CRACK SEALING AND FILLING

Lowell Parkison, Crafco, Inc.

Why Crack Seal?

Crack Sealing and Filling

- Why seal the cracks?
  - Sealed cracks today, do not turn into potholes tomorrow
    - Without crack sealing, 75% of cracks form into potholes in less than 3 years (Utah DOT[1])
    - With crack sealing, 1% of sealed cracks develop into potholes in less than 3 years (Utah DOT)
  - Fewer potholes result in less base damage, fewer repair emergencies and less pothole repair material

[1]Belangie, Michael C. and Anderson, Douglas I.. May 1985. Crack Sealing Methods and Materials For Flexible Pavements. Utah Department of Transportation. Salt Lake City, UT. Report FHWA/UT-85/1.

Crack Sealing Is The Lowest Cost Preservation Treatment[2]

Treatment[1]	4-Year Avg. Cost ($/yd^2)
Paver Placed Surface Seal	$4.70
HMA Mill and Overlay	$4.34
HMA Overlay	$3.59
Double Microsurfacing	$2.35
Ultra Thin Overlay	$2.29
Double Chip Seal	$2.27
Single Chip Seal	$1.31
HMA Crack Seal	$0.26

The next lowest cost treatment is a Single Chip Seal that is 4 times more expensive

[2]Ram, Prashant and Peshkin, David. April 2013. Cost Effectiveness of the MDOT Preventive Maintenance Program – Final Report. Michigan Department of Transportation. Bureau of Field Services. Lansing, MI. RC-1579.

Crack Sealing Has The Highest Benefit-Cost Ratio[2]

	Benefit-Cost Ratio	
Treatment[1]	Flexible Pavements	Composite Pavements
Double Microsurfacing	0.09	0.24
HMA Overlay	0.10	0.03
HMA Mill and Overlay	0.11	0.06
Double Chip Seal	0.18	0.14
Single Chip Seal	0.22	
HMA Crack Seal	0.46	0.19

A dollar spent crack sealing returns more benefit than a dollar spent with other surface treatments

2. Ram, Prashant, and Peshkin, David. April 2013. Cost Effectiveness of the MDOT Preventive Maintenance Program. RC-1579. Michigan Department of Transportation. Lansing, MI.

Crack Sealing; The Basics

Crack Sealing - Definitions

- Crack Sealing vs Crack Filling
  - Working Cracks – Crack Sealing
  - Non-working Cracks – Crack Filling
  - Working Cracks > 1/8-inch (3 mm) movement
  - Crack sealing consists of installing extensible sealants into reservoirs in working cracks in pavements in good conditions
  - As Crack spacing decreases, movement in the cracks decreases
  - Rule of thumb, less than 20 ft spacings are non-working cracks
  - Crack Filling consists of installing flexible, traffic resistant product into prepared, cleaned non-working cracks.

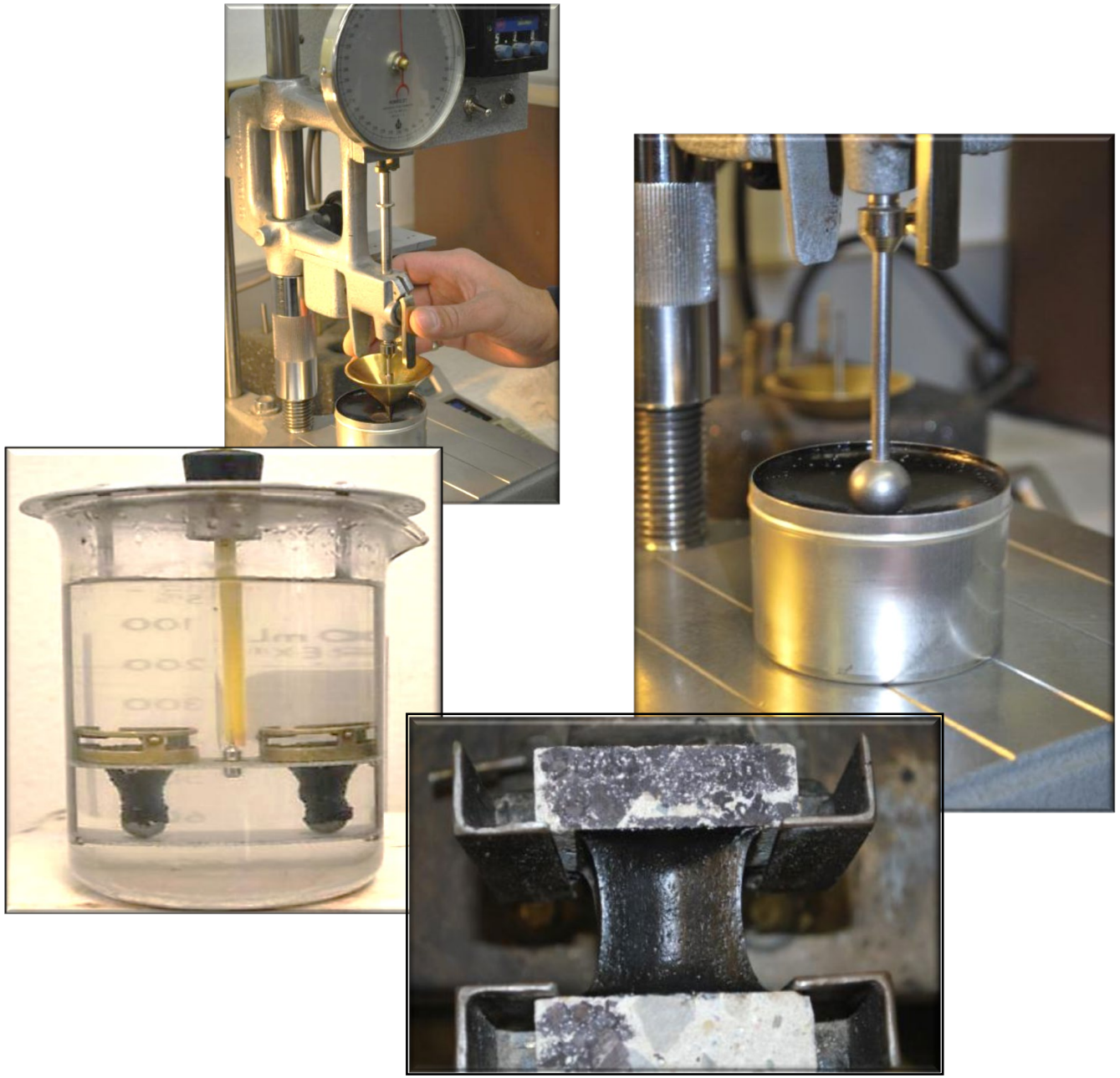
Specifications

- ASTM D6690 *Standard Specification for* ***Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements***[3]
  - Crack Sealant Specification
  - Four types
    - Type I – For moderate climates (-18˚C low temperature testing)
    - Type II – Most common specification (-29 ˚C low temperature testing)
    - Type III – replacement for obsolete Federal Specification SS-S-1401c
    - Type IV – Cold Climate Specification (-29 ˚C low temperature testing, 200% extension)

3. ASTM International, Barr Harbor Drive, West Conshohocken, PA

Test Methods

- Cone Penetration
- Resilience
- Softening Point
- Bond to Concrete



Specifications

- ASTM D5078 *Standard Specification for* ***Crack Filler, Hot-Applied, for Asphalt Concrete and Portland Cement Concrete Pavements***[3]
  - Cone Penetration at 25 ˚C
  - Cone Penetration at 4 ˚C
  - Softening Point
  - Resilience

3. ASTM International, Barr Harbor Drive, West Conshohocken, PA

Formulation

- Soft Enough Asphalt, Asphalt/Extender to reach low temperature properties
- Polymer
  - Meet high temperature properties
  - Not too tough so as to decrease adhesion
- Ground Tire Rubber
- Filler
- Other Additives

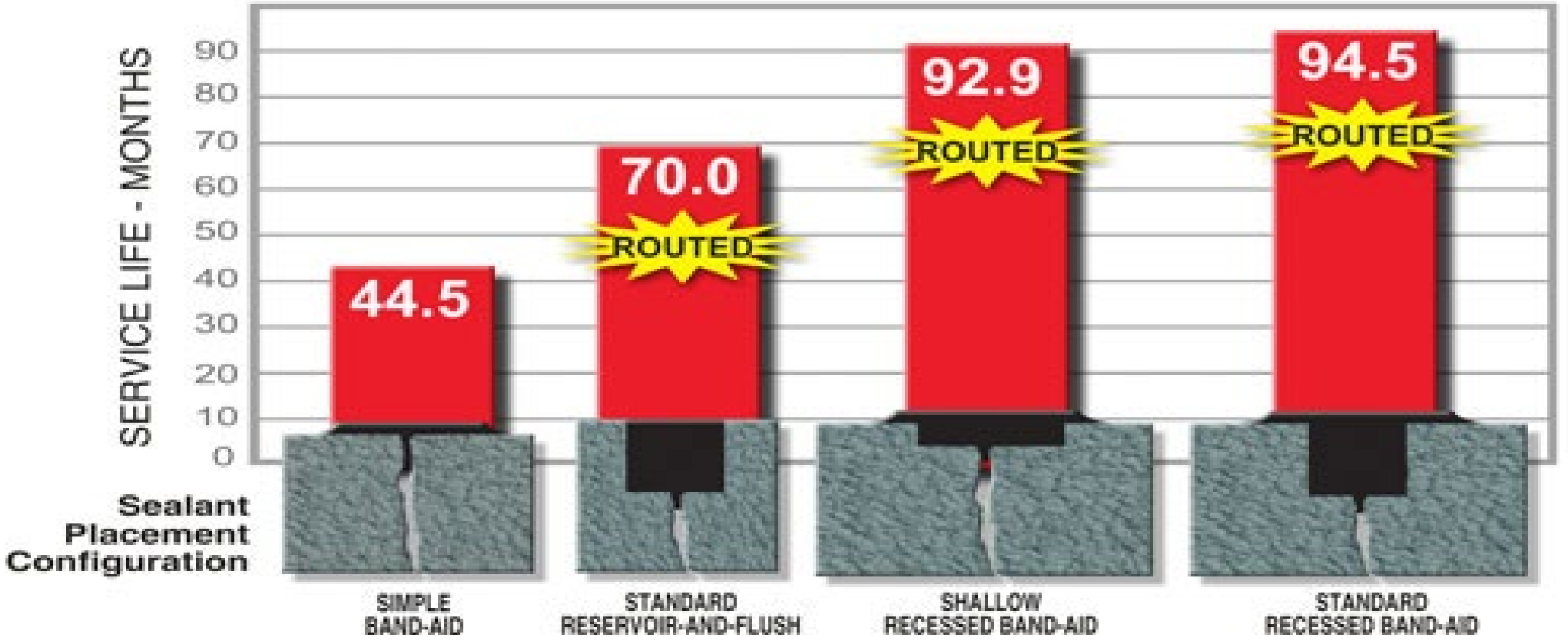
Cleaning

- Cracks must be thoroughly clean and dry before application of crack sealant. Both sides of the crack shall be clean
- Cracks can be blown out
- Or vacuumed

Routing

- Routing increases the width of the crack which reduces sealant extension requirements
- Proper reservoir depth to width ratio based on UTI.

Sealant Placement Impacts Service Life



[1]Smith, K.L., and A.R. Romine. 1999a. *Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements.* FHWA-RD-99-147. SHRP-H-348 Asphalt Pavement Repair Manuals of Practice. Strategic Highway Research Program, Federal Highway Administration, Washington, D.C.

[2]Smith, K.L., and A.R. Romine. 1999b. *LTPP Pavement Maintenance Materials: SHRP Crack Treatment Experiment, Final Report.* FHWA-RD-99-143. Federal Highway Administration, Washington, D.C.

Proper Application

- Select Proper sealant
- Proper Temperature
- Can be flush filled
- Overbanding improves performance
- Overbanding with tip
- Or with squeegee

Crack Sealing Resources

PPRA'S Road Resource Website

RoadResource.org


PPRA
Better roads today. Stronger networks tomorrow.
RoadResource.org
A COMPREHENSIVE RESOURCE FOR
OPTIMIZING NETWORK MANAGEMENT

Three Associations Join Together to Support the Industry at Large

AEMA™
ASPHALT EMULSION MANUFACTURERS ASSOCIATION

ISSA®
PRESERVING PAVEMENT

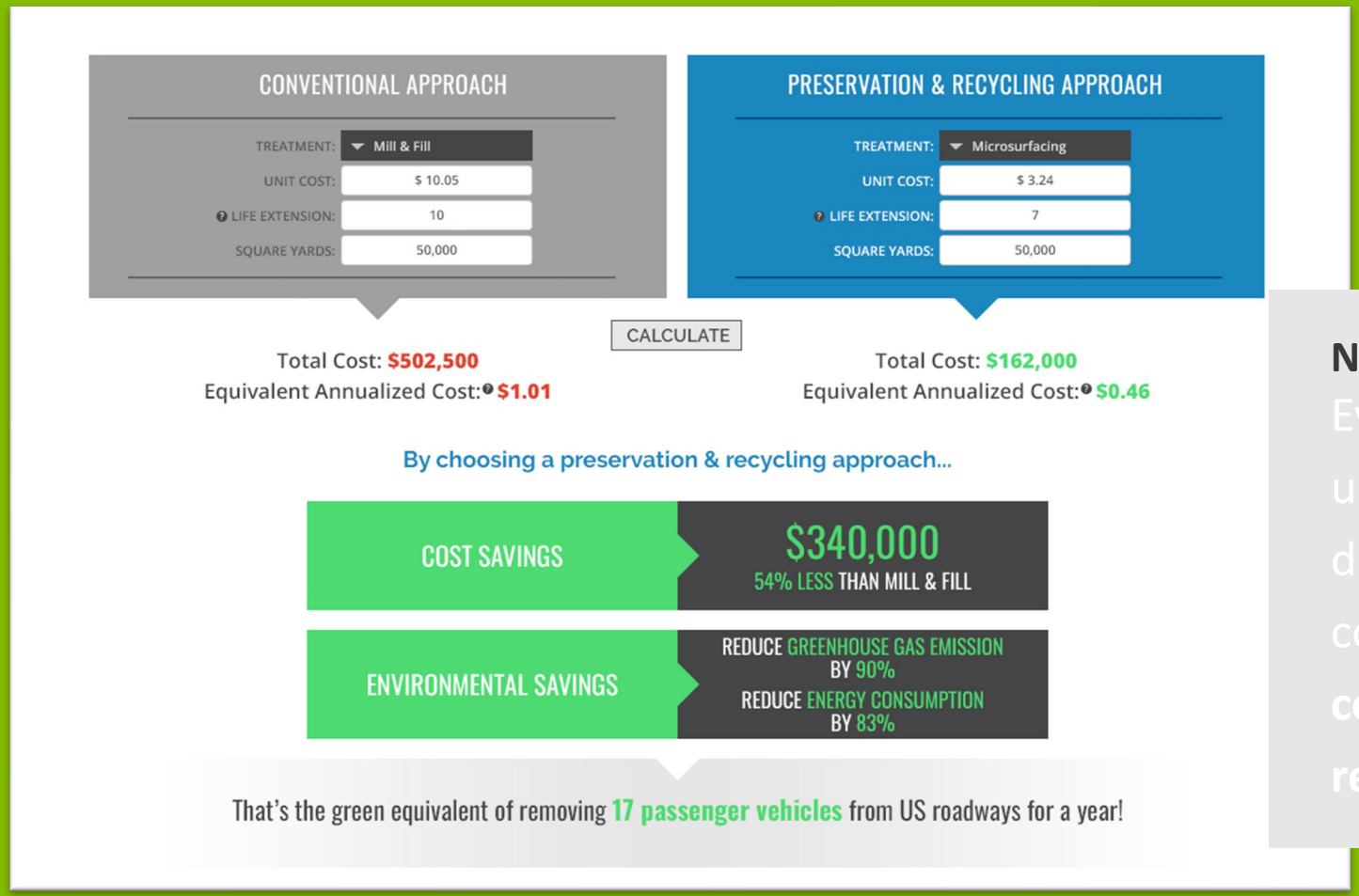
ARRA™
Asphalt Recycling & Reclaiming Association

FORMING THE PAVEMENT PRESERVATION & RECYCLING ALLIANCE

PPRA™
Better roads today. Stronger networks tomorrow.

Compare Treatments

Project Cost & Environmental Benefits



NOTE ON COST:

Every calculator gives users the ability to use average life extension numbers and cost data from an internationally aggregated cost survey (US & CA) **or input their own costs and life extension relevant to their region.**

Equivalent Annualized Cost

PPRA
Better roads today. Stronger networks tomorrow.

Compare treatment cost based on Life Extension

Use our nationally aggregated data or enter your own data

Treatment Type	Cost Per Sq Yard	Life Extension	EAC $ SY/YEAR
Crack Seal	$0.50	2	$0.25
Fog Seal	$1.00	3	$0.33
Single Surface Tr,	$2.00	5	$0.40
Double Surface Tr.	$4.25	8	$0.53
Thin Overlays	$7.00	10	$0.70
Mill-and-Fill	$12.00	12	$1.00
Cold In Place	$17.00	15	$1.13
Reconstruction	$25.00	20	$1.25
-	-	-	-

Clear Data / Chart Your Own

CHART IT

AMAP Pavement Preservation Training

- AMAP technical board plans to create a basic pavement preservation training
- Goal: to provide educational materials about the benefits of pavement preservation, and an overview of various materials and techniques. This will be a “101” type course for general knowledge.
- Partnering with Crafco’s training department to develop the web-based training. Crafco is providing the software to develop content and offering technical assistance. Content will be developed with a variety of partners and will be reviewed by the board.

AMAP Pavement Preservation Training

- Timeline & Next Steps:
  - Announce training initiative at AMAP conference in Houston Feb 2022
  - Spring; finalize training plans and identify team that will help provide content
  - Summer; compile and finalize content; develop draft training for review
  - Fall; review/finalize content for publication, create communication and roll out plan
- For more information or questions, please contact Mark Stewart or Dave Ploense.