San Diego County

BUILDING

BETTER ROADS

Working Group Meeting
10/26/2021

Website: https://sandiegocounty.gov/bbr

AGENDA

1) Orientation / Sign-In / Polling

2) Public Comments

3) Welcome

4) Opening Statement

5) Working Group Updates

6) Organization / Industry Updates

7) Key Presentation / Questions and Answers

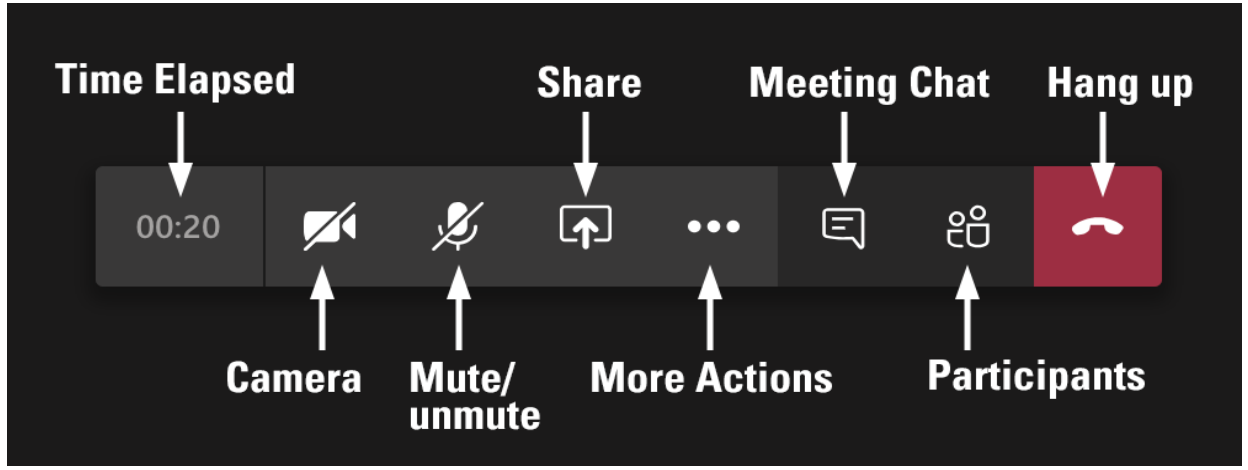
8) Next Working Group Meeting / Close

Use your cell phone, computer or tablet and log in to: www.menti.com

Enter Code 7397 1385

Teams Meeting Etiquette / Sign-In

- Mute Microphone unless presenting
- Turn Camera off unless presenting
- Use Chat window or Raise Hand for questions
- Please enter your Name, Company/Agency, E-mail in Chat



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Interactive Polling – Part 1 of 2

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SUPERVISOR JOEL ANDERSON – DISTRICT 2

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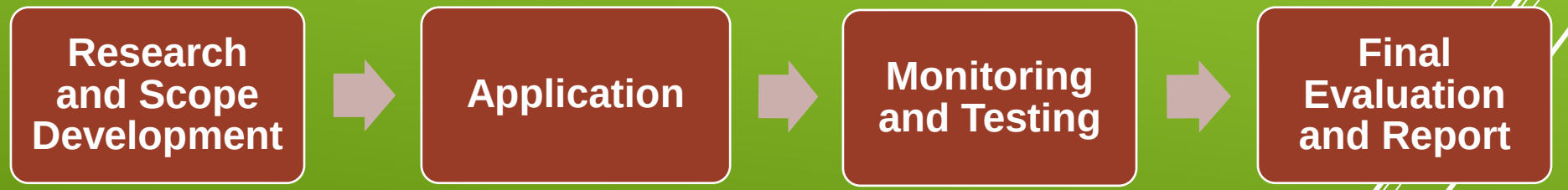
USING RAP IN PAVEMENT SEALS-PILOT STUDY-COUNTY OF SAN DIEGO

OCTOBER 2021

SAN DIEGO COUNTY PUBLIC WORKS

PILOT STUDY PROCESS



USING RAP IN PAVEMENT PRESERVATION

- Environmental sustainability
- Cost savings
- Response to depleting aggregate resources

RAP-SLURRY SEAL

- LA County experience
- Reduced emulsion rates
- Darker surface

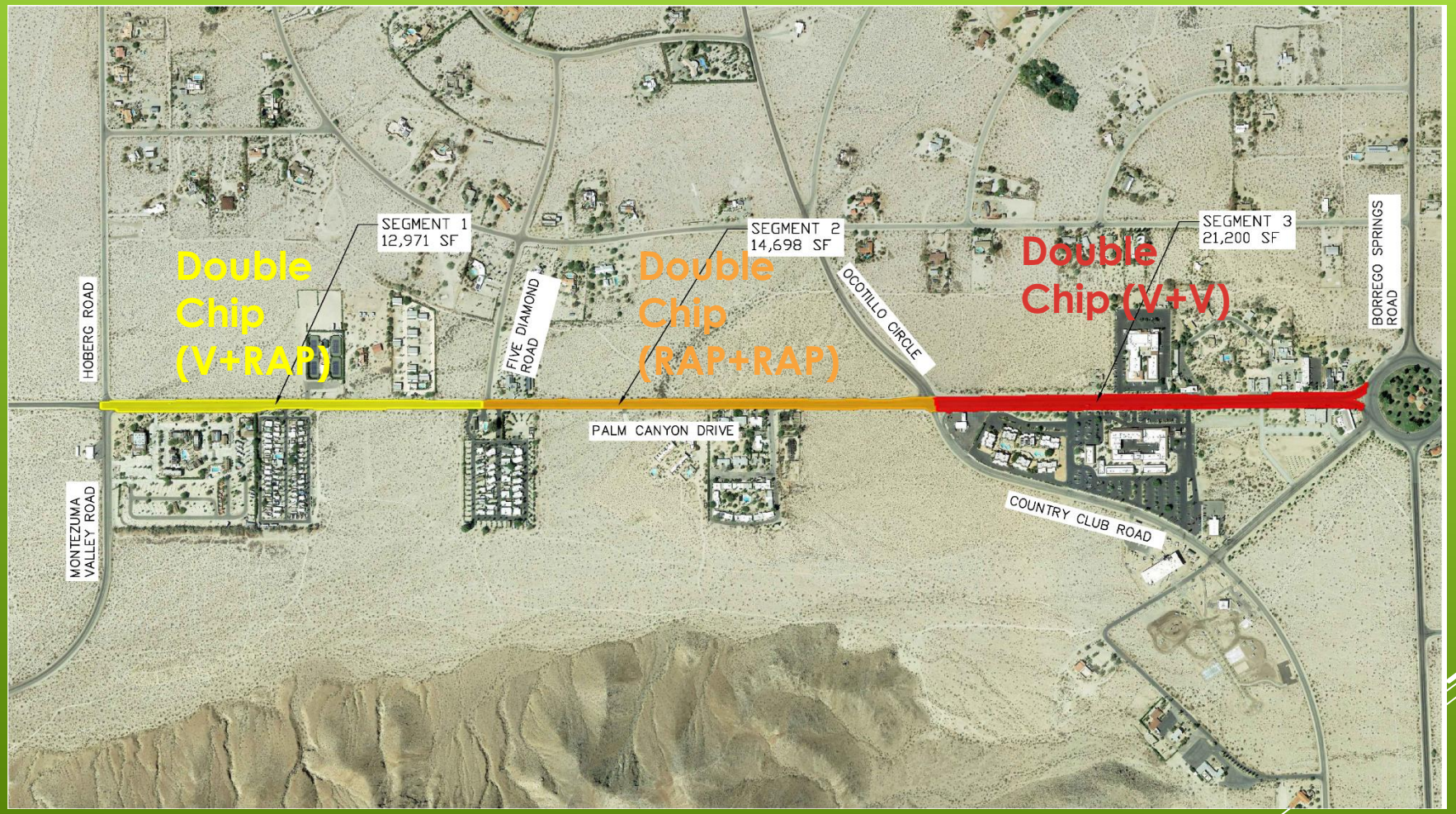
RAP-CHIP SEAL

- San Bernadino County Experience
- Same emulsion rates for single layer chips
- RAP-Double chip with reduced emulsion rates

SAN DIEGO COUNTY PILOT STUDY

- RAP slurry (Low/high traffic)
- Single chip using RAP (Low/high traffic, Desert Environment)
- Double chip ,RAP+RAP (Low/high traffic, Desert Environment)
- Double chip , Virgin+RAP (Desert Environment)

PILOT STUDY EXHIBIT



FIBER REINFORCED ASPHALT CONCRETE (FRAC) PILOT STUDY-COUNTY OF SAN DIEGO

OCTOBER 2021

SAN DIEGO COUNTY PUBLIC WORKS

FRAC PILOT STUDY- OVERVIEW

Objective

Evaluate crack mitigation and resistance to rutting of FRAC vs Control

Basis

- Place both FRAC and control AC at various settings (4 Locations Total)
- Visually inspect on 6-month intervals for 1st 3 years
- Annual inspection years 3-10
- Record frequency, evel of Severity and growth

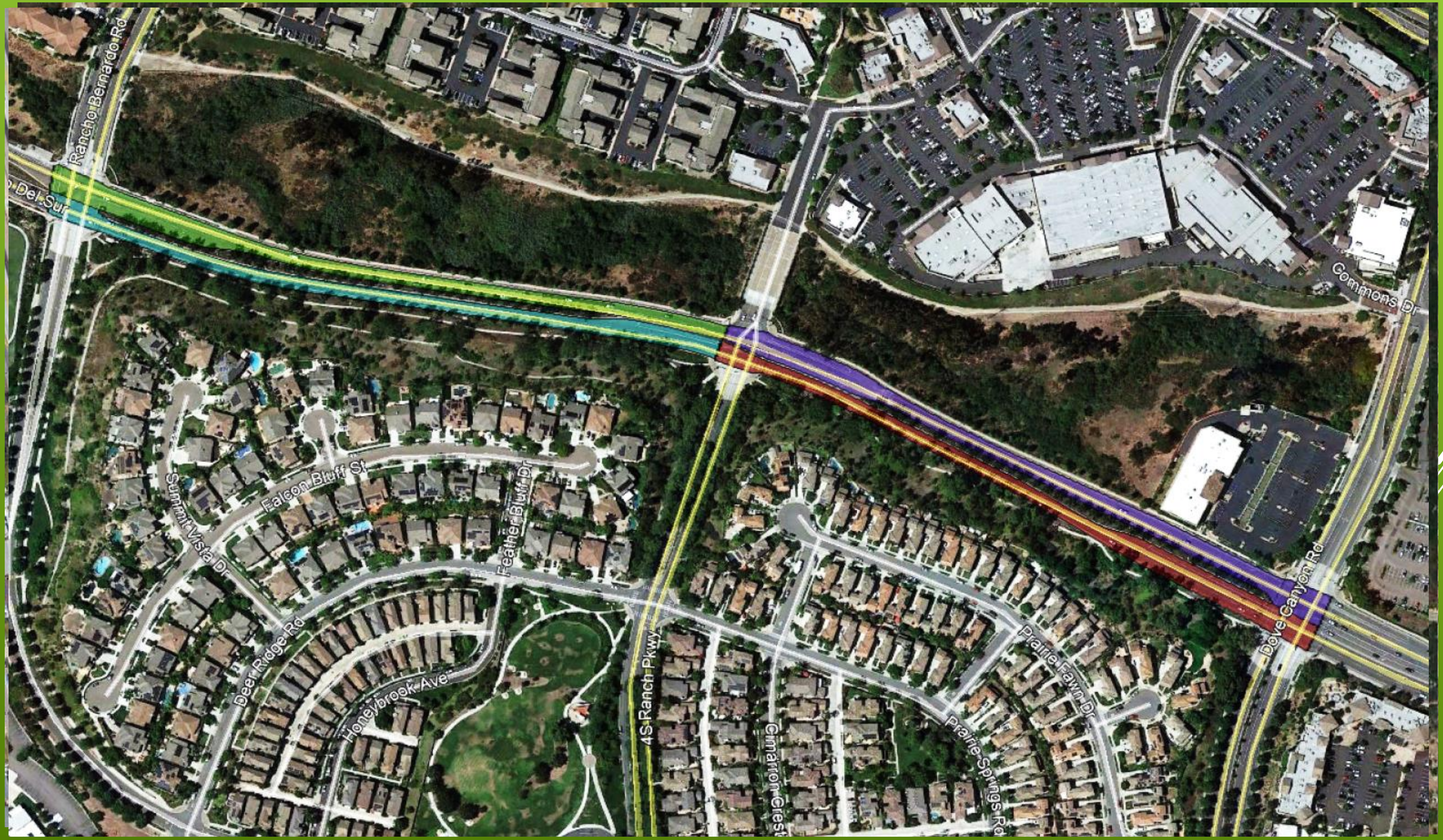
Report

Produce Final Report Detailing findings and make recommendations for continued use

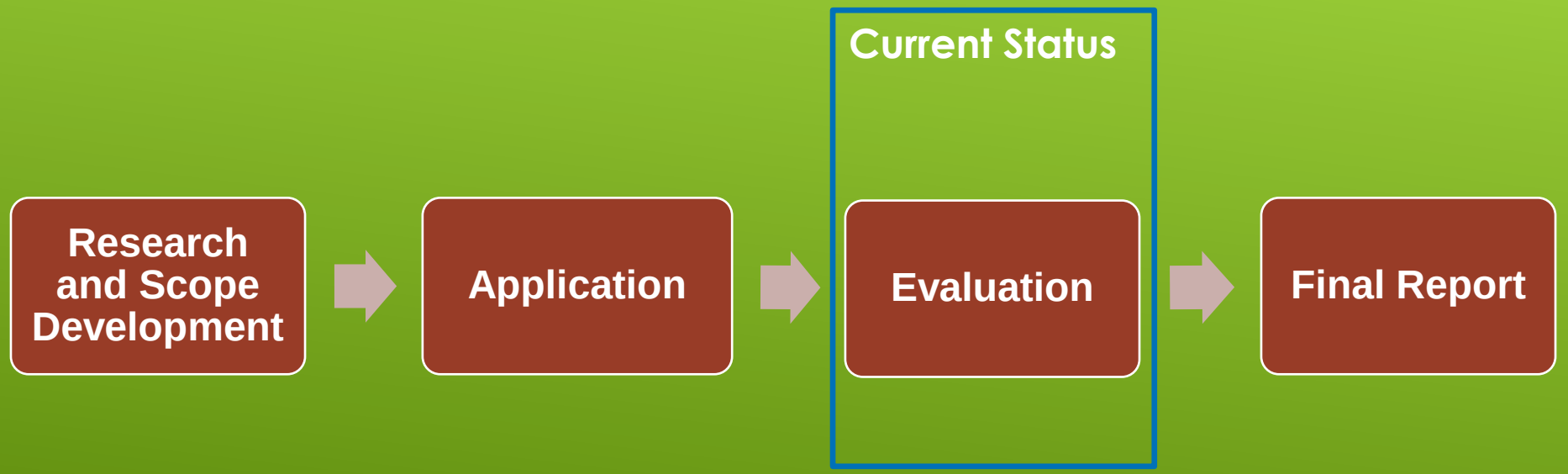
FRAC PILOT STUDY- LOCATIONS

Location 1

- Residential Area ... Heavy Vehicle ... Rutting
- 4 Segments ... Gonzalez ... OGFC ... RPPG



FRAC PILOT STUDY TIMELINE



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Brandon Milar- CalAPA

- The California Asphalt Pavement Association

Asphalt Industry Update

Brandon Milar- CalAPA

1) CCPIC Asphalt Specification available for agency use.
   a. http://www.ucprc.ucdavis.edu/ccpic/
   b. Presentations available on the specification

2) CalAPA Hosting NCAT Airfield Asphalt Certification Program QC Manager Certification Course
   a. Ontario, CA
   b. Nov 16-18

Brandon Milar- CalAPA

3) CalAPA Technical Webinar – WMA
   a. Nov 3

4) Caltrans focus on Equity - Sustainability - Safety

3) Caltrans Pilot Projects
   a. HMA 40% RAP
   b. HMA w/ RAP & RAS
   c. RHMA w/ RAP

Brandon Milar

Contact Information

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Director of Technical Services
California Asphalt Pavement Association (CalAPA)
916-791-5044
bmilar@calapa.net
www.calapa.net

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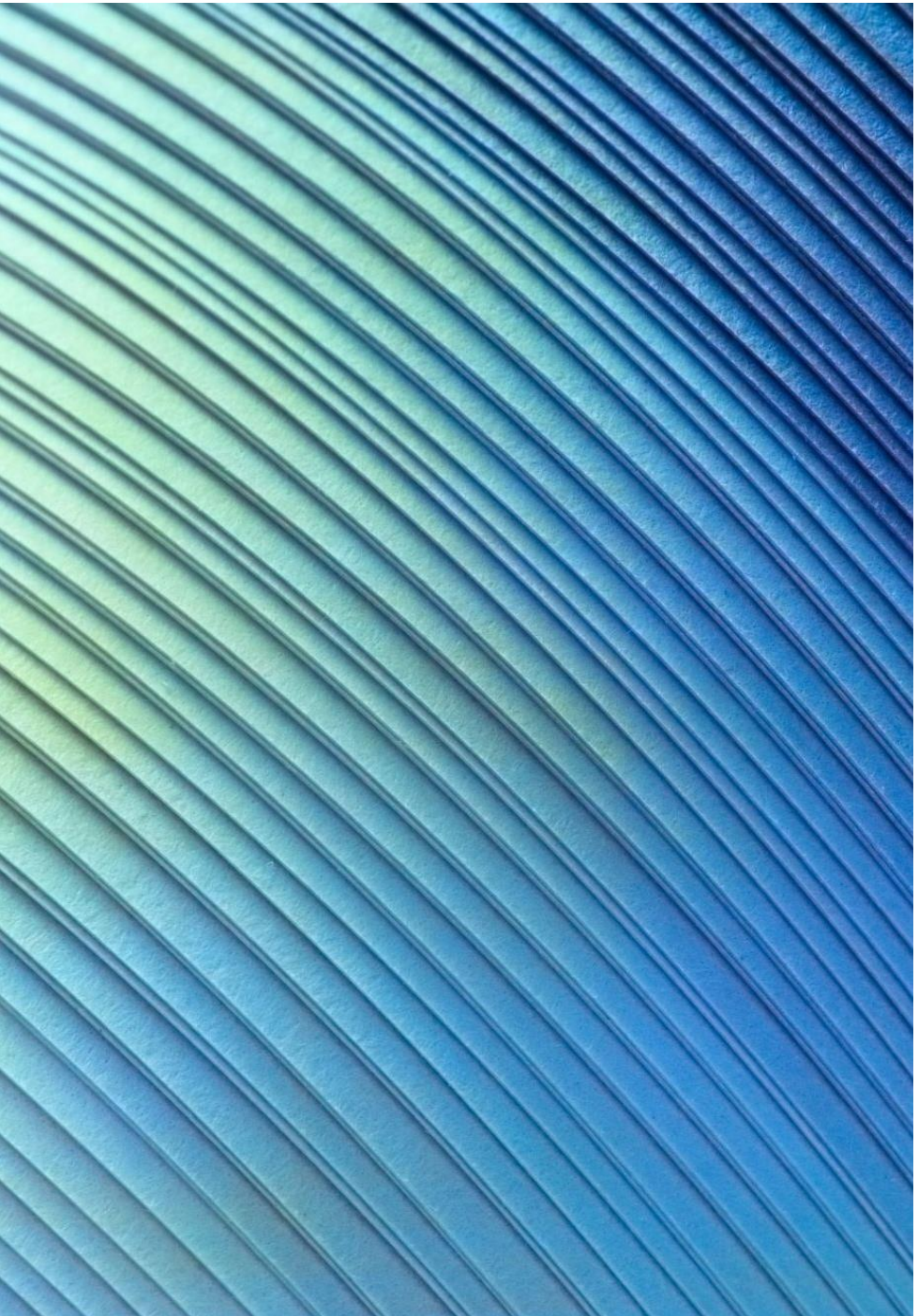
Building Better Roads
Pavement Preservation Processes and New Technology

Including an introduction to RoadResource.org

Agenda

- Combination Products
- RAP in Preservation
- Introduction to PPRA RoadResource.org
- New Technology in Materials and Equipment



Why Combination Treatments are Used

Enhance the performance of multiple products.

Stop Gap: Something that serves a purpose for a short time but, is replaced as soon as possible.

- Combination treatment were used as a stop gap measure when funding was not available to complete full mill and fill or reconstruction
- Over time, properly place combination treatment were far outlasting the short-term goals.

Combination Options

Fog Seal

- Over crack treatment
- Over chip seals
- Over scrub seals
- Over slurry seal
- Over microsurfacing

Crack Treatments

- Prior to fog seal
- Prior to Chip Seal
- Prior to Slurry Seal
- Prior to Microsurfacing
- Prior to Thin HMAC Overlay

Note – Crack treatments should have ample time to cure prior to placing any of the above referenced surface treatments.

Note – check with suppliers and contractors for compatibility

Combination Options

Chip & Scrub Seal

- SAMI – Stress Absorbing Membrane Interlayer

  -Chip Seal prior to Asphalt Overlay
- Double Bituminous Surface Treatment
- Chip Seal with Fog Seal
- Cape Seal

Slurry Seal & Microsurfacing

- Scratch Course & Surface Course
- Rut Fill with Surface Course
- Rut Fill with HMAC overlay
- Over Crack Treatment
- With Fog Seal
- Cape Seal

Thin Overlay

- Over Crack Treatment
- Over Chip Seal (Stress Absorbing Membrane Interlayer)

Cape Seals

A cape seal is the application of any type of chip seal followed by one or more layers of a slurry seal or micro surfacing

Cape Seal Do’s

Cape Seal?

YES

Cape Seals Don’ts

Cape Seal?

No, this is NOT
a candidate
for cape seal

Cape Seals

EDUCATION

- Identify the need and set a goal
- Understand your goal
- Select the proper treatment
- Educate Everyone!
  - The Agency
  - The Public
  - “Communicate realistic expectations when using pavement preservation as stop-gap measure.”

American Infrastructure Summer 2011

Road Maintenance

Using Pavement Preservation Treatments to Buy Time

Communicate realistic expectations when using pavement preservation as stop-gap measure.

By Paul Fournier

With the budgets available today, government agencies need every tool available to extend the life of their roads and keep stakeholders happy. The reality is, when applied at the optimal time, pavement preservation can extend the life of pavement by up to seven or more years. But that's not currently realistic for a lot of government agencies due to budget constraints and current road conditions. Many have no choice but to use pavement preservation as stop-gap measures, a process otherwise known as reactive maintenance. Reactive maintenance can still be beneficial, but many times the difference between these two processes is not explained or communicated fully.

Many have no choice but to use pavement preservation as stop-gap measures, a process otherwise known as reactive maintenance.

Without communication of realistic expectations to stakeholders, the use of pavement preservation surface treatments as stop-gap measures for structurally unsound pavements can give the agencies who specify the treatments and the contractors who apply them a bad name. And, it could certainly tarnish the value and future use of the treatments themselves. States and local agencies need to work with the media and explain to reporters why a certain type of treatment is being applied. The public would be more understanding if agencies shared the message that 'keeping good roads good' will help agencies save money and provide a better system of roads.

Eric Thibodeau, pavement management chief for the New Hampshire Department of Transportation's Bureau of Materials and Research, shares the philosophy of keeping media and public informed. When questioned as to why the Department of Transportation (DOT) had just paved a state highway that was in "pristine" condition instead of paving another road that obviously needed work, he explained that the highway had not been paved but instead received a thin pavement preservation asphalt overlay. He said the goal of such a project was to keep good roads in good condition and further made clear that a pavement preservation strategy such as this allows the DOT to maintain its roadways at a higher level of service for less money versus the more traditional "worst first" or rehabilitation strategies.

For economic reasons they may be using the preservation surface treatment to try to hold the road together as a stop-gap measure until they can rehabilitate or reconstruct. But, if for any reason the agency decides to use a preservation surface treatment where it's not appropriate, then the public should be informed so they'll have realistic expectations as to how long it might perform adequately. "If the road wasn't a good candidate for pavement preservation, then the treatment probably won't perform well and will get a bad reputation, not those making the decision to use it," Thibodeau said.

In order to prevent an unfair assessment of what may be a short duration performance of surface treatments used in this way, agencies should be encouraged to publish some kind of disclaimer. Ideally this disclaimer should state that the surface treatment is being applied as a temporary measure for economical reasons or to correct imminent safety hazards posed by rutting or other conditions inherent in the pavement.

Peter Montenegro, a market development manager for Kraton Polymers LLC, a custom chemicals supplier to asphalt product manufacturers, said that the use of thin, non-structural fixes inappropriately hurts the entire pavement preservation industry. "The FHWA and American Association of State Highway and Transportation Officials (AASHTO) are strongly advocating for an asset management approach to the care of our roads and bridges," Montenegro said.

Ideally, agencies would apply pavement preservation treatments at the appropriate time. Unfortunately, today's economy makes it necessary for agencies to mix and match road treatments according to their allotted budgets. This increases the importance of clear communication about what treatments are being applied and the goal and anticipated life expectancy. The agency's reputation, along with the treatment, is on the line with each decision. Proper communication is the key to uphold both in the future.

Paul Fournier *is a freelance writer for the International Slurry Surfacing Association (ISSA). For more information about ISSA, visit www.slurry.org.*

Cape Seals Challenges

Understanding when and where to apply chip seal

- It is **NOT** recommended to apply chip seal to
  - Small cul-de-sacs
  - In warmer climates
    - Stopping points
    - Intersections
    - At signal lights

Cape Seal Extras

Going the Extra Mile

- Micro Mill Edge Grind: Mill a build up edge flush with concrete curb. Clean any old slurry or chip seal off of the existing curb

Micro Milled edge flush to gutter face

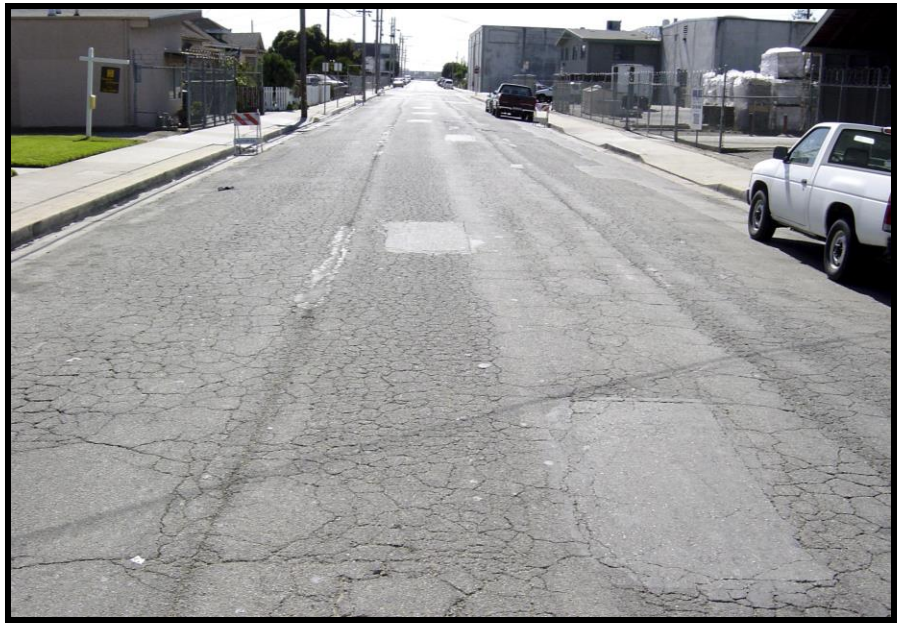
Cape Seal Mistakes

When good intentions go bad

- An edge grind that should be flush but isn't is very difficult to fix with a cape seal
- Pre-filling the edge with type III Polymer modified slurry seal is time consuming and inconvenient for residents but will do the job

Three Layer Cape Seals

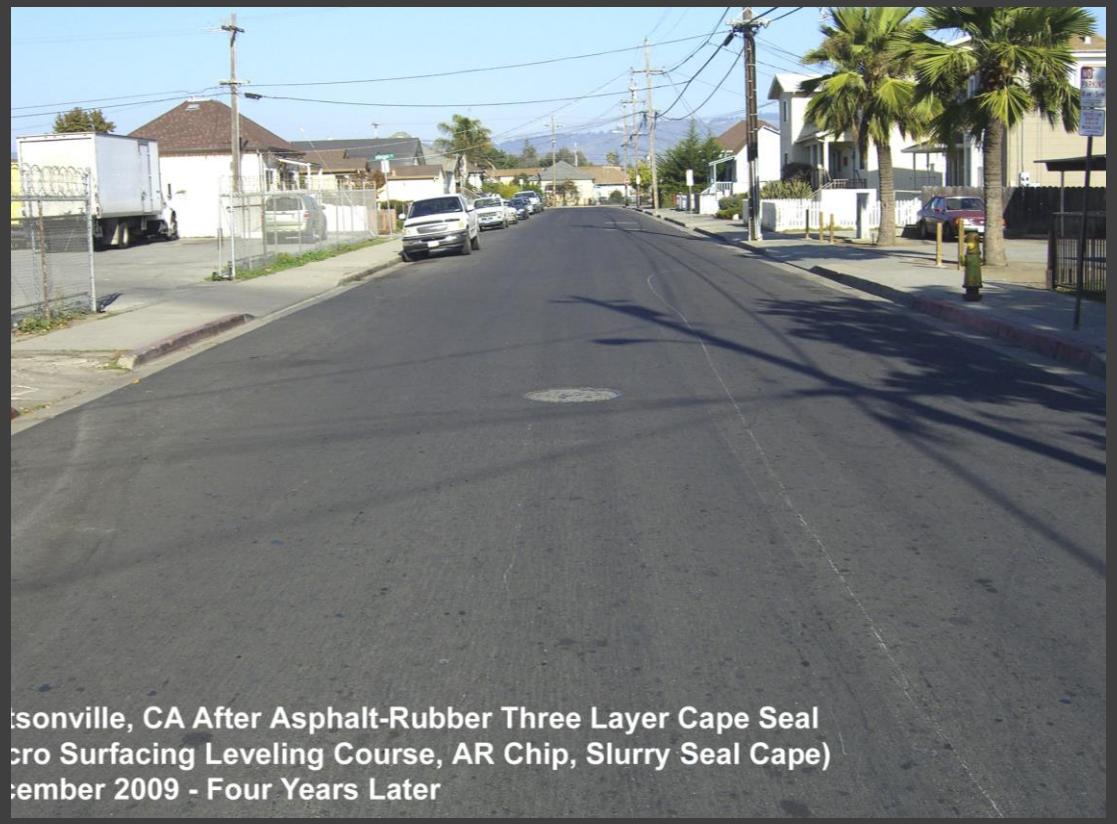
How to handle streets with damage beyond the capability of a cape seal.



Three Layer Cape Seals

Three Layer Cape Seal

- Micro Surfacing Leveling Course
- Asphalt Rubber Chip Seal
- Slurry Seal



Three Layer Cape Seals

Reclaimed Asphalt Pavement (RAP)

- Chip Seal
  - Double Chip Seal
- Slurry Seal
- Cape Seal

- Supply
  - Virgin Aggregate varies site by site but is pretty consistent in a single pit
  - RAP supply varies by source, size and asphalt

RAP Supply Concerns

Little concern	Original Quarry Supply
Little concern	Rock Quality
Marginal concern	Original AC Aggregate size
Marginal concern	Method RAP was created
Heavy concern	Asphalt Binder

Crushing and Screening

- Segregation is Key
  - Don’t over crush!

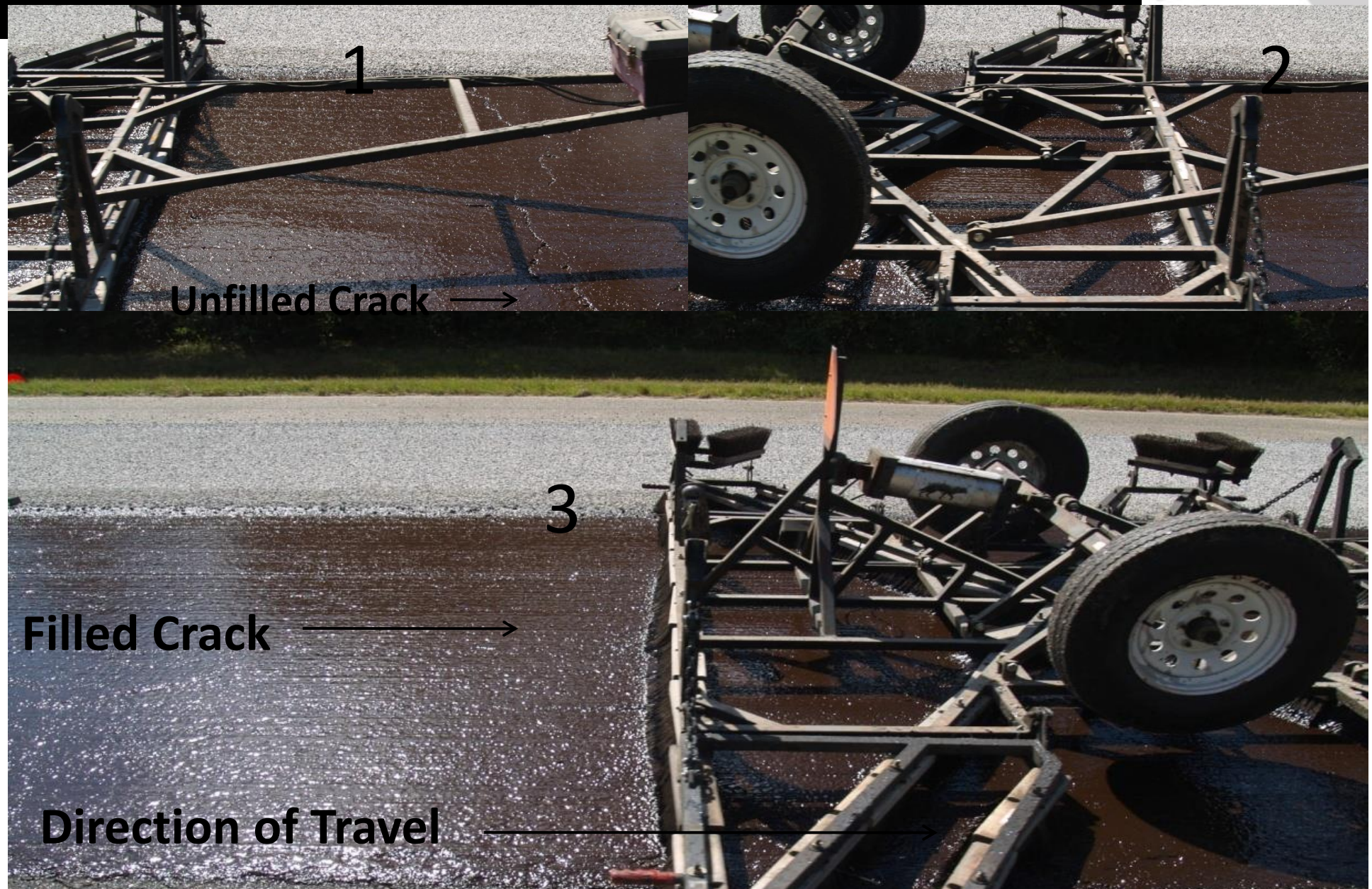
Consistency is imperative!

Supply Management

- Import Management
  - Supply must be clean
    - No Fabric
    - No Base Material
    - No Native Soil
  - Load Crusher From Varying Locations
    - Mix the supply as much as possible
    - If supply has a location that fits a specific product, use it.

RAP Chip Seal

- Binders Used with RAP Chip
  - PMCRS2 – Typical polymer modified emulsion
  - PMRE – Polymer modified rejuvenated emulsion (also used as scrub seal)


1
2
Unfilled Crack
3
Filled Crack
Direction of Travel

RAP Chip Seal

- Binders Used with RAP Chip
  - PMCRS2 – Typical polymer modified emulsion
  - PMRE – Polymer modified rejuvenated emulsion (also used as scrub seal)
  - Hot applied modified PG – Polymer modified hot asphalt.

Chip Sizes

- 5/16”
- 3/8”
- 1/2”

Poor product utilization due to segregation process.

Minimal windshield claims

RAP Chip Gradation

TABLE 200-1.2.1 (A)

Sieve Size	Percent Passing[1]	
	Medium 3/8"	Medium Fine 5/16"
1/2" (12.5 mm)	100	
3/8" (9.5 mm)	85-100	100
No. 4 (4.75mm)	0-15	0-50
No. 8 (2.36 mm)	0-5	0-15
No. 16 (1.18 mm)	-	0-5
No. 200 (75 um)	0-2	0-2
Residual Asphalt Content[2]	3.5% Min. (Based on dry weight of aggregate)	3.5% Min. (Based on dry weight of aggregate)

1. On unextracted RAP. 2. On extracted RAP. Determined by CT362, CT379 or CT382.

Test	Test Method	Requirement
Percentage Wear (100) Revolutions	ASTM C 131	12% Maximum *
Percentage Wear (500) Revolutions	ASTM C 131	35% Maximum *
Cleanness Value	CT 227	Report Only
California Durability	CT 229	52 Minimum

Key RAP Chip Quality Requirements

- * On RAP Source Retained on Number 4 Sieve.

RAP Chip Material

Residual Asphalt

Chips

Single stones and conglomerations

Residual asphalt content will vary by sample

Bonding of RAP Chip Seal

- While the RAP chip seal may appear dirty, it is coated with small asphalt particles
- The dusting of asphalt allows it to stick to any product
- Adhesion is exceptional
- Appearance is even better

Slurry Seal and Microsurfacing

- Type II only
- Type III can be made by blending the segregated materials. Consistency in asphalt residual is challenging and excessive binder will rut and shove.

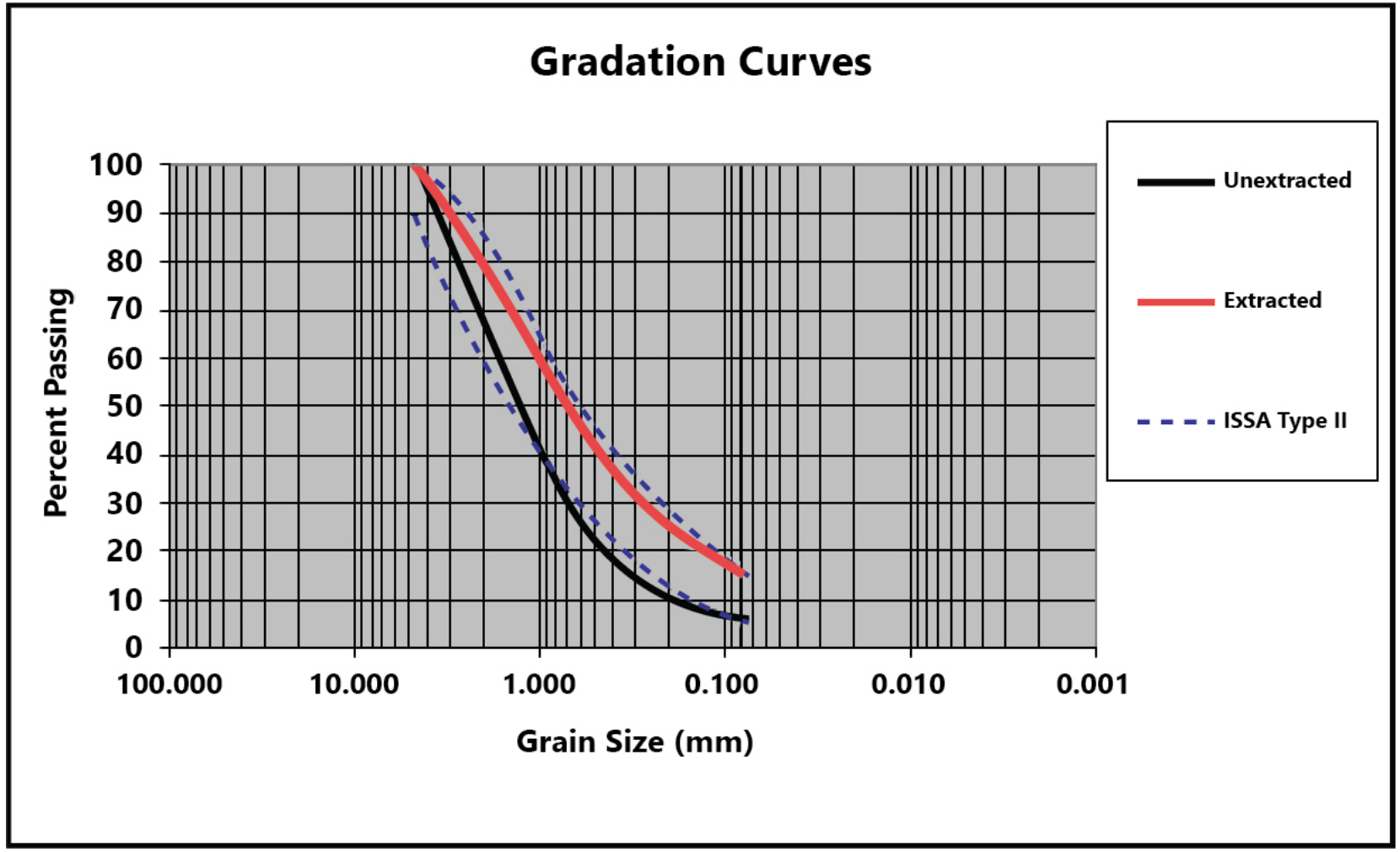
RAP Slurry Seal

RAP Slurry Dust

Sieve Size	Actual Finished Product Percent Passing UN-extracted	Bare Aggregate Percent Passing Extracted	ISSA Specification Type II
3/8"	100	100	100
No. 4	95-100	95-100	90-100
No. 8	65-85	70-90	65-90
No. 16	35-60	50-75	45-70
No. 30	18-38	35-55	30-50
No. 50	8-25	22-40	18-30
No. 100	5-20	13-38	10-21
No. 200	2-12	10-20	5-15
Residual AC		6.5% Min.	

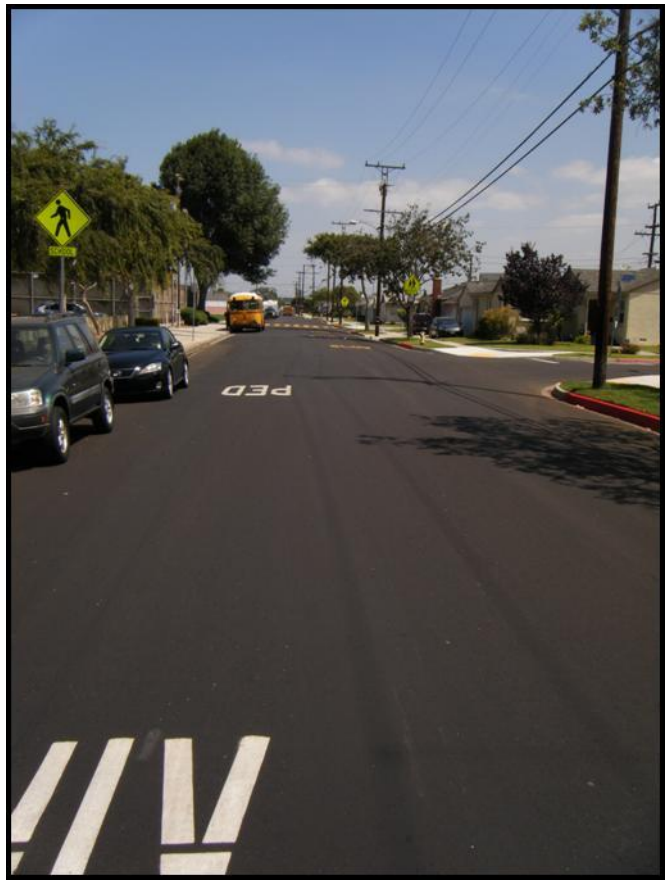
Averages 7 – 7.3%

RAP Slurry Seal



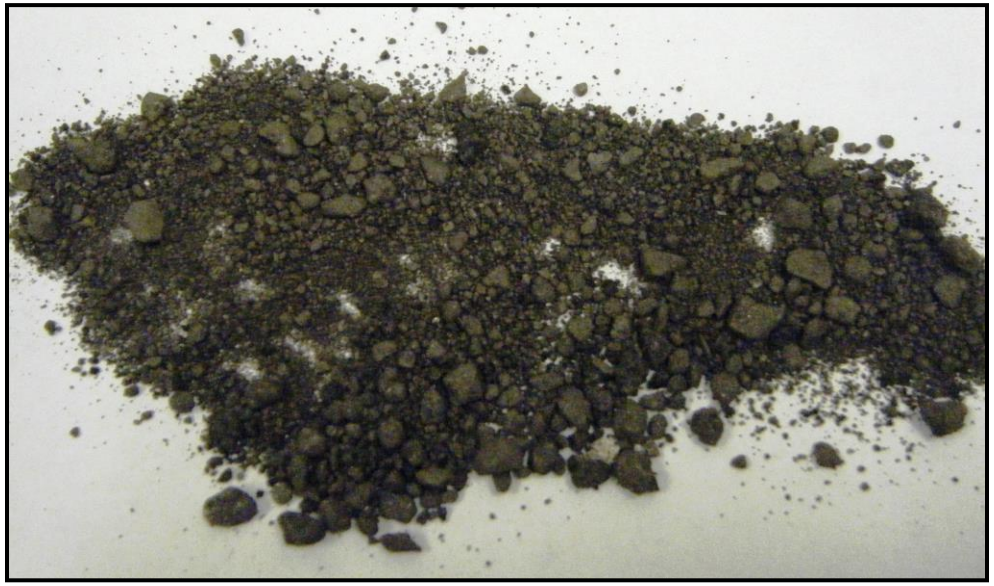
RAP Slurry Seal

Typically 14%
Residual asphalt



RAP Slurry Seal		ISSA Type II
Component	**RAP**	**Virgin**
Emulsion	10% - 14%	*12% - 18%
Residual AC	12.5% Min.	7.5% - 13.5%

*Caltrans Standard



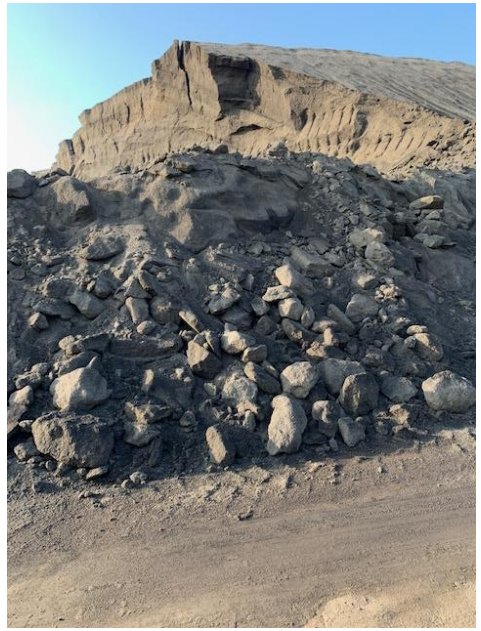
Lessons Learned

The value of the residual asphalt in the RAP

- 7%+ residual asphalt is dry. How is it affective?
  - Time, Traffic and Heat
    - Over time the existing asphalt in the RAP will blend with the new asphalt binder in the emulsion
    - Traffic and high temperatures speed up the process
  - Too much binder will push and bleed in high heat
  - Initial mixing does not pre-wet aggregate easily
  - Early aggregate retention is challenging

Best Practices Unique to RAP

- Emulsion
  - PMCQS-1h 3%
  - MSE 3%
- RAP Aggregate
  - Keep moist, don’t over wet
  - Don’t allow pile to stack up too long
  - Don’t pre-load truck the day prior
- Application
  - Roll all material with Pneumatic Roller



RoadResource.org

A COMPREHENSIVE RESOURCE FOR OPTIMIZING NETWORK MANAGEMENT

Mike Concannon, P.E.
Pavement Recycling Systems, Inc.

AGENDA

1 | Background

2 | Website Features

Treatment Toolbox | User Profile | Network Optimization

RoadResource.org

The Situation:

Demand is increasing for asphalt emulsions, preservation and recycling.

However, many city and county agencies are still unaware of benefits and best practices to successfully choose and apply these treatments.

PPRA
Better roads today. Stronger networks tomorrow.

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.

Two Guiding Questions

1 How do we equip road owners & end users with **tools to increase the successful use** of pavement preservation and recycling?

2 How do we better disseminate research, success stories, and learning across all agencies, **making information more accessible**?

Research & Collaboration

Competitive exploration & Industry affiliations

International data survey

Retreats with ISSA, AEMA & ARRA leadership

Input from over 45 agency and industry leaders

Interviews & beta-testing with agency-level users, pavement managers, DOTs, & roadway engineers

Page by page technical review from multiple committees

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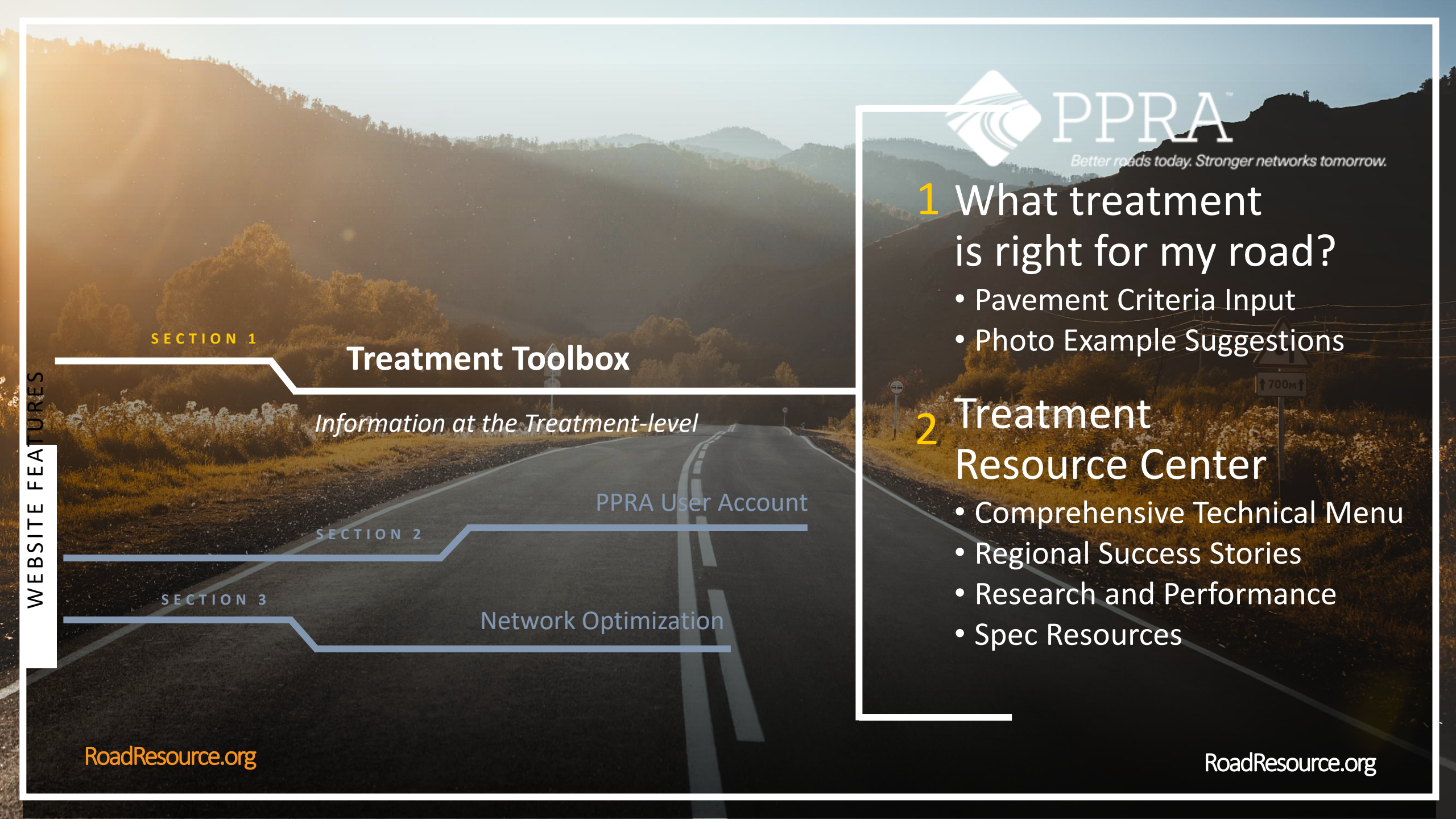
Better roads today. Stronger networks tomorrow.

RoadResource.org



WEBSITE FEATURES

SECTION 1

Treatment Toolbox

Information at the Treatment-level

PPRA User Account

SECTION 2

SECTION 3

Network Optimization

RoadResource.org

PPRA

Better roads today. Stronger networks tomorrow.

1 What treatment is right for my road?

- Pavement Criteria Input
- Photo Example Suggestions

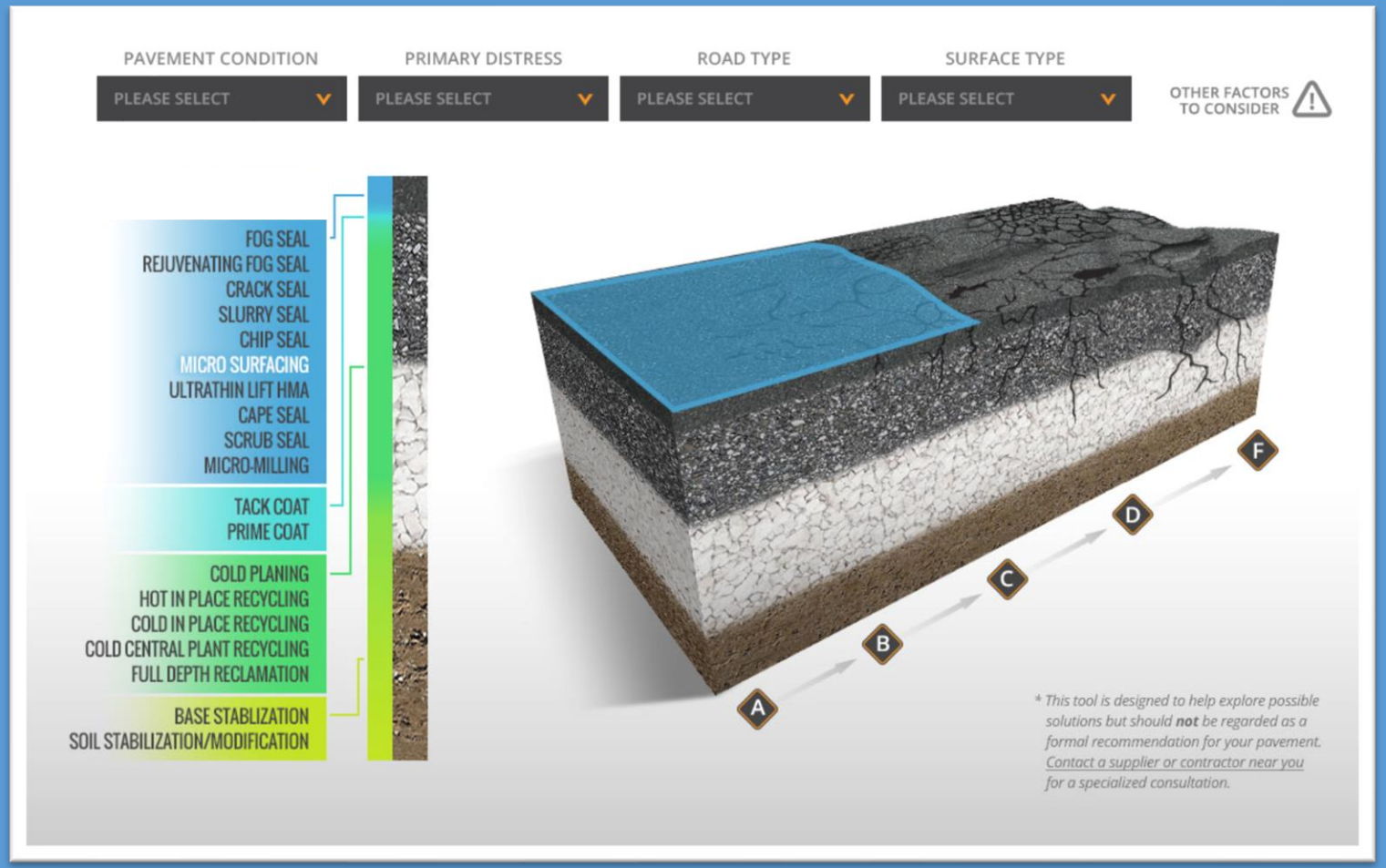
2 Treatment Resource Center

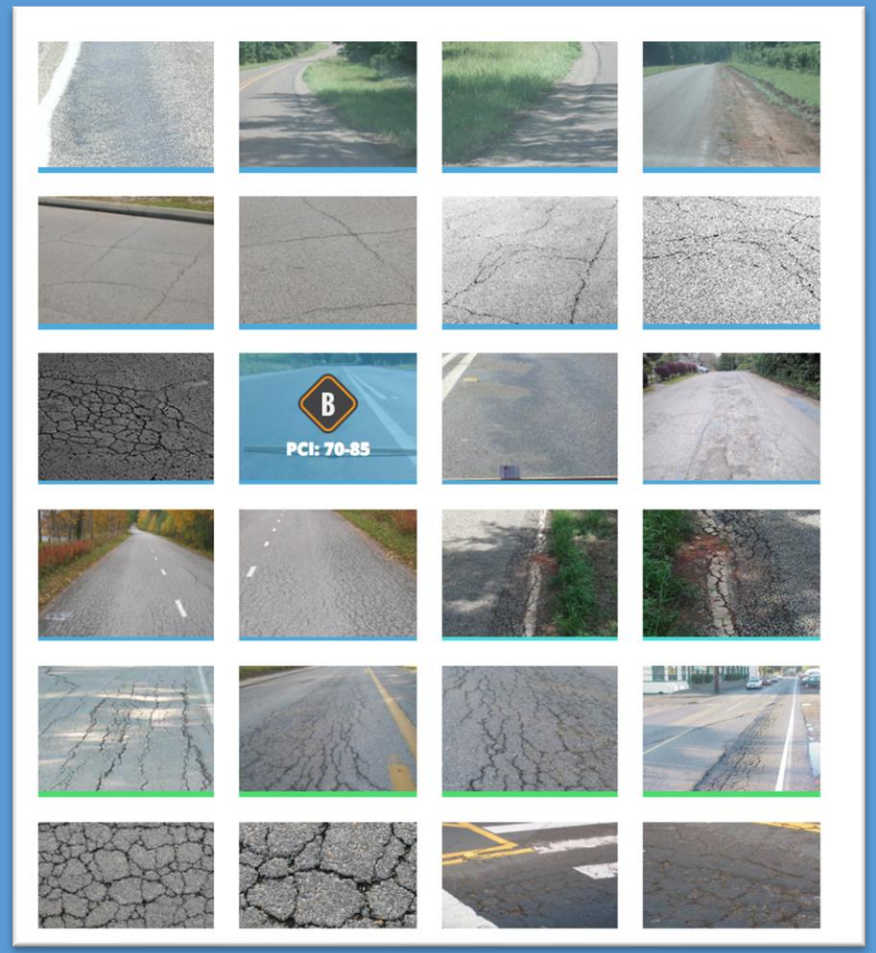
- Comprehensive Technical Menu
- Regional Success Stories
- Research and Performance
- Spec Resources

RoadResource.org

Which treatment is best for my road?

Input pavement criteria or select photos for treatment options





Treatment Resource Center

PPRA
Better roads today. Stronger networks tomorrow.

Ensure treatment success with comprehensive information on 18 treatments

FOR PAVEMENT CONDITIONS C-D-F (PCI of less than 70)

A cost-effective, long-lasting, greener alternative to conventional maintenance and rehabilitation techniques. Cold In-place recycling (CIR) is a process that cold mills and recycles the top 2-5 inches of asphalt using a continuous train operation. Through the complete reuse of existing material, CIR greatly reduces trucking, time and natural resources to significantly lower project costs. Generally, any road that is a candidate for mill & fill is a candidate for CIR.

- 20%–50% less expensive than conventional maintenance and reconstruction methods
- Reduce Greenhouse emissions by Up to 90%
- Reuses 100% of existing materials
- 20%–40% faster construction times
- Adds 15–20 years (combined with appropriate wearing course)
- Most agencies use SLCs between 0.30–0.38 (Recent research indicates values from 0.36–0.44 may be more appropriate)

ISSUES ADDRESSED

- Frequent, severe, non-load distresses in top lift of hot mix
- All distresses within the recycling depth (2-5 inches)
- Reflective cracking from below CIR layer
- See all

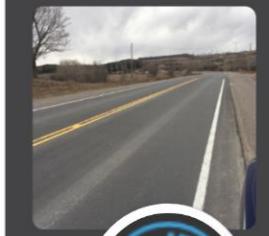
ATTRIBUTES

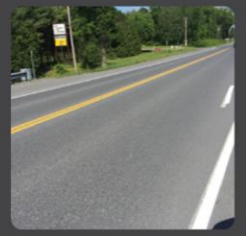
- Eliminates defects within the recycling depth
- Blocks or slows reflective cracking
- Reuses existing material in place
- Replaces 1 or 2 lifts of hot mix
- Allows for road widening where desired

COMMON COMBINATIONS

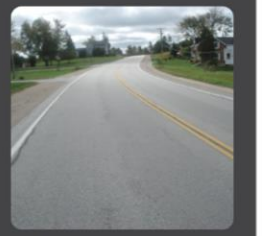
CIR	Optimum Performance	Average Performance	Stop-Gap Performance
Types of Distress	• Transverse, longitudinal, multiple cracking • Ravelling • Oxidation	• Wheelpath cracking • Rutting (asphalt or subgrade)	• Alligator cracking from base failure • Distortion
Depth of Distress	Within treatment depth (2"–5")	1"–3" below treatment depth	More than 4"–6" below treatment depth
Life Extension	20–25 years	10–20 years	5–10 years

EXAMPLES OF ROADS THAT HAVE BEEN TREATED WITH COLD IN-PLACE RECYCLING OVER VARIOUS STAGES IN SERVICE LIFE:


CIR 1 Y… B…


CIR 3 years later: Prescott-Russel County Road, Ontario


CIR 5 years later: Bloomington Road, Ontario


CIR 7 years later: Hwy 6, Ontario

If a CIR mix ravels excessively due to rain, the mat can be re-processed with or without adding cement to facilitate drying

Success Stories & Research

PPRA
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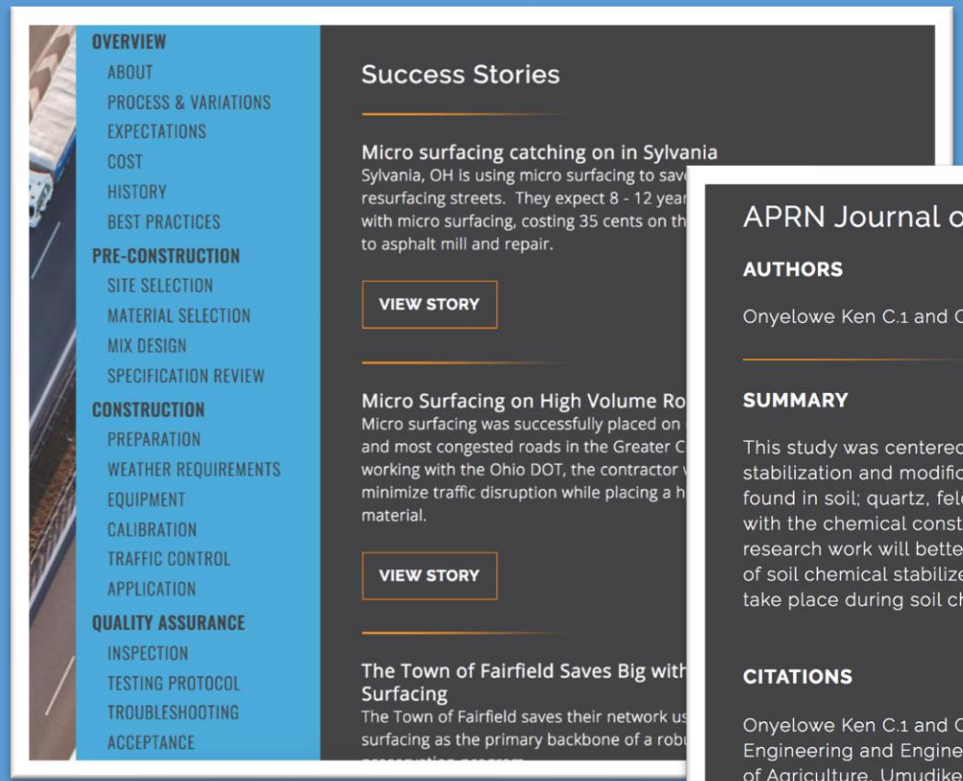
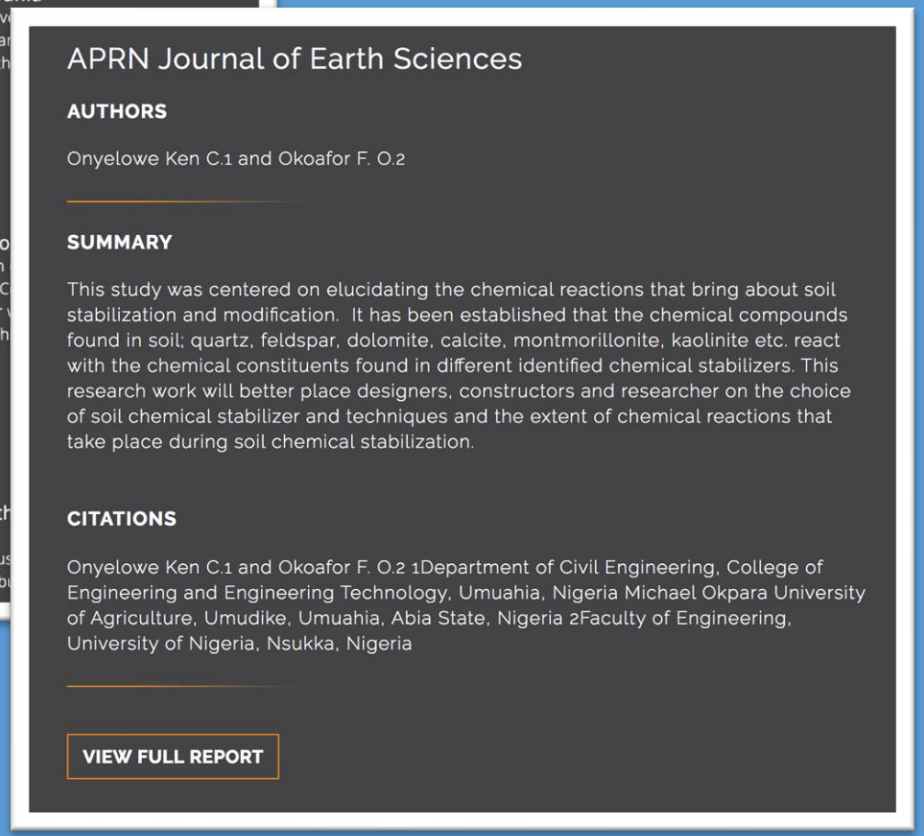
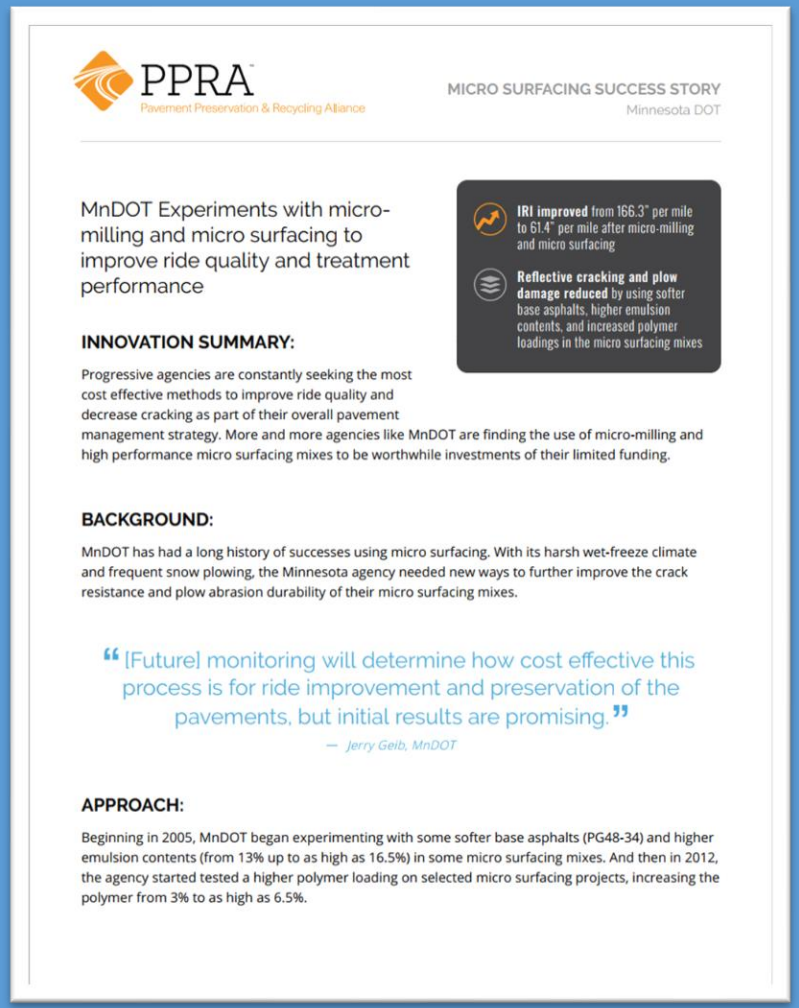
Use, performance & best practices in your region

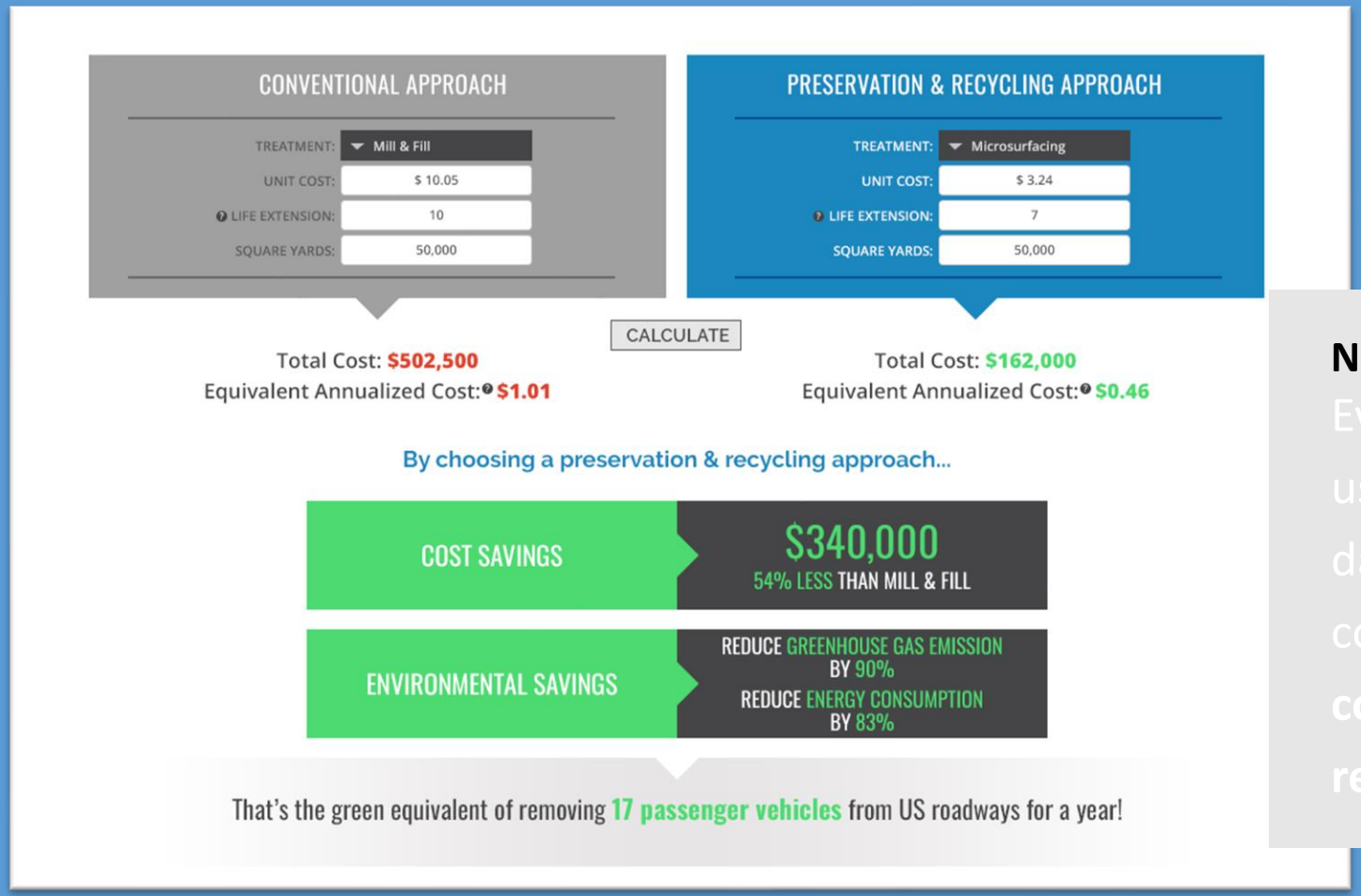






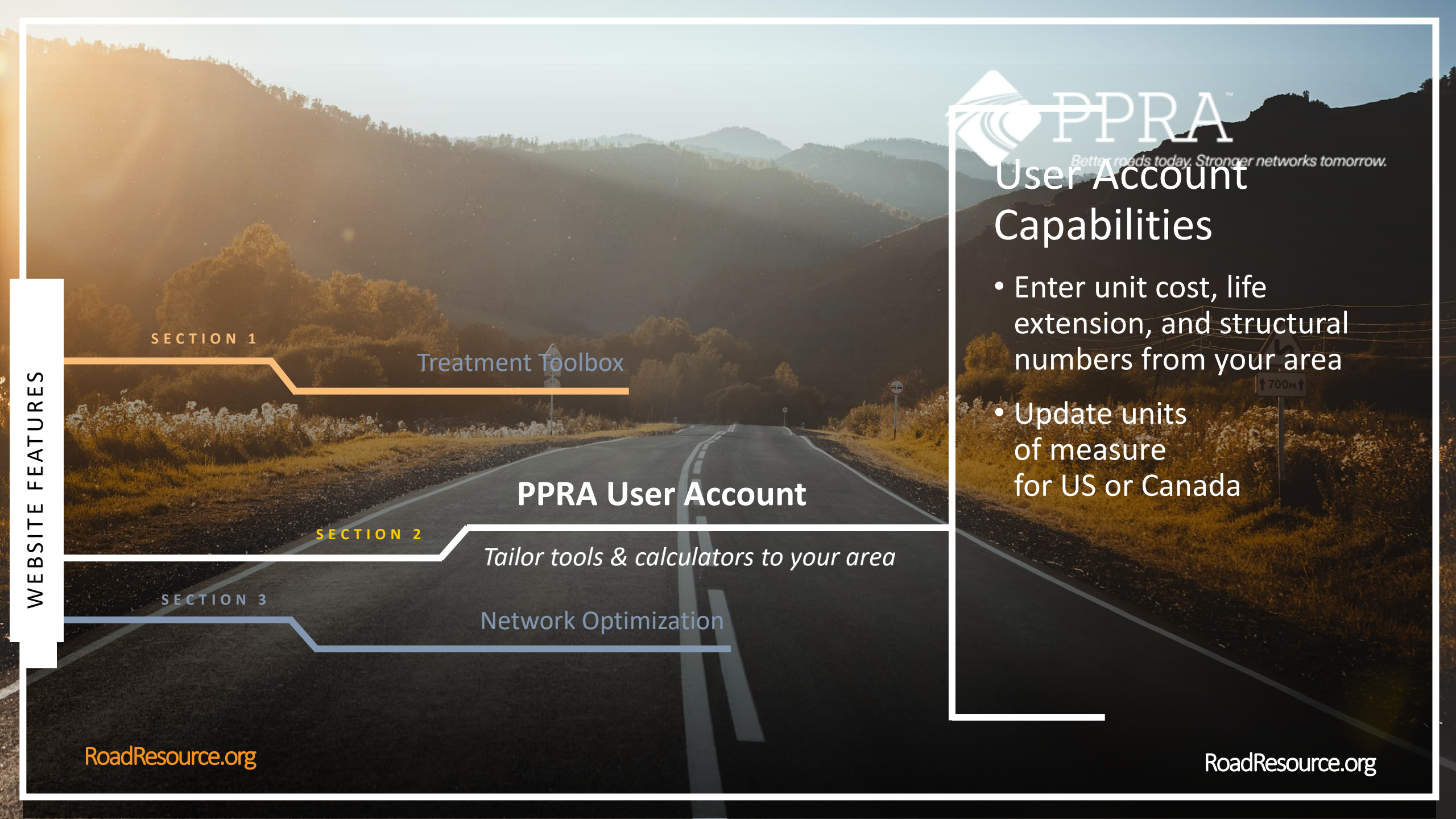
Compare Treatments

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.**


WEBSITE FEATURES
SECTION 1
Treatment Toolbox
PPRA User Account
SECTION 2
Tailor tools & calculators to your area
SECTION 3
Network Optimization
RoadResource.org
PPRA
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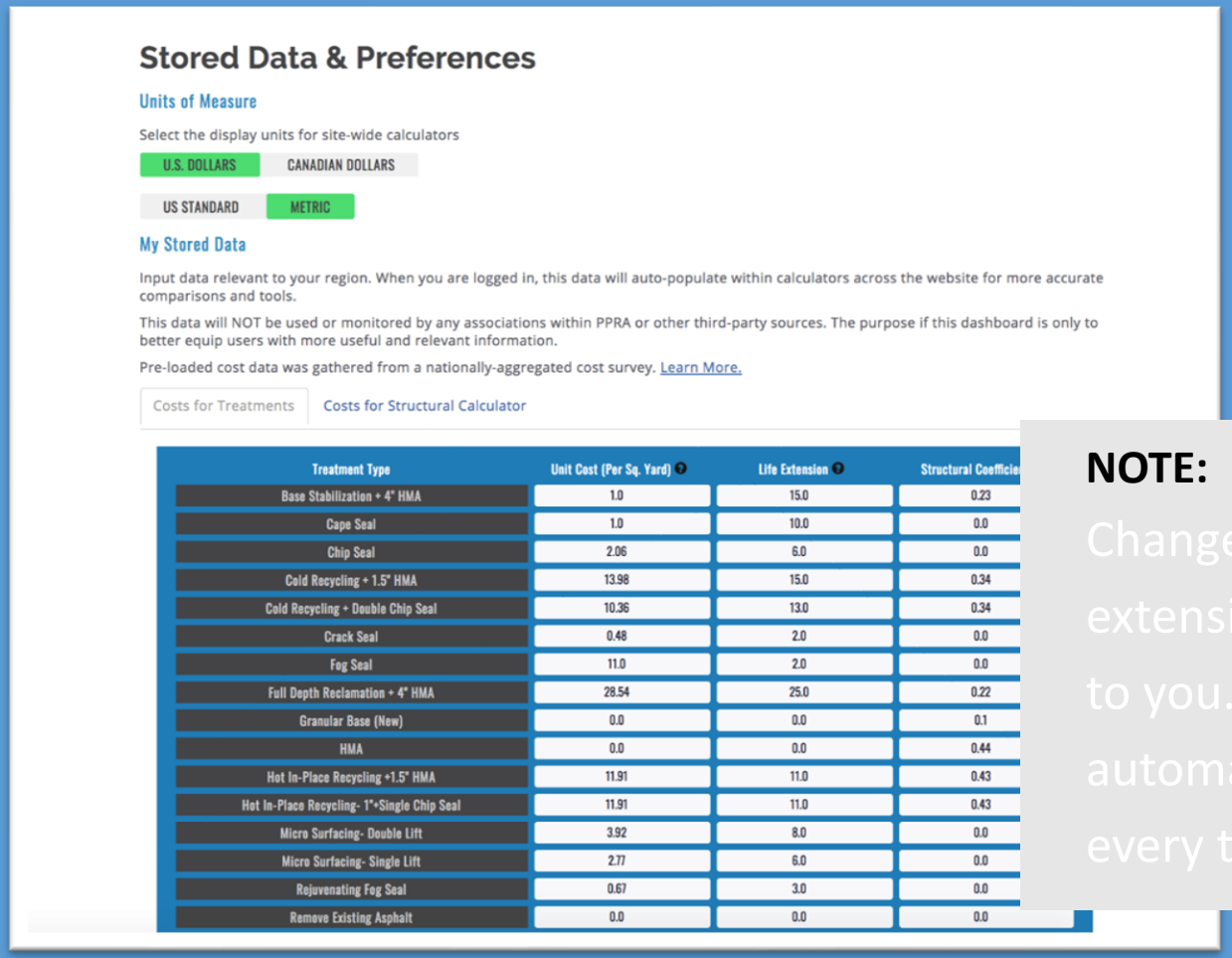
User Account Capabilities
• Enter unit cost, life extension, and structural numbers from your area
• Update units of measure for US or Canada
RoadResource.org

My PPRA Account

Input costs and life extension in your area to make the most of the site & tools



Stored Data & Preferences

Units of Measure

Select the display units for site-wide calculators

U.S. DOLLARS | CANADIAN DOLLARS

US STANDARD | METRIC

My Stored Data

Input data relevant to your region. When you are logged in, this data will auto-populate within calculators across the website for more accurate comparisons and tools.

This data will NOT be used or monitored by any associations within PPRA or other third-party sources. The purpose if this dashboard is only to better equip users with more useful and relevant information.

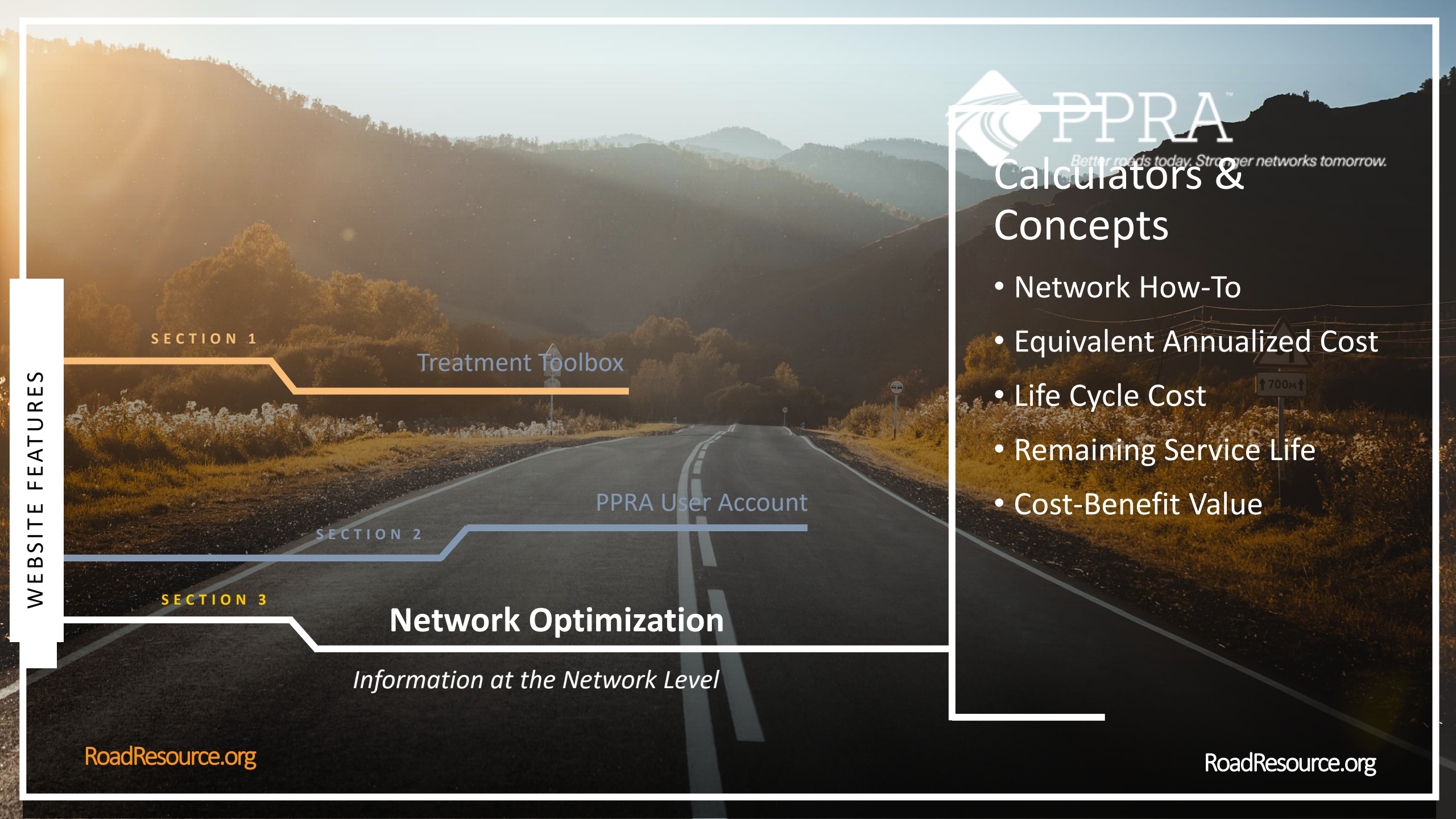
Pre-loaded cost data was gathered from a nationally-aggregated cost survey. Learn More.

Costs for Treatments | Costs for Structural Calculator

Treatment Type	Unit Cost (Per Sq. Yard)	Life Extension	Structural Coefficie
Base Stabilization + 4" HMA	1.0	15.0	0.23
Cape Seal	1.0	10.0	0.0
Chip Seal	2.06	6.0	0.0
Cold Recycling + 1.5" HMA	13.98	15.0	0.34
Cold Recycling + Double Chip Seal	10.36	13.0	0.34
Crack Seal	0.48	2.0	0.0
Fog Seal	11.0	2.0	0.0
Full Depth Reclamation + 4" HMA	28.54	25.0	0.22
Granular Base (New)	0.0	0.0	0.1
HMA	0.0	0.0	0.44
Hot In-Place Recycling +1.5" HMA	11.91	11.0	0.43
Hot In-Place Recycling- 1"+Single Chip Seal	11.91	11.0	0.43
Micro Surfacing- Double Lift	3.92	8.0	0.0
Micro Surfacing- Single Lift	2.77	6.0	0.0
Rejuvenating Fog Seal	0.67	3.0	0.0
Remove Existing Asphalt	0.0	0.0	0.0

NOTE:

Change aggregate data into costs, life extension, and structural numbers relevant to you. Tools throughout the site automatically re-populate with your data every time you log in.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WEBSITE FEATURES
SECTION 1
Treatment Toolbox
SECTION 2
PPRA User Account
SECTION 3
Network Optimization
Information at the Network Level
Calculators & Concepts
• Network How-To
• Equivalent Annualized Cost
• Life Cycle Cost
• Remaining Service Life
• Cost-Benefit Value
RoadResource.org
RoadResource.org

Equivalent Annualized Cost

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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

Life Cycle Cost Calculator

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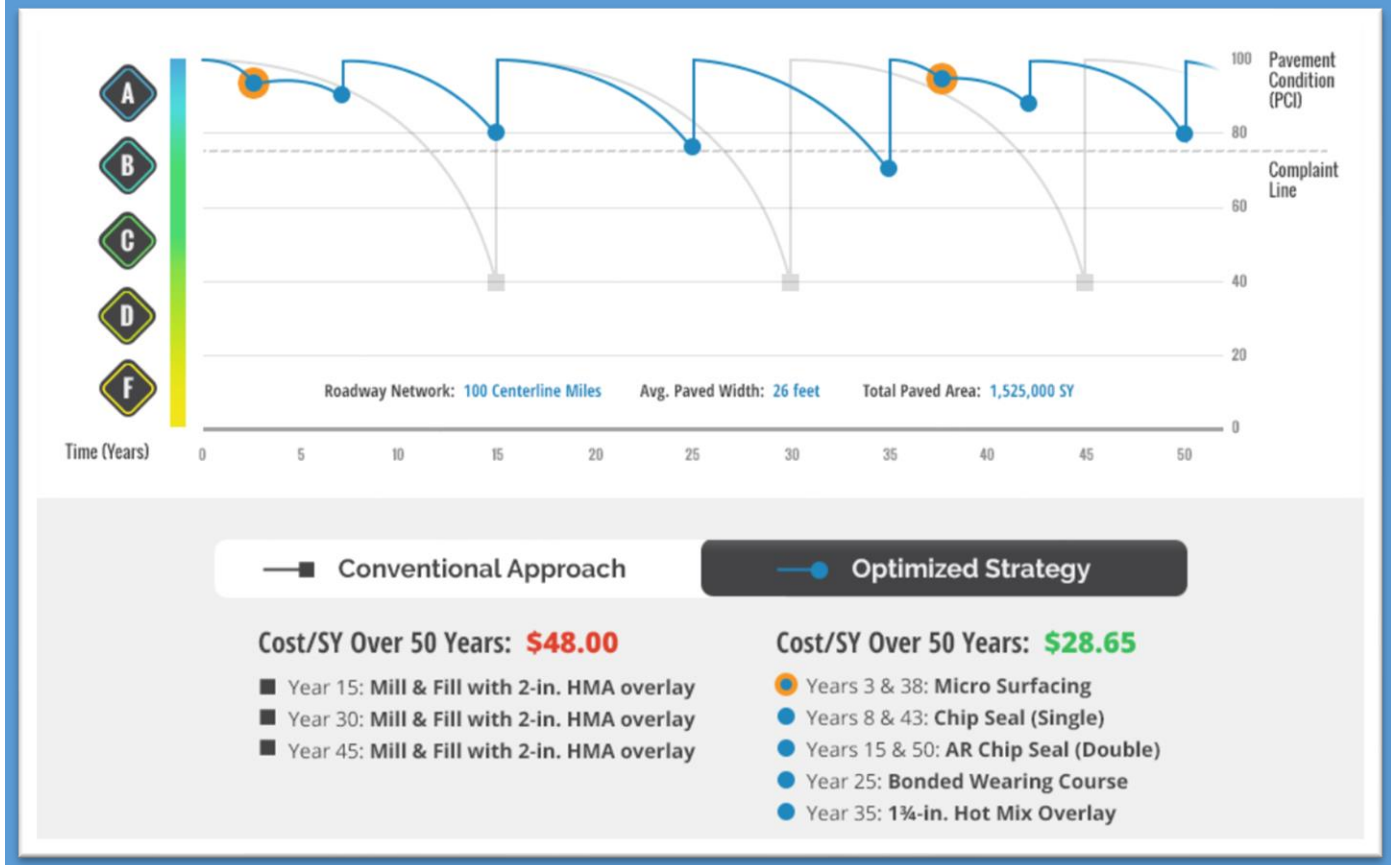
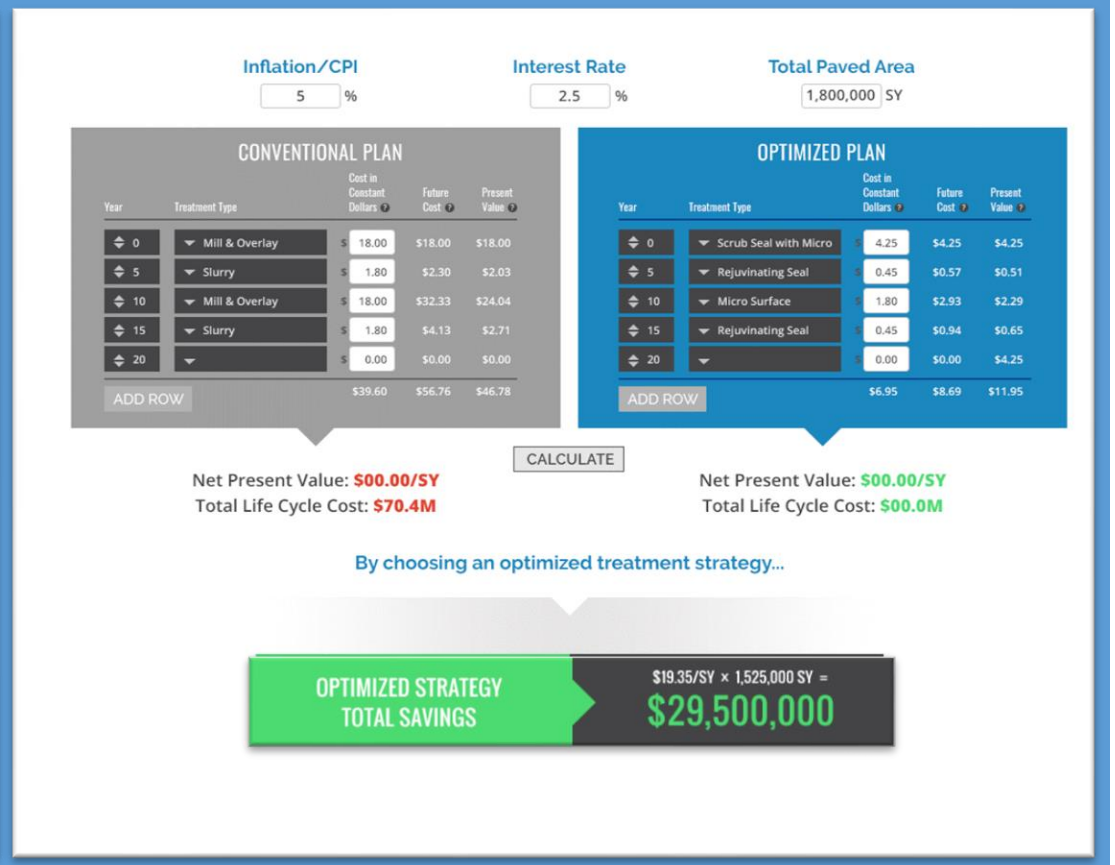
Save big over the life of your pavement with progressive maintenance





Remaining Service Life

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How much life is your network gaining or losing each year?

ABOUT | CALCULATOR

Remaining Service Life

Is your network gaining or losing life each year?

Understanding Remaining Service Life (RSL) is critical to designing a treatment plan that stretches your budget further and reverses the trend of a deteriorating network.

Download the FHWA RSL pub IF-07-006

CRITICAL CONCEPT

A 500-mile network loses 500 mile-years of life annually.

Every year, every mile of your network loses 1 mile-year of life. To avoid losing ground, the roadway owner must design a treatment plan that adds 500 mile-years of life or more!

See how this agency reallocated funds to inject more life into their network, using the same budget

RSL Calculator

How to use this Tool

Use the calculator below to explore how different treatment combinations can be varied to inject maximum life into your network and use your resources more wisely. See examples and learn more about remaining service life here.

Total Network Lane-Miles	Average Lane Width (ft)	Total Budget	Remaining Budget
1000	15	$ 5000000	$2,920

yd

Treatment Type	Category	Life Extension	Lane-Miles* Treated	Lane-Mile-Years	Unit Cost	Total Cost
Rejuvenating Fog Seal	Preservation	3.0	25	75	0.67	$147,400
Micro Surfacing- Double Lift	Preservation	8.0	34	272	3.92	$1,172,864
Chip Seal	Preservation	6.0	40	240	2.06	$725,120
Cape Seal	Preservation	10.0	24	240	5.20	$1,098,240
Minor Mill & Fill	Rehabilitation	11.0	2	22	9.80	$172,480
Cold Recycling + 1.5" HMA	Rehabilitation	15.0	4	60	13.98	$492,096
Full Depth Reclamation + 4" HMA	Reconstruction	25	2	50	28.54	$502,304
Full Depth Remove & Replace	Reconstruction	25.0	2	50	39.01	$686,576

ADD ROW

YOU ADDED 1,009 LANE-MILE-YEARS OF LIFE | 9 LANE-MILE-YEAR NET GAIN | 13% OF ROADS ADDRESSED

Cost-Benefit Value

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Better roads today. Stronger networks tomorrow.

Which projects will give the “biggest bang for the buck?”

Cost-Benefit Value

With limited funding, how do I prioritize my projects?

CBV offers roadway managers a way to prioritize projects while accounting for the variables relevant to you and the realities of traffic, cost and life extension.

$$CBV = \frac{(\text{Traffic} / \text{Constraint Factor}) \times (\text{Life Extension})}{(\text{Unit Cost}) \times (\text{PCI})}$$

Two road comparison: Which road should I treat first?

ROAD 1 — Worst First / Reconstruction — AADT: 5000, PCI: 30

$$\frac{(5000_{\text{AADT}} / 7_{\text{CF}}) \times (25_{\text{YEARS}})}{(\$39_{\text{PER SY}} \times 30_{\text{PCI}})} = 15 \text{ CBV}$$

ROAD 2 — Pavement Preservation / Chip Seal — AADT: 5000, PCI: 75

$$\frac{(5000_{\text{AADT}} / 7_{\text{CF}}) \times (6_{\text{YEARS}})}{(\$2_{\text{PER SY}} \times 75_{\text{PCI}})} = 29 \text{ CBV}$$

CRITICAL CONCEPT

For Equal Traffic, Preservation Has A Higher Benefit.

Total Network Lane-Miles: 500 | AADT Constraint: 7 | Total Budget: $ 2500000

yd

Road Name	Segment From / To	PCI	AADT	Length (ft)	Width (ft)	Treatment	Life Extension	Unit Cost	Segment Cost	Cumulative Cost	CBV
Midway road	Oakland to Folsom	86	8500	26400	15	Rejuvenating Fog Sea	3.0	0.67	$29,480	$29,480	63.22
Thom Ave.	Oak to Rowland	84	5500	105600	15	Crack Seal	2.0	0.48	$84,480	$113,960	38.97
Beach Street	Baxter to Clayton	64	7500	36850	15	Cape Seal	10.0	5.20	$319,367	$433,327	32.19
Adams Street	First to 17th	72	6500	47520	15	Micro Surfacing- Dou	8.0	3.92	$310,464	$743,791	26.32
Williams Ave.	Clayton to Market	68	3500	42680	15	Chip Seal	6.0	2.06	$146,535	$890,325	21.42
Arthur Ave.	Condor to Southwi	43	7000	32650	15	Full Depth Reclamati	25.0	28.54	$1,553,052	$2,443,377	20.37
Canal Street	Cherry to Park	62	3000	7920	15	Minor Mill & Fill	11.0	9.80	$129,360	$2,572,737	7.76
South Road	Redding to Shenar	47	1500	16500	15	Full Depth Remove &	25.0	39.01	$1,072,775	$3,645,512	2.92
						Select...			$0	$3,645,512	0.00

Budget Line

ADD ROW

Subscribe to the Road Resour Newsletter

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Get the latest in industry trends, research, success stories, and technical updates in a succinct monthly e-newsletter.

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FOR MORE INFORMATION

Mike Concannon, P.E.

Pavement Recycling Systems, Inc.

951-790-3430

mconcannon@pavementrecycling.com

For Association Information

AEMA ASPHALT EMULSION MANUFACTURERS ASSOCIATION | ISSA PRESERVING PAVEMENT | ARRA Responsible Renewal. Reliable Results.

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Visit the new RoadResource.org

GET THE MOST OUT OF ANY PAVEMENT WITH JUST ONE NEW TOOL.

Fiberized Slurry Seal

- All slurry seal applications can have fiber added
- Understand the goal of the fiber
  - Added strength to the surface
  - Does not reduce reflective cracking.
- Specifications vary for size of fiber and method of delivery
- Fiber can show though surface and reflect as sparkles in headlights

Test Results with RAP Slurry Seal

- Forta Asphalt Binder test results show higher flexural tension and better wet track abrasion test results
- Independent testing agreed with the WTAT improvement.

FORTA ASPHALT FIBER
STRONGER LASTING

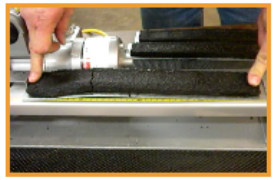
SURFACE-EXT™

Micro Surfacing & Slurry Seal Fiber

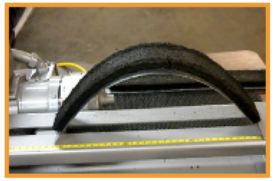
How does Surface-EXT™ improve your asphalt pavement?

- Increases Pavement Durability
- Increases Pavement Flexibility
- Mitigates Surface Cracking
- Reduces Set Up and Cure Time

FLEXURAL TENSION TEST



Standard Mix - No Fiber



0.2% 1/4" Slurry Seal Fiber*

WET TRACK ABRASION TEST

FROM THE LAB:

I get samples of material into the laboratory which claim to give superior performance to emulsion products on a regular basis. Very few of these performance enhancers live up to the claims and I have grown skeptical over the years when I receive materials in claiming to be the next "game changer".

Last October, I received a sample of your fiber along with a sample of Delta aggregate and was informed that I should add 0.2% fiber into the microsurfacing mix. The design was done for the city of Austin and was placed by Ballou Construction the following month. It was such a small amount of fiber that I was skeptical as to how it could improve the properties of the final micro slurry product.

I saw no change in the mixing properties nor did I have to change the formulation of the emulsion used in the design when the fibers were introduced. Water requirements remained unchanged when fibers where used in the mix. In all regards the fibers acted as if they were inert.

The Wet Track Abrasion Tests (WTAT) showed an incredible difference with the mixes which had the fibers in compared to the control mixes I performed without fibers (almost a 60% improvement). The fibers made the mixes tougher which should translate to longer service life on the road.

Best Regards
Ian Jack
Technical Leader
ijack@heartlandasphaltmaterials.com

*Results are based on FORTA® Asphalt Fibers and specific chemistry, aggregates, and emulsions. You may experience different results for differing materials.

Contact your FORTA® Representative for more information

FORTA ASPHALT FIBER | 100 Forta Drive, Grove City, PA 16127 | 800-245-0306 | forta-fi.com |

SS.2.1.06.18

Research and Development Department

10240 San Sevaine Way
Jurupa Valley CA. 91752

Slurry samples testing results:

Fiber Reinforced RAP Slurry Type II							Sept_21_2020
		Results		Results		Results	
		10%		12%		14%	
Test Description	Specs	W/Fiber	W/O	W/Fiber	W/O	W/Fiber	W/O
Mixing Time (Seconds)	180 min.	180+	180+	180+	180+	180+	180+
Slurry Seal Consistency (mm)	30 max.	14	17	26	27	34	39
WTAT at 1 hr (g/m²)	650 max.	301	538	278	316	85	120
		44% Decrease		12% Decrease		29% Decrease	

Comments:

- All testing was done under laboratory conditions at 77-79°F

Highly Modified Microsurfacing

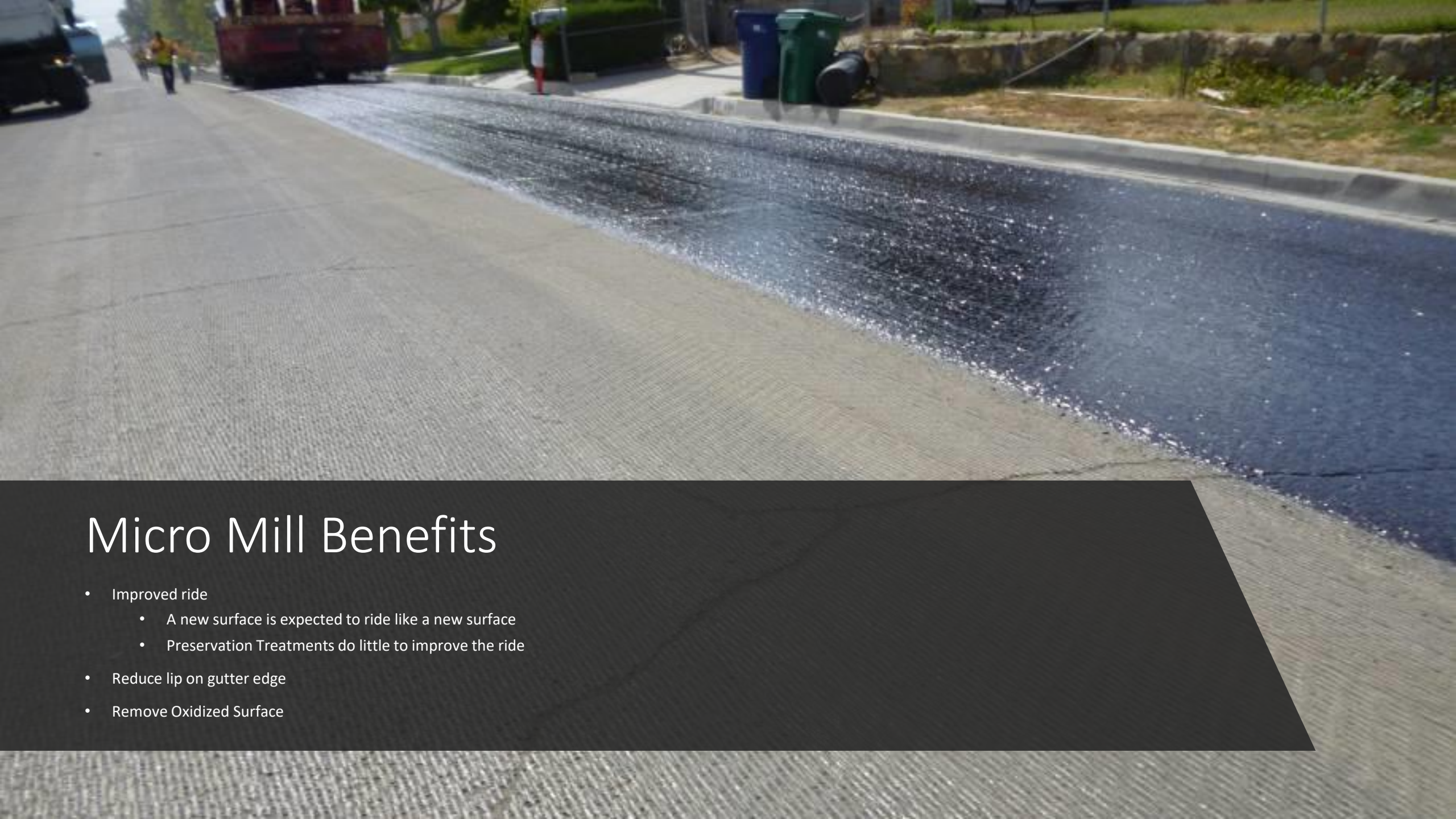
- What lead to Hi Mod?
  - Request from agency for durability against snowplow
- What hurdles are created with Hi Mod?
  - Workability with additional polymer
  - Latex chemistries overriding asphalt chemistries
  - Manufacturing differences

Highly Modified Micro and Slurry Surfacing (High Mod)

- Increased Durability
- Accomplished with Conventional Equipment
- Improved resistance to plow and chain damage
- Improved resistance to power steering scuffing
- Modification of Base Asphalt

Micro Milling with Pavement Preservation

How to react to public perception and provide a better product

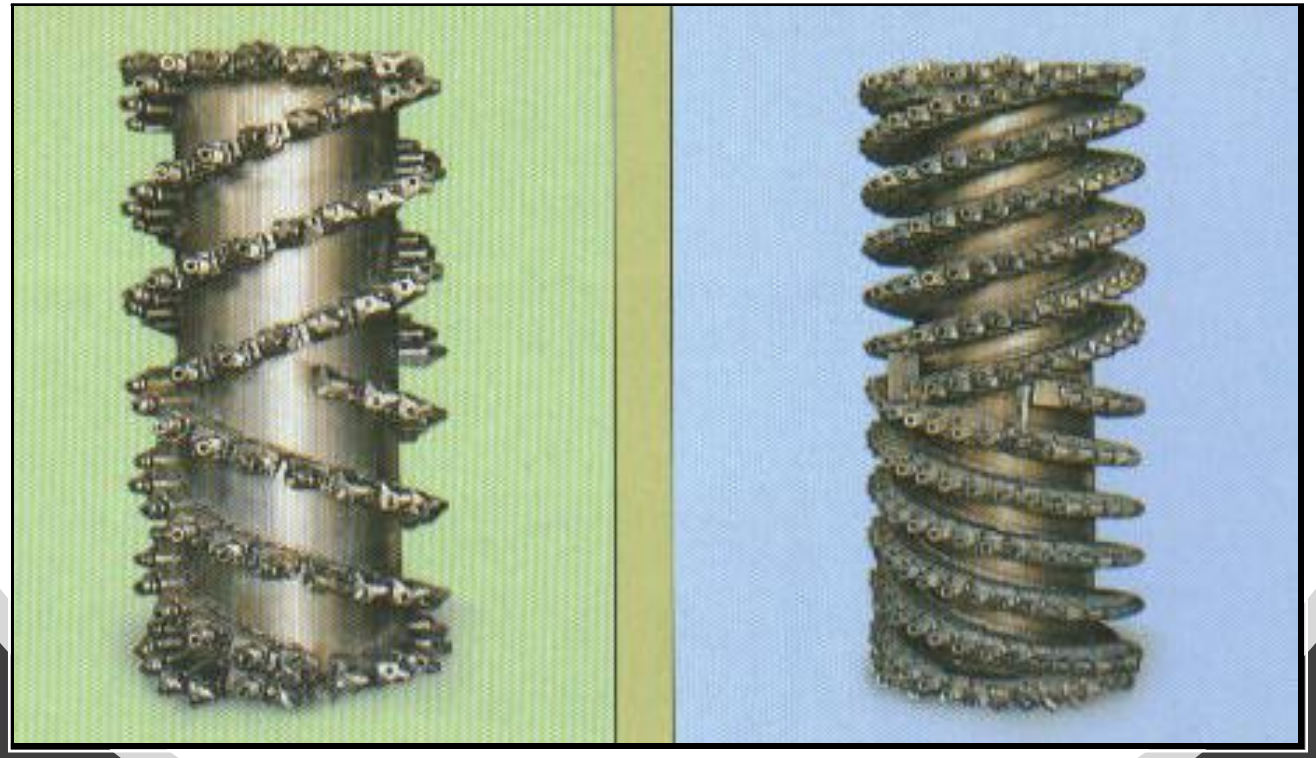


Micro Mill Benefits

- Improved ride
  - A new surface is expected to ride like a new surface
  - Preservation Treatments do little to improve the ride
- Reduce lip on gutter edge
- Remove Oxidized Surface

Standard Drum

Profile Drum



Micro-Mill Drum

Cutting Speed and Depth

Maintain a good pattern.

- Drum RPM
- Forward Speed

Don’t mill too deep

- Stay on top, avoid slippage between paving layers

Electronic Mix Control and Diagnostic Technology

Slurry and Microsurfacing mixing machines have been volumetrically controlled for years.

There are three manufacturing companies in the US. Two are still volumetric and one is computer controlled

Computer control builds consistency and simplifies calibration.

Remote access to production will soon be available.

EZ-OP PRO Computer Controls

Advanced Calibration and Mix Design Controls

The computer controller not only controls main start and start/stop sequencing but provides instructions and data input for calibration.

To help prevent plugging of the pugmill, an interlock feature is included in the computer that prevents main start from engaging unless the pugmill is operating and it will dis-engage main start if the pugmill gets overloaded and starts to stall.

The display is ergonomically located at the operator control station. When not in use, the display is folded down and locked in the operator control station. When the display is raised up for operation, it becomes placed right in front of the operator as he stands at the operator station.

The EZ-OP PRO system also monitors ground travel and when the spreader box width is input into the computer, the production rate and spread rate can be displayed, as well as displaying an average distance remaining per load.

Macropaver Telematics

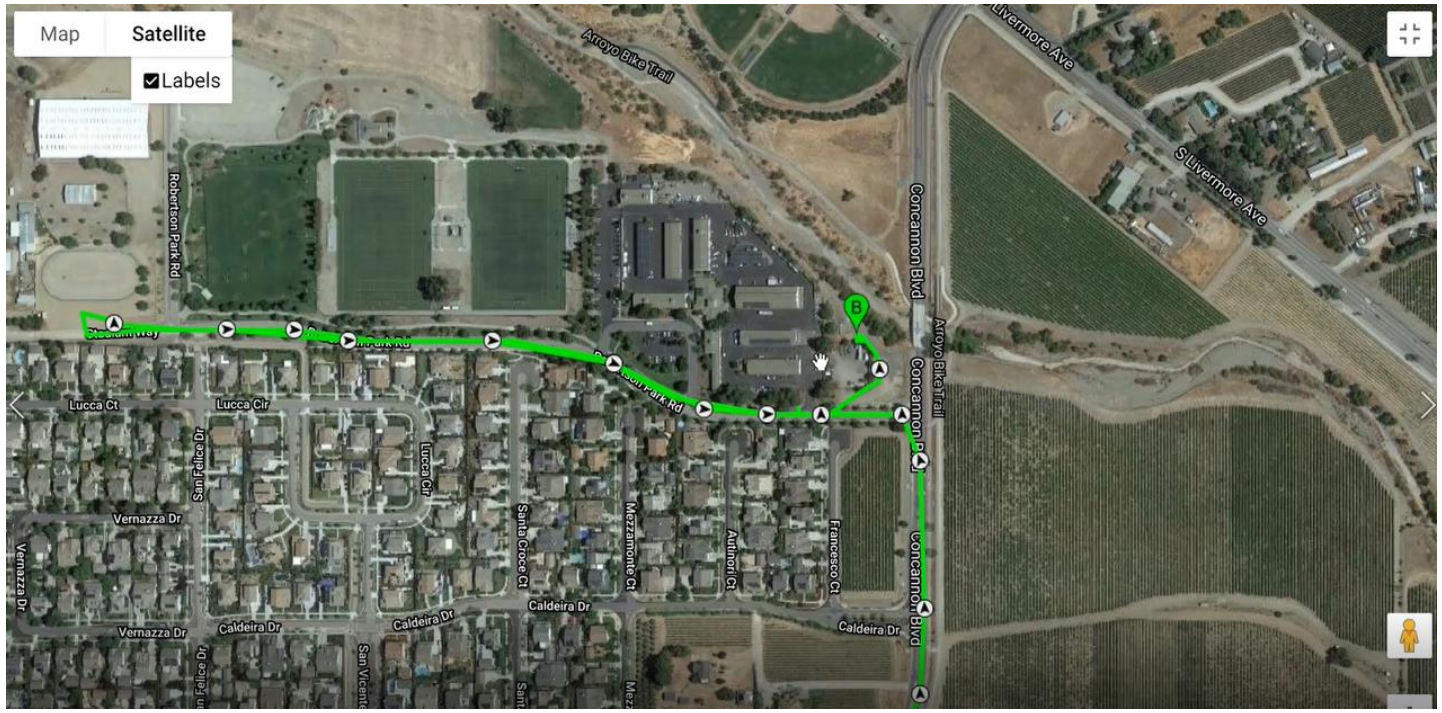
The telematics system is developed to improve the efficiency of construction. This system provide information in real time, over the cloud, to your computer, phone or tablet.

The Telematics pushe the material production information along with GPS location up to the cloud using wireless cellular technology. It will even store the information and automatically send it if there is a loss of connectivity. Using a cloud portal, the project manager can generate daily reports showing material usage and spread rate for a team of machines or an individual machine on a project. This saves time and allows for reporting without interruption to the crew or the project.

Dashboard

Show 10 entries Search:

Job Id	Machine Name	Effective Date	Gate Setting	Agg Rev	Emulsion Rev	Fines Rev	Emulsion To Agg
19-072.	91150	2019-07-29	6.00000	103.00000	15.00000	1.00000	0.14560
19-072.	91152	2019-07-29	6.00000	103.00000	15.00000	1.00000	0.14560
19-093.	91147	2019-10-28	7.00000	99.00000	14.80000	1.00000	0.15000
19-093.	91151	2019-10-28	5.36000	99.00000	14.80000	1.00000	0.15000



Thank you

Questions

AGENDA

1) Orientation / Sign-In / Polling

2) Public Comments

3) Welcome

4) Opening Statement

5) Working Group Updates

6) Organization / Industry Updates

7) Key Presentation / Questions and Answers

8) Next Working Group Meeting / Close

San Diego County

BUILDING BETTER ROADS

MEETING ADJOURNED

THANK YOU FOR ATTENDING!

Website: https://sandiegocounty.gov/bbr