

Best Practices for Crack Treatments for Asphalt Pavements

NCHRP Report 784

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*Thanks to the Program
Committee for inviting me.*



Cracking in Asphalt Pavements

- First Asphalt Road in U.S. ~ 1828
- First Observance of Cracking ~ 1830*

* Undocumented!



Objective of Crack Treatments

- **Minimize intrusion of water into underlying layers of pavement structure**
- **Efforts are major element of every maintenance engineer's work**

Crack Treatment Definitions

- **“Working” crack**
 - A crack that is moving as a result of contraction and expansion during seasonal changes
 - May be challenging to identify
 - 1/8” (3mm) is generally accepted as classification criterion

Crack Treatment Definitions

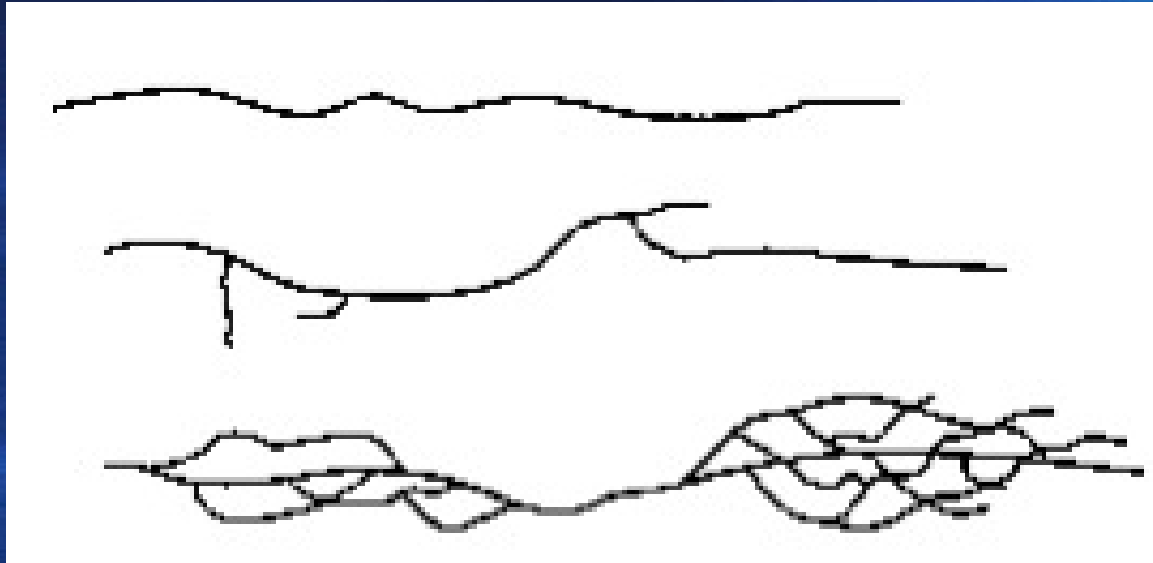
- **Crack Sealing**
 - Used for “working” cracks $> 1/8$ ” (3mm)
 - Materials placed into cracks in order to prevent intrusion of water and incompressibles into cracks
 - Commonly used as a transverse crack treatment

Crack Treatment Definitions

- **Crack Filling**

- Placement of materials into “non-working” cracks to substantially reduce water infiltration and reinforced adjacent cracks
- Commonly used as a longitudinal crack treatment and/or in temperate climates

Potential Cracking Conditions

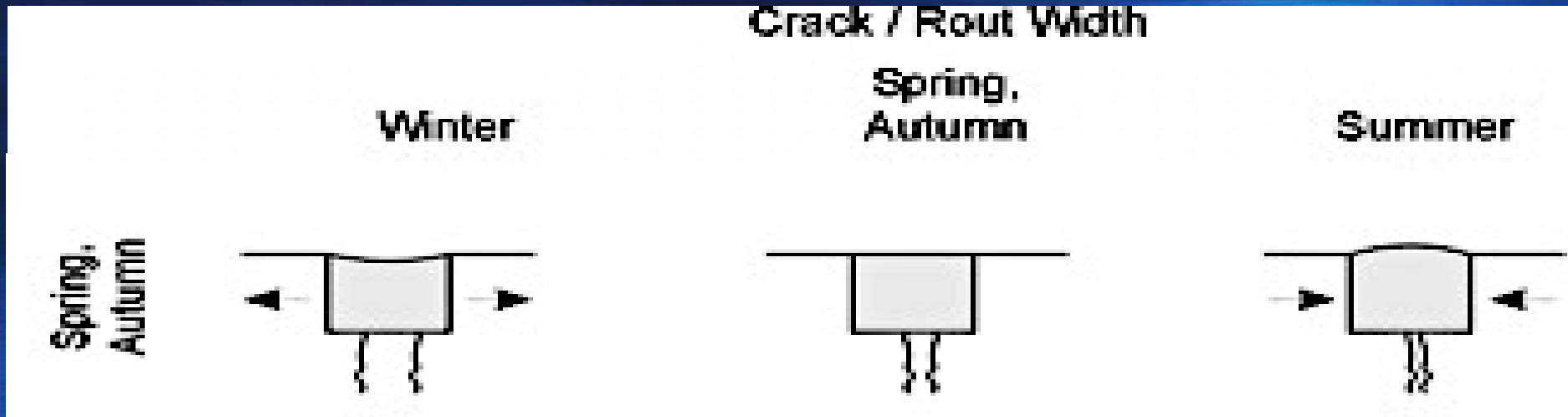


Poor Choices for Crack Treatments



**BEST PRACTICES
FOR
CRACK TREATMENTS**

Seasonal Impacts

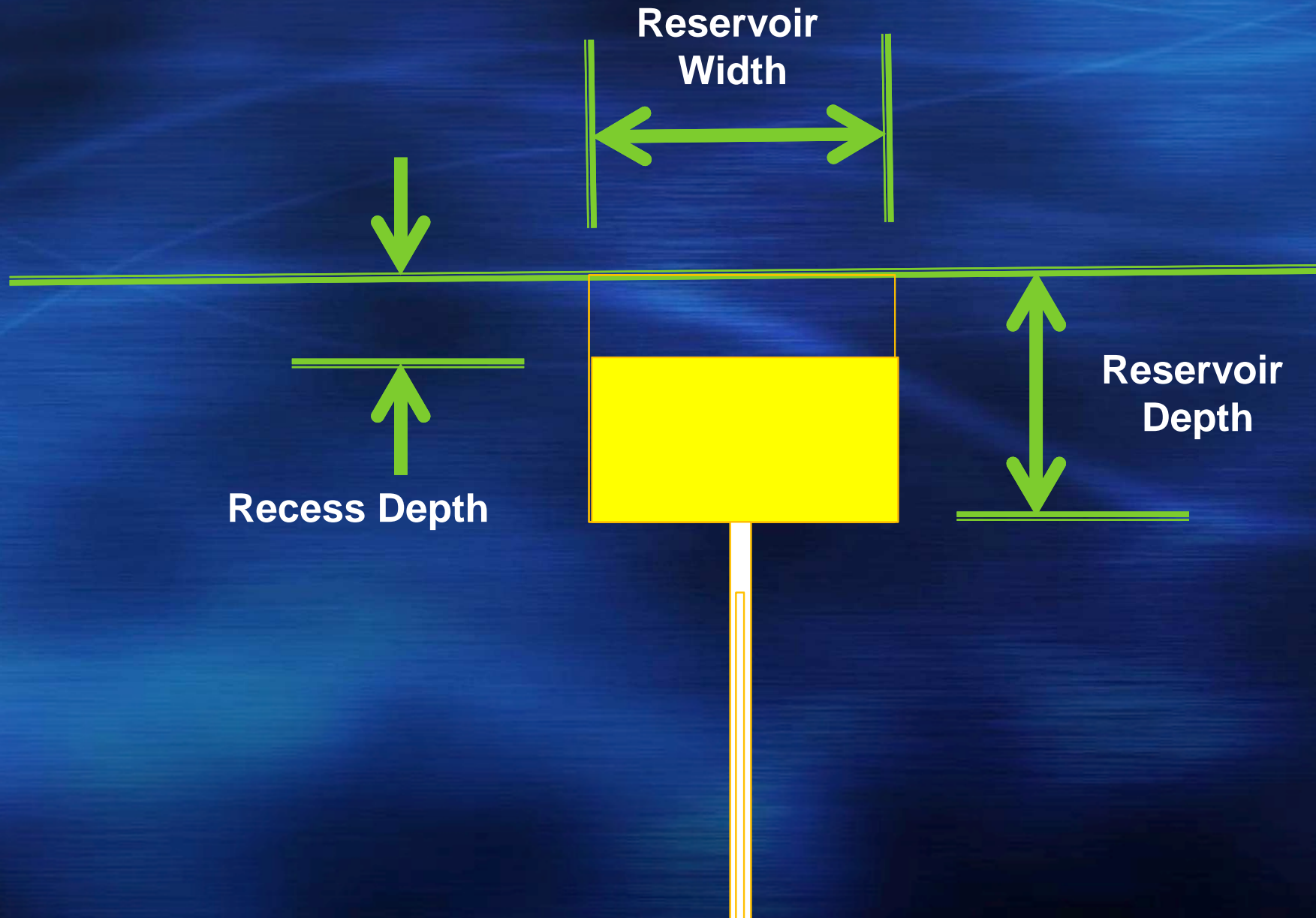


- **Spring/Autumn Treatment**
 - Crack is at “middle” size
 - Less deformation of sealant during cold and hot temperatures

Crack Treatment Geometry

- **Recessed with Routed Crack**
- **Flush Fill with Routed Crack**
- **Flush Fill with Non-Routed Crack**
- **Overband with Routed Crack**
- **Overband with Non-Routed Crack**

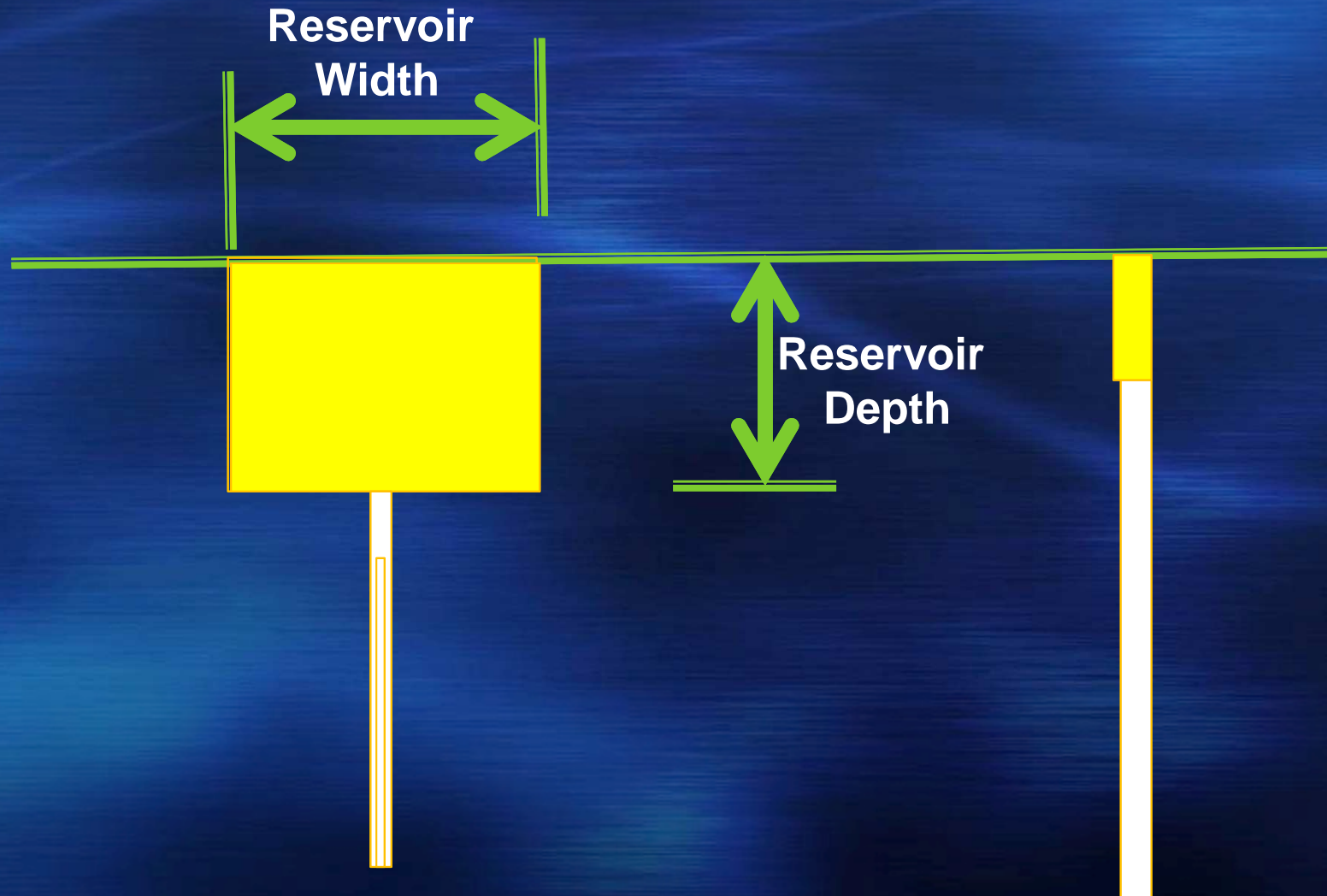
Recessed Geometry



Flush Fill Geometry

Routed

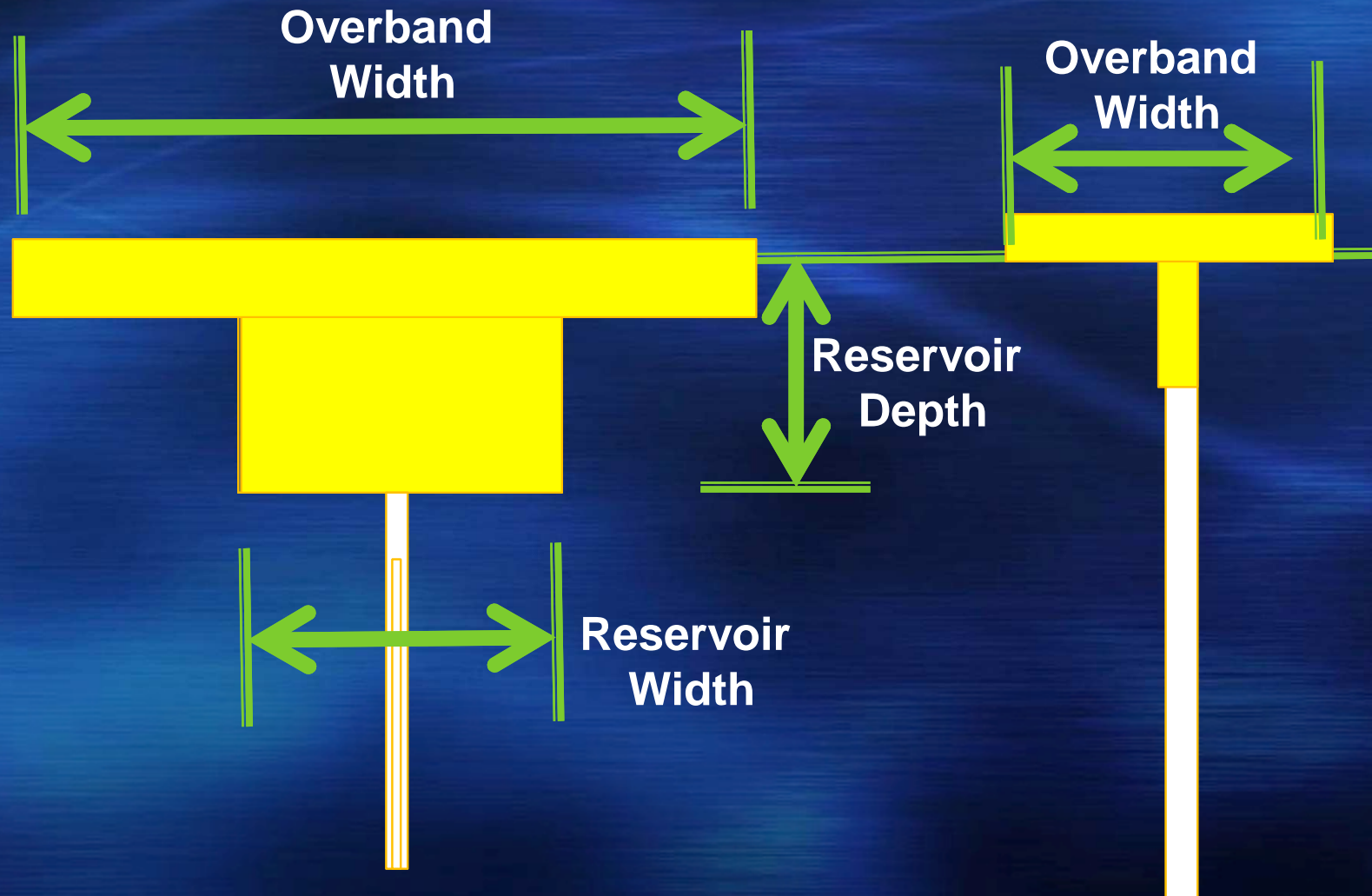
Non-Routed



Overband Geometry

Routed

Non-Routed



Crack Treatment Materials

- Crack sealing costs:
 - Labor – 66%
 - Equipment – 22%
 - Materials – 12%
- *“More cost effective to use a product that will last longer, even if it is more expensive”*

Nebraska Department of Roads

An aerial photograph of a residential street. A large, dark puddle of water is on the asphalt road, reflecting the sky and trees. The street is flanked by sidewalks and grassy areas. A blue car is parked on the right side of the road. The text "Where to start???" is overlaid in large, bold, yellow letters at the bottom of the image.

Where to start???

Project Design

- Evaluate existing conditions
 - “Working” or not; type, density, climate
- Past, present and future rehabilitation activities are understood
- Right preparation of crack for treatment
- Right techniques to install sealant
- Proper selection of sealant product

Crack Treatment BP

- Block
- Longitudinal
- Reflective
- Transverse

Treatment not usually successful for fatigue cracks and is not recommended.

Project Selection



Where are crack treatments not appropriate?

Project Selection

- Crack **sealing** not appropriate
 - Cracks are too wide, too deep or too numerous
 - Non-working cracks (filler is cheaper and quicker)
 - Deterioration too severe (fatigue)
 - Rehab scheduled within 2 years
 - Sealing would cover >25% of area

Project Selection

- Crack **filling** not appropriate
 - $>1/8''$ (3mm) per year movement
 - Deterioration too severe
 - CIR scheduled in near future
 - Reconstruction scheduled within 2-3 years

Preparation for Crack Treatment

- Routing to establish geometry
- Compressed air to clean
- Hot compressed air lance to remove dust and moisture
- Backer rod if necessary

Best Practices

- **Climatic Conditions**
 - **40-70°F (4-20C)**
 - **Low humidity**
 - **No precipitation**
 - **Low wind**

Construction Procedures

- Crack treatment prior to **overlay**
 - Primary overlay issue is time
 - Complete crack treatment 1-3 years prior to overlay
 - For same-season overlay, use recessed configuration
 - Generally no changes made to crack treatment operations

Construction Procedures

- Crack treatment prior to **surface treatment**
 - Primary issue is time
 - Generally no changes made to crack treatment operations
 - Crack treatment should be done one season before surface treatment
 - For same season, at least one month between operations
 - More time is better

Construction Procedures

- Crack treatment prior to **surface treatment**
 - Procedures do not vary by planned surface treatment type
 - Do not rout if microsurfacing is planned
 - Determine compatibility of crack sealant with surface treatment
 - Do not perform HIR over crack sealant

Best Practices



- **Crack Configurations**
 - **Recessed/Routed**
 - **Used when overlay is to be placed**
 - **Minimizes potential for a bump**
 - **3/8" (9mm) recess is common**
 - **Place sealant 6-12 months prior to overlay**
 - **Not used commonly (35%)**

Best Practices

- **Crack Configurations**
 - **Flush Fill**
 - **Widely used (50%)**
 - **Routed or Non-Routed**
 - **Used when surface treatment is to be applied**
 - **Non-Routed used for crack filling**
 - **Squeegeed surface common**

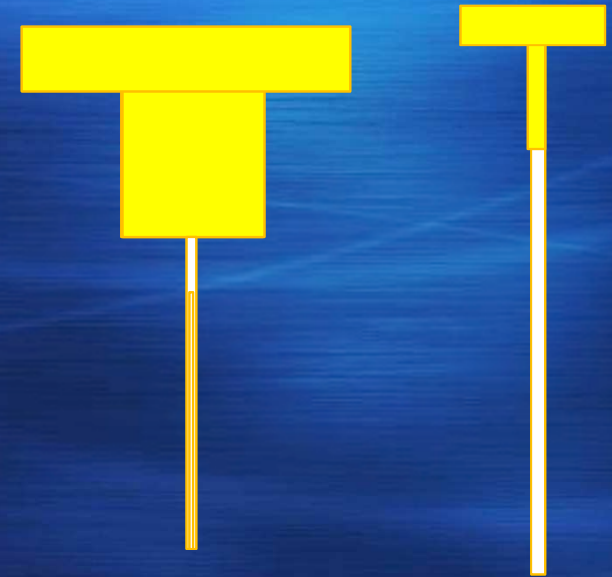


Best Practices

- **Crack Configurations**

- **Overband**

- **Traffic soon after placement on low volume roadways**
- **Traffic can track**
- **Not used if overlay planned**
- **Either squeegeed or left as cap**
- **No more than 3" (75mm) wide**





← Overbanding

Excessive
Overbanding →



Routing Recommendations

- **Do Not Rout:**
 - **Crack opening $< 1/8''$ (3mm)**
 - **Fatigue cracks**
 - **Crack density is high ($< 30'$ (9m) apart)**
 - **Overall pavement thickness $< 2''$**
 - **Pavement condition is poor**
 - **Pavements being considered for rehabilitation**

Routing Recommendations

- Touch both sides of crack (1/8") (3mm)
- Minimum Width of cut: 1/2" (12mm)
- Maximum Width of cut: 1-1/2" (25-38mm)
- No spalling of cut face
- Use backer rod if deep crack
 - Sealant too deep, potential for cohesive failure is high

Crack Cleaning

- Crack must be clean and dry prior to sealant application
- Power sweeper or vacuum cleaner



Crack Cleaning



← Compressed Air

Vacuum →



Crack Drying

- Hot air lance used to dry crack
- Also warms surface to enhance bonding
- **DO NOT OVERHEAT THE MIX**



Don't Burn the Crack



Construction Procedures

- Anti-tracking approaches (Blotter)
 - Blotter sand
 - Release agent
 - Plastic/paper

Most don't use blotter



Closure

- **Goal of crack treatments is to achieve a pavement maintenance application that will perform well**

Best Practices

- **“Use the right materials at the right time for the right conditions”**
 - **Jim Sorenson**
- **Have the right people with the right training**
 - **Dale Decker**



NCHRP

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NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM

Best Practices for Crack Treatments for Asphalt Pavements

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES



Alabama Condominiums

Thank You!

Merci!

Gracias!

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