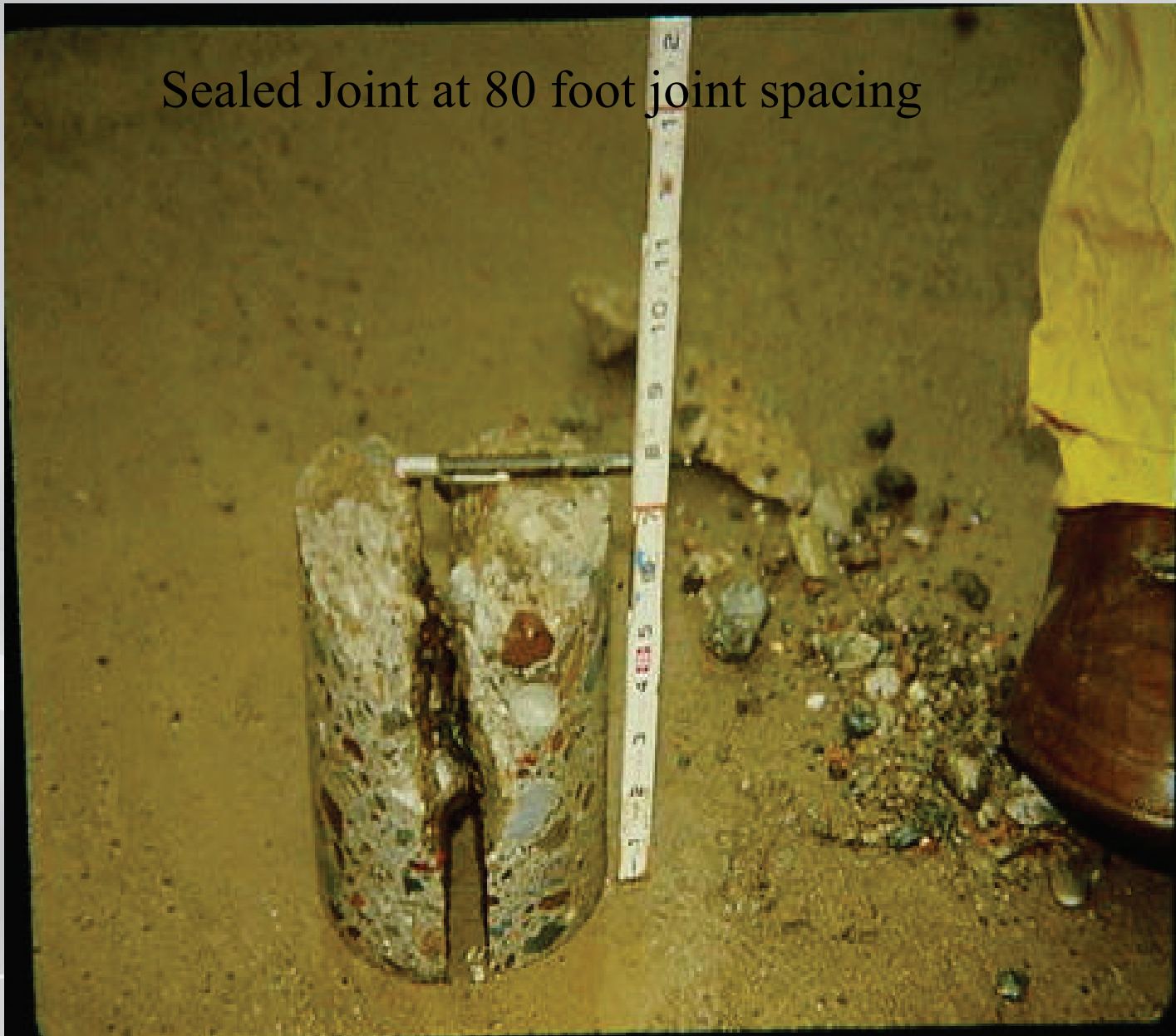




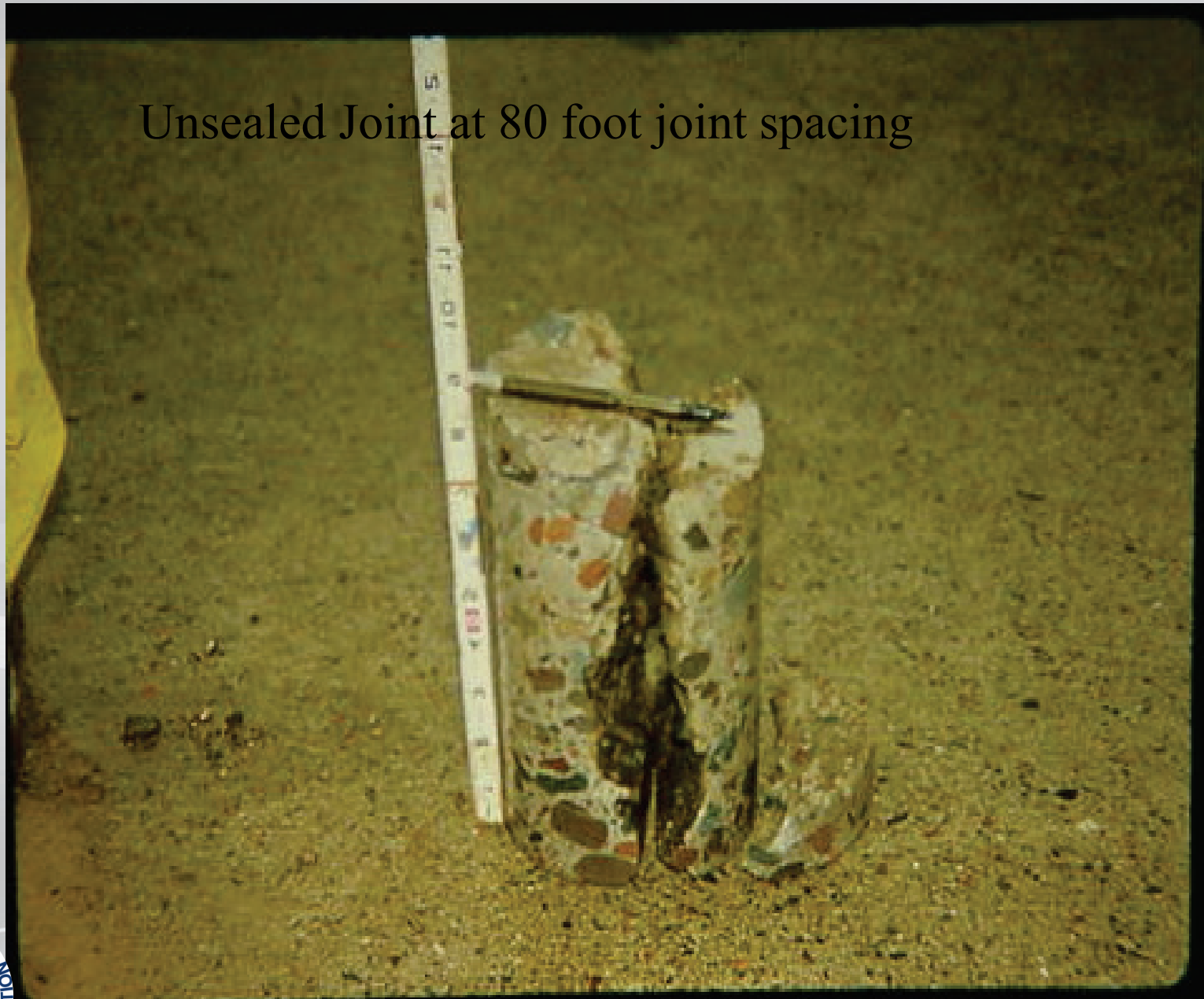
Unsealed Joint and 20 foot joint spacing



Sealed Joint at 80 foot joint spacing

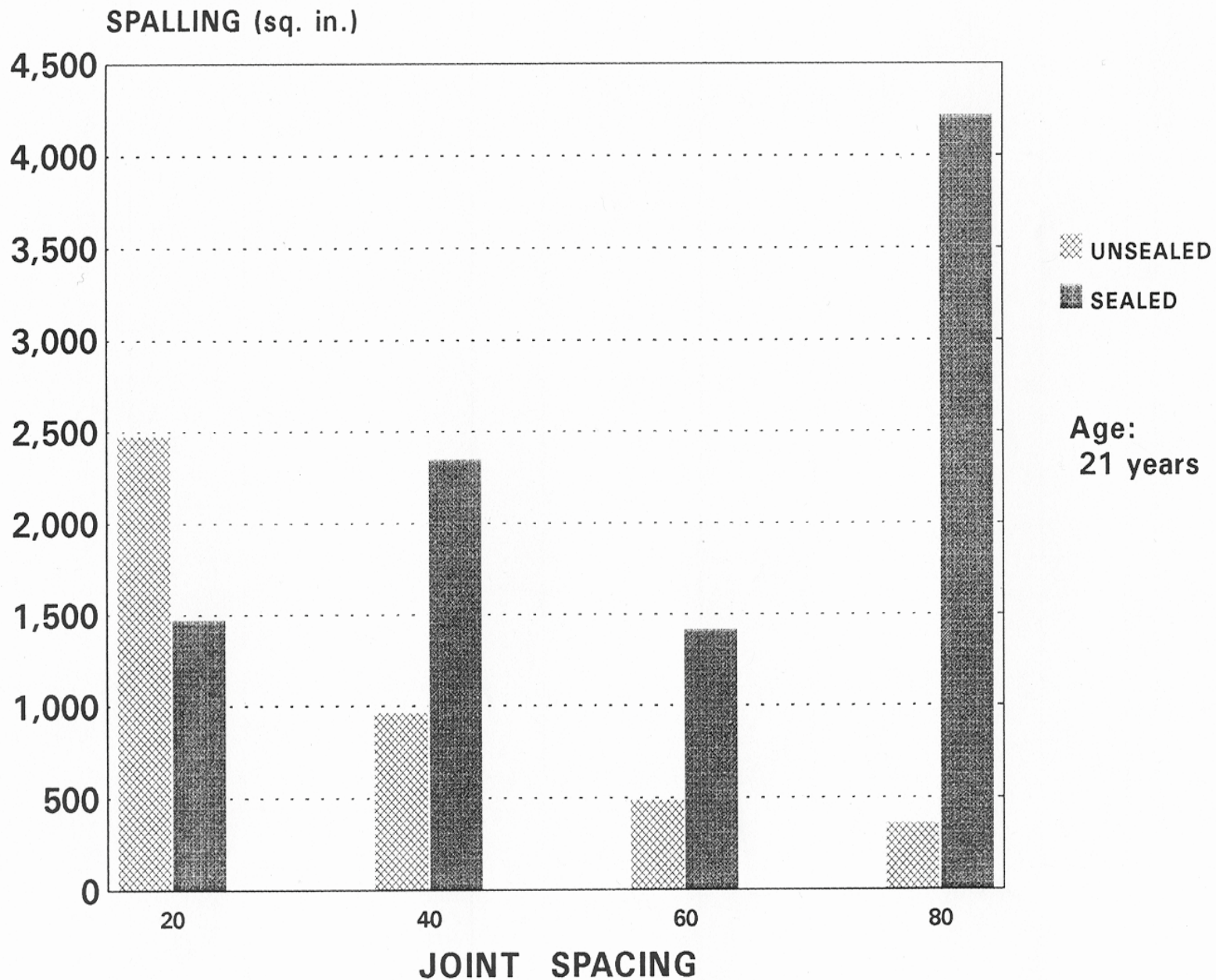


Unsealed Joint at 80 foot joint spacing





**FIGURE 1. AVERAGE AREA OF JOINT SPALLING PER TEST SECTION
USH 51**





1989 CONCLUSIONS

- Joint distress is significantly reduced as joint spacing is shortened
- Joint sealing
 - Does not improve ride or pavement distress
 - Does not increase life
 - Is not cost effective
- Implemented no seal policy



Some additional work between 1989 and 1994



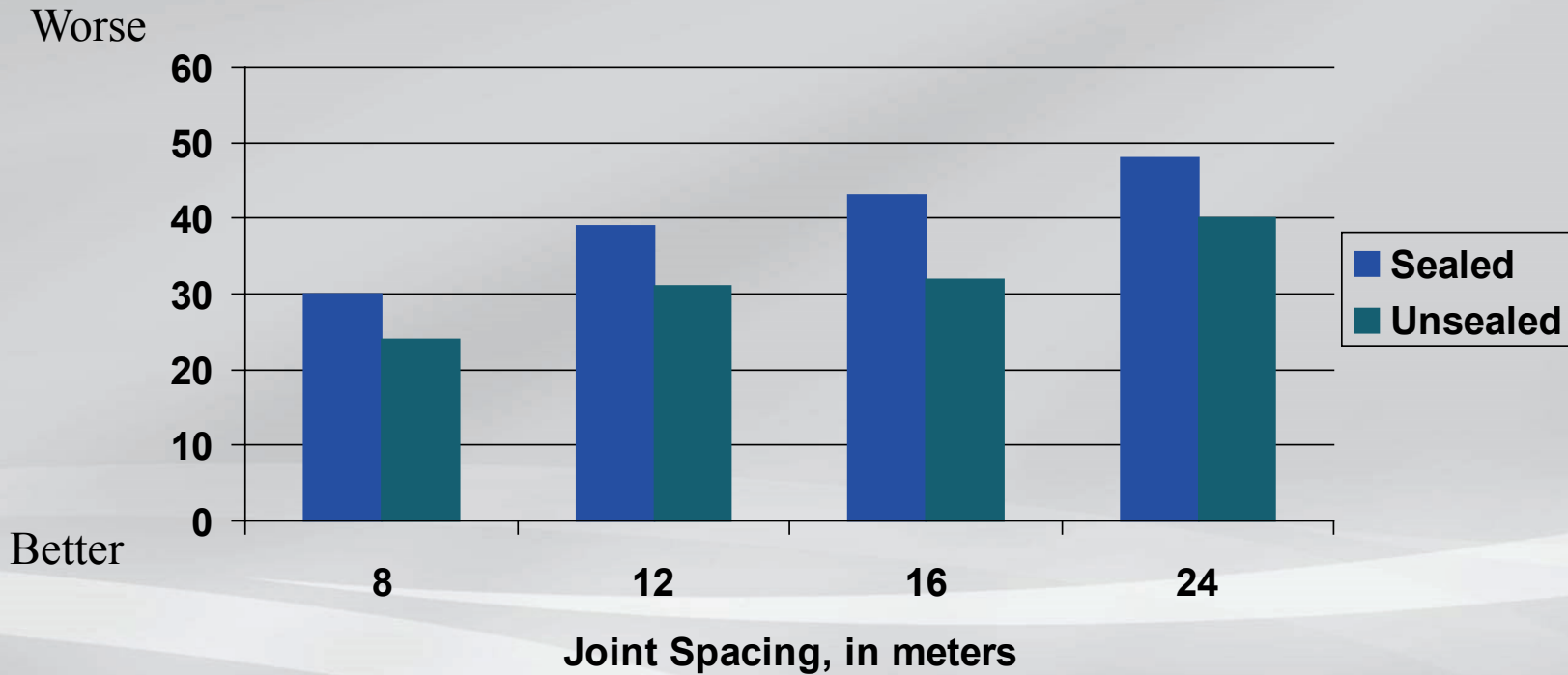
VERIFICATION

Wisconsin results have been verified by:

- FHWA
- Minnesota DOT
- North Dakota DOT
- WCPA
- ACPA
- ERES



PDI



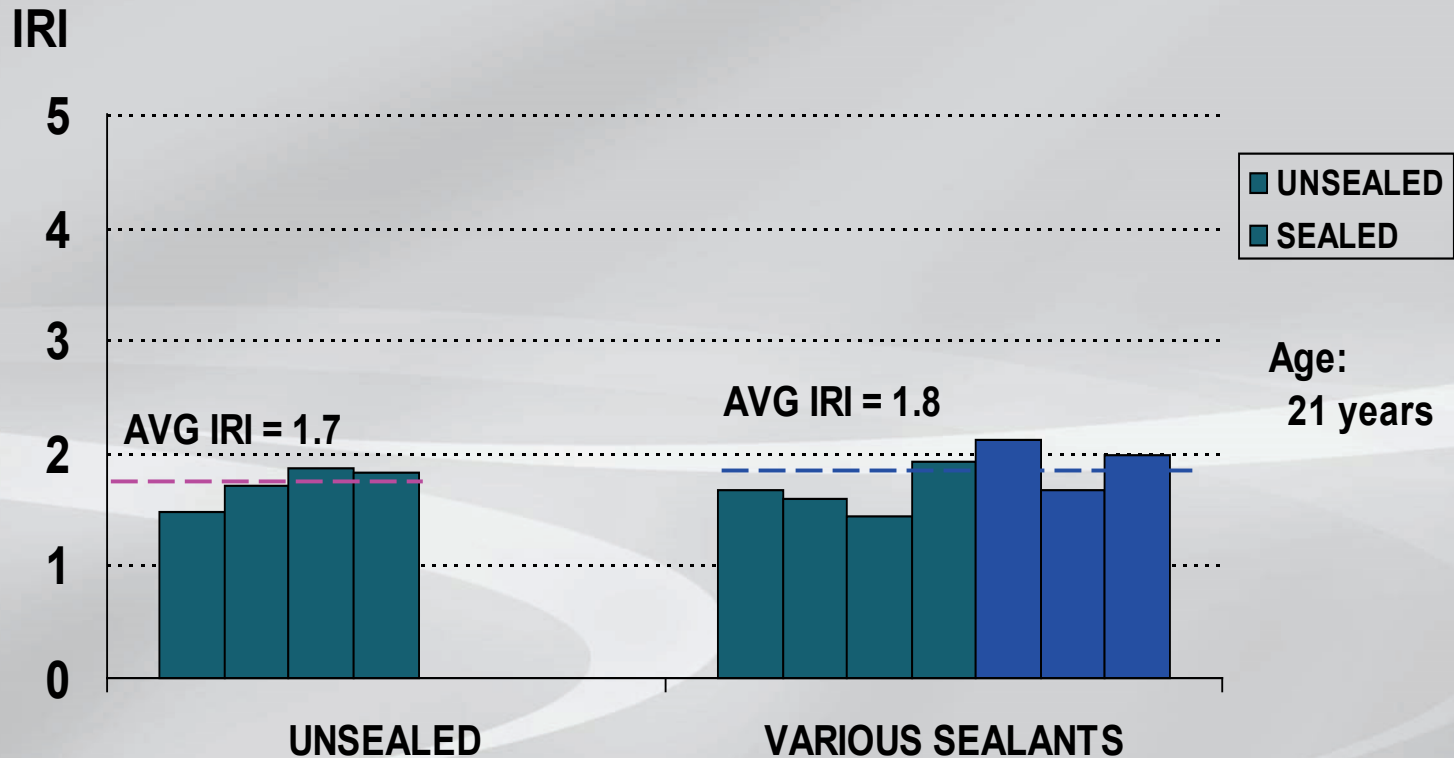
PDI Ratings on USH 51 - - 21 raters from MN & ND (TS 8 omitted)



INTERNATIONAL ROUGHNESS INDEX

USH 51 (AVG: NBL & SBL)

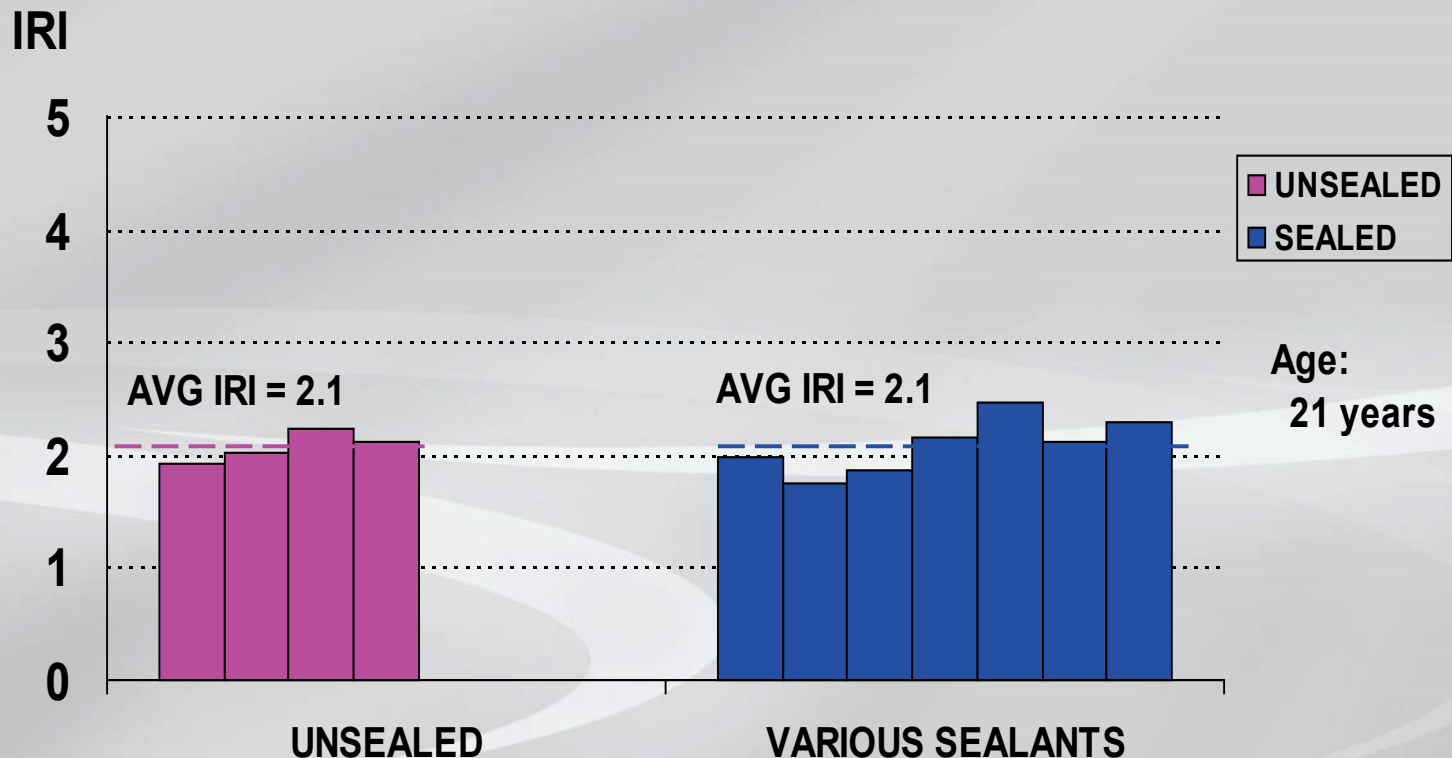
SUMMER



INTERNATIONAL ROUGHNESS INDEX

USH 51 (AVG: NBL & SBL)

WINTER



Materials Conclusion:

Joint Sealing has **NO**
significant effect upon
materials integrity.



Distress Conclusion:

Joint Sealing has **NO**
significant effect upon
pavement distress or life.



Ride Conclusion:

Joint Sealing has **NO** significant effect upon pavement ride qualities.



BRIDGE ENCROACHMENT

No change since adopting
no-seal policy



1995 WCPA Cost Assessment

Total Costs of Joint Sealing

Initial	\$2,800,000
Maintenance	\$3,200,000
Total	\$6,000,000 / yr



Over the Years Wisconsin Evaluated:

- Doweled and Undoweled
- Heavy and Light Traffic
- Plain and Reinforced PCC
- Heavy and Sandy Soils
- Dense and OGBC
- Bridge Encroachment





2000 IRI – Other Research Test Sections

Highway	Test Age	No. of Test Sections	IRI Sealed Summer	IRI Sealed Winter	IRI Unsealed Summer	IRI Unsealed Winter
USH 18/151 No dowels	10	5 Sealed 2 Unsealed	2.01	2.17	1.97	2.01
USH 16 No dowels	10	4 Sealed 3 Unsealed	2.75	2.83	2.75	2.91
STH29 Dowels and no dowels	6	2 Sealed 2 Unsealed	1.49		1.31	
AVERAGE			2.38	2.50	2.36	2.46



2007 IRI – Other Research Test Sections

Highway	Test Age	No. of Test Sections	IRI Sealed	IRI UnSealed
USH 18/151 No dowels	18	5 Sealed 2 Unsealed	1.77	1.09
USH 16/190 No dowels	18	4 Sealed 3 Unsealed	2.87	2.83
STH29 Dowels and no dowels	14	2 Sealed 2 Unsealed	1.63	1.67



TOTAL AGENCY PERSPECTIVE:

For 5 controlled studies:

TOTAL PAVEMENT PERFORMANCE,
CUSTOMER CONVENIENCE

and SAFETY

were NOT POSITIVELY influenced by
Joint Sealing

(95% confidence level).

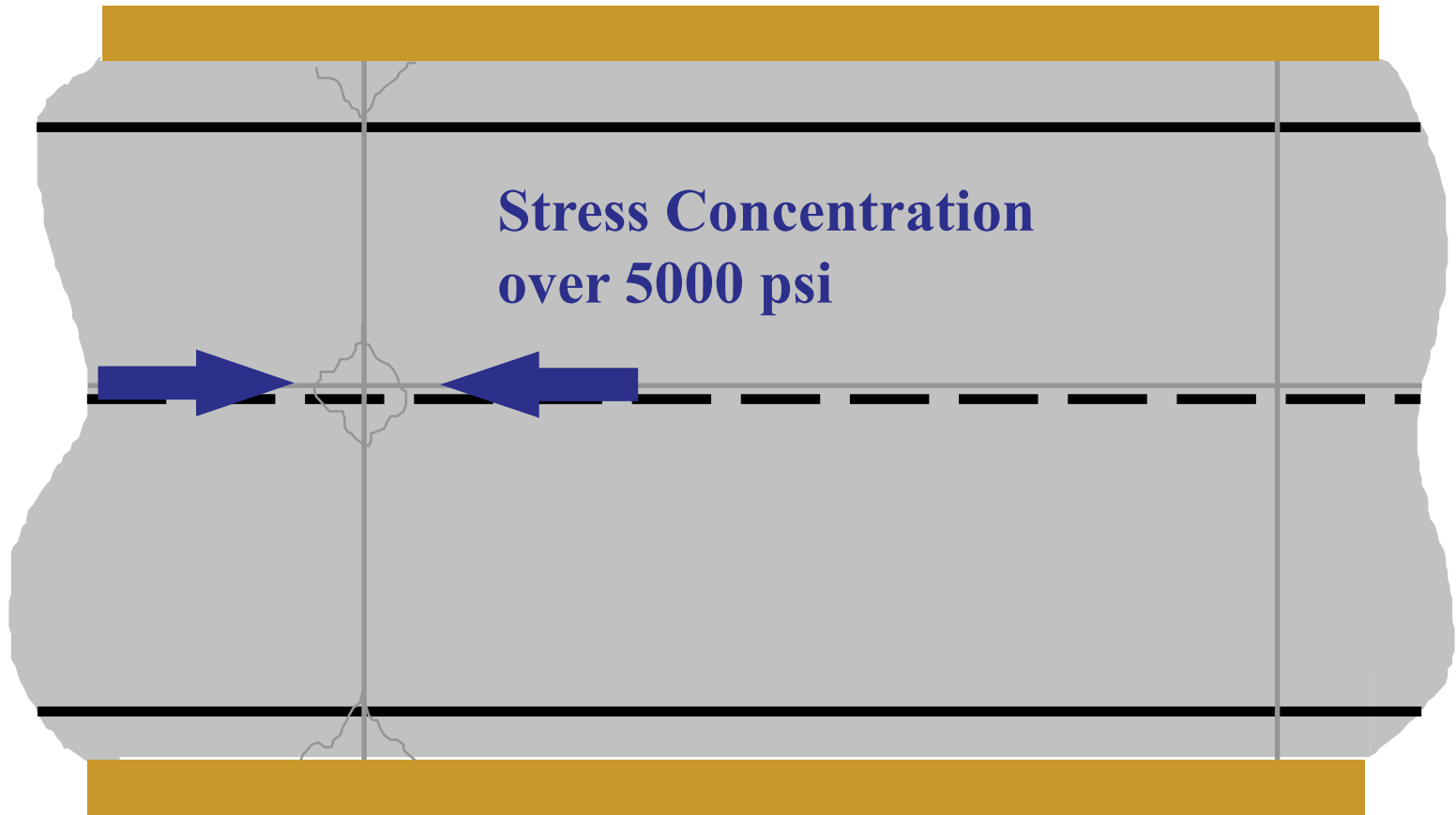


Best to Worst Performance

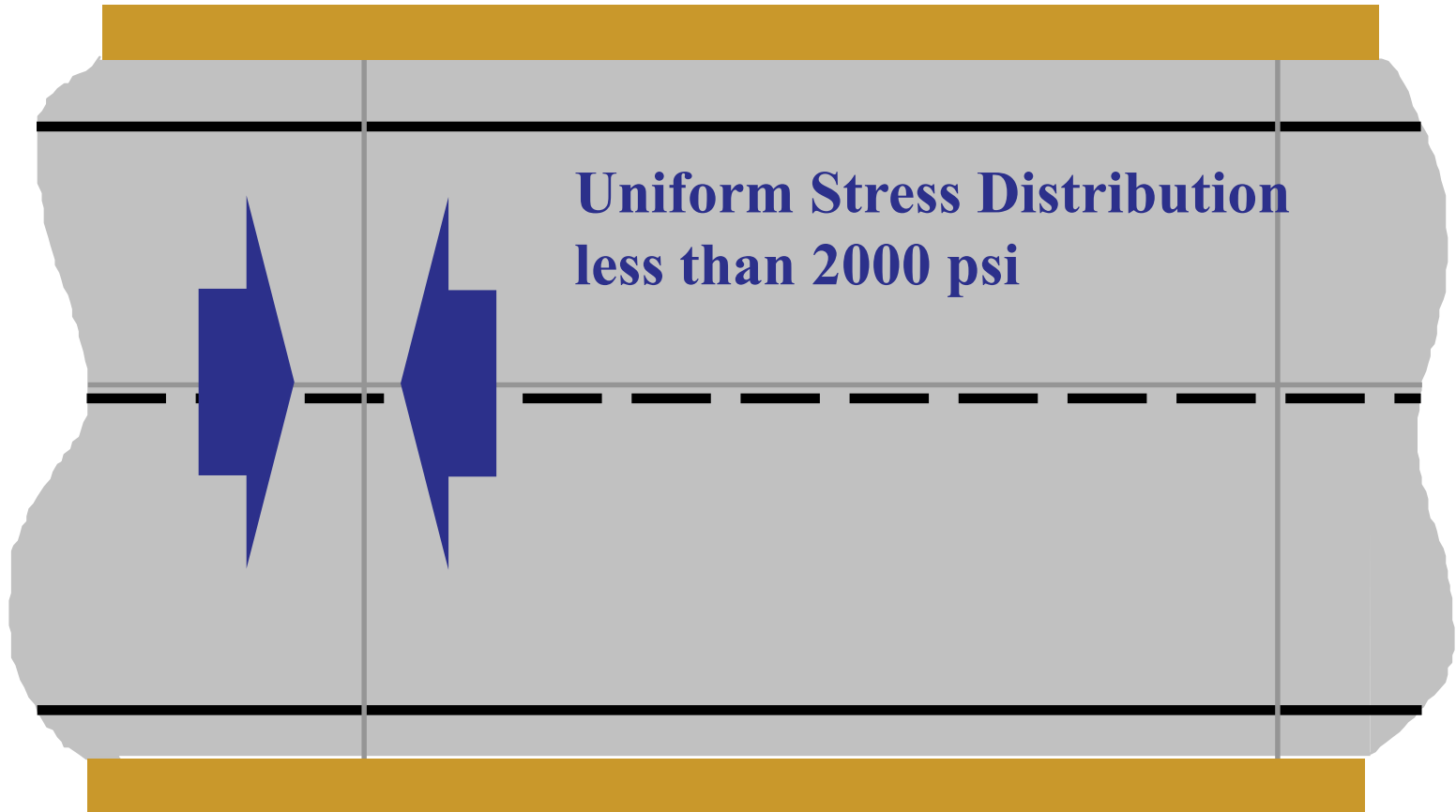
- Best – Unsealed Joints
- Then – Sealed Joints
- Worst – Partially Sealed Joints



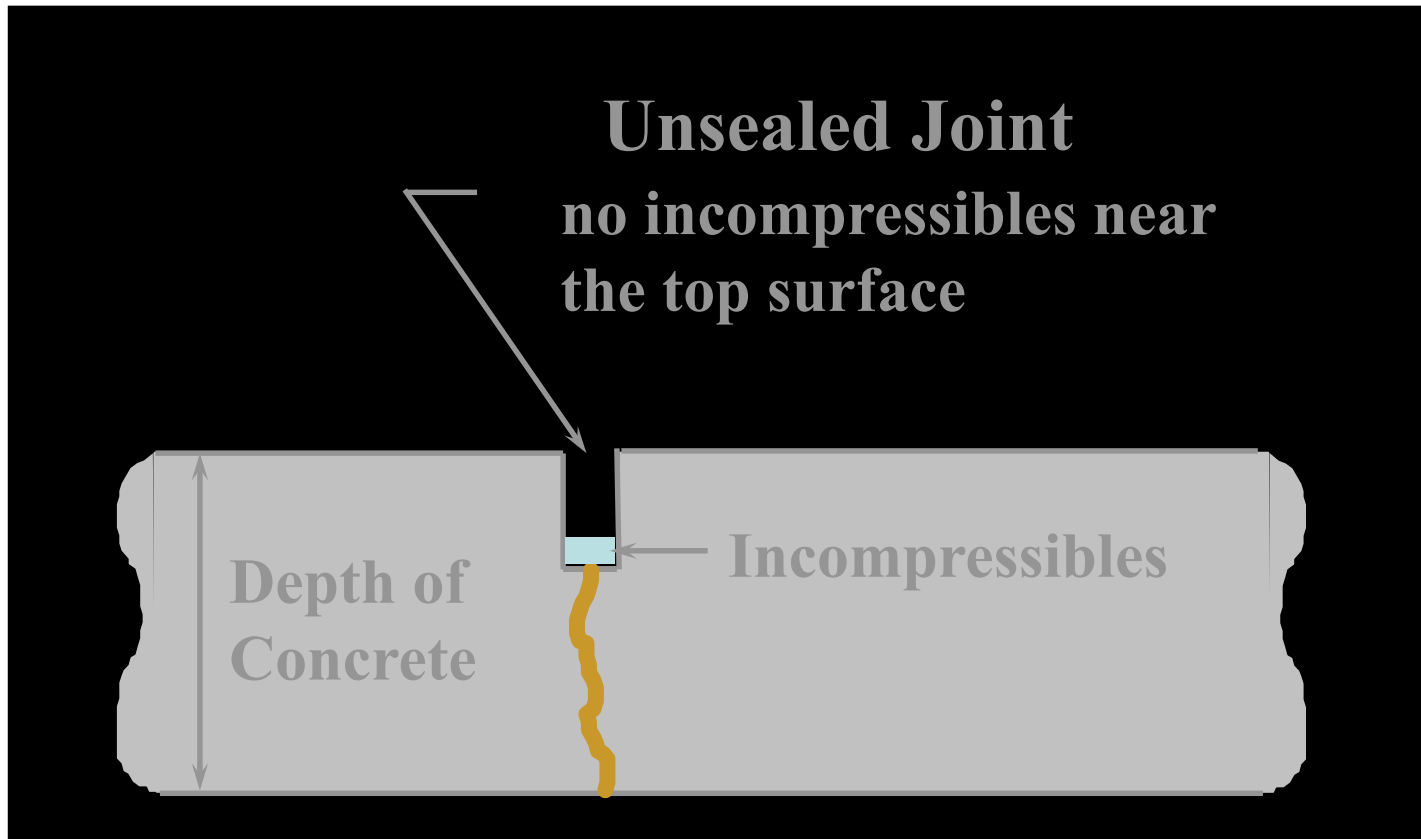
Partially Sealed Joint



Unsealed Joint



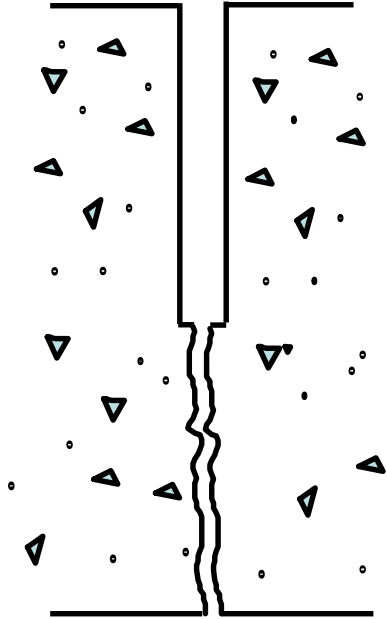
Location of Incompressibles



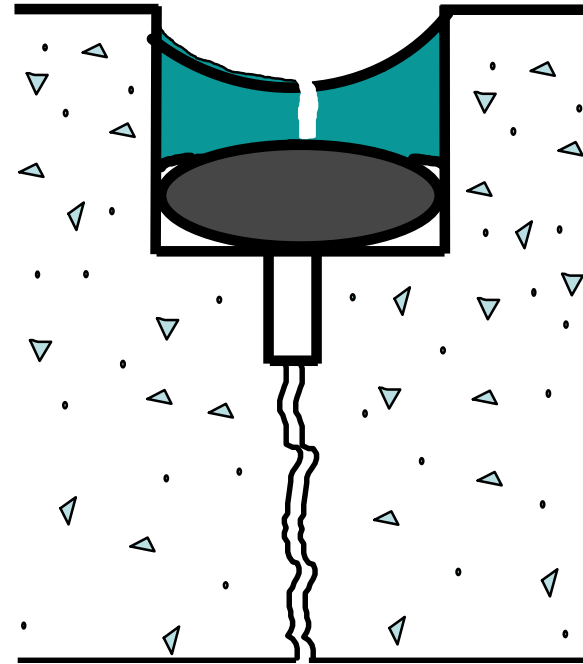
Maintenance Distress



WisDOT Policy



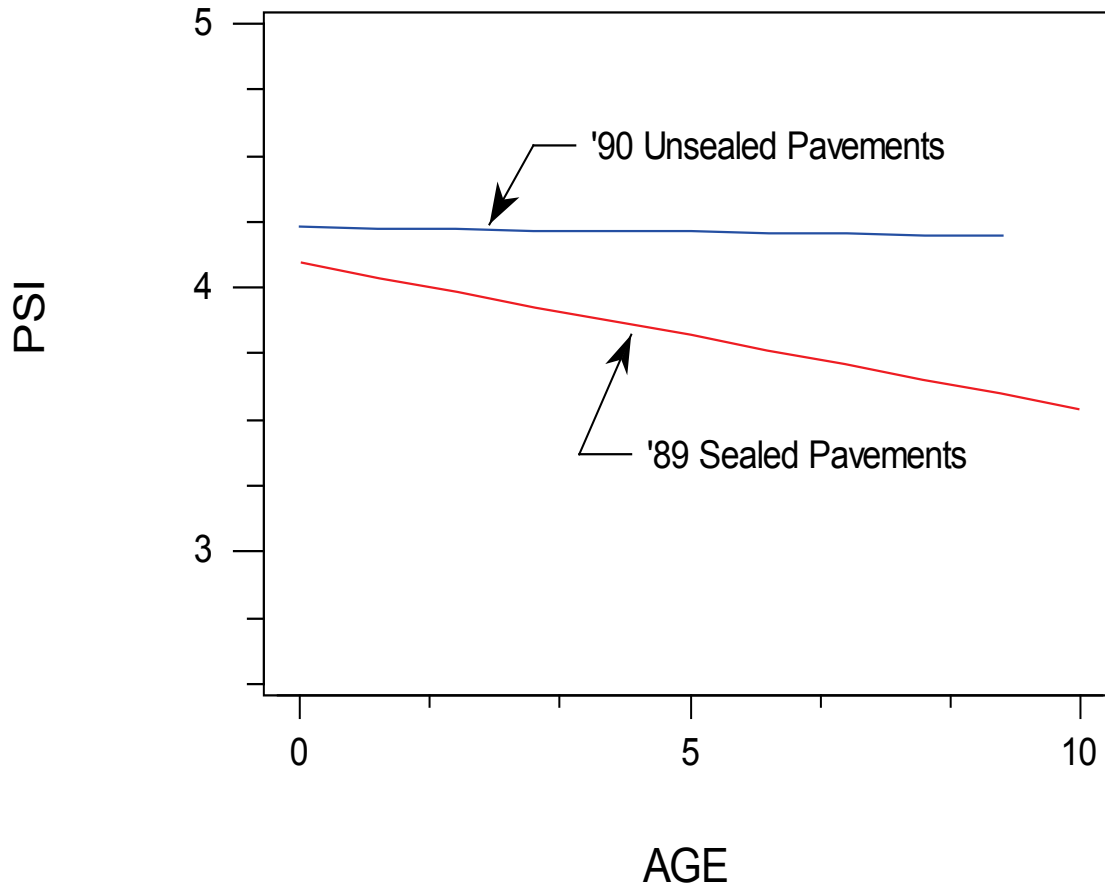
Narrow Unsealed,
CURRENT



Sealed System,
PRE-1990

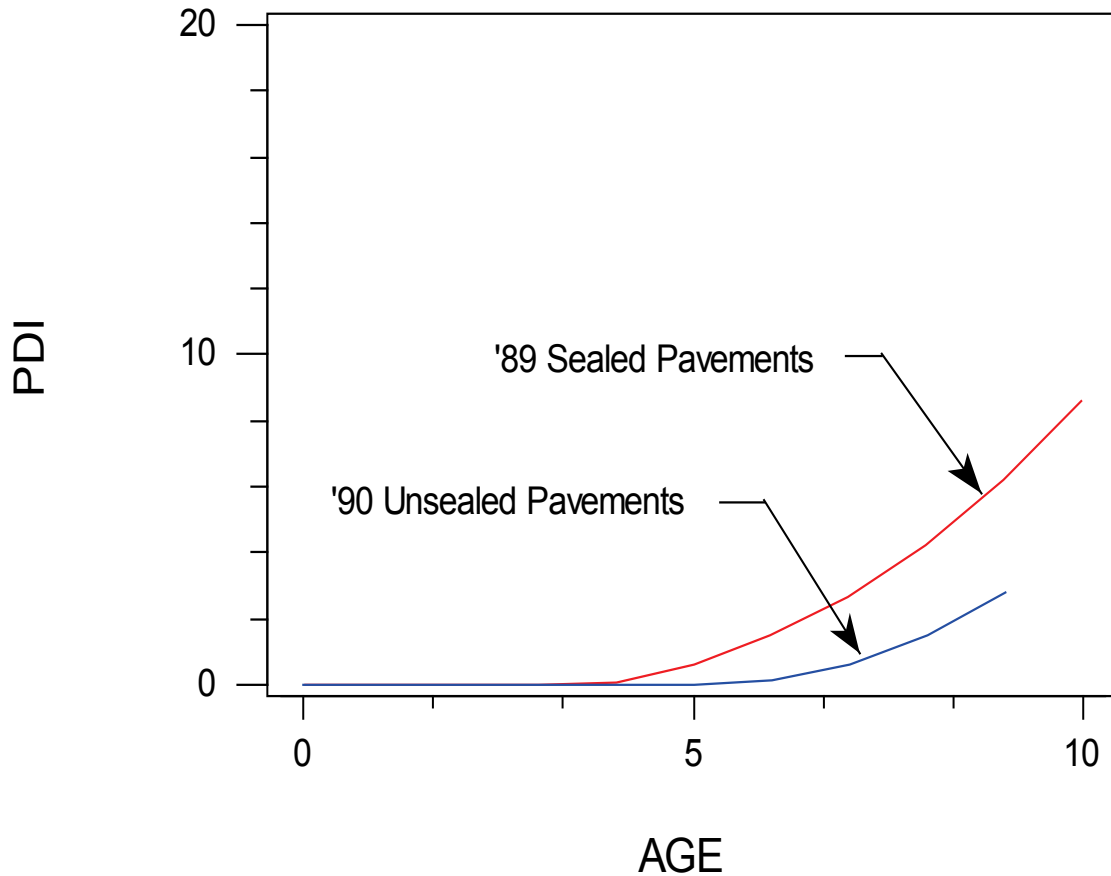
2004

System Wide Performance Pavement Ride



2004

System Wide Performance Pavement Distress



Current WisDOT Policy

- Single sawcut
- One blade width
- One third depth



Evolving WisDOT Policy after 25 years of no seal policy

- Rural highways – no change in policy
 - High speed
 - Shoulders and ditches
 - Traffic blows material off the roadway
 - Joints are essentially clear
 - No increased frequency of blowups
 - No increased frequency of bridge damage



Evolving WisDOT Policy after 25 years of no seal policy

- Urban highways and City streets –
 - Low speed
 - Curb and gutter
 - Sand and debris confined on the pavement
 - Joints are full of incompressibles
 - Frequency of joint distress
 - Increasing city requests to address the issue



Evolving WisDOT Policy after 25 years of no seal policy

- Urban highways and City streets –
 - Single saw cut
 - One blade width
 - One third depth
 - Fill with hot pour asphalt sealant
- To be implemented on all WisDOT work in 2016
- To be a participating cost on all local projects funded by WisDOT



WCPA Official Policy

- Rural and high speed highways – Concur with WisDOT Policy
- Urban and low speed highways and streets – single sawcut and hot pour asphaltic joint filler
- Previously sealed pavements should have sealants replaced when rehabilitations are completed.



QUESTIONS

?

