Pavement Crack Treatment

Crack treatment overview.

- Why and when to treat cracks.
- Evaluating pavement and selecting product.
- Proper application and equipment.
Why treat cracks?

Prevents water intrusion into the sub-base.
Why treat cracks?

Prevents incompressible intrusion.
– Improves ride quality smoothness.
Why treat cracks?

Slows down pavement deterioration.
Cracks are inevitable, and neglect leads to accelerated cracking and potholing, further reducing pavement serviceability.

(FHWA-RD-99-147)
“With proper and timely application, crack sealing and filling can extend pavement life past the point where the cost-benefit of added pavement life exceeds the cost of conducting the operation.”

(FHWA-RD-99-147)
Why treat cracks?

- Protect your largest investment.
- Pavement failure imminent
- Crack treatments are cost-effective, up to 9 years of performance.
- Extends pavement life.
When to Seal Cracks?

- Soon after they appear… any crack opening will allow moisture penetration into pavement foundation (sub-base).

- At minimum all cracks \( \geq 1/8" \).
What cracks to treat?

- Water Intrusion
- Incompressible Intrusion
- Edge Joints

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Crack Evaluation

- "Working" (high movement)
  - ≥ 3mm movement
  - Thermal

- "Non-working" (low or no movement)
  - < 3mm movement
  - Longitudinal
  - Block
  - Fatigue
Two Different Treatments

Crack Sealing

“Working” cracks - [10% of cracks]-
“The placement of specialized treatment materials above or into working cracks using unique configurations to prevent the intrusion of water and incompressibles into the crack.”

(FHWA-RD-99-147)
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- ≥ 3mm movement.
- Will develop in 2-7 years on most new pavements, 1-3 years on overlaid concrete.
Crack Preparation / Routing

- Rout at least 1/8” from each crack face.
- Keep centered over crack.
- Reduce spalling by using as many cutters as possible.
Performance Crack Filling

“Non-working” cracks - [90% of cracks]- “The placement of ordinary treatment materials into non-working cracks to substantially reduce infiltration of water and to reinforce the adjacent pavement.”

(FHWA-RD-99-147)
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), over-band 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 - “Fatigue (alligator)"

Definition:

• Caused by repeated traffic loading
• Occurs in heavy traffic areas and wheel paths.
• Cracks form in closely spaced, interconnecting block patterns.
• Sure sign of pavement structural failure.
• Considered low or no movement “non-working” cracks- < 3mm movement.
Crack Type - “Fatigue (alligator)”

Same street- slurry seal treatment two years later.

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Slurry Seal

• Slurry Seal Industry:
• “Crack sealing is absolutely necessary for optimum slurry seal performance”.
• All cracks 1/8” and larger.
• Can slurry seal over fresh hot-pour crack sealant the next day when necessary.
• Preferably, when time permits, wait 2-3 months before slurry sealing over crack sealant.

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Large Cracks

Polymer modified/aggregate materials

- No Air Voids
- No Compaction
- Adhesive

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Forget It!

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Product Selection

Cohesive Failure       Adhesive Failure

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Crack sealants and crack fillers need to remain functional over the range of anticipated pavement temperatures.

Determine temperature ranges with LTPPBind

- [www.tfhrc.gov/pavement/ltpp/reports/03080/](www.tfhrc.gov/pavement/ltpp/reports/03080/)
- [www.tfhrc.gov/pavement/ltpp/ppt/bind.ppt](www.tfhrc.gov/pavement/ltpp/ppt/bind.ppt)
Types of products: (FHWA-RD-99-147)

Crack Filling

- Emulsion and asphalt cement fillers
  - At best 2 to 4 years performance in un-routed non-working cracks
- Rubber and fiber-modified asphalt fillers
  - 6 to 8 years performance in un-routed non-working cracks
Crack Sealing

- Rubberized (polymer-modified) asphalt sealants
  - 5-9 years performance in *routed* working cracks
- Rubberized (polymer-modified) asphalt sealants
  - 2.5-5 years performance in *un-routed* working cracks

Types of products: *(FHWA-RD-99-147)*
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Proper equipment - Basics

Melter Applicator

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

* Construction of HMA Pavements- Asphalt Institute

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Proper equipment - Basics

PAVEMENT CUTTER

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Proper equipment - Basics

Worn Cutters will not provide a good reservoir.

New Cutter

Worn Cutter
Installation Choices

- Rout or Not
- Size of Rout
- Cleaning Recess
- Flush
- Overband
Basic Needs Requirements

All applications

- Clean - most important
- Dry
- Intact pavement
- Proper temperature
  (pavement 40°F and application 400°F)

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Cleaning Methods

- Compressed air - sufficient pressure and velocity
- Vacuum - in combination with compressed air
- Heat lance - used to warm pavement when needed
- Routing - cuts new bonding surface

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Flush Fill Seal

Clean Crack

No Sealant on the pavement surface

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Recommended Overband

Correct

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NOT Recommended

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Summary *(Why Crack Seal?)*

- Prevents water intrusion into sub-base
- Prevents incompressible intrusion
- Improves ride quality smoothness
- Slows down pavement deterioration
- Cost effective
Summary (What Crack Treatment?)

- 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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