

How to Build Successful Crack Sealing & Filling Treatments on High Traffic Volume Roadways

SHRP R26 Workshop for the
preservation of High Traffic Volume
Roadways

Crack Sealing & Filling Treatments on High Traffic Volume Roadways

The Most Important Thing with High Traffic Situations is the Crack Treatment Should Perform Properly Extending the Pavement Life for as Long as Possible.



Crack Treatment Design Process

- Pavement Evaluation
- Temperature Ranges
- Process Selection
- Installation Geometry
- Sealant Selection
- Installation



Step 1 - Pavement Evaluation

- Cracks occur as the AC mix ages and can no longer resist stress and strain from temperature changes and traffic loadings. They fall into two categories;
 - High Movement
 - Transverse
 - Reflective
 - Low Movement
 - Longitudinal
 - Fatigue
 - Construction
 - Block



Step 1 - Pavement Evaluation

Guidelines for determining if reservoir usage is appropriate include:

1. Cracks density shouldn't exceed approximately 10-15% (linear feet of cracks per square feet of pavement area).
2. The pavement should be sound enough to resist significant spalling during reservoir cutting.

(Final reservoir width shouldn't exceed 1½" max.)

Step 2 – Pavement High/Low Temperature Range

FHWA LTPPBIND is the best system for indicating temperatures that could be used for design.

- Indicates 7-day average maximum and minimum pavement surface temperatures, with consideration of statistical reliability.
- High pavement temperatures range from approximately 52-70°C at a 98% reliability.
- Low temperatures range from approximately 0°C-40°C, at a 98% reliability.

Step 2 – Pavement High/Low Temperature Range

LTPPBIND program determines high and low pavement temps thus determining appropriate asphalt cement grade for use in asphalt concrete paving mixtures.

Typical asphalt grades include

58–40 for very cold climates

64–22 for moderate climates

70–10 for very hot climates

** For increased traffic loadings, increases in high temp grades are performed to require asphalts with greater rutting resistance*

Crack sealant or filler materials need to function at both the high and low temps they will be exposed to.

Step 2 – Pavement High/Low Temperature Range

Crack sealant materials need to function at both the high and low temps they will be exposed to.

The Process used for the sealing project should be adjusted to function within the temps the pavement will experience.

LTPPBIND provides the high to low pavement temperature range used for these decisions.

Step 3 - Cracks Sealing Process

Types & Selection (SHRP H106)

Different treatments for high and low movement cracks.

- **Crack Seal** – “Rout & Seal”

High Movement cracks require highly extensibility sealants in reservoirs.

- **Crack Fill** – “Blow & Go”

Low movement cracks require a flexible but stiffer materials placed in a reservoir or overband installation.

Step 3 - Cracks Sealing Process

Types & Selection

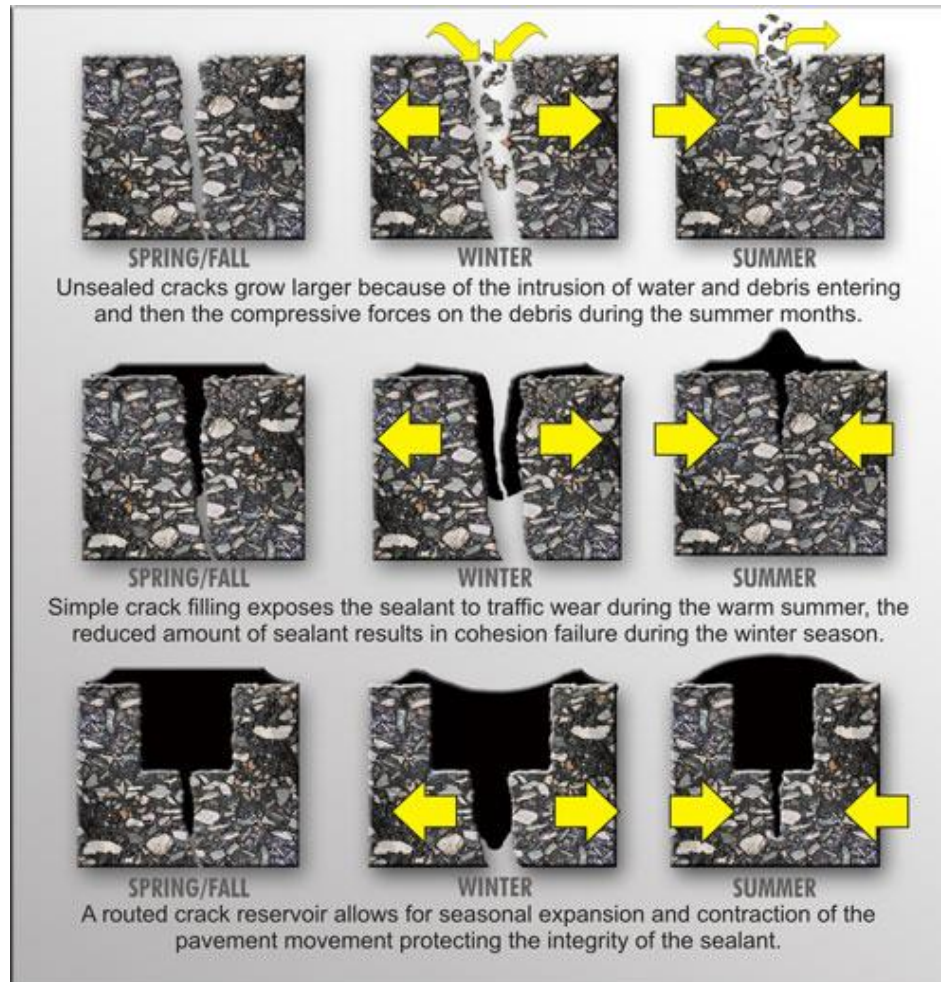
If cracks are wide enough, generally greater than $\frac{1}{4}$ inch wide, cracks may be cleaned and filled, without reservoir cutting. This type of application can be used when life expectancy does not exceed 2-3 years, or when the pavement/cracking type is not a widened reservoir candidate.

For longer lasting results are generally achieved with the use of a cut reservoir.

SHRP H-106 Best Performance

- **Crack Seal** -- High Movement Cracks
Rubberized asphalts installed in reservoirs with cap, 5-7 year life
- **Crack Fill** -- Low Movement Cracks
Rubberized asphalt installed in overband, +2 year life

Step 4 - Installation Geometry Selection



Crack
Movement

Crack Fill

Crack Seal

Step 4 - Installation Geometry Selection

Based on LTPPBIND 98% Temperature Range (difference from high to low) Asphalt Grade.

Minimum Reservoir Recommended

<u>Range</u>	<u>Width</u>	<u>Depth</u>
80 C or less	1/2"	3/4"
86°C	3/4"	3/4"
92°C	1 1/8"	1/2"
98°C or greater	1 1/2"	3/8"

Note: These recommendations are applicable for thermal crack spacing up to approximately 75 feet. For greater spacing, the next wider width can be used for improved results. Reservoir width should not exceed 1 1/2".

Step 4 - Installation Geometry Selection

Regardless of reservoir width, the cut needs to be centered in the crack.

If the crack is not followed correctly, and the reservoir is not centered over the crack, intermittent edge sealant adhesive separations will occur during winter crack opening cycles.

The depth to width ratio of the installed sealant influences its extensibility. The wider the reservoir (sealant) is in relation to depth the greater the extensibility of the seal.

Step 4 - Installation Geometry Selection

Widened reservoir cutting can be easily performed using commercially available pavement routers or cutters. These devices quickly and efficiently cut reservoirs, of the desired width and depth and can follow meandering cracks.



The future of cutting a reservoir is cleaner.



Step 5 – Sealant Selection

Sealant materials installed in cracks needs to be able to withstand hot summer pavement temps as well as cold winter low temps. Throughout the world climate and temp extremes vary widely. Different climates require sealant materials with differing properties, and may require different installation procedures.

Step 4 – Sealant Selection

Using the LTPP Bind temp. range select a sealant suited for your climate.

FHWA LTPPBIND Filler Temperature Rating	Crafco Recommended Filler Products by Climate
82-4	34200, 34526, 34533
82-10	34200, 34533
82-16	34200, 34533
76-4	34521, 34533, 34534
76-10	34200, 34533
76-16	34202, 34533
76-22	34202, 34532
76-28	34202, 34532
70-10	34250, 34518, 34541
70-16	34201 NM, 34250
70-22	34201 NM, 34202, 34532
70-28	34202, 34532
64-10	34516, 34518
64-16	34241, 34516
64-22	34211, 34241, 34515
64-28	34515, 34535
64-34	34515, 34535
58-16	34241, 34250
58-22	34241, 34211
58-28	34515, 34535
58-34	34515, 34535
58-40	34514, 34522
58-46	34514, 34522

FHWA LTPPBIND Sealant Temperature Rating	Crafco Recommended Sealant Products by Climate
70-16	34201 NM
64-10	34201 NM, 34211
64-16	34211, 34241
64-22	34201, 34221, 34515
64-28	34221, 34534, 34515,
58-10	34211, 34241
58-16	34211, 34241
58-22	34201, 34221, 34515
58-28	34231, 34515, 34522
58-34	34522, 34231
58-40	34514, 34522

Step 5 – Alternative Sealant Selection Process

- Look to the approved products list for your State.

Step 6 - Installation

Loose debris must be removed and bonding surfaces cleaned.

There are 3 recommended cleaning methods that can be used:

1. *CLEAN* Compressed Air
2. Hot Air Lance – *Warms & Dry*
3. Vacuum – *NO DUST*

Step 6 - Installation

Sealant must be prepared according to manufacturers instructions.

****Proper Application Temperature****

****Proper Weather****

Cracks should be filled from the bottom up.

Three final sealant configurations/finishing can be used:

1. Under fill - *Before Overlay*
2. Flush fill – *Squeegee Excess*
3. Overband cap. – *Sealant on top of pavement*

Step 6 - Installation

Sealant Blotting/Detackifying: Toilet Paper



Step 6 - Installation

Sealant Blotting/Detackifying: Spray Applied Solutions



Toilet Paper

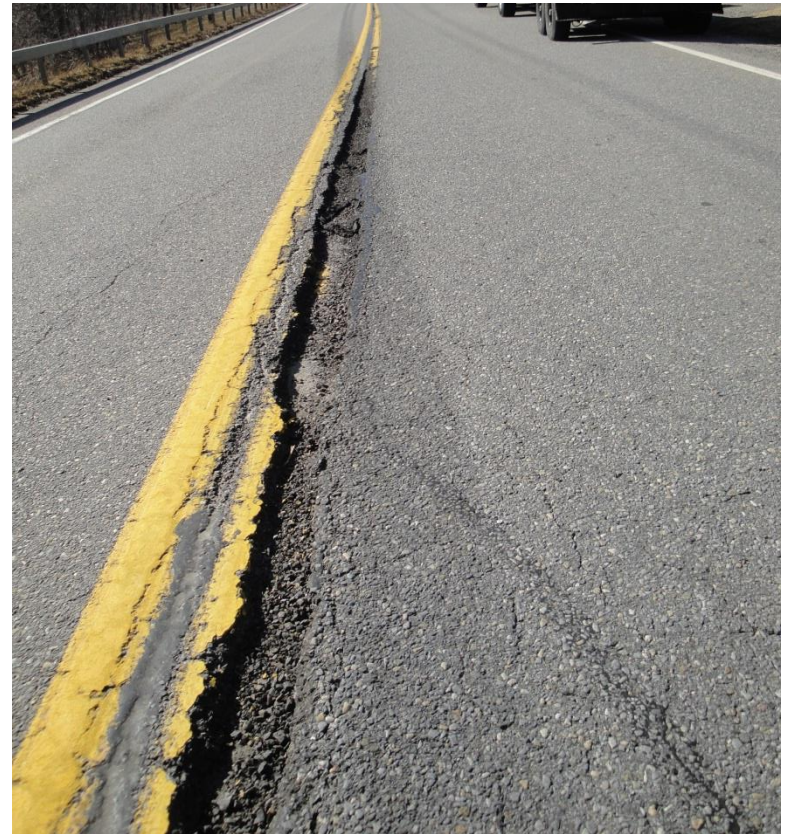


Blotting

Blotting the sealant allows for a smaller work zone.



Cracks Wider than 2" Require Crack Patching



New Hot Applied Mastic Repair Materials



- Flexible
- Water Proof
- Highly Adhesive
- Aggregate Filled
- No Compaction
- Ready for Traffic Quickly
- Good Skid Resistance



New Hot Applied Mastic Repair Materials





High Traffic Volume

Extremes