

When to Apply a Chip Seal



TH 56 Aging Test Site

What was Done & Why

- Built aging study
 - Because 15 years take 15 years
 - 3" Mill & Overlay 1999
 - Chip seal 1 mile on each section a year starting in 2000
 - Last sections was chip seal 2004
- Wanted to see what effect PM has on aging
- When is best time

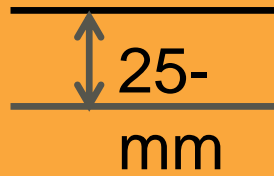
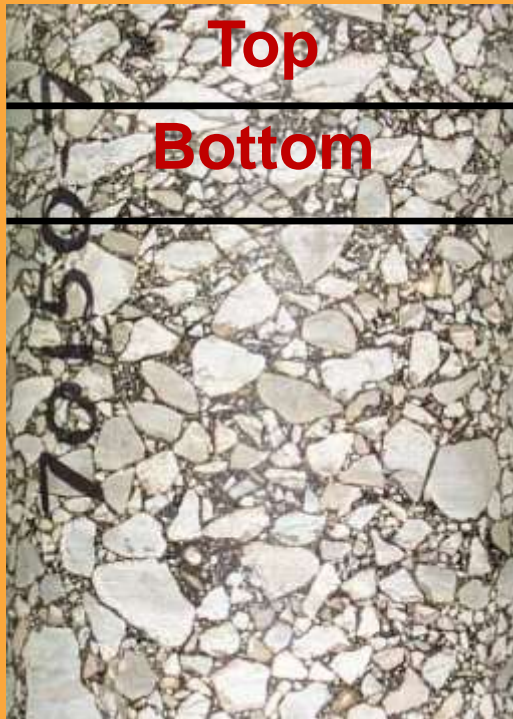
Mill & Overlay

- 3" mill and overlay 1999
- PG 58-28 binder
- Cored in 2011 for Asphalt Institute study

TH56 Test Sections Mill & Overlay

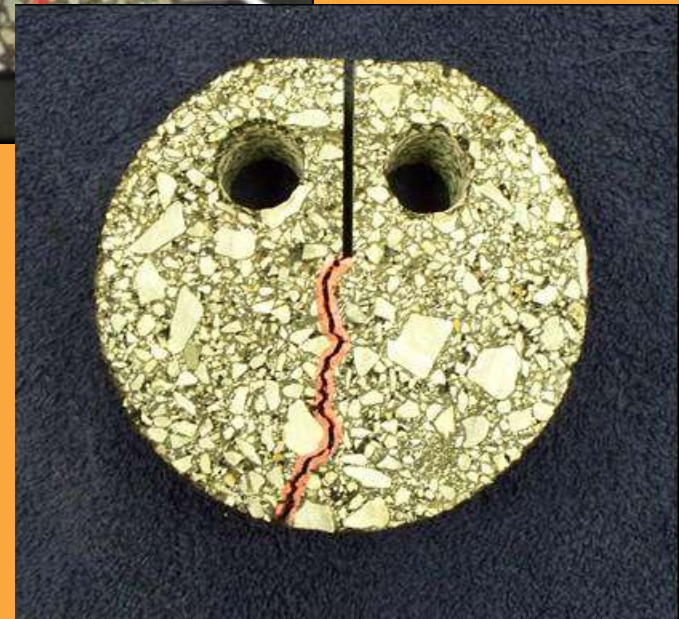
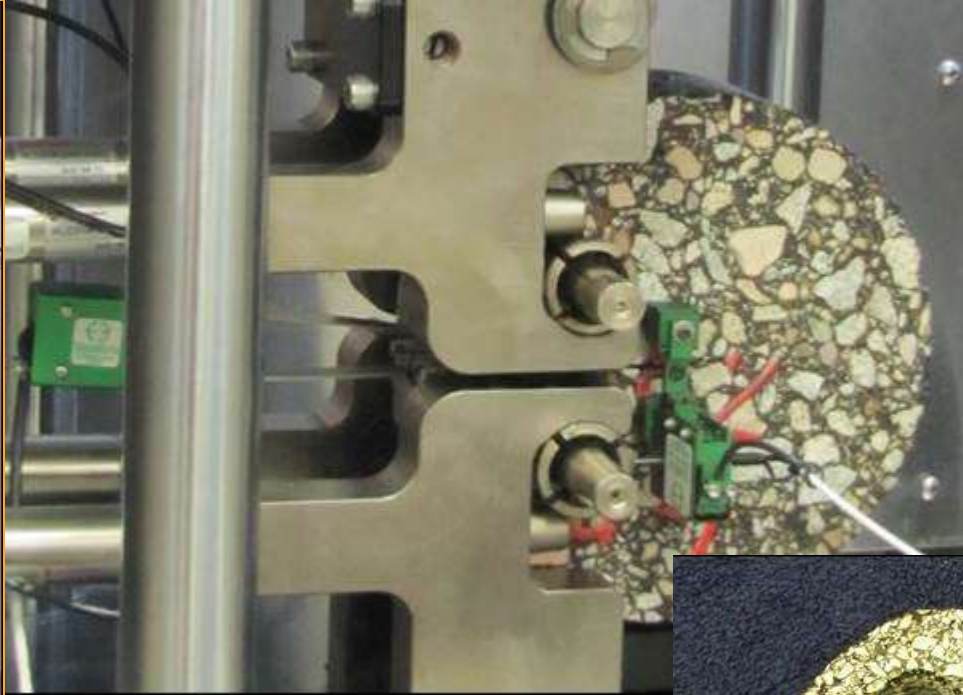
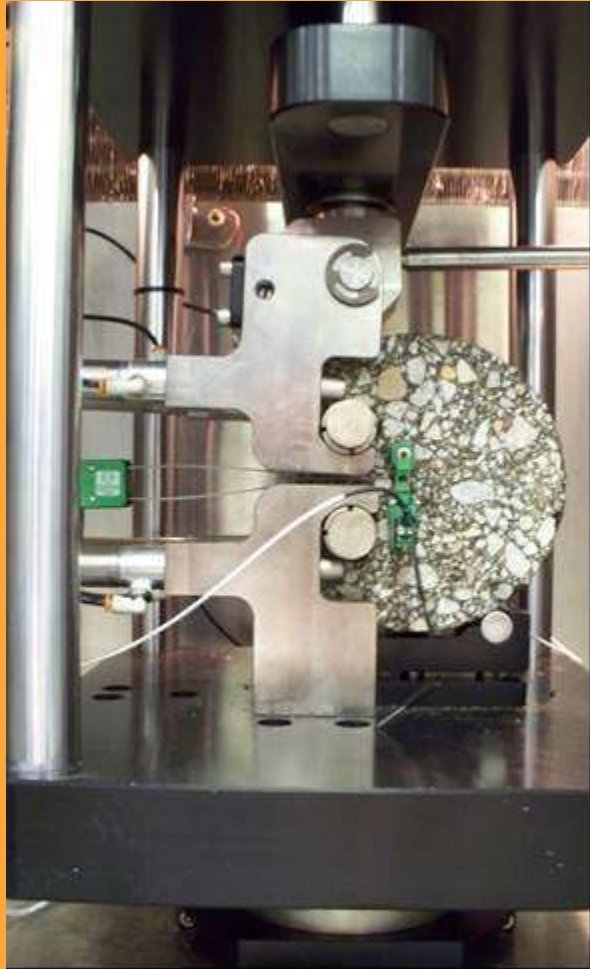
| MINNESOTA TH 56 SITE LAYOUT | | | | |
|-----------------------------|----------|----------|----------|---------------------|
| 14 TO 15 | 13 TO 14 | 12 TO 13 | 11 TO 12 | 10 TO 11 |
| 2000 | 2001 | 2002 | 2003 | CONTROL |
| 1 YEAR | 2 YEAR | 3 YEAR | 4 YEAR | Age when treated |
| ORIGINAL CONSTRUCTION- 1999 | | | | |

TH56 Cores

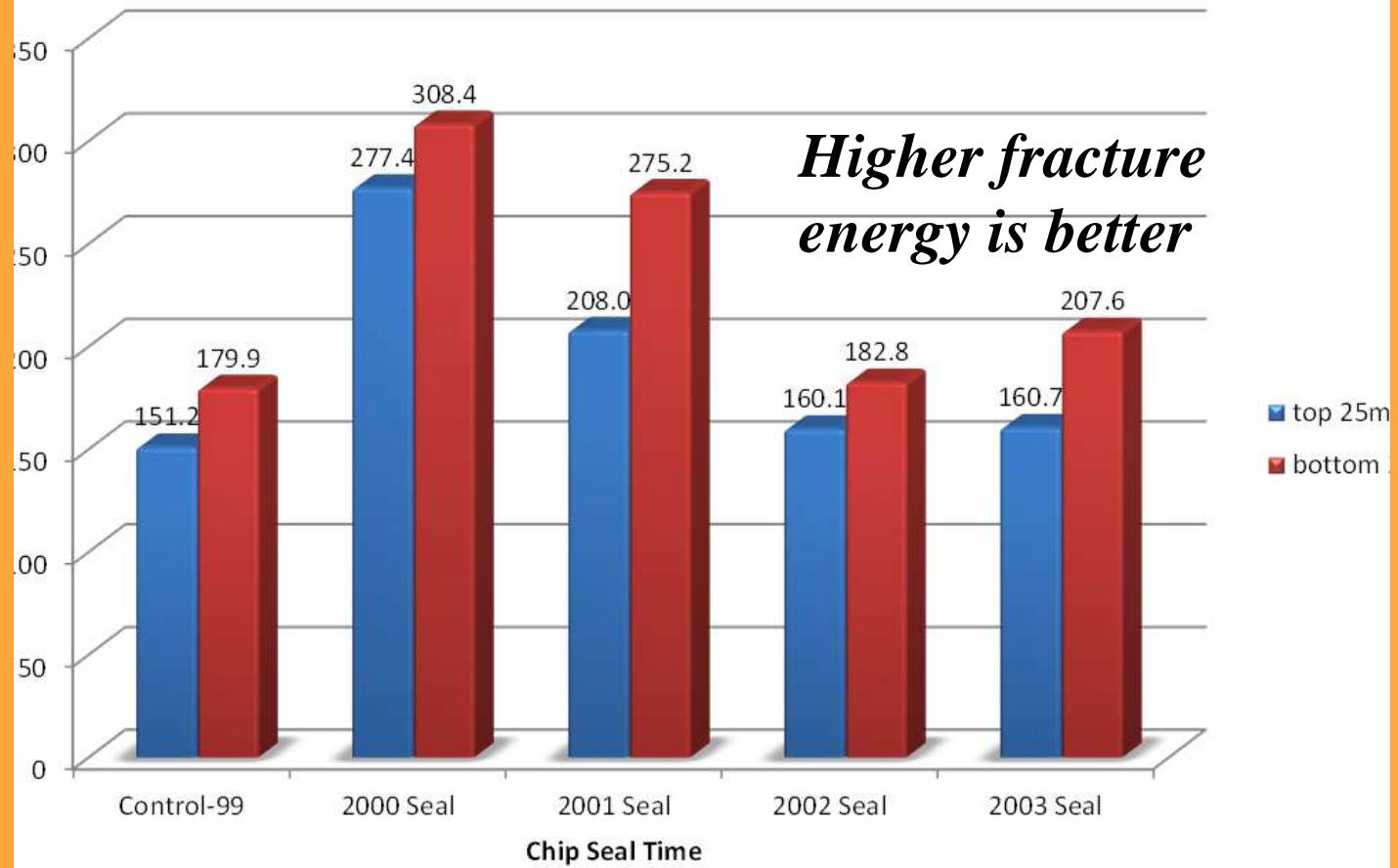


- Cores
 - Remove chip seal (if any)
 - Cut into two 25-mm layers
 - Test for fracture energy (cracking potential)
 - Recover component asphalt to check aging

Disk-Shaped Compact Tension Test: DC(T)



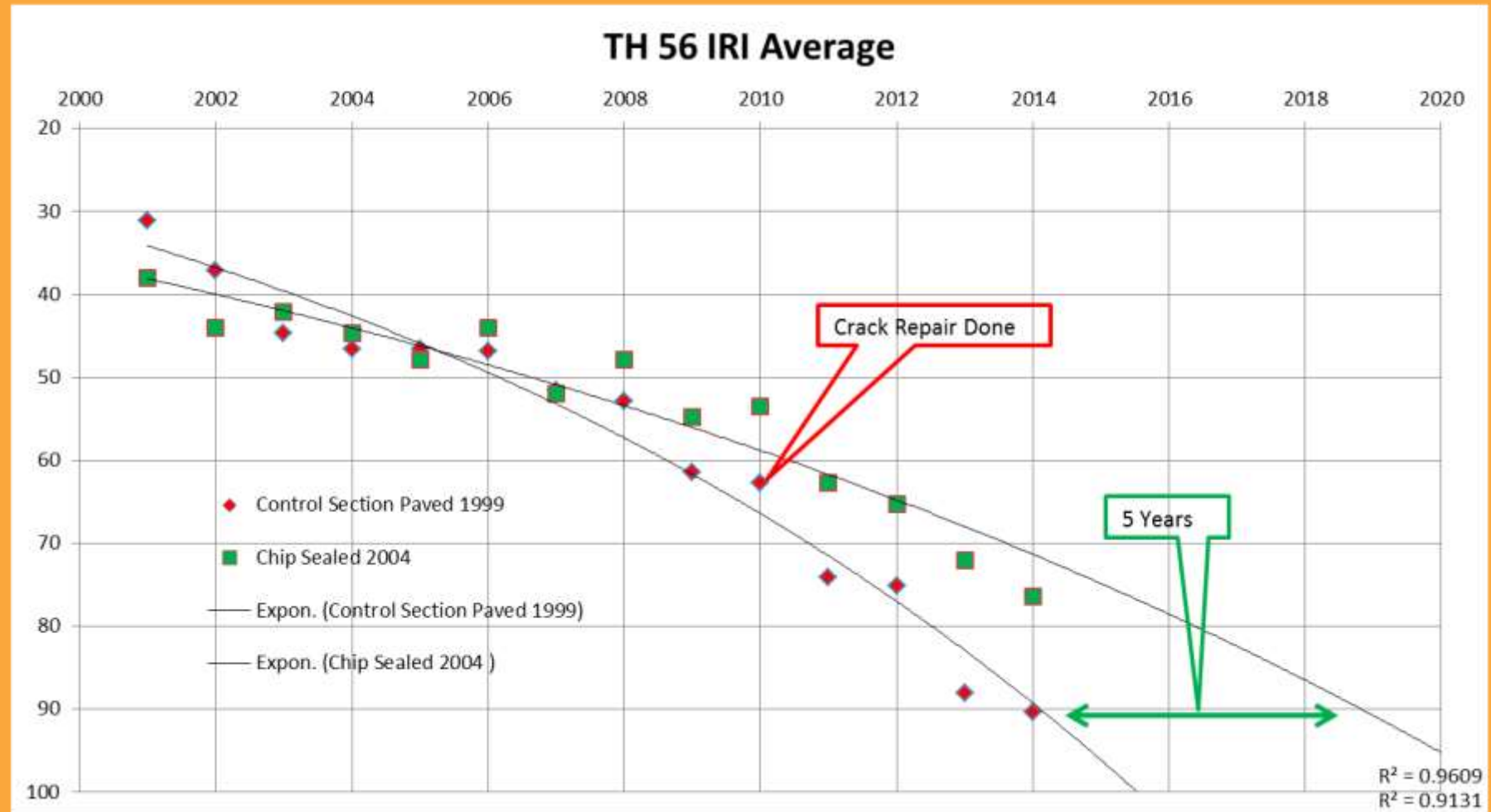
TH56: DC(t) Data @ -24°C



TH56 Findings

- Sealing improves resistance to aging (cracking)
- Sooner is better when sealing
 - Waiting for 3 or more years to seal after construction produced similar results as unsealed pavement related to DCT
 - Sealing after 1 or 2 years showed improvement in resistance to aging (cracking)

Ride Data



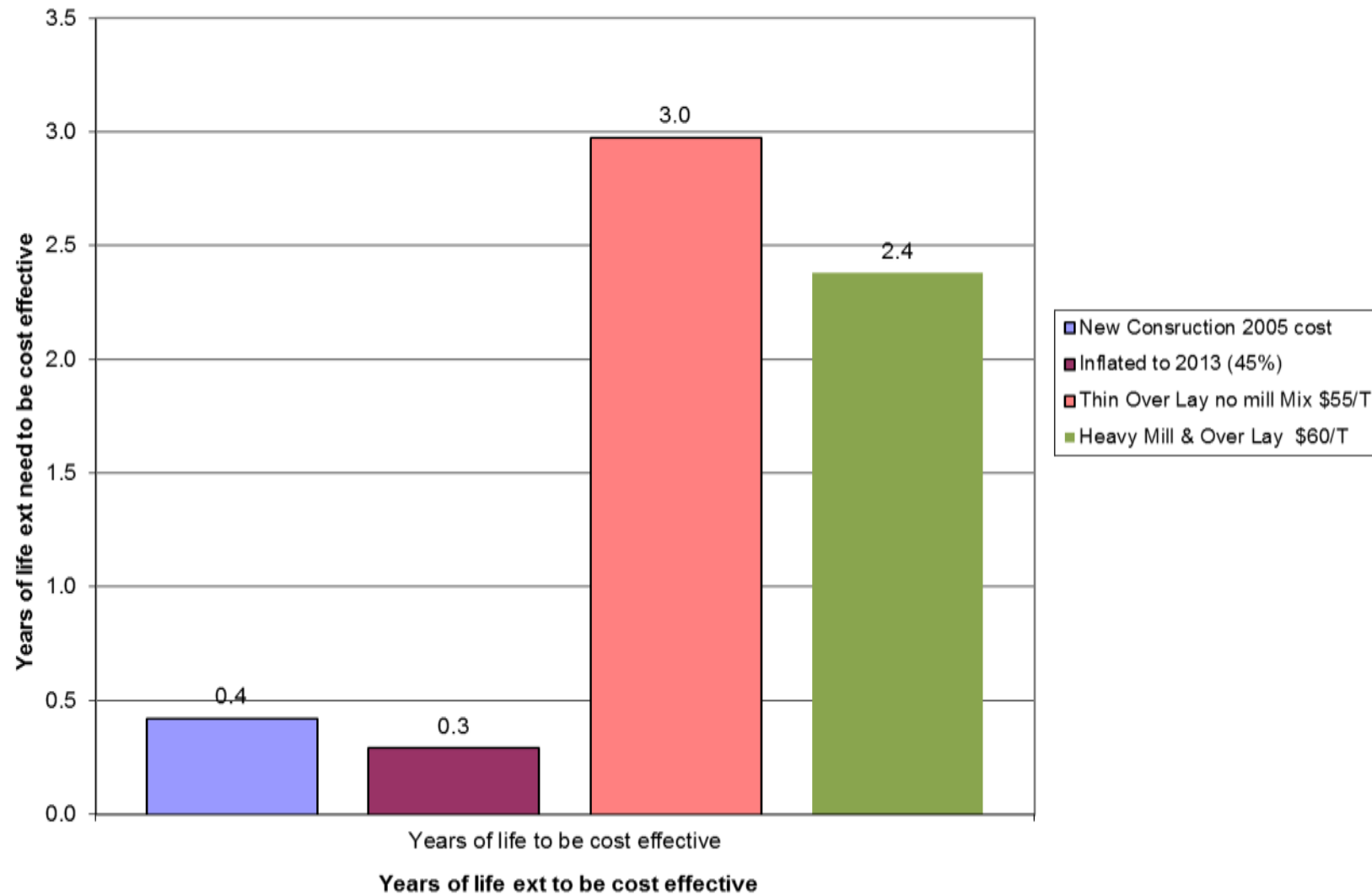
Control Section



Chip Sealed at Year 5



Years of Life Ext. Needed for Chip Seal to be Cost Effective.



Fog Sealing



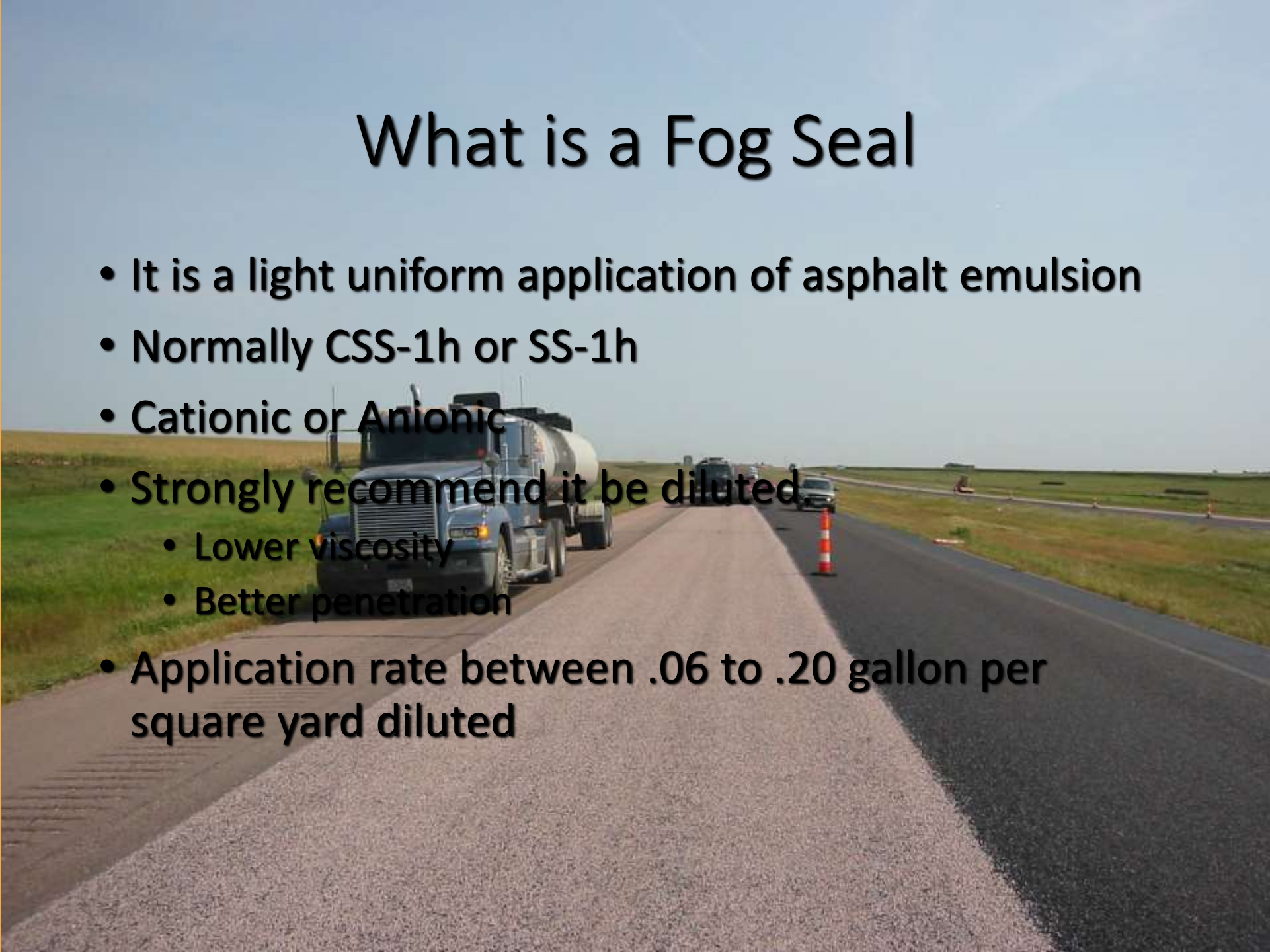
Topics

- What is a Fog Seal
- What are the Benefits of Fog Sealing of a chip seal
- Construction Issues



What is a Fog Seal

- It is a light uniform application of asphalt emulsion
- Normally CSS-1h or SS-1h
- Cationic or Anionic
- Strongly recommend it be diluted.
 - Lower viscosity
 - Better penetration
- Application rate between .06 to .20 gallon per square yard diluted





Why Fog Seal Chip Seal?

How does Fog Sealing help limit snowplow damage

- **Increased embedment**
 - Additional residual asphalt
 - Accelerates curing of pavement because of dark color
- **Combination of binders**
 - Combination of soft elastomeric asphalt underneath and harder asphalt over top



Other benefits of Fog Sealing Chip Seals

- Locks down marginally embedded chips
- Makes pavement marking more visibly
 - Reduces amount of paint needed
- Customer perceives surface treatment as a new HMA overlay not a chip seal

11/12/2001

Construction Issues

- No rain forecasted for next 3 hours
- Environmental conditions dictates speed of cure
- Proper nozzle size for uniform application
- Properly functioning equipment and qualified operator
- Overlap the centerline at least 1 foot
- Light coat of sand in intersections/high volume areas

07/18/2014 10:37



NOT THIS!

07/14/2005



What the Traveling Public See!



5 Years Later



Why Crack Treatment?

- Prevents water intrusion into subbase
- Prevents incompressible intrusion
- Improves ride quality smoothness
- Slows down pavement deterioration
- COST-EFFECTIVE

Why You Should Treat Cracks

- Protect your largest investment
- Pavement failure imminent
- Crack treatments are cost-effective, up to 9 years of (75% effectiveness) performance
- Extends pavement life

Why you need to crack seal!



What cracks to treat?

- All cracks soon after they appear... any crack opening will allow moisture penetration into pavement foundation (subbase)
- At minimum all cracks $\geq 1/8''$

Water intrusion



Water intrusion



Incompressible intrusion



Crack sealing treatment

Use:

- In thermal cracks
- Routed reservoirs
- Pavements in good condition- >20' transverse crack spacing, minor other cracking
- Sealants that are flexible and extensible at lowest temperatures encountered

Type of crack- “thermal [transverse]” (definition)

- Moving cracks formed by temperature related pavement/sub grade movement
- Generally in transverse direction (perpendicular to center line)
- Generally full width of street or road
- Generally >20 foot spacing
- Considered “working” cracks- $\geq 3\text{mm}$ movement
- Will develop in 2-7 years on most new pavements, 1-3 years on overlaid concrete

Crack type- thermal

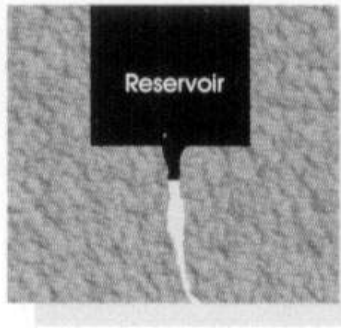


Routing

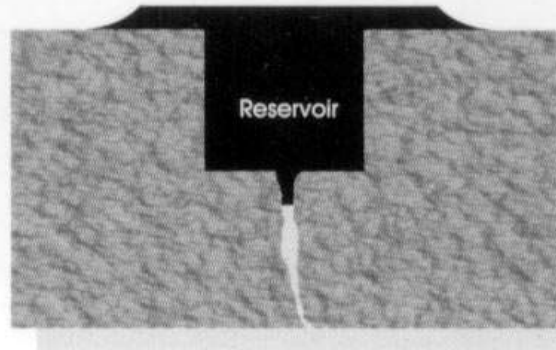


- Rout at least 1/8" from each crack face
- Keep centered over crack
- Reduce spalling by using as many cutters as possible

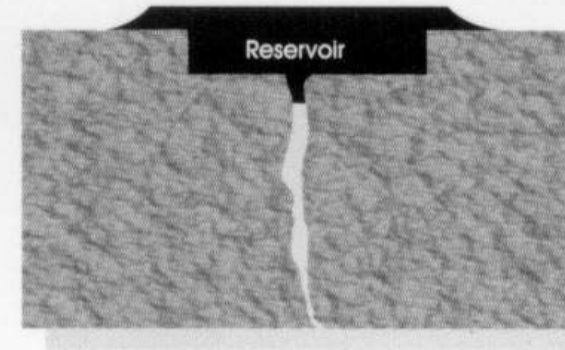
Rout Size Recommendation



Configuration A
Standard Reservoir-and-Flush



Configuration B
Standard Recessed Band-Aid



Configuration C
Shallow Recessed Band-Aid

Crack filling treatment

Use:

- In longitudinal, block, fatigue and closely spaced transverse cracks (< 20' spacing)
- In wheel paths and high traffic areas
- Stiffer more “traffic resistant” product
- Routed or non-routed reservoirs (use discretion), overband application
- Pavements in fair to poor condition

Crack type- “longitudinal” (definition)

- Can develop in 2-5 years along with thermal cracks
- Occur in longitudinal (parallel to center line) direction
- Caused by thermal movement, construction joints and edge joints
- Considered low movement, “non-working” cracks- < 3mm movement

Crack type- longitudinal



Crack type- fatigue



Not a Candidate for Crack Sealing



Large Cracks???



Polymer modified/aggregate materials





CRAFCO MASTIC
HWY 75
STEARNS CO., MN



Pick Best Sealant for Climate

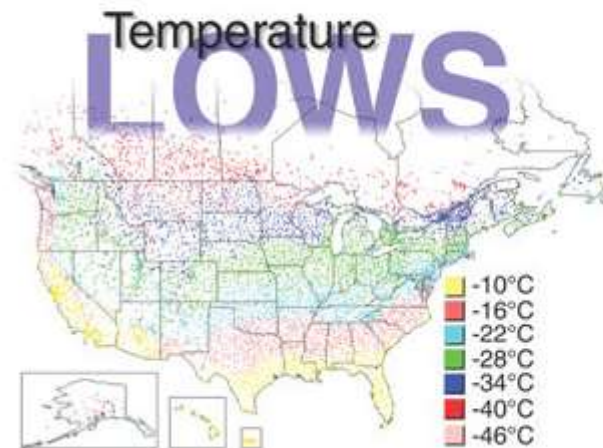
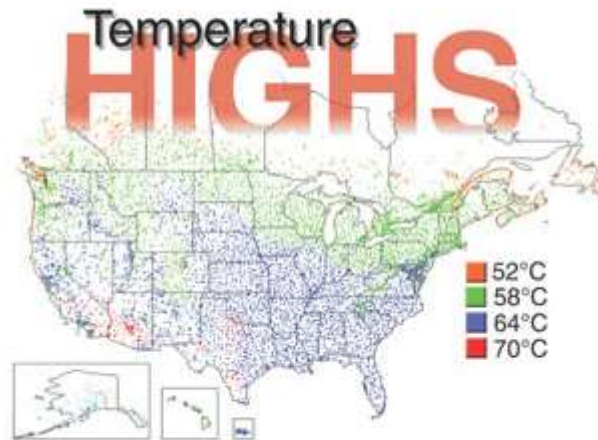
Three Step Sealant Selection

1 - Determine whether to **Crack Seal**, **Crack Fill** or **Joint Seal** by using the Pavement Evaluation Guide link below.

[PAVEMENT EVALUATION GUIDE](#)

2 - Select your **Temperature Model** by selecting the "**High**" and "**Low**" temperatures in your region using the temperature guide maps below.

3 - Cross reference the **high and low temperature** on the charts below to determine the proper sealant for your application. (Click on your selection)



Cohesive failure:



Adhesive failure:



Installation Choices

- Rout or not
- Size of rout
- Cleaning recess
- Flush
- Overband

Crack Sealants

- Crumb rubber
 - Clean and seal
- Low modulus
 - Clean and seal
 - Rout and seal
- Extra low modulus
 - Rout and seal
 - Transverse cracks only!!!

Basic Needs- all installations

- Clean- most important
- Dry
- Intact pavement
- Proper temperature (pavement 40°F and application of sealant at manufactures recommend temperature)

Cleaning Methods

- Routing - cuts new bonding surface
- Sawing- does same as routing
- Compressed air - sufficient pressure and velocity
- Vacuum - in combination with compressed air
- Heat lance - used to condition pavement

Clean cracks:



Sealant Application - Overband

- Maximum 1/8" thick
- Maximum 3/4" overband on each side of crack
- Overband- best performance (SHRP/FHWA)

Neat application



Recommend Overband Appearance (Non-Rout/Clean & Fill)



Not recommended



Proper Equipment (basics)

- Oil-jacketed
- Thermostatic heat controls
- Continuous agitation
- Over-heating safety controls
- Right size for operation
- Many commercially versions.....

Asking Water to Jump the Crack



What cracks to treat?
“Don’t forget edge joints”



Summary- Why Crack Treatment?

- Prevents water intrusion into subbase
- Prevents incompressible intrusion
- Improves ride quality smoothness
- Slows down pavement deterioration
- COST-EFFECTIVE

Summary- Crack Treatment Steps

- Pavement evaluation
- Determine if Crack Sealing or Crack Filling treatment is needed
- Determine temperature (high/low extremes)
- Select product
- Proper application

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THANK YOU