

Pavement Maintenance Design to Meet Expectations

2014 NWPMA Seattle, October 2014



A performance leader in cold mix and pavement maintenance products and technology for over 50 years

HERE'S WHY CONGRESS NEEDS TO REAUTHORIZE FUNDING TO REBUILD AMERICA'S INFRASTRUCTURE:

65% of America's major roads are rated in **less than good condition**

25% of our bridges require **significant repair** or can't handle today's traffic

45% of Americans lack **access to transit**



WH.GOV/REBUILD-AMERICA

Existing resources, strategies are not keeping up with national transportation demands!

AN ECONOMIC ANALYSIS OF TRANSPORTATION INFRASTRUCTURE INVESTMENT

July 2014



Maintenance and rehabilitation consume about **80% of the typical local budget** today, leaving only 20% for local improvements and new construction.

With a constant budget, are there options to shift dollars from maintenance to new construction or will maintenance continue to grow?

**MTP2035 Issue Papers:
Road Maintenance**



DRIVER EXPECTATIONS ARE BEING COMPROMISED EVERY DAY



THE PLAIN DEALER

MORE THAN 1.3 MILLION READERS IN PRINT AND ON CLEVELAND.COM WEEKLY | 75¢ NEWSSTAND 63¢ HOME DELIVERY

SATURDAY, APRIL 6, 2013

ODOT held negligent for failing to fix potholes before fatal crash

State must pay woman's family \$3.34M in 2008 accident

WHAT ARE YOUR EXPECTATIONS WHEN PLANNING A PROJECT or REPAIR?



- ✓ Are you expecting a permanent or temporary solution?
- ✓ How many times are you expecting to repeat the same repair annually?
- ✓ Is the design within limits of your materials, tools and installation?
- ✓ Are the tools and material capable of meeting your expectations?
- ✓ **What are your options if expectations are not met?**



What is green and what does it mean relative to product performance and environmental impact?

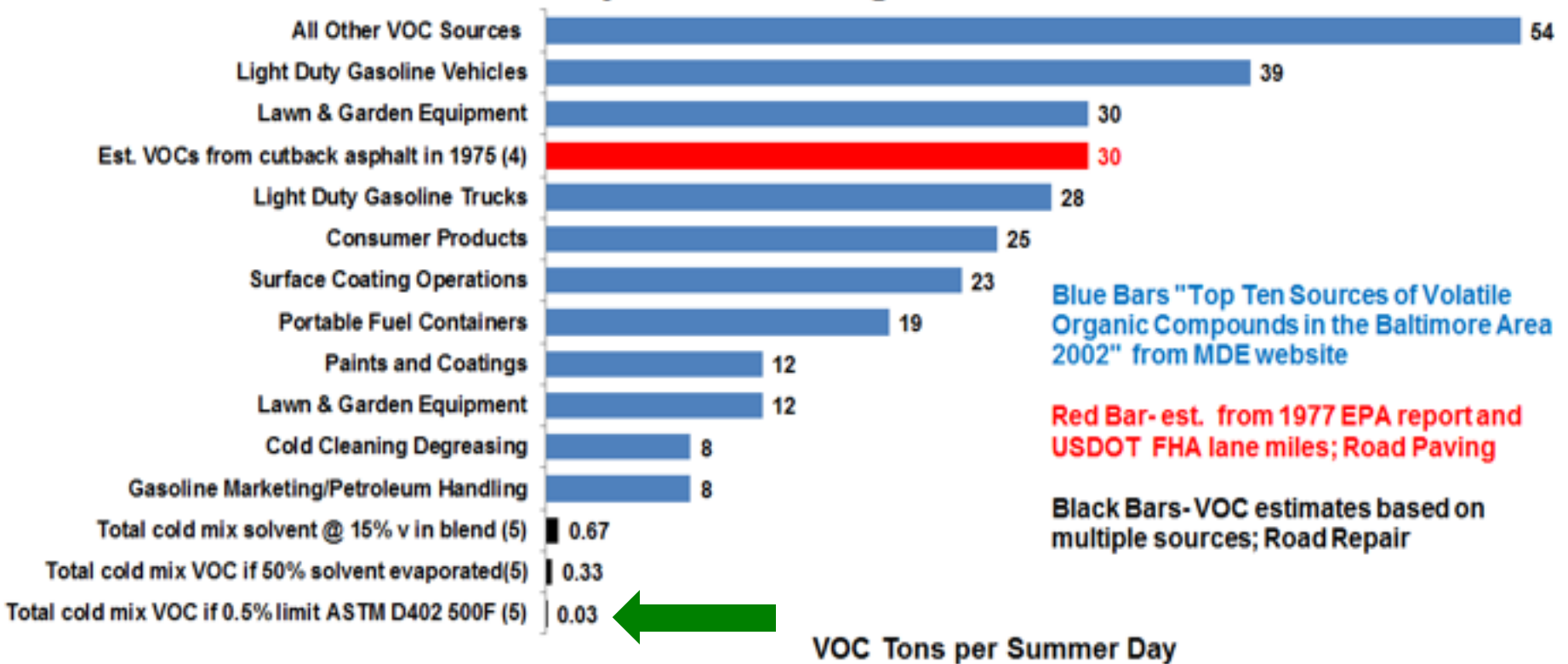
It is critical for pavement maintenance products to meet expectations, if performance expectations are not met, is green of value?

All UNIQUE products are designed to perform and be environmentally friendly.

Products are tested internally and by independent labs to verify industry acceptable performance.

Following the standard industry protocol, UNIQUE has demonstrated that UPM[®] mix does not contribute to VOCs or environmental damage to aquatic life.

Maryland VOC Categories and Estimated Cutback VOCs



The VOC contribution from cutbacks used in road repair are magnitudes less than other known sources.

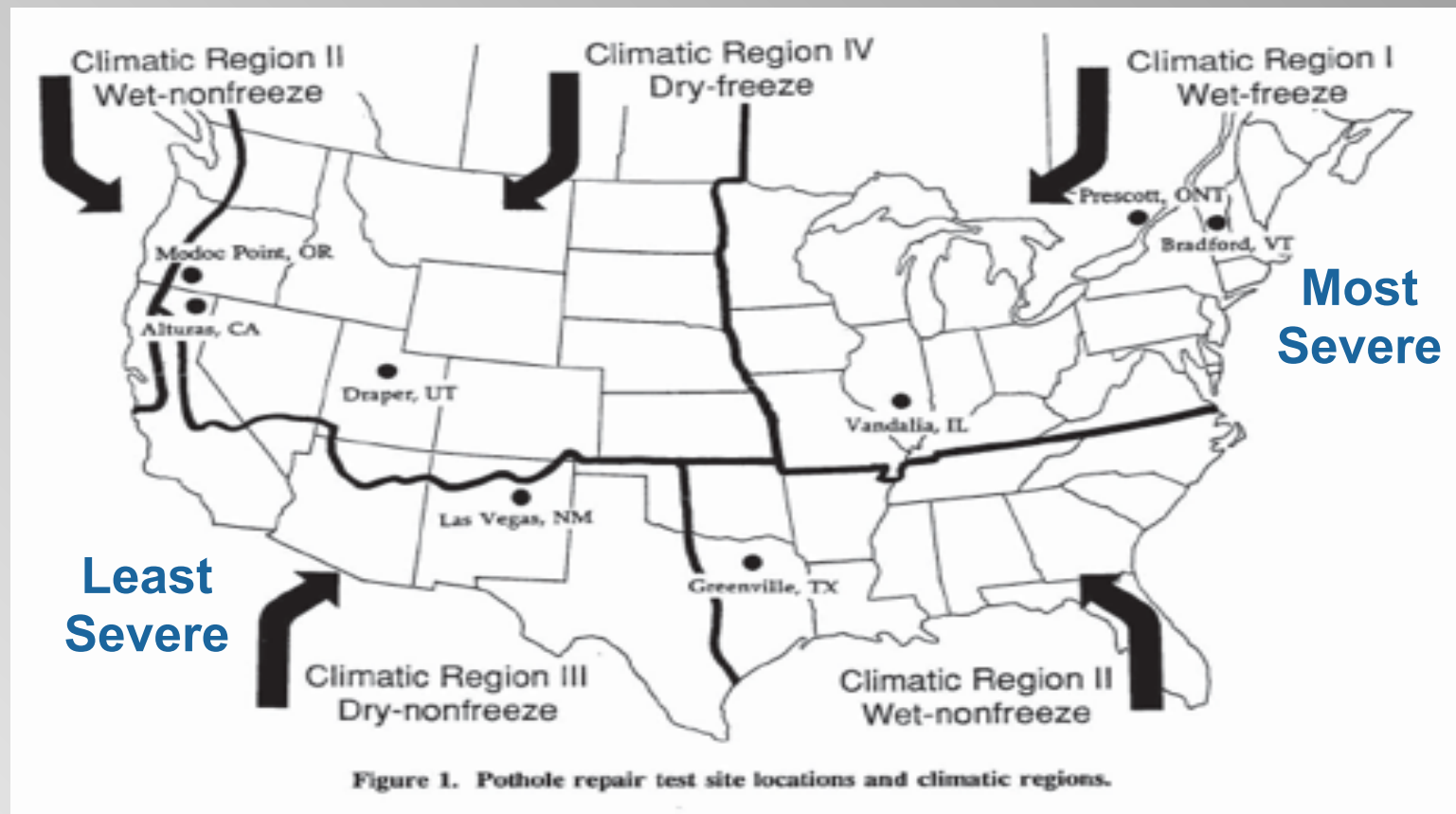
VOC legislation implemented in the 1970s essentially eliminated VOC emissions from cutback road paving applications by shifting to emulsions.

1. **Will performance expectations be achieved**
2. **Are they politically or economically green**
3. **Are they cost effective**
4. **Can they be applied with existing tools**
5. **Will additional training be required**
6. **Is the green benefit measurable**

Work with those interested in pursuing green to clarify expectations throughout the life cycle including manufacturing, installation, performance and long term maintenance.

Selecting maintenance techniques and products to meet expectations

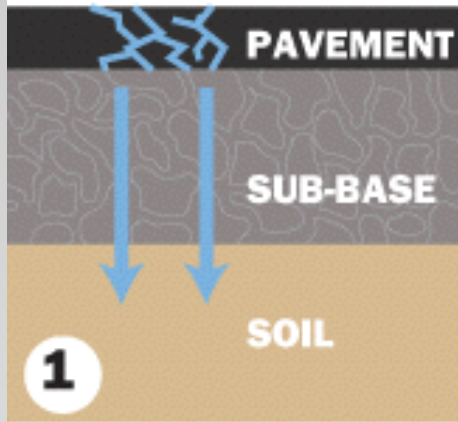
“Patches placed in the dry-freeze region exhibited a higher rate of success than those placed in the wet-freeze region (93% vs. 48%).”



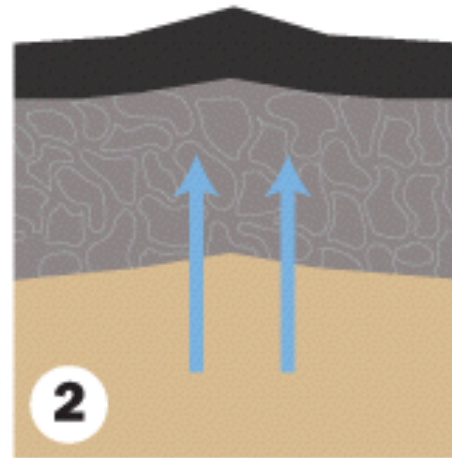
Source: Innovative Materials Development and Testing Volume 2: Pothole Repair Strategic Highway Research Program-H-353

HOW DO POTHOLES FORM?

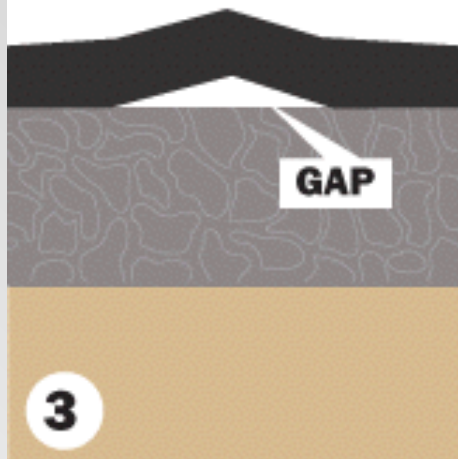
Winter weather does more than close schools and disrupt lives: it also brings about ideal conditions for potholes to form.



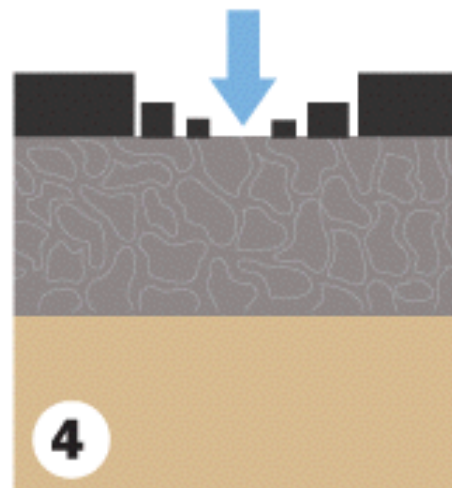
Water seeps through cracks in the pavement into the soil



Water freezes and expands, causing surface to rise

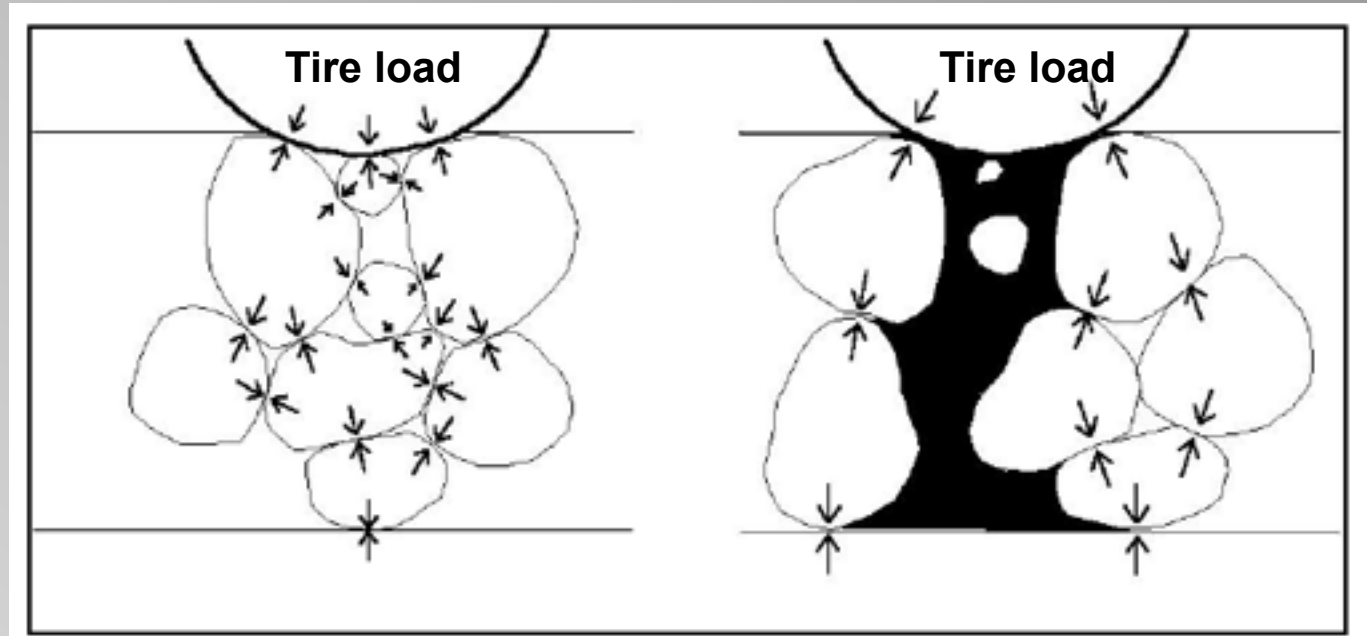


The ice melts, leaving a gap beneath the road



Car tires collapse the surface into the gap, causing a pothole

Water in the pavement structure will exert tremendous pressure if voids are filled with water while loading.



Heavy traffic will load and compress the road surface at a rate faster than the water can drain. Unlike air, water is not compressible and separates asphalt attached to aggregate. The process creates mineral fines that are washed away leaving larger voids, increasing porosity and accelerating damage.

POOR INSTALLATIONS CONSUME RESOURCES AND CAN REDUCE RIDE QUALITY ON AC



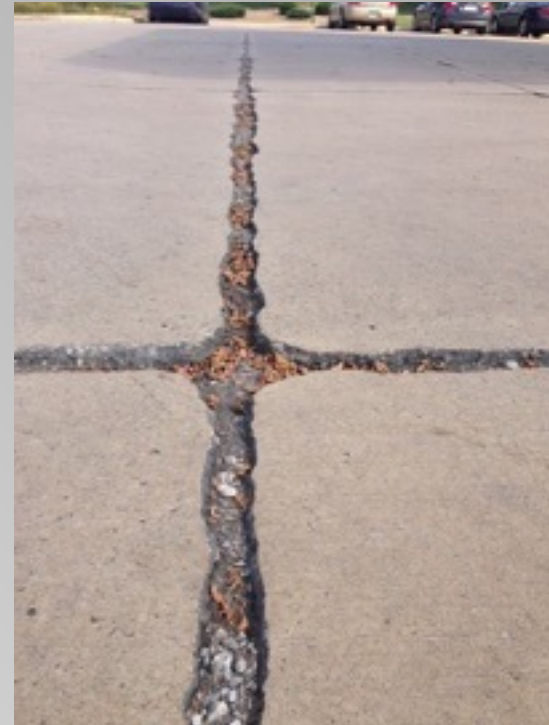
EXCESSIVE SEALANT
Labor intensive

**POOR WORKMANSHIP will
compromise ride quality**





- Active pad movement
- Water in crack migrating to base
- Freeze-Thaw surface damage
- Cracks too wide for conventional crack filler.
- Economical solution



Hot applied or cold applied AC, know the pros and cons:

- Cost
- Performance life
- Equipment required
- System reliability
- Manpower requirements
- Safety concerns





A. Flush Fill



B. Over-band



C. Standard Reservoir and Flush



D. Shallow Recess Over-band




E. Standard Recessed Over-band

- There is no single solution for every crack sealing application.
- Labor, material, equipment cost & safety must be considered.
- The combination of reservoir and over-band helps to maximize sealant performance.

Make performance demonstrations and field training a requirement for material vendors. The value of Best-in-Class materials will only improve with proper use.

Life Cycle cost for crack filling combinations presented a range in expected performance. Define expectations as part of maintenance solution.

Year of Service	Material	Fill Techniques
<p>8</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>.</p> <p>1</p> 	<p>Modified Rubber AC</p>	<p>Standard Recessed Over Band</p>
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Crack filling materials should meet pavement expectations for load and sealing out water. All crack sealers seal out water, wide cracks may require load bearing capability.

Crack Width	UNIQUE Recommendation
<i>0-1"</i>	<i>Kold-Flo® Cold Pour Crack Filler</i>
<i>1-3"</i>	<i>MICRO MIX™ sand mix using UPM mix technology</i>
<i>3" plus</i>	<i>UPM Permanent Pavement Repair Material</i>

CRACK FILLING 1" to 3", CRACKS SEAL AND SUPPORT TRAFFIC LOAD; HMA or CONCRETE



**MICRO MIX sand mix repair
material dense course sand**



**UPM cold mix
Open Grade 3/8"
minus aggregate**



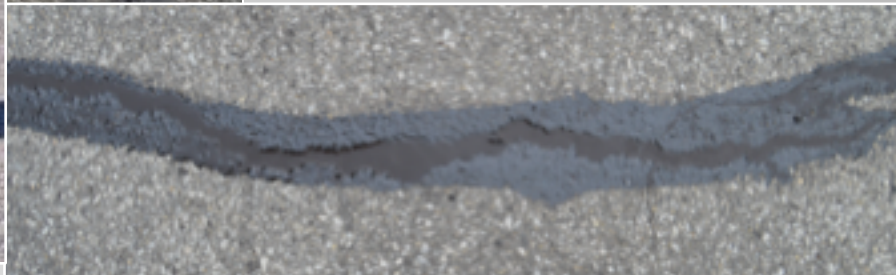
**MICRO MIX
sand mix
provides better
crack filling
performance
compared to
cold mix; both
filling and
sealing;
applicable to
smaller cracks**



CRACK FILLING MATERIALS AND APPLICATION DEFINES PERFORMANCE-HMA



Hot pour or cold pour, proper installation techniques affect performance. Define performance and total cost expectations including equipment. Request demonstrations prior to making decisions.



CRACK FILLING MUST MEET THE NEEDS OF THE CRACK-CONCRETE



MICRO MIX sand mix repair installed into 1' to 6" wide cracks.

Request demonstrations



Use de-tack powder if need to immediately open to traffic.

Design solutions are added into products and applications.



Wide cracks occur due to poor installation and material design. Undesirable, but must be filled or area replaced. To maintain ride quality crack fill material must support load.

Recommendation is *MICRO MIX* sand mix or *UPM* mix



MICRO MIX (sand mix)



Peace Bridge, USA to Canada, concrete, heavy traffic, excessive pad movement, rubberized crack filler not meeting expectations on 1-4" cracks. UNIQUE offers **MICRO MIX** sand mix with monthly monitoring.



Conduct field trials,
qualify performance in
your applications.
Set expectations!



**Sometimes the
problems are
obvious.**



UPM Permanent Pavement Repair Material

Pothole patching in the U.S. is likely the single most common pavement maintenance technique used to repair roads.

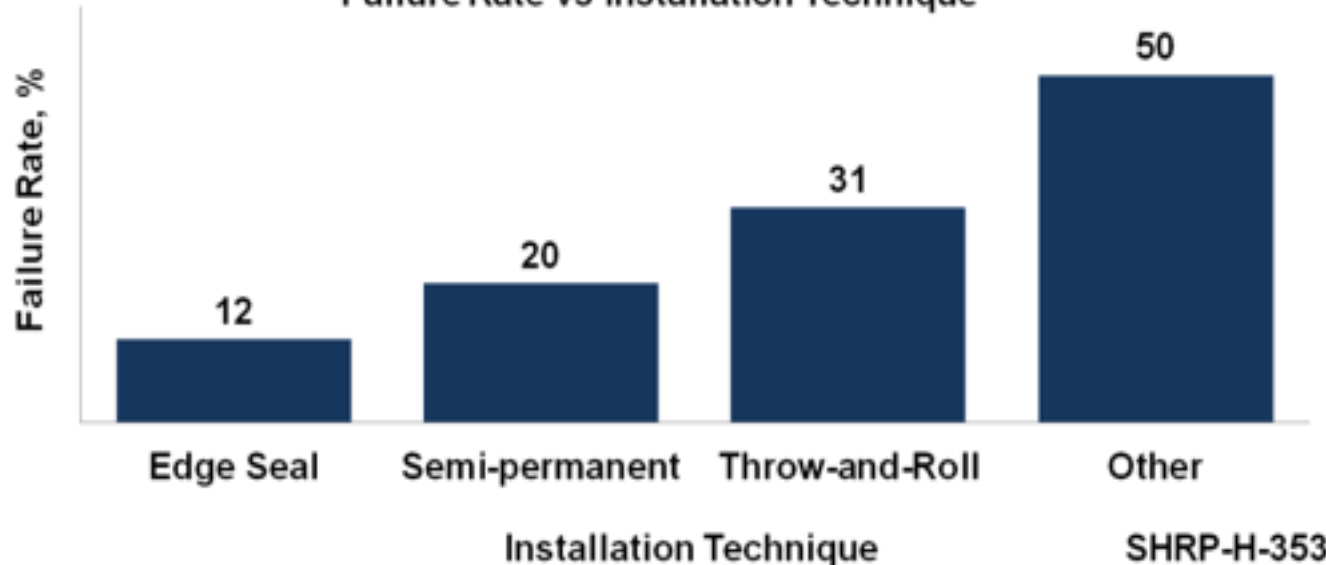
It is possibly the most overlooked opportunity to improve local maintenance effectiveness.

Patching methods and materials have been studied in most states and in the Federal Strategic Highway Research Program.

The overall recommendation from all studies is to utilize the best materials available to reduce repatching.

“The cost of repatching the same pothole over and over because of poor-quality material quickly offsets the savings from purchasing a less expensive cold mix. In most cases, the poorer performance associated with inexpensive cold mixes will result in greater overall cost for patching because of increased cost of labor, equipment, traffic control, and user delay.”

Failure Rate vs Installation Technique



Select the installation method to meet expectations.

Average productivity values for various operations

Procedure	Average Productivity (tons/hr)	Laborers Recommended	Average Productivity (tons/person-day)
Throw-and roll	1.6	2	3.2
Edge seal	1.4	2	2.8
Semi-permanent	0.3	4	0.3

source: SHRP-H-353

The TOTAL cost of cold mix repair is what impacts the budget, NOT the cold mix material cost.

Don Koehler 10-18-2014

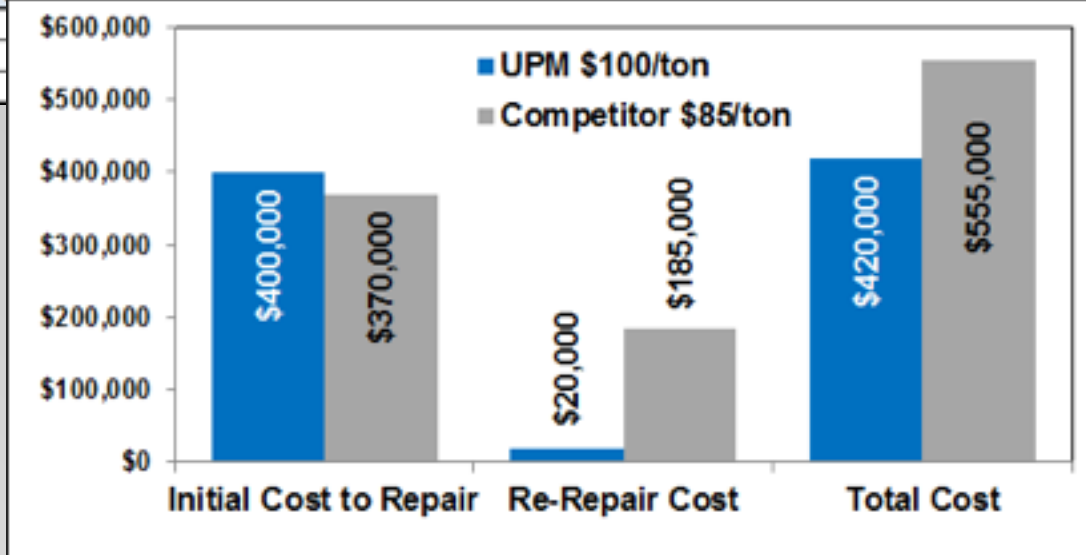
Components of Total Cost	UPM mix		Competitor	
	Initial Repair	Re-Repair	Initial Repair	Re-Repair
Cold Mix price, \$/ton	\$100.00	\$100.00	\$85.00	\$85.00
Cold Mix usage, total tons/Year	2,000	167	2,000	1,000
Cold Mix usage, tons/month	167	14	167	83
Cold Mix pounds/pothole	100	100	100	100
Cold Mix Survivability	95%	5%	50%	50%
Labor Cost, \$/hour	\$20.00	\$20.00	\$20.00	\$20.00
Equip/Fuel Cost, \$/hr	\$20.00	\$20.00	\$20.00	\$20.00
Number of Crews	3	3	3	3
Men per Crew	2	2	2	2
Potholes repaired per hour	10	10	10	10
Labor Cost/Pothole, \$	\$12.00	\$12.00	\$12.00	\$12.00
Equip/Fuel Cost/Pothole, \$	\$6.00	\$6.00	\$6.00	\$6.00
Material Cost/Pothole, \$	\$5.00	\$5.00	\$4.25	\$4.25
Total Cost of Single Pothole	\$23.00	\$23.00	\$22.25	\$22.25
Potholes/month	3,333	167	3,333	1,667
Potholes/year	40,000	2,000	40,000	20,000
Initial Cost to Repair	\$920,000		\$890,000	
Re-repair Cost, \$/Year		\$46,000		\$445,000
Tons of Cold Mix required	2,167		3,000	

Re-repairs will exceed maintenance resources

Initial Cost Savings to Repair using UPM	
Savings using UPM based on Re-repairs	
Total Saving using UPM	

Labor and equipment can be 95% in an emergency situation.

1 ton of UPM mix is equivalent to 1.4 tons of competitive cold mix.



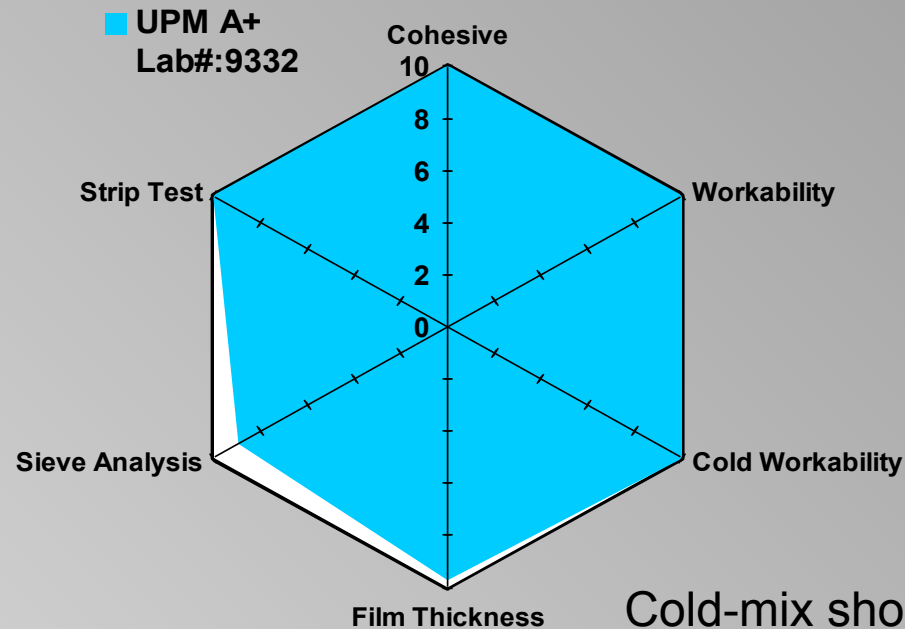
WHAT ARE THE CRITICAL CHARACTERISTICS of a COLD MIX?



Major mix attributes & testing factors that have been correlated to field performance:

1. Cohesiveness
2. Workability
3. Cold Workability
4. Film Thickness
5. Sieve Analysis
6. Strip Test

Parameters are weighted based on comparative field-lab correlation; creating a balanced rating, if achieved will guarantee superior field performance.



Cold-mix should be seasonally graded to guarantee workability in all weather.

All parameters are interdependent, overall field performance deteriorates rapidly if any one parameter fails.



**Best in Class
Performance Guaranteed
Most Tested
Best in Value**

Document field performance:

- RAVELLING
- PUSHING
- DISTORTION

Request supplier to supply test material.

Document: (photograph as much as possible)

Specify locations

Include application date

Include method of placement

Note ambient temperatures and weather

Field performance criteria will be used to measure the effectiveness of the patch material.

A total of twenty patches should be used for the rating process, ten each within two discrete areas from one another preferably representing two different work crews.

Request supplier to provide plan and documentation forms for field evaluations.



REQUIRE SUPPLIER TO VERIFY PERFORMANCE



Before installation



3 years after installation



After installation



7 years after installation

Installation Date: May 2007
Location: Weston Street & New Road, Hartford, CT
Installation Conditions: Sunny and warm

THIS IS NOT EFFECTIVE WITH ANY MATERIAL!



**THROW and GO
QUICK and EASY, but a waste of resources and
increases maintenance to remove failed material from
tree lawns and storm drains.**



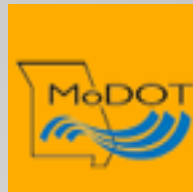


11/28/12, installation

Missouri DOT, St Louis, heavy truck traffic and water from hillside maintains constant surface water and hydrostatic pressure forces water up through base.

Re-repair required every 10 days.

No additional repairs following installation of **UPM** mix.



BELLEFONTAINE



9/24/14, 22 months

SHIFTING TO A PREMIUM PAVING MATERIAL, TACKING FOR INCREASED SEALING



**Typical re-repair every 90 days.
materials and installation procedures, changes the result.**

HOW TO CREATE A PERFORMANCE-BASED SPECIFICATION FOR HIGH-PERFORMANCE PERMANENT COLD MIX

UNIQUE offers multiple educational documents to aid you in presenting your road requirements throughout your organization. **(11 pages)**

The background information, test methods and acceptable performance ranges are based on industry studies and fifty years working with CM in the field and lab.

BACKGROUND

Cold mix performance is determined by the length of time it stays in the repair. This term is referred to as survivability. It can range from minutes to outlasting the surrounding pavement.

Survivability is controlled by these parameters:

Material quality	Controllable
Installation technique	
Surrounding road condition	
Traffic	Uncontrollable
Weather	

Managing the controllable parameters for maximum survivability and optimizing performance with application will create the lowest overall cost and greatest value.

CM quality is a combination of engineering design, aggregate, asphalt and additives, both quality and quantity, and production method. Proper design targets the highest performance CM. Each production event must include pre-testing incorporated into engineering/production design to account for variability.

Productions based on pre-testing and design is the only means to achieve consistent high quality. Following production with analysis is the only method available to confirm quality

enforceable CM performance specification?

Performance variations incorporated by suppliers, sometimes random and sometimes intentional, complicate the understanding of CM performance. This variability creates the opportunity for selected suppliers to claim equivalence or superior survivability even though it is not substantiated or true.

Controlled head- to-head lab or field testing is the only method to verify equivalence.

Most suppliers offer CM as a secondary product to Hot Mix Asphalt (HMA) using available aggregate and asphalt from HMA production.

Price per ton is second to survivability in a properly designed performance based specification. Reason being, each time the CM fails it must be re-repaired, doubling material cost and labor.

Labor and equipment represent 60-80% of the total repair cost. In an emergency these costs will increase to greater than 95% of total cost. Any savings in initial price will quickly be exceeded by the increased need for CM, labor and equipment.

Purchasing specifications based solely on initial price will NOT PROVIDE the overall lowest value.

The best CM performance specification will focus on the overall lowest cost and primary cost components, not initial selling price.

Unique Cold Mix Field Evaluation Procedure

This field evaluation procedure recognizes performance differences between materials on a basic installation and compares them to a "throw-and-roll" procedure. It is designed to recognize variability and evaluation cost. The procedures to be included are:

A program goal is to differentiate materials. Differentiation can be achieved through exposure to traffic, wear, and parameters. Parameters are typically random and program design will result in characteristics being observed.

Program design must include a minimum program duration. Example test programs are:

Program design should utilize the opportunity for variability.

When repairs are more than two inches deep, water is not a problem as the cold mix will not adhere to wet pothole surfaces. To achieve a one inch compacted cold mix to achieve a one inch compaction the cold mix should be preferred to a slight depression inches deep should be repaired passes using the rear truck tire tire bridging over the patch (surface compaction of test material).

Large deep repairs typical of urban areas are being filled. Non compacted causing failure.

Test materials should be represented in the area where the cold mix is

Unique provides field testing manuals and assistance. (10 pages)

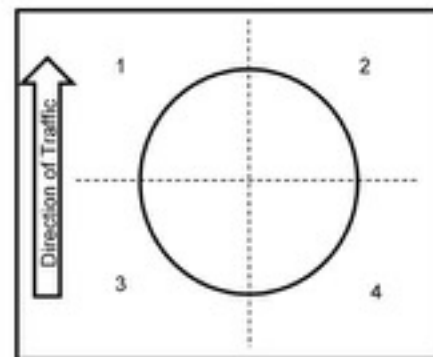
Date: _____

Inspector: _____

Patch No.: _____

Photograph No: _____

Comments: _____



Distress Types	Quadrant				Average
	1	2	3	4	
Bleeding					
Dishing					
Edge Disintegration					
Missing Patch					
Raveling					
Shoving/Tracking (Specify)					
Workability (Installation only)					

Distress Types	Rating			
	4	3	2	1
Bleeding	None	< 30%	> 30% but < 60%	> 60%
Dishing	None	< 6.4 mm	> 6.4 mm but < 12.5 mm	> 12.5 mm
Edge Disintegration	None	< 30%	> 30% but < 60%	> 60%
Missing Patch	None	< 30%	> 30% but < 60%	> 60%
Raveling	None	Pock marks on surface due to loss of fines	Larger particles loose, loss limited to surface	Damage not limited to surface
Shoving	None	Localized bulge < 12.5 mm	< 12.5 mm but < 25 mm	Depth of corrugation > 25 mm
Workability (Installation)	Easily Workable	Requires moderate effort, no clumps	Requires moderate effort, clumps in material	Requires significant effort, clumps in material

Products Claiming Equivalence to UPM[®] mix.

UNIQUE provides technical articles to aid in qualifying industry claims. (2 pages)

In the early 90's the Strategic Highway Research Program of the National Research Council conducted a series of studies. Many of the multiple publications generated from these studies utilized UPM[®] Permanent Pavement Repair Material as the standard for cold mix performance evaluations. Being the first cold mix and available throughout North America made UPM mix the logical choice. The performance evaluations included locally available DOT and commercially available materials. As there were multiple studies there were multiple combinations of materials tested with UPM mix being tested in nearly all studies. UPM mix was consistently rated higher than most cold mixes. For this reason nearly all commercial cold mixes marketed in North America have claimed or currently are claiming equivalency to UPM. They make this claim without supporting documentations or authorization from Unique, the manufacturer of UPM.

In many bidding situations for local municipalities and state DOT bids, UPM or equivalent performance is required. Many bidders simply claim equivalence without support. Right or wrong the claim is accepted and products are accepted within the bid process. Many times the incorrectly approved product fails; forcing the purchasing organization to incur increased expense and inconvenience. While this may result in blocking failed products from participating in future bids, it does not protect organizations from the many entry level cold mixes continuing to claim equivalent performance.

Every UPM mix production is analyzed to verify quality control specifications. Test verification is a critical component established over 50 years ago. Any product claiming equivalency to UPM mix will require frequent analysis to maintain consistent quality.

The purpose of this document is to offer a definition of equivalence to UPM mix. For those marketing products interested in making claims as equivalent to UPM mix, Unique suggests the following options:

- 1: Conduct a 12 month local performance evaluation.
2. A stockpile mix sample should be supplied to the Unique laboratory for testing.

Option 1: The material should be installed in all weather conditions and typical traffic patterns using the throw-and-roll or better installation techniques. The materials should be monitored and performance documented relative to UPM mix. Only materials the agency has placed on the approved product list maintained by the agency, will be allowed to be bid. All others will be deemed as non-compliant. In order to be placed on the approved product list, a minimum of 2.5 tons of material will be provided to the agency for the evaluation.

The evaluation of the material will be for a period of 12 months and a portion of the material must be installed by agency personnel between January 1st and March 1st. All mixes will be used and compared to the current approved material. Performance must meet or exceed current performance criteria.

HOW TO SELECT AN EFFECTIVE COLD MIX

satisfaction, resource utilization

Included are:

- ✓ A simple step-by-step selection
- ✓ A simple demonstration of effective CM
- ✓ A simple question

UNIQUE
provides how to
screening tests
to aid in
optimizing cold
mix with
application.
(2 pages)

4. QC verification on eve
5. Installation
6. Performance Monitoring

critical), add one half to 1 inch of candidate cold mix in one jar and UPM® or other CM in the other. It is recommended to use a reference material such as UPM®. Either the candidate material will be better, same or worse. Add water to each jar approx. three quarters full. Water type and amount are not critical. Tightly seal the caps and shake the jars. Initially nothing may appear to happen. At random intervals shake jars and within 24 hours significant differences will be discernable.

If the water becomes cloudy the asphalt is stripping. The cloudy water is due to small dust like aggregate released into the water. This is exactly what happens when many cold mixes are exposed to rain; the asphalt strips away and there is nothing to bind the aggregate and it ravel out of the repair. UPM® will begin to coat the jar: this is the self-tacking performance incorporated into UPM®.

The pictures show what can be observed when conducting this simple test:

1. This is UPM®. It will coat the jar, like it will self-tack into a pothole.

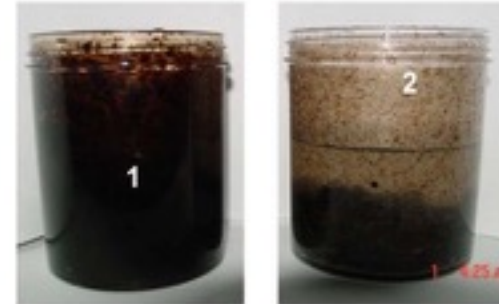
2. Typical of most cold mixes. The water becomes cloudy as asphalt is stripped from the aggregate releasing fine particles into the water.

3. The dust released into the water will eventually settle leaving a layer of dust on the partially coated aggregate. Each time you agitate the jar more asphalt will strip.

4. Picture taken from top of the jar through the water looking at the released fine aggregate settled onto the loose larger aggregate.

Stripping is one of the most common failures for CM. A primary reason this occurs is due to the general lack of compaction used during repairs.

couple of jars, contact your UPM® sales representative, who will supply these to you free, and can assist you in conducting these tests.

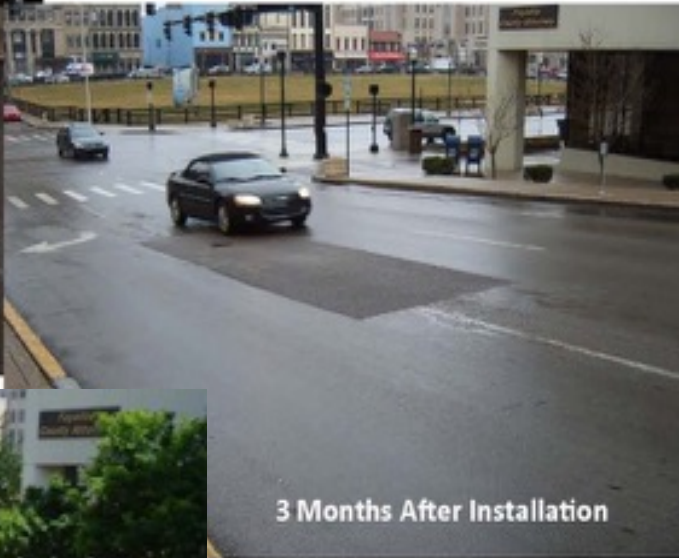


Contacts: Mr. Sam Williams

Lexington, KY



Installation: 11/16/11. Wet 40°F
Picture after 1 month



3 Months After Installation



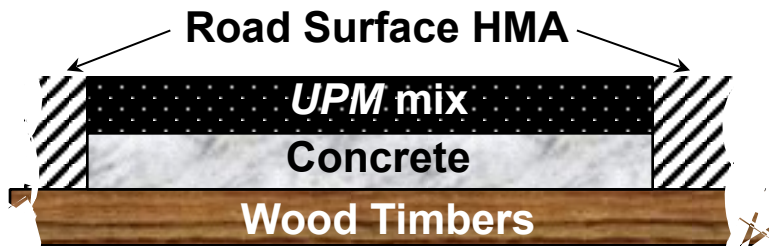
May 2014 31 months 2.5+ years

UPM mix will exceed expectations creating the option to delay or eliminate the routine removal and replacement of what some might consider temporary surface repair material.

FLEXIBLE APPLICATIONS REQUIRE FLEXIBLE REPAIR MATERIALS



Bridge design and excessive heavy loads resulted in daily repair. UNIQUE utilized our **UPM** mix and UNIQUE® Concrete to determine the optimum repair. **UPM** mix was selected and the repair remained in-place 60 days until mill and overlay could be scheduled. Two inches were milled and the UPM mix was overlaid with HMA.





UPM mix in-place 2 years until
bridge deck overlaid.



SHRP STUDY

Strategic Highway Research Program

Industry studies
objectively evaluating
maintenance strategies
and weather effects.

Following are two pages from the 215
page study. Complete copy is available
on the Web.

SHRP-M/UFR-91-504

Innovative Materials and Equipment for Pavement Surface Repairs

Volume I: Summary of Material
Performance and Experimental Plans

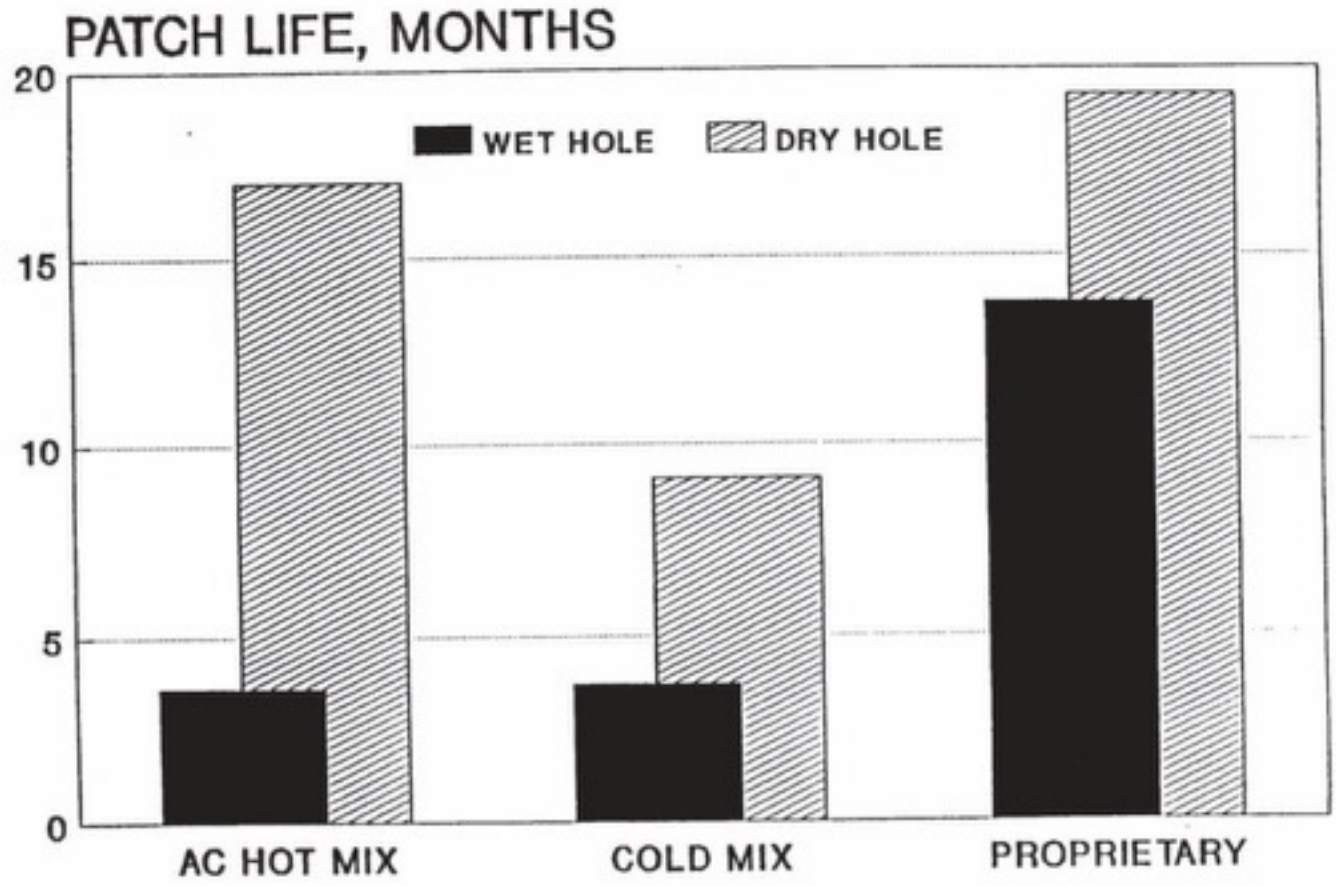
Kelly L. Smith
David G. Peshkin
Elias H. Rmeili
Toen Van Dam
Kurt D. Smith
Michael I. Darter

ERES Consultants, Inc.
Savoy, Illinois

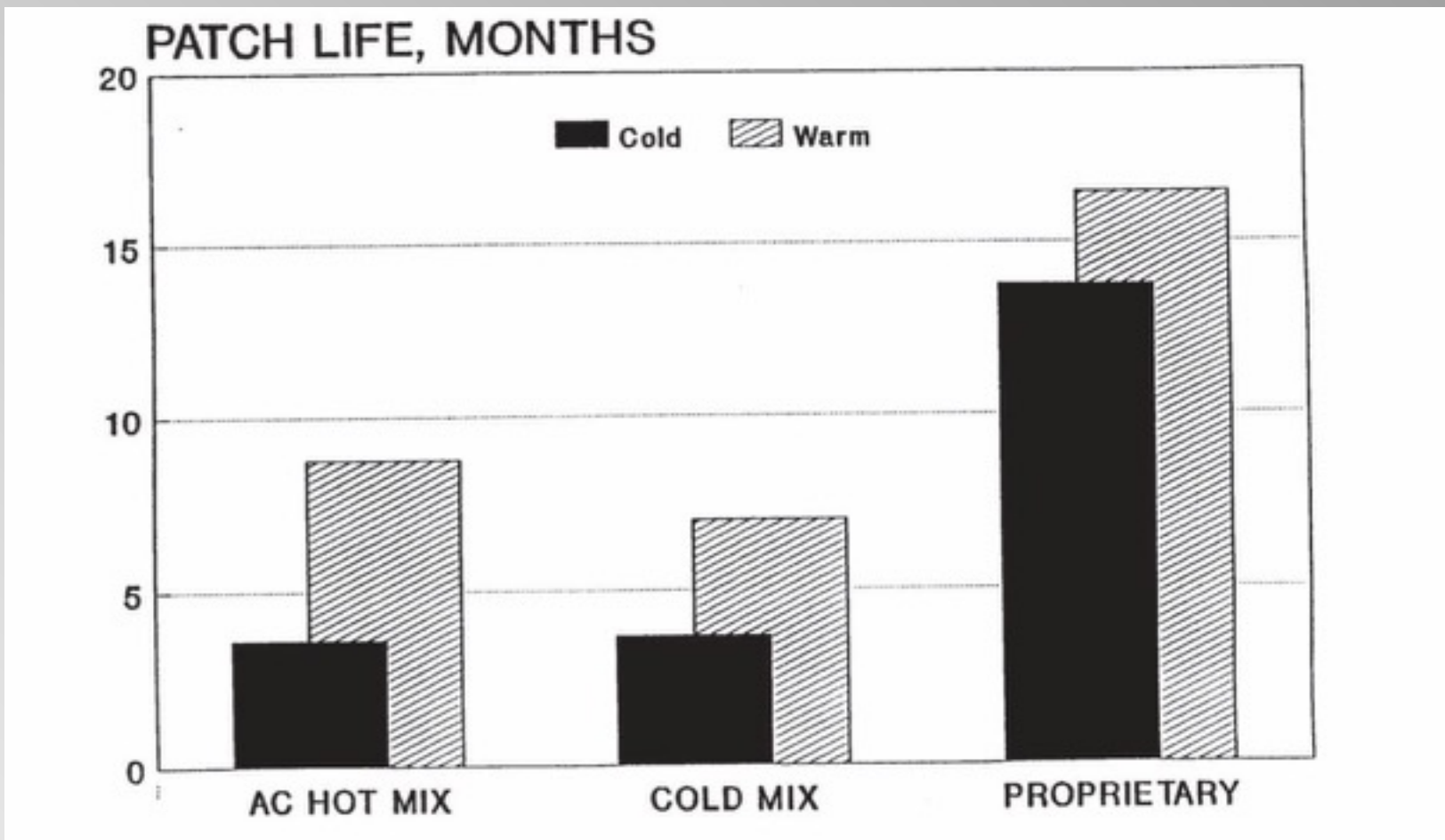


Strategic Highway Research Program
National Research Council
Washington, D.C. 1991

In cold temperatures proprietary cold mix was superior to HMA in both wet and dry potholes. Significant performance difference using high performance cold mix.



In wet potholes proprietary cold mix was superior to HMA in both cold and warm potholes.



ENGINEERED REPAIR MATERIAL APPLIED UNDER WATER

- Get rid of loose chunks of asphalt or concrete
- Sweep out hole
- Repair material with effective film characteristic will adhere to pothole walls through water
- Water does not need to be removed
- **Do not try this with HMA or conventional cold mix**

UPM®, Permanent Pavement Repair Material

Demonstrating UPM® in High Volume traffic and Heavy Loads.

Install Conditions: Wet Above 40°F

Pavement Conditions: Some cracking, mostly solid

Installation Date: February 13, 2012

Time Elapsed: 1 Year

Location: Vancouver, WA, Gas Station Entry

Contacts: Bart Shadbolt

Very wet conditions

Loose material removed



Installed in water



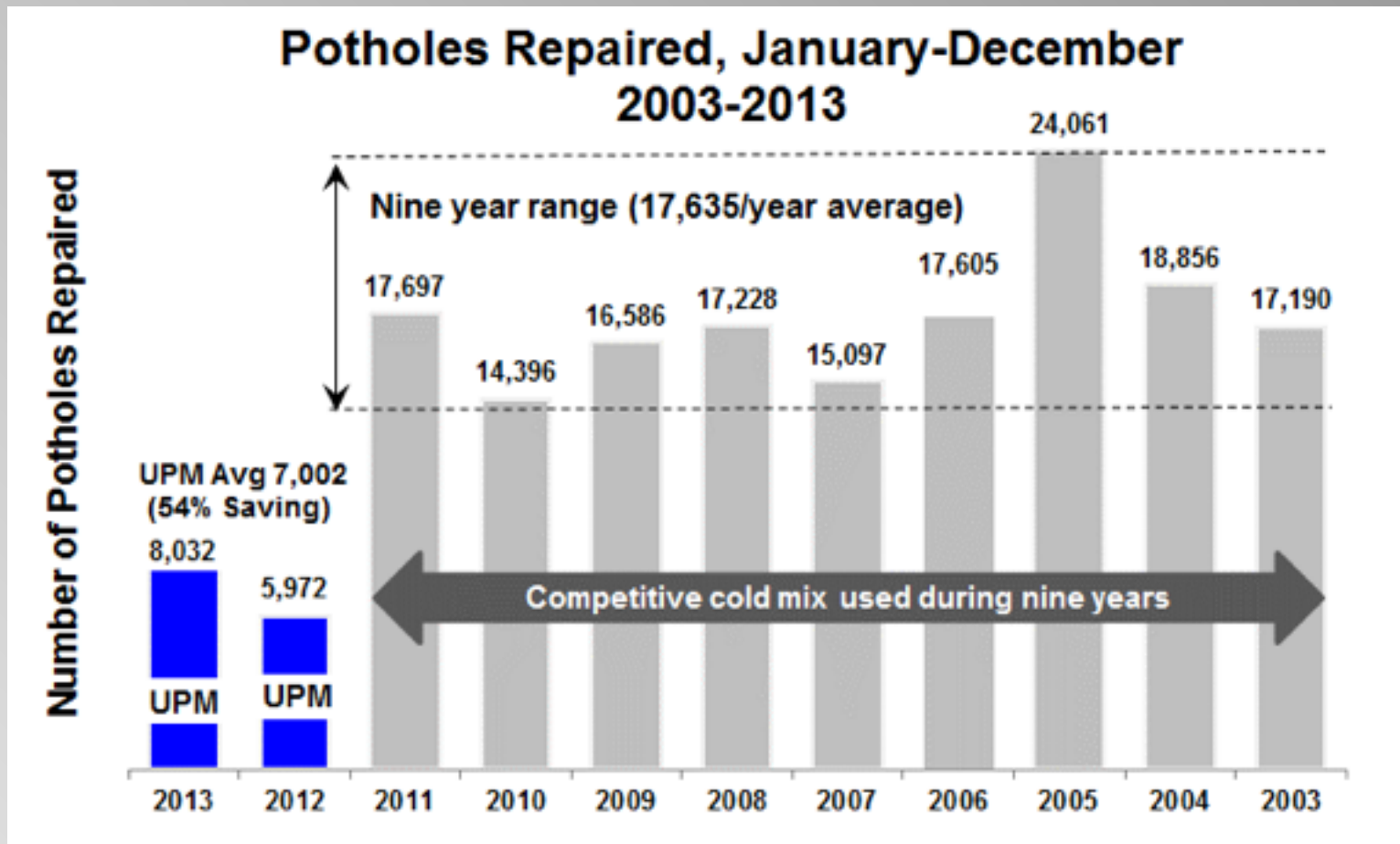
Finished Repair



~~One year later~~

Two





Lexington continues to capitalize on the value resulting from using *UPM* Permanent Repair Material. The resources made available through the elimination of re-repairs are a welcomed addition to the limited maintenance budget.

**Brown Township, Mifflin
County, PA, Green Lane &
Coffee Run Road**



**South bound after
one year repaired
with *UPM* mix**



**North bound prior to
repair with *UPM* mix**



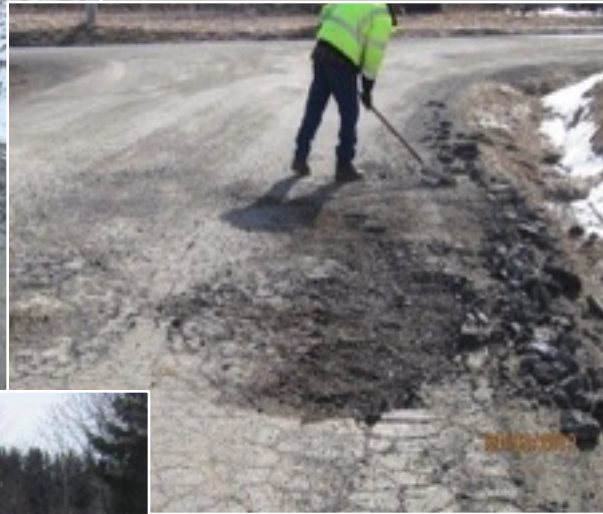
CONDUCT DEMONSTRATIONS MONITOR SURVIVABILITY



Pennsylvania Township
maintenance crew
installed and monitored



Installation April, 3, 2012

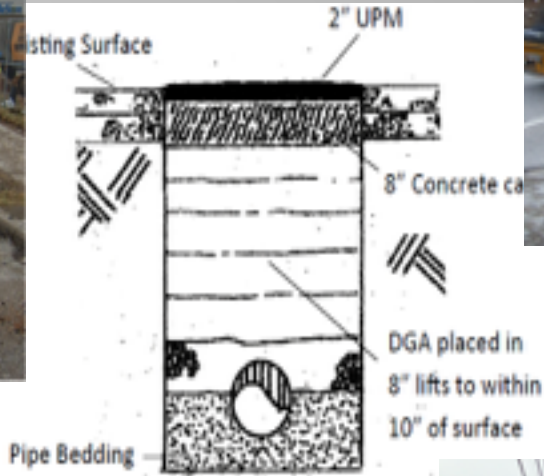


**Make demonstrations a
priority. Your resources are
being consumed; success or
failure**



17 months after installation

UPM MIX ROUTINELY USED IN UTILITY REPAIRS



Installation using paver & roller



Bus immediately after installation



Feb 11, 2013



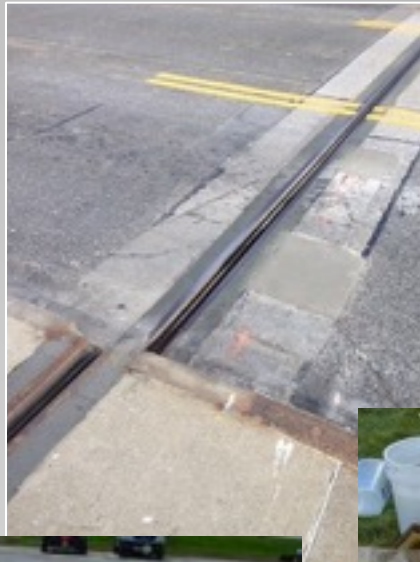
Bus after 12 months of service

Feb 24, 2014



Unique[®]
**Concrete
Solutions**

Optimize materials for application to increase survivability: Compressive strength
Flexibility
Set Time
Economics



HIGH PERFORMANCE FAST SET

Final Set: 20 Min. @ 72°F

Results may vary depending on weather conditions and other unknown factors.

HIGHWAY DOT

Final Set: 20 Min. @ 72°F

Results may vary depending on weather conditions and other unknown factors.

OVERHEAD AND VERTICAL REPAIR

Final Set: 120 Min. @ 72°F

Results may vary depending on weather conditions and other unknown factors.

ANCHOR CEMENT

Final Set: 28 Min. @ 72°F

Results may vary depending on weather conditions and other unknown factors.

Concrete solutions with the option
to mix to your application.
(i.e. Adjust strength and set time)

 **Unique**[®]

Concrete Solutions

WATER STOP

Final Set: 3-4 Min. @ 72°F

Results may vary depending on weather conditions and other unknown factors.

FLEXICRETE 25

Final Set: 45 Min. @ 72°F

Results may vary depending on weather conditions and other unknown factors.

FLEXICRETE XP

Final Set: 45 Min. @ 72°F

Results may vary depending on weather conditions and other unknown factors.



Honey, I hit a small pot hole...

SURFACE TREATMENT PRODUCTS



RAVEL CHECK® Pavement Preservation/Rejuvenation Liquid from UNIQUE PAVING MATERIALS, an industry leader since 1959.

LOCK the ROCK™ Technology

Be Pro-Active, Not Re-Active

Stop Asphalt Raveling

in its Tracks

- ✓ **Preserve**
- ✓ **Extend**
- ✓ **Seal**



RAVELCHECK APPLICATION



Raveling is the progressive loss of fines & aggregates in the asphalt mat. These loss of fines & aggregates can accelerate the deterioration of the road and lead to potholes.



Improper compaction & surface defects lead to higher moisture retention & damage from raveling



RAVEL CHECK LIQUID CANDIDATE APPLICATIONS



Raveling areas range from small local areas to miles of road.

RAVEL CHECK liquid is formulated for smaller localized areas.

Chip Seal



Snow Plow Damage



Wheel Lane



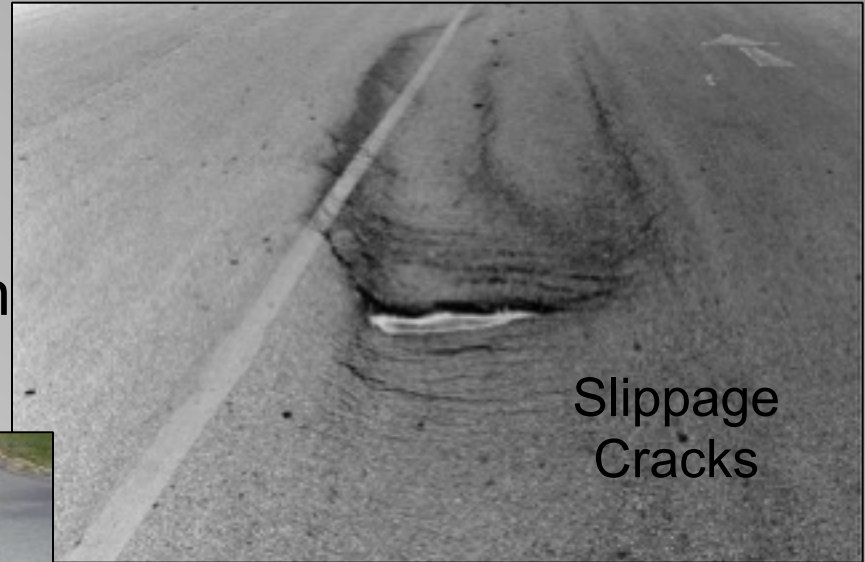
Weather, Traffic, Delamination



RAVEL CHECK LIQUID CANDIDATE APPLICATIONS



RAVEL CHECK liquid is formulated as a pro-active treatment for small localized surface defects before they become potholes or cut & patch sections.



Slippage
Cracks



Cold compacted HMA or
infrared patches



Cold
Seams



Problem areas in a
good asphalt mat



Snow plow damage

Repairs too small for distributor trucks but too big to ignore.

RAVELCHECK REJUVENATOR DEMONSTRATIONS



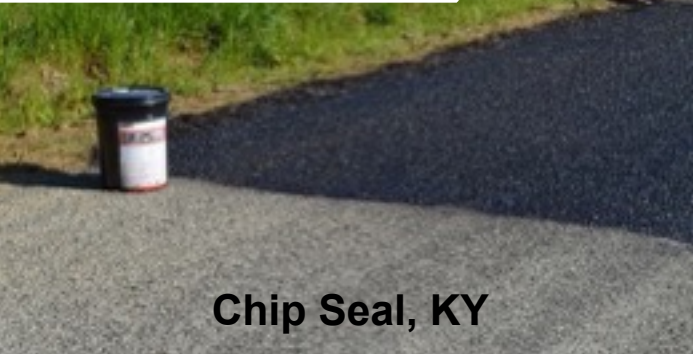
5 way intersection, NJ



Deteriorating church parking lot, 15 yrs old KY



3 yr old parking lot, KY

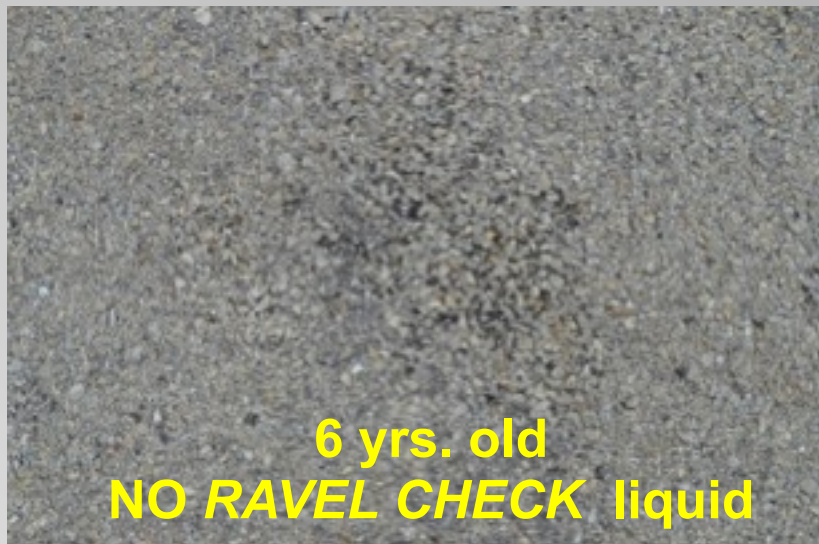


Chip Seal, KY



Recreational exercise path, KY

Rejuvenate and seal pavement adding 3-5 years to pavement life which will stop the loss of fines from the surface and stop the raveling



Gilsonite is a natural asphalt containing natural and resinous hydrocarbons with a rock like appearance. The maltenes contained in Gilsonite (21-37%) replace those lost during oxidation and the added oils penetrate and rejuvenate the failing asphalt binder.



Refined asphalt distilled at 800°F plus, stored and produced at 350°F and installed and exposed to traffic, weather and sun naturally oxidizes. **RAVEL CHECK** liquid enhanced with Gilsonite, returns lost components to the aged asphalt and significantly reduces further oxidation.

RAVEL CHECK liquid enhanced with Gilsonite will add 3-5 years to the asphalt surface.

ANOTHER QUALITY PRODUCT FROM UNIQUE

Product Description: INTEGRA-SEAL® is a professional grade premium Gilsonite modified asphalt based sealer, formulated with special polymers and additives to seal, protect, preserve and beautify asphalt pavement. INTEGRA-SEAL is a non-skid formula that will fill hairline cracks (1/8" or less).

Recommended Uses: Use on any paved asphalt surface including driveways and parking lots. Water may be added for greater coverage. Sand may be added for increased surface friction and crack filling. Call UNIQUE's Technical Department for questions related to on-site optimizations.

Surface Preparation: Surface must be clean and free of all loose material and dirt. Surface should also be clean and free of all oil, grease and other contaminants to ensure bond.

Mixing: Some separation/settling in containers may occur over time. Stir INTEGRA-SEAL to achieve a consistent mixture.

Extending: Experienced contractors have the option to extend INTEGRA-SEAL. The addition of water should be limited to 10% (10 gallons of extra water per 100 gallons of sealer). The addition of sand should be limited to 300 pounds per 100 gallons of sealer or diluted sealer.

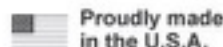
Placement: Surface should be Saturated Surface Dry (SSD) and free of any standing water. Sealer can be applied directly from the container or with automated spray equipment like Unique's Crack-N-Tack unit and finished with brushes and/or squeegees. Multiple coats may be applied for heavy traffic areas. Allow 1-2 hours curing time between coats.

Coverage: One gallon of INTEGRA-SEAL will cover approximately 100-120 square feet (11-13 square yards). Coverage rate will vary due to age, surface condition and porosity. Newer pavements and recently sealed pavement will require less sealer for coverage.



Sealer with Integrity!

- **Asphalt based and free of coal tar**
- **Professional grade**
- **Formulated to be extended with water and/or sand**
- **Stable for easy mixing**
- **Excellent adhesion to pavement surfaces**
- **Seals over coal tar to "encapsulate" and seal pavement**



42 lbs. net weight

ANOTHER QUALITY PRODUCT FROM UNIQUE

Curing: Final cure time prior to opening to traffic should be 24 hours. Cure time will vary due to ambient conditions.

Storage: Keep from freezing.

Shelf Life: 12 months in unopened containers. Materials extended with water or sand should be used immediately. Product stability is beyond the control of UNIQUE and is the responsibility of the customer.

KEEP AWAY FROM CHILDREN AND PETS

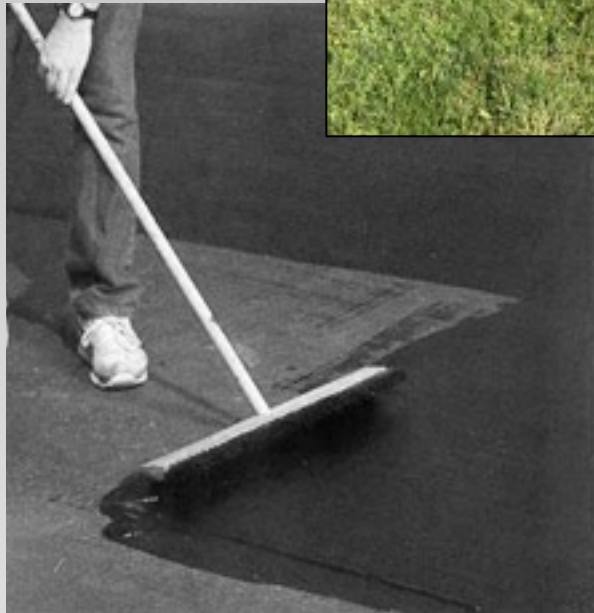
Warning: Injurious to eyes and causes skin irritation. Contains petroleum derived ingredients and various chemicals to enhance performance. Use approved protective equipment when using this product. Avoid eye contact or prolonged contact with skin. In case of contact with eyes, immediately flush with water for at least 15 minutes and seek medical attention. **DO NOT TAKE INTERNALLY.** Please refer to the Material Safety Data Sheet for more details.

Limitations: INTEGRA-SEAL should not be applied when the ambient temperature is expected to drop below 50°F or rain is expected within 24 hours following application.



3993 E. 93rd Street, Cleveland, Ohio 44105
800-441-4880 | UniquePavingMaterials.com

INTEGRA-SEAL® SEALER SPRAY, BRUSH or BROOM



**UNIQUE is continuously evaluating
sealer performance.**

- **Appearance**
- **Survivability**
- **Cost-Effectiveness**

4

3

2

1

All surfaces wetted prior to sealing



UPM[®] Permanent Pavement Repair Material is our high-performance asphalt patching material and the UNIQUE ingredients that go into it.



Specification Product Materials offers our customers consistent, superior specification bid products.



RAVEL CHECK[™] rejuvenation and preservation liquid is a ready-to-use gilsonite asphalt based emulsion formulated with penetrating oils and high asphalt resins designed with Lock The Rock[™] technology to rejuvenate, preserve and restore small distressed areas of asphalt based pavements.



MICRO MIX™ Mini Pavement Repair Material is our high-performance asphalt patching material produced with manufactured sand.



PAVEGRIP® Hot Mix Adhesion Promoter offer our customers consistent, superior hot and cold asphalt modifier bid products..



INTEGRA-SEAL® gilsonite modified sealer is a professional grade concentrated zero VOC premium asphalt based sealer engineered to seal, protect and beautify aging asphalt. It is a non-skid formula that will fill hairline cracks (1/8 in. or less).



KOLD-FLO® asphalt emulsion based pourable crack filler offers our customers a simple and safe cold -applied process to maintain their current infrastructure.



UNIQUE® Concrete Solutions Products Line offers our customers “concrete” repair solutions for concrete applications.



STIFFWITCH® broom is a road repair broom designed to help prep roads, potholes, and pavement cracks.



UNIQUE offers a variety of everyday and specialty tools and applicators for its products.

Traffic Control Strategies FAKE REPAIRS



They work great for speed control.

Quick to fix



Contact your local Unique Sales Representative

UNIQUE REP

Bart Shadbolt

bshadbolt@uniquepavingmaterials.com

(360) 770-8874

UNIQUE Paving Materials
Providing valuable products,
from valuable people,
to valuable customers.

Unique Paving Materials Corp.

3993 East 93rd Street

Cleveland, OH 44105

www.uniquepavingmaterials.com

Customer Service: 800-441-4880

Fax Number: 866-448-9123

QUESTIONS ?