



A partnership with  
MDT, NDDOT, SDDOT, WYDOT and the  
Mountain-Plains Consortium Universities

# Asphalt Maintenance - Crack Sealing to Surface Treatments

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## Agenda

- Crack Sealing
- Micro Surfacing
- Other treatments and stuff



## Crack Treatment- Overview

- Why, when?
- Pavement evaluation
- Determine if Crack Sealing (working cracks) or Crack Filling (non-working cracks) treatment is needed
- Determine pavement temperature (high/low extremes)
- Select product
- Proper application/equipment
- Dealing with big cracks

## Why Crack Treatment?

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

## What cracks to treat?

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

## Working vs. Non-working cracks

- Working
  - high movement -  $\geq 3\text{mm movement}$
  - Thermal
  - Transverse
- Non-working
  - low or no movement  $< 3\text{mm movement}$
  - Longitudinal
  - Block
  - Fatigue

## How to Bid

- 3 methods
  - By pound of sealant
    - Could have over runs
    - Tend to get wide thick over band
  - Linear foot of crack
    - Could have over runs
    - Watch to make sure filled level full
  - Road Station
    - 100 foot segments
    - No over runs
    - Easy to inspect
    - Watch to make sure filled level full

## Sealant Selection

- Hot pour
  - 3 categories
    - Crumb Rubber
    - Low Modulus
    - Extra Low Modulus
- Need to pick best type for what method you are using
  - May need 2 types of sealant on the job
- Sealant should be tailored for region of country

# Pick Best Sealant for Climate

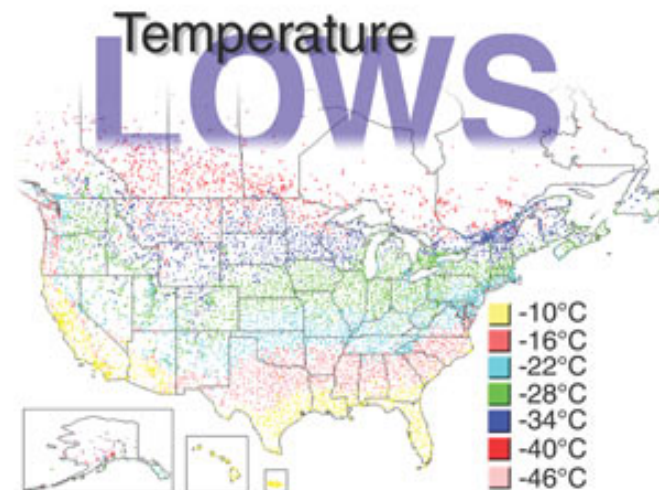
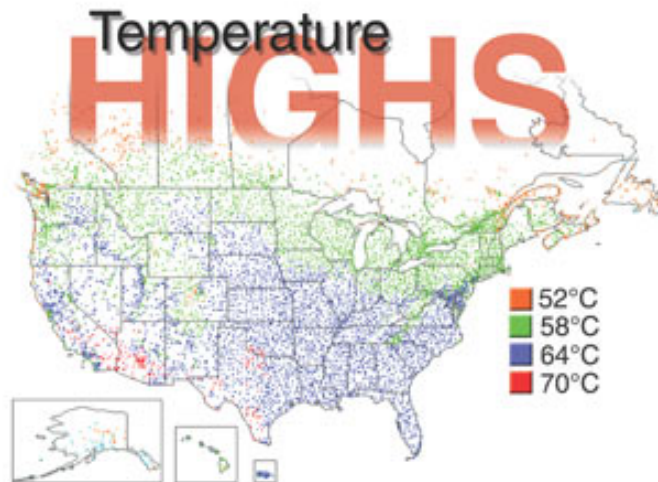
## Three Step Sealant Selection

**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)



### **Project Selection**



### **Not a Candidate for Crack Sealing**



### **Not a Candidate for Crack Sealing**



### **Not a Candidate for Crack Sealing**



## Good Candidate



## Great Candidate



## Equipment



## Two Methods

- Crack Filling
  - Clean & Seal
  - Blow & Go
- Crack Sealing
  - Rout & Seal

## Crack Filling

- Normally used for non-working cracks
  - Longitudinal cracks
- If crack spacing is too close together
  - <20'
- On thin overlays
- Properly applied sealant can last 6 to 8 yrs.
- Parking lots
- Recreational trails

## Crack Filling



## Clean Cracks



## Heat Lances

- Conditions edges of crack
  - 1400 to 1800° F
- Be careful not burn pavement
- Help remove dirt
- Does not dry **WET CRACKS**



## Filling Cracks



## Neat Tight Job



## Recommendations

- Structurally pavement
- Dry pavement and cracks
- Remove all vegetation
- Clean loose debris from cracks
- Work when cracks are open
- Neat thin over bands
  - No more than 3" wider than crack

## Recommendations

- Fill with proper sealant
  - Hot Pours
    - Crumb Rubber
    - Low Modulus

## Filling Longitudinal Joint

- Little movement
- Keep width of sealant to minimum
  - Safety issue for motorcycles
- Do not use extra low modulus sealants



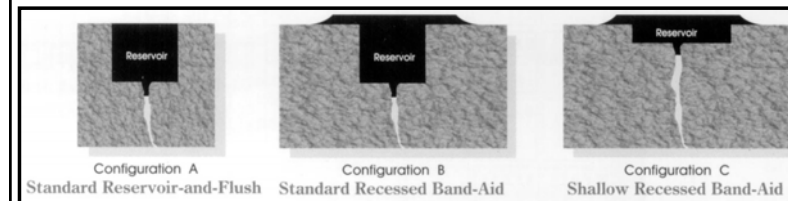
## Crack Sealing

- Normally used for working cracks
- If crack spacing is greater than 20'
- Properly applied sealant can last 6 to 8 yrs.
- Highways
- Streets
- Parking lots
- Recreational trails
- Prepare reservoir
  - Routing
  - Sawing

## Reservoir Size & Shape

- 1 to 1 ratio width to depth
  - Most commonly used
    - $\frac{3}{4}$ " by  $\frac{3}{4}$ "
    - 1" by 1"
- 4 to 1
  - 1  $\frac{1}{2}$ " by  $\frac{3}{8}$ "
  - Can be noisy
- Over band
  - Best performing
- Flush filled

## Rout Size Recommendation

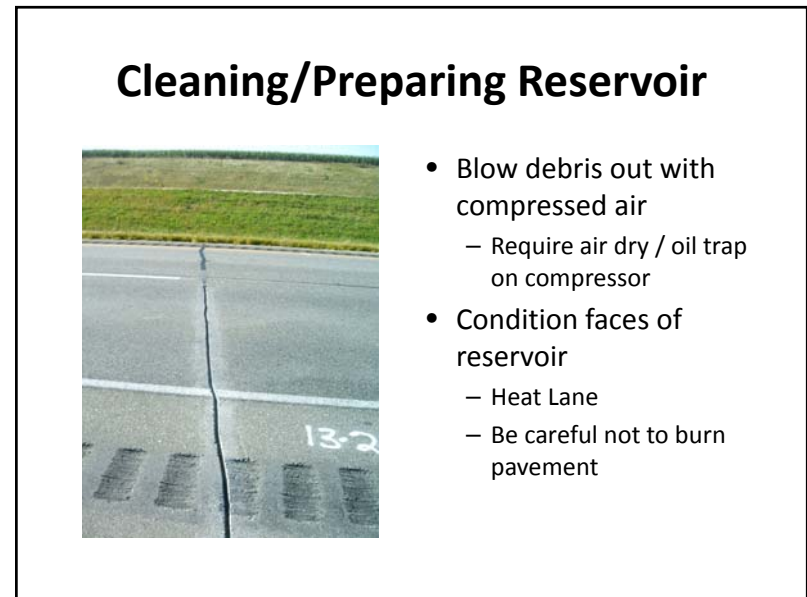


## Router



## Check Width & Depth







## Sealant Melter



## Melting Sealant

- Follow Manufacturer's recommendations
  - Recommend pouring temperature
  - Maximum temperature
  - # of heating cycles
  - How long
- Temperature at end of wand
- Recommend sampling out of wand



## Sealant Melter Recommendations



- Not direct fired
- Tank mixer
- Temperature control on
  - Transfer Oil
  - Finished product
- Sealant Temperature gauge
- Heated hose
- Flow controls on wand
- Able to back suck hose and wand





## Single Fill Method Flush



## Double Fill Method



## Double Fill Method

- Flush filled with thin narrow OB
- 2 Kettles needed
- 1<sup>st</sup> fill reservoir  $\frac{1}{2}$  to  $\frac{2}{3}$  full
  - Allow couple minutes for sealant to cool and set
- 2<sup>nd</sup> finishes filling reservoir and creates OB
- Better production
- Better results



## Recommendations

- Keep re-cycling sealant into kettle between cracks
- Don't dribble sealant between cracks
- Thin, narrow over bands
  - NO more  $\frac{3}{4}$  inch wider than reservoir on each side
  - Less than  $\frac{1}{8}$  inch thick

## Cohesive Failure



## Adhesive Failure



## Dealing with Traffic



## Sealing Damp Pavement



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





### Too Big of Cracks





## Mastic

- Hot pour crack & pothole filler
- Polymer modified sealant
- With special aggregate mix into it
- Very durable
- Does good job filling large cracks
- Cupped crack
- Adjust structures
- Numerous suppliers





## Recommendations

- Limit # of cracks in pavement
  - Use proper PG grade when paving
- Seal cracks as soon as they appear
- Pick best process for cracks
  - Clean & Seal
  - Rout & Seal
- Best time of year
- Dry pavement & cracks

## Recommendations

- Clean & Seal
  - Clean crack
  - Fill crack
  - Neat application
  - Dry cracks and roadway

## Recommendations

- Routing sealing
  - Cut cracks
  - Clean cracks with compressed air
  - Condition cracks with heat lance
    - Don't burn pavement
  - Fill in two steps
  - Neat, tight over-bands
  - Protect new sealant from traffic

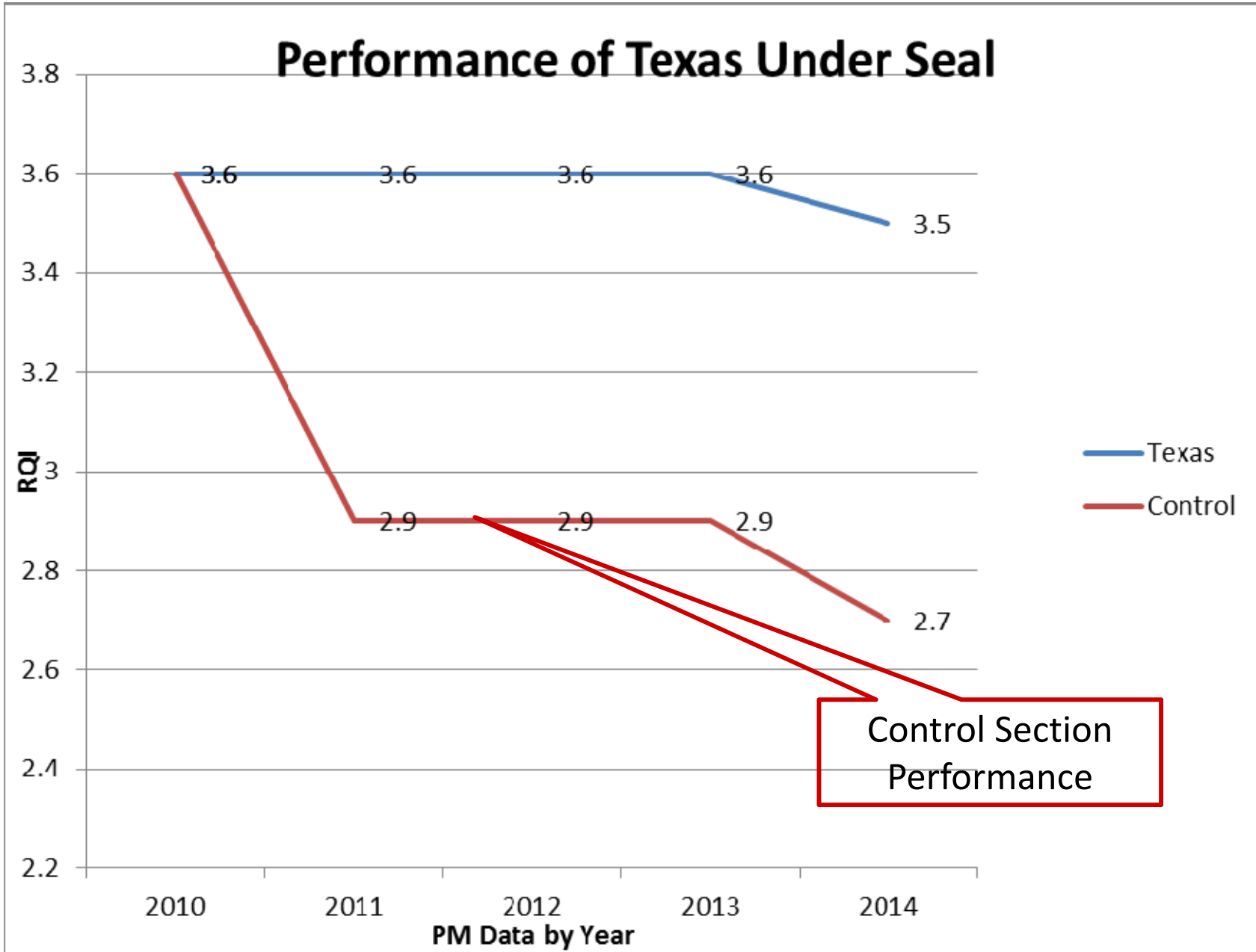
## Texas Under Seal



## Texas Under Seal

- Chip Seal applied before HMA Overlay
  - Milled surface
  - Non milled surface
- $\frac{3}{8}$ " minus chip
- CRS-2p
- Light on cover aggregate
- Can pave as soon as rolling & sweeping is completed

# PM Performance Data



## Texas Under Seal

- Why does it perform
  - Acts as stress relief membrane?
  - Super Tack?
    - Have had other tack methods with higher peak strengths
  - Limits water infiltration from base?

## Texas Under Sealed



2012

2013

2016

## No Texas Under Seal



2012

2013

2016

## Questions



## Brief Introduction to Micro Surfacing



## What is Micro?

- Homogenous mixture of aggregate and asphalt emulsion
  - Like a Dairy Queen Blizzard
- Micro Surfacing chemical cure
  - Will cure and set at night
- Used for Surface treatments
- Rut filling
- Ride improvement
- Improve Friction
- Used both on concrete and HMA



## Project Selection

- Structurally sound
- Small potholes ok
- Raveling ok
- Flushing ok
- Aged and oxidized ok

## Project Selection

- Micro
- Surface treatment
  - Increase Friction
  - Slow aging
- Developed by Germans in the late 70'ies
- Rut filling
  - Up to 1 ½ inches in one pass
- Restore Cross Section
- More durable then slurry

## Good Candidate



## Rut Filling





## Possible Candidate for Micro



## NOT a Good Candidate for Micro





### How it Should Look



### What final product should look like.



### Other Stuff



## Fiber Glass Re-enforced

- Chip seal emulsion modified with fiber glass fibers
- Approximately 2"
- Cut and applied with emulsion
- Help seal small cracks



# Scrub Seal



## Things I Learned 38 Years

- Drainage
- Compaction
- We have time to do it right
- Doing it right is the cheapest option
- No question is dumb
- When in doubt go with your heart
- Telling them to stop does not make you a bad guy!

## Questions?



**Thank You**

# EVALUATION

Thank you for participating in today's presentation. Please take a minute to evaluate and provide us with your input.

There are three methods available:

- 1) Complete the paper evaluation provided in your room; or
- 2) Type this link into your web browser;  
[https://ndstate.co1.qualtrics.com/jfe/form/SV\\_cACndD2yHxEGSsl](https://ndstate.co1.qualtrics.com/jfe/form/SV_cACndD2yHxEGSsl)
- 3) Using a barcode scanner app on your smartphone, scan the QR code.



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