

# **Northeast Bridge Preservation Partnership Meeting**

September 18, 2012 – Newport, RI

- **Module 1** – TSP<sup>2</sup>
- **Module 2** – Pvmnt and Bridge Preservation
- **Module 3** – Bridge Preservation Research

By: Colin Franco, P.E.  
RIDOT

# **AASHTO TSP•2 History & Update**

**Northeast Bridge  
Preservation Partnership Meeting**

**September 18, 2012**

**Colin Franco, PE, Rhode Island DOT  
TSP•2 Oversight Panel Member**

# AASHTO

**Transportation System Preservation  
Technical Services Program**

# TSP•2

# TSP•2

## Background & History

- **Approved** by the AASHTO Board of Directors on May 8, 2005 (PR-10-05)
- **Created** to support the research, technical, and program needs of the member States in their development of Transportation System Preservation programs
- **Implemented** through the National Center for Pavement Preservation at Michigan State University

# TSP•2 Oversight Panel

**John Barton**, Texas DOT – Panel Chair

**Jennifer Brandenburg**, North Carolina DOT – Panel Vice-Chair

**Gregg Freeby**, Texas DOT – Panel Vice-Chair (Bridge)

**Peter Weykamp**, New York State DOT (Bridge)

**Eric Pitts**, Georgia DOT

**Nancy Albright**, Kentucky TC

**Lloyd Neeley**, Utah DOT

**Bruce Johnson**, Oregon DOT (Bridge)

**Judith Corley-Lay**, North Carolina DOT

**Colin Franco**, Rhode Island DOT

**Barton Newton**, California DOT (Bridge)

**Erle Potter**, Virginia DOT (Equipment)

**Butch Wlaschin**, FHWA Liaison



# Regional Bridge Preservation Partnerships





# Regional Pavement Preservation Partnerships





**14 state DOTs**

**Current Chair**

Don Whisler,  
Kansas DOT





**11 state DOTs**

**Current Chair**

Pete Weykamp,  
New York State DOT



## 13 state DOTs

### Current Chair

Chris Keegan,  
Washington  
State DOT



## 12 state DOTs & Puerto Rico

### Current Chair

Danny Tullier,  
Louisiana DOTD



# TSP.2 Support

- **Program for Bridge & Pavement Preservation**
- **Financially supported by over 75 % of AASHTO member agencies**
- **Over 90% of AASHTO member agencies participate in regional partnerships**



# TSP.2 Involvement

**More awareness by local highway agencies  
and associations**

- **Local APWA Chapters**
- **NACE**

**Building university memberships throughout  
the country**



# TSP.2 Involvement

**Increasing participation from industry associations**

- **ACPA**
- **AEMA**
- **ARRA**
- **ARTBA-BPA**
- **FP2 Inc**
- **IGGA**
- **ISSA**
- **NAPA**

# TSP•2 Media Campaign

## Campaign Resource Toolkit

- Spokesperson Training Guide
- Spokesperson talking points
- Media fact sheet
- News release template
- Opinion column template
- Letter to editor template
- Article for trade publications
- Campaign brochure
- PowerPoint presentation
- Campaign video

# TSP•2 Media Campaign

## Campaign Resource Toolkit

- Member access NCPP website:  
[www.pavementpreservation.org](http://www.pavementpreservation.org)
- Member access TSP•2 website:  
[www.tsp2.org](http://www.tsp2.org)
- Media access Coalition website:  
[www.preserveourroads.com](http://www.preserveourroads.com)



# TSP•2 Media Campaign

## Coalition to Preserve America's Roads

**A Coalition creates a  
"chorus of voices"  
for pavement preservation**

**Recruiting organizations as coalition members must see:**

- 1. Merit of Issue**
- 2. Need to preserve our infrastructure**
- 3. Benefit for the American Public**

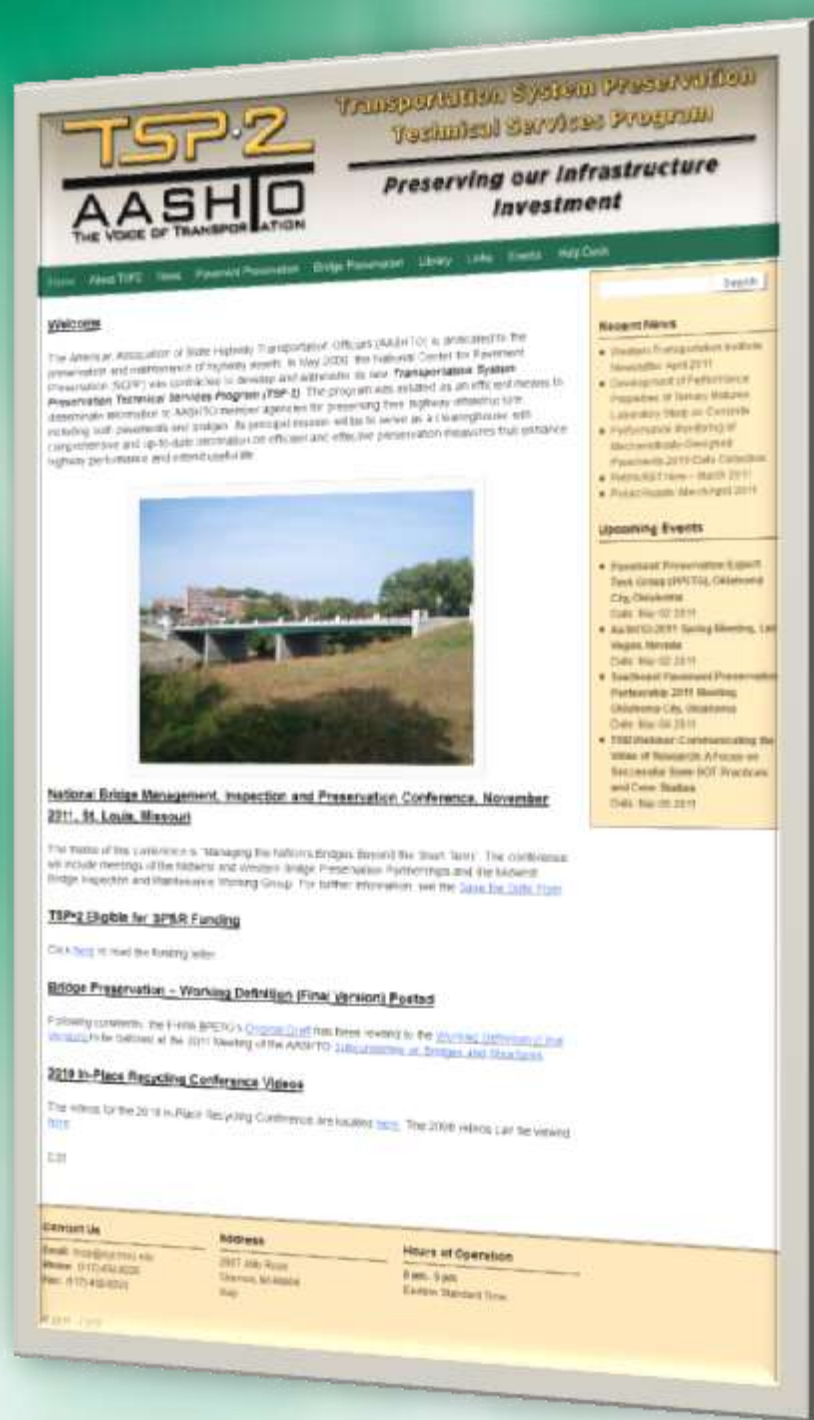
# TSP•2 Media Campaign

**Is a Campaign Resource Toolkit  
Needed for Bridge Preservation ?**



New website design

[www.tsp2.org](http://www.tsp2.org)



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PAVEMENT PARTNERSHIPS

BRIDGE PARTNERSHIPS

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EVENTS

FORUMS

LINKS



# Scholarship

## James B. Sorenson Memorial Pavement Preservation Scholarship



# **James B. Sorenson Memorial Pavement Preservation Scholarship**

- **Recipient shall be a U.S. Citizen or permanent resident.**
- **Has senior standing and accepted into the pavement engineering graduate program at MSU.**
- **Has strong academic history**

# Scholarship Requirements

- Recipient shall be a U.S. Citizen or permanent resident.
- Has senior standing and accepted into the pavement engineering graduate program at MSU.
- Has strong academic history

## Scholarship Recipients



**Alex Russeau**



**Michael Krcmarik**

# NCPP Staff



**Larry  
Galehouse**  
Director



**Patte Hahn**  
Administrative  
Manager



**John  
O'Doherty**  
Project  
Specialist -  
Road



**Angela  
Jernstadt**  
Accounts  
Manager



**Dennis  
Tang**  
IT Specialist



**Syed Haider**  
Research  
Specialist



**Darlene Lane**  
Travel  
Coordinator



**Doyt Bolling**  
Local  
Programming



**Ed Welch**  
Project  
Specialist -  
Bridge



**Dick Baron**  
Equipment  
Management  
Specialist



**John Hooks**  
Bridge  
Preservation  
Specialist



**Aaron  
Algrim**  
Production  
Specialist



**Ebony  
Houston**  
Student  
Assistant



**Samantha  
Hahn**  
Student  
Assistant

# Questions ?



**Enjoy your Day!**





**End of Module 1**

## *Module 2*

# *The RIDOT Journey into Pavement Preservation*



# *Formation of the Highway Assessment Committee (HAC) — 1995*

- HAC: Incorporate members from various engineering divisions in RIDOT
- Study Focus: Five year old roads
- Purpose: Determine the impact of design and construction practice on highway maintenance
  - Minimize need for maintenance
  - Identify practices that improve highway durability

# *Highway Assessment Committee —*

## *1997*

- Study Focus: Ten year old roads
- Updated databases
- Researched use of Geographical Information Systems (GIS)
- Researched use of Pavement. Management Systems (PMS)

# *Pavement Preservation Program*

*(P<sup>3</sup>) — 1998*

- Program initiation with statewide crack seal contracts
- Created extensive databases on highway/highway conditions
- Effected Integrated Geographical Information System with database
  - For selection of roads for P<sup>3</sup>
  - For monitoring of P<sup>3</sup>
- 4 contracts (Total Funds: \$460K)

# *Program History*

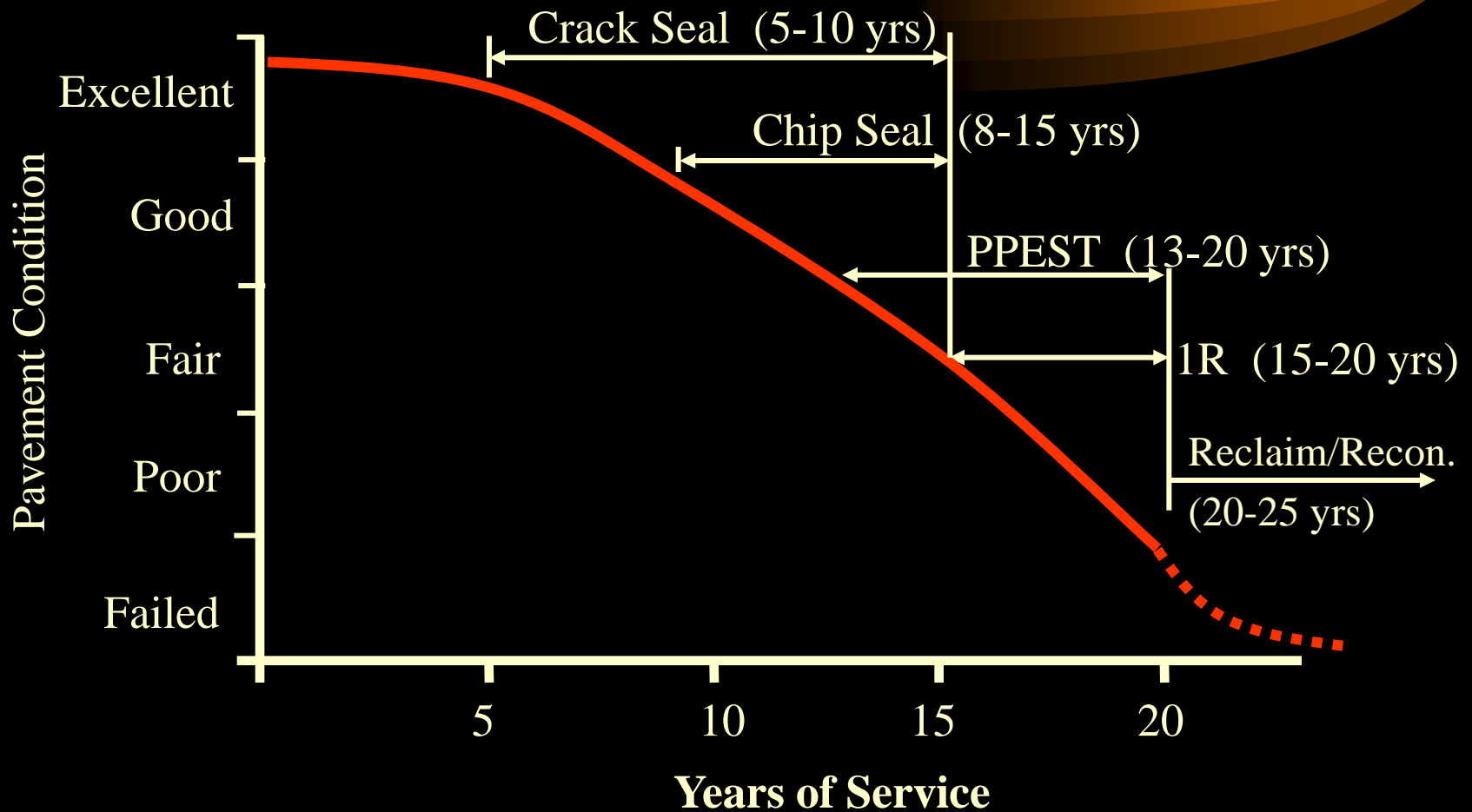
## **Pavement Preservation Tools/Treatments**

- 1998 - Crack Seal
- 1999 – Microsurfacing and 20% Rubber Asphalt Chip Seal (RACS)
- 2000 - Nova Chip, Stress Absorbing Membrane Interlayer (SAMI)
- 2001 - Polymer/Crumb Rubber Modified Asphalt Thin Overlay

# Decision Matrix

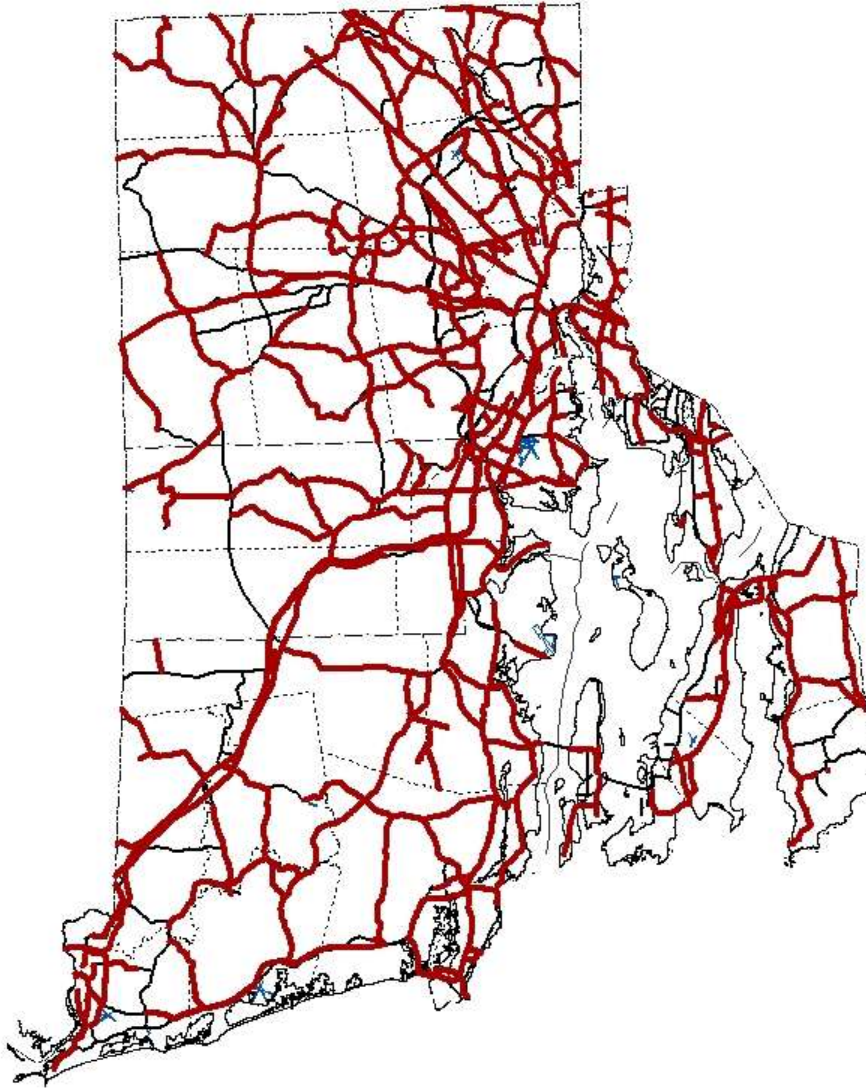
Factors	MICROSURFACING	RUBBERIZED ASPHALT CHIP SEAL	NOVACHIP	ELASTOMERIC THIN OVERLAY
Age of Road	7 (+) Years	7 (+) Years	7 (+) Years	7 (+) Years
Road Type	C2,C3	C2,C4	C2,C3	C2,C3
Traffic Volume	High Car / Low Truck	High Car / (Medium/High) Truck	High Car / High Truck	High Car / High Truck
Pavement Structure	>5 inches	>5 inches	>5 inches	>5 inches
Land Use	All Types	Non Residential, Rural, Farm, Non City, Industrial	City, Urban Upscale	City, Urban Upscale
Pedestrian / Children	OK to use	Do not use	OK to use	OK to use
<b>Road Features</b>				
Curbing	OK	OK	OK	OK
Sidewalk	OK	OK	OK	OK
<b>Distress Factors</b>				
rutting > 3/4in.	OK with shim course	OK with shim course	OK with shim course	OK with shim course
utility trenches	OK with shim course	OK with shim course	OK with shim course or patching	OK with shim course or patching
crack density	Light	Medium/Heavy	Light/Medium	Light/Medium
base failure alligator cracks	No	yes with shim course	yes with shim course	yes with shim course
pothole / raveling	No	Yes with patching	Yes with patching	Yes with patching
<b>Location</b>	City, Urban, Suburban, non commercial	Suburban, Rural, Commercial, Industrial	City, Urban	City, Urban
<b>Restrictions</b>				
Thetmoplastic striping	No (must be removed)	No (must be removed)	Yes	Yes
Rigid Base	No	Yes	No	No
Intersections	Yes	No	Yes	Yes

# *Deterioration Curve w/ Strategies & Costs*





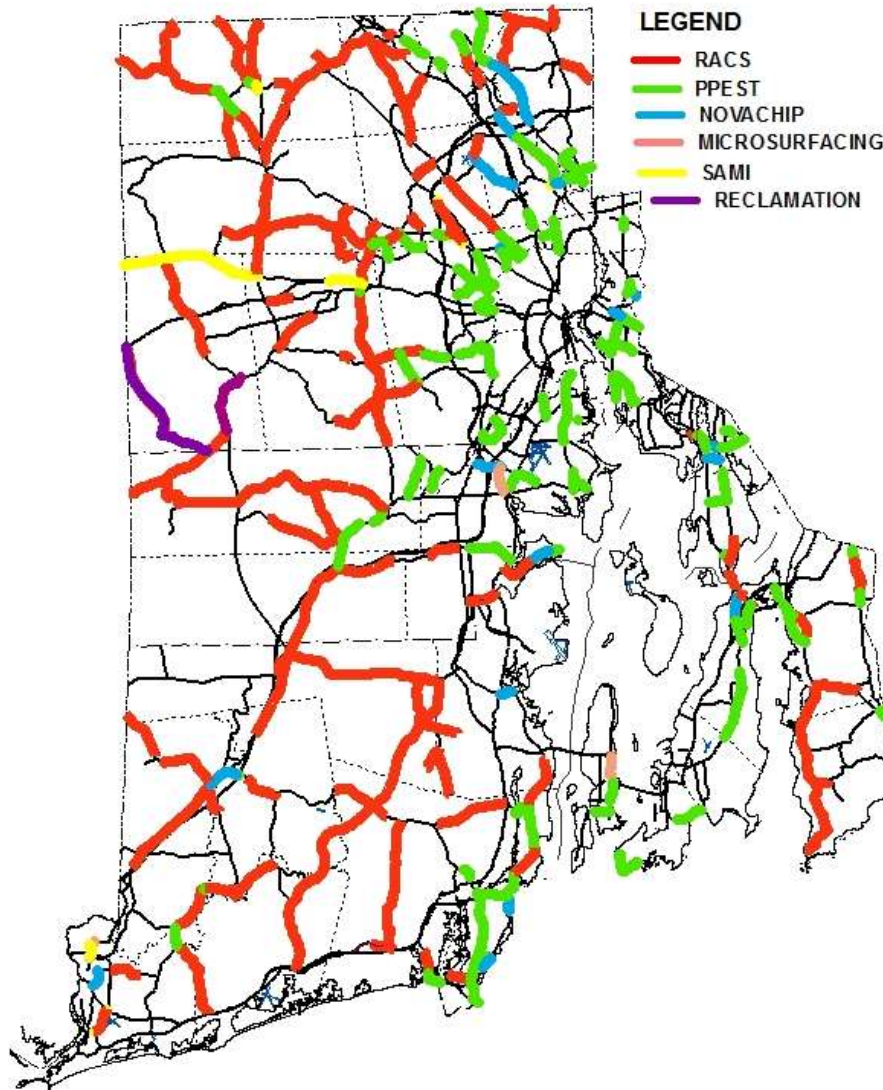
CRACK SEAL 1998-2011



*1998-2011  
Crack Seal*

1700 Lane  
Miles  
27 Million  
Linear Feet

## SURFACE SEALS 1999-2011



# 1999-2011 Surface Seals

## 624 Lane Miles



*RIDOT*

Pavement Preservation  
Technology For Bridges

# *Rubberized Asphalt Chip Seal (RACS) — Description*

The RACS is a **blend of 20% crumb rubber and asphalt**. RACS is hot spray-applied at the rate of 0.6 gallons per square yard. Then covered with **3/8" or 1/2" precoated stone**, followed by rolling.

- Flexible - Good for moderately cracked roads.
- Relatively easy/fast to apply
- Ideal for cold wet climates
- Other unique applications

# *20% Rubber Asphalt Chip Seal Material Composition*

- PG 58 – 28
- Crumb Rubber – Max size #10 sieve
- Rubber % -  $20 \pm 3$
- Aggregate Size – 3/8” to 1/2” (single size)
- 100% Aggregate coating w/PG 58 - 22

# *RACS Process Spray Application*



# *Liquid Mat*



# *Rubberized Asphalt Chip Seal — Chip Spreader*





# *Rolling*



# *Sweeper*



# *Example Bridge Application of RACS — Mount Hope Patches*



Concrete Overlay on Steel Grid Deck

# *Rubberized Asphalt Chip Seal — Mount Hope Bridge Finished*



Detail

Lightweight Deck Seal

# *Rubberized Asphalt Chip Seal — Barrington Bridge Finished*



Timber Plank Decking

# *Paver-Placed Surface Treatment (Nova Chip/PPST) - Description*

PPST is a **polymer emulsion** (applied at 0.25 gallons per square yard) sprayed immediately before placement of the **hot mix overlay (5/8")**.

- Efficient/fast operation
- Used on roads with sound foundation
- Good ride and aesthetically pleasing

# *Paver-Placed Surface Treatment — Train*



# *Paver-Placed Surface Treatment — Emulsion and Mix Application*





# *Paver-Placed Surface Treatment — Sakonnet Bridge Placing*



# *Paver-Placed Surface Treatment — Sakonnet Bridge Placing*

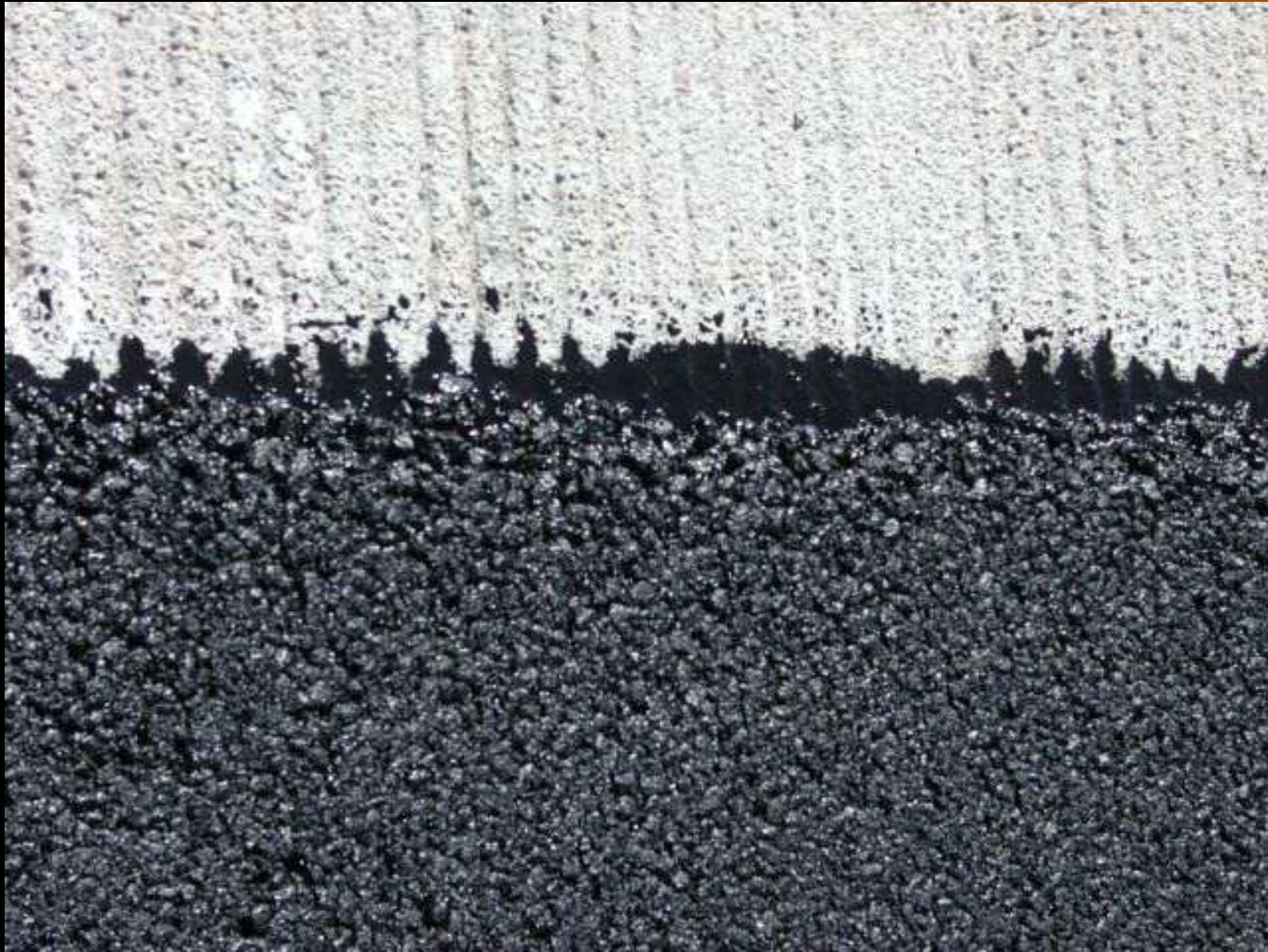


# *Paver-Placed Surface Treatment — Sakonnet Bridge Rolling*



Light wt deck seal & noise reducer

# *Paver-Placed Surface Treatment* *— Sakonnet Bridge Detail*



# *Paver-Placed Surface Treatment* *— Sakonnet Bridge Finished*



# Sample Monitoring Section Data

## MONITORING SECTION DATA

Element ID	ROAD NAME	ROUTE #	LOCATION	SEASON	DATE	JOINT CRK (FT)	EDGE CRK (FT)	LONG CRK (FT)	TOTAL LONG CRK W/EDGE (FT)	TOTAL LONG CRK W/O EDGE (FT)	TRANS CRK (FT)	REFL CRK (FT)	TOTAL TRANS CRK (FT)	TOTAL LINEAR CRK W/O EDGE
SS40xx(02)XX-2N	E	Rt. 1000	Pole 94 – SOUTHERN LIMIT	SPRING 2001	5/9/2001	5	0	48	53	53	4	0	4	57
				FALL 2001	9/24/2001	5	0	50	55	55	4	0	4	59
				SPRING 2002	5/21/2002	5	4	64	73	69	6	0	6	75
				FALL 2002	10/24/2002	5	4	68	77	73	6	0	6	79
				SPRING 2003	4/17/2003	5	4	129	138	134	11	0	11	145
				FALL 2003	11/24/2003	5	4	129	138	134	14	0	14	148
				SPRING 2004	3/9/2004	8	4	172	184	180	17	0	17	207
				FALL 2004	11/9/2004	8	4	150	162	158	15	0	15	173
				SPRING 2005	6/9/2005	8	4	127	172	168	16	0	18	186
				FALL 2005	12/20/2005	8	4	127	172	168	16	0	18	186
				SPRING 2006	5/25/2006	8	4	167	179	179	19	0	21	196
				FALL 2006	12/14/2006	8	4	167	179	175	19	0	21	196
				SPRING 2007	5/31/2007	8	4	173	218	214	20	0	20	234
FALL 2007	10/15/2007	8	4	173	218	214	20	0	20	234				
<b>TOTAL DISTRESS</b>						8	4	173	218	214	20	0	20	234

BLOCK CRACKING (FT <sup>2</sup> )	ALLIGATOR CRACKING (FT <sup>2</sup> )	RUTTING	SHOVING	RAVELING (FT <sup>2</sup> )	BLEEDING (FT <sup>2</sup> )	POLISH (FT <sup>2</sup> )	POTHoles		UTILITY PATCHES		AADT	IRI	SKID RESULTS	PAVEMENT STRUCTURE
							(#)	(FT <sup>2</sup> )	(#)	(FT <sup>2</sup> )				
0	0	0	0	0	0	0	0	0	0	0				0.5" SURFACE TREATMENT 2" CLASS I-1 5 1/4" BINDER/BASE 12" GRAVEL BORROW
0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	8	0	0	0	0				
24	0	0	0	0	0	8	0	0	0	0				
67	0	0	0	0	0	8	0	0	0	0				
67	0	0	0	0	20	8	0	0	0	0				
67	0	0	0	0	20	8	0	0	0	0	2000		52.4	
67	4	0	0	0	27	20	0	0	1	20				
67	16	0	0	0	35	20	0	0	1	20				
67	16	0	0	0	35	20	1	8	1	20				
67	16	0	0	0	35	20	1	8	1	20				

# Section Crack Map

MONITORING TYPE -

YEAR PLACED - 2000

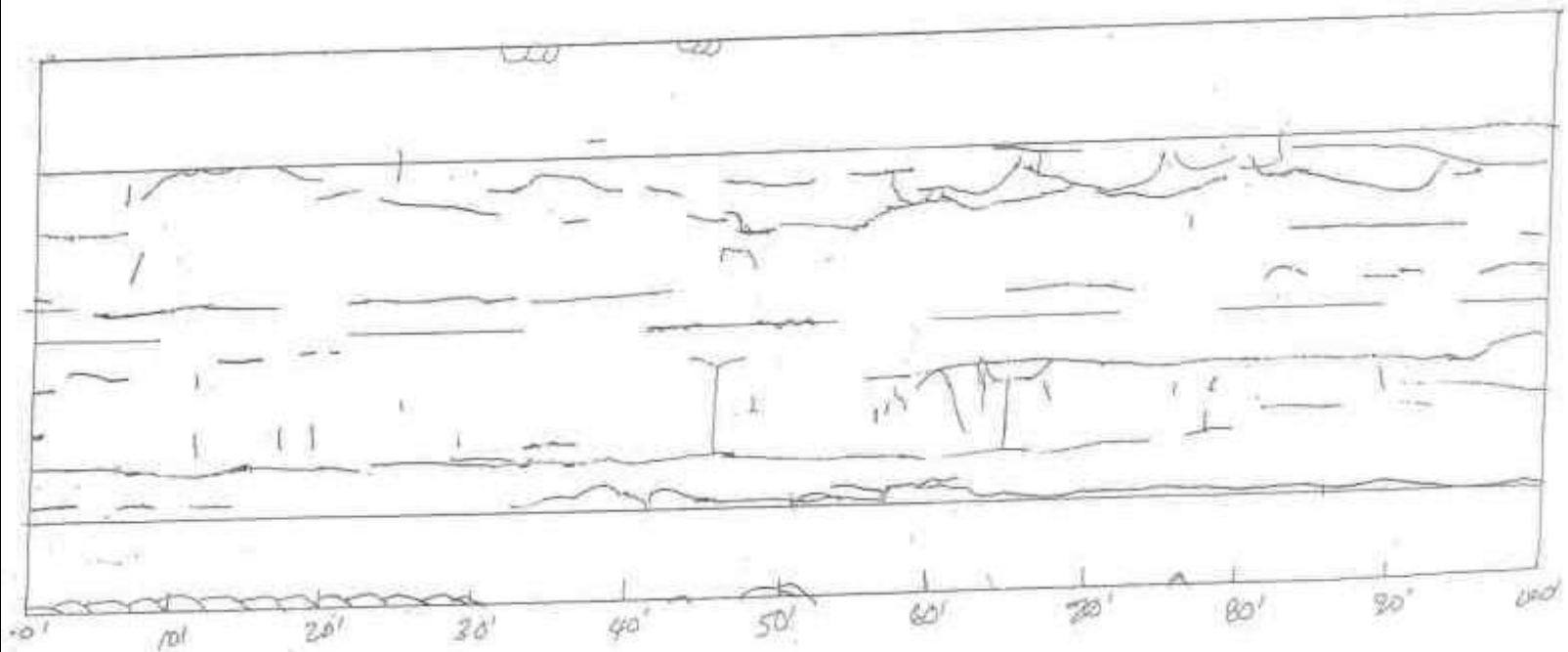
ROAD -

LIMITS -

TOWN - JAMESTOWN

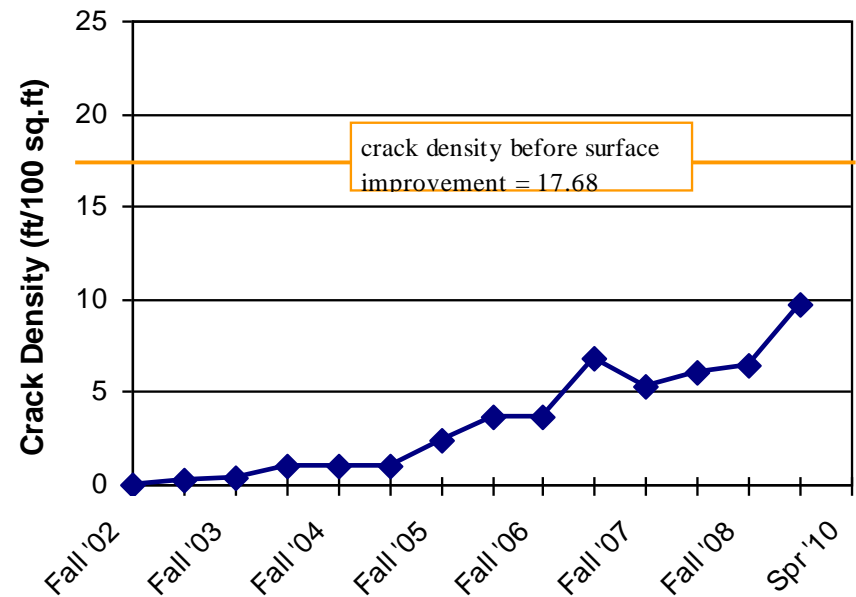
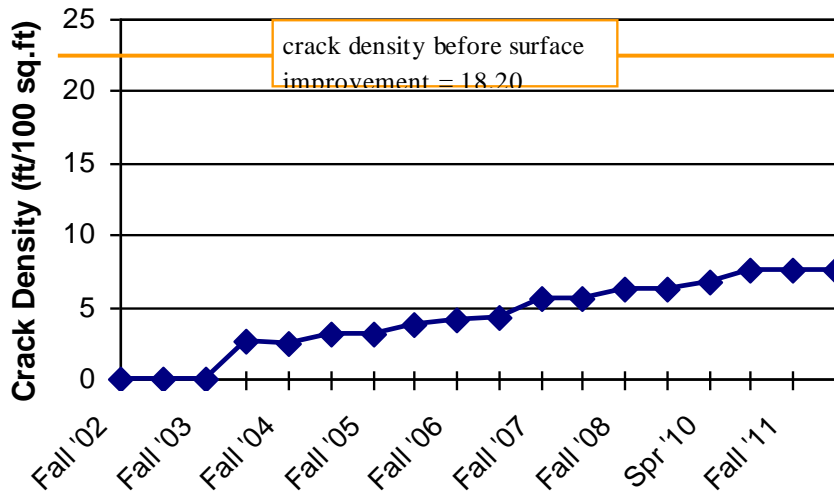
REVIEW DATE - FALL 2004

SECTION ID -



# Monitoring Sections PPEST

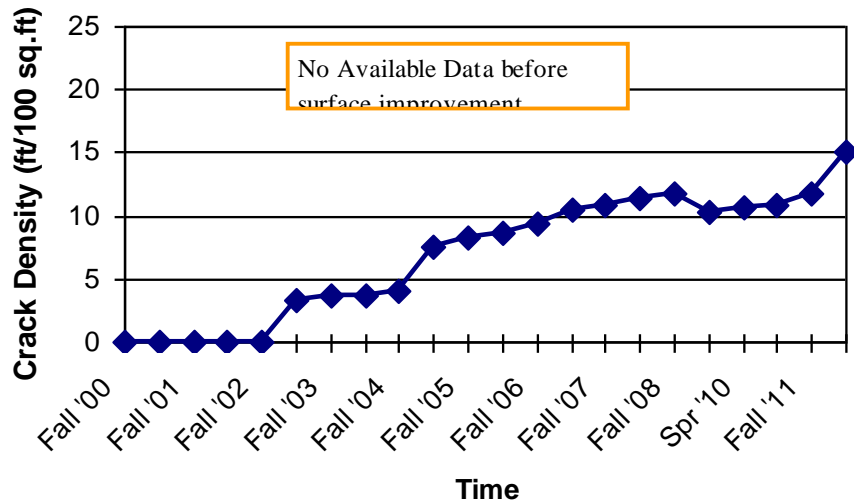
RI-1A (Kingstown Rd) SS3080(02)TO-1:  
Crack Density vs. Time



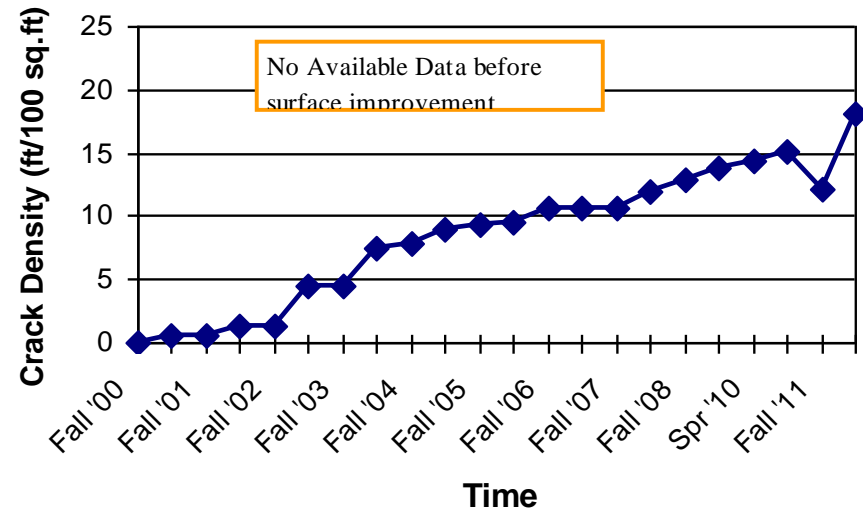


# Monitoring Sections SAMI

RI-123 SAMI-E: Crack Density vs. Time

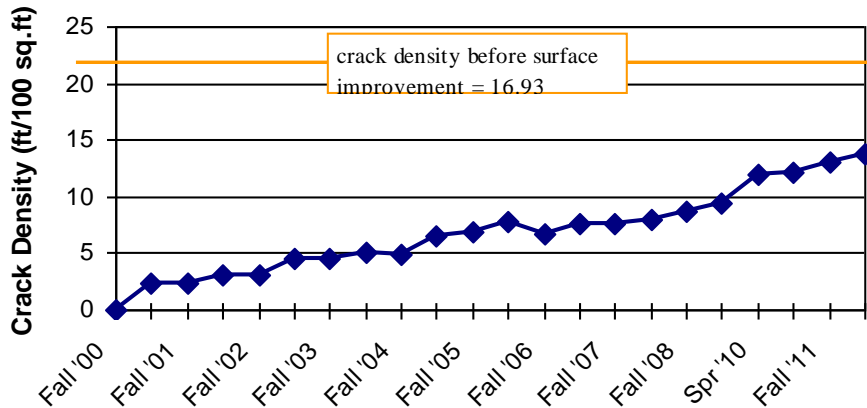


RI-98 SAMI-N: Crack Density vs. Time

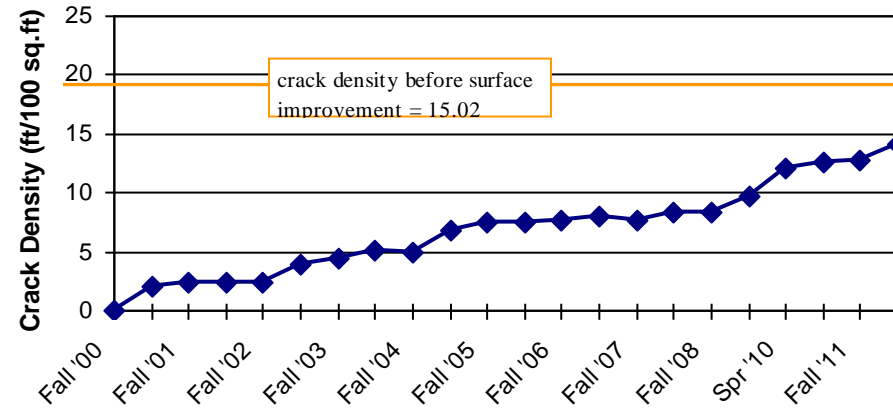


# Monitoring Sections RACS

RI-126 (Old River Rd.) RCS1170-1:  
Crack Density vs. Time



RI-126 (Old River Rd.) RCS1170-2:  
Crack Density vs. Time



# *Questions*





*End of Module 2*

# Module 3: RIDOT Research in Bridge Preservation

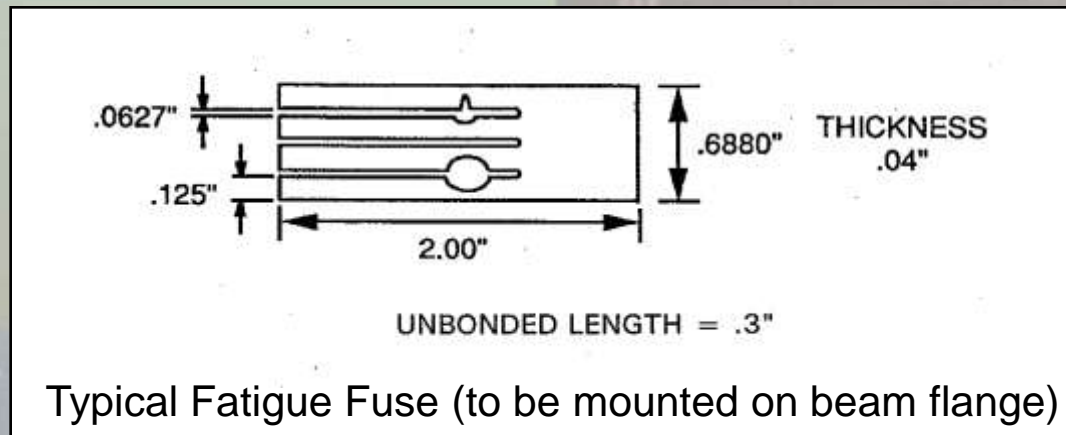
2012 Northeast Bridge Preservation  
Partnership Meeting  
Newport, Rhode Island  
September 18, 2012

# RIDOT Research

- RIDOT's research is geared towards projects whose results can be implemented into our program. That includes technologies that can extend the life of our existing structures.

# Fatigue Fuse (#2219)

- One of RIDOT's earliest research projects
- The work investigated the use of a fuse that could indicate the **fatigue level** of a steel beam
- Although the results were inconclusive, it was an attempt to understand the mechanisms of bridge deterioration.



# Elimination of Expansion Joints (#2228)

- Leaking of joints is a major cause of deterioration of substructure elements
- The project looked at several means of constructing decks without joints
- Limits of applicability for the techniques was also evaluated
- ◆ RIDOT uses this technique or moves the joint away from substructure elements when possible



# Evaluation of Corrosion Inhibitors (#2241)

- An attempt to develop a quantifiable measure of the protection provided by corrosion inhibitors for reinforcing
- ASTM G109 was used as a laboratory test, to compare different products
- ◆ RIDOT uses corrosion inhibitors

# Composite Pier Cap Project

- An Innovative Bridge Research Concept (IBRC) project
- Investigated using fiber-reinforced polymers (FRP) as a **protection system for concrete from chlorides**, rather than the focus on structural reinforcement
- A structure was chosen that was already slated for rehabilitation, to assess how well the FRP could arrest further deterioration; no repairs were made to the joint over the pier caps

# Composite Pier Cap Project (cont.)

- The bridge was visually inspected for the next four years and tested for chloride content
- The piers remained stable; the bridge recently began to undergo a rehabilitation project
- ◆ It was decided to use FRP to wrap the columns after they were repaired, only for protection
- ◆ RIDOT will use FRPs in the future, both for structural repairs and as protection

# Composite Pier Cap Project Application



# Composite Pier Cap Project @ Four Years



# Durability of FRP/Concrete Joints (#2245)

- A concern was raised on the lifespan of un-reinforced adhesives used to bond carbon fiber FRPs to the underside of bridge beams
- Because **carbon fiber is electrically conductive** and would be placed in an electrochemically active environment, this reaction could potentially cause premature failure of the system
- Tests have been conducted for **fatigue and electrochemical reactions** on the bond strength
- ◆ RIDOT has used FRPs for flexural strengthening of beams

# Evaluation of Stainless Steel Rebar (#2250)

- Stainless steel is **corrosion resistant** due to the passive film of chromium oxide that forms on its surface
- **Crevice corrosion** occurs when the film is consistently worn away when the metal is in contact with another surface
- This project looked at the potential for **crevice corrosion** of SS rebar as a reinforced concrete element moves
- Results indicated that crevice corrosion was not an issue
- ◆ RIDOT used SS rebar on the new Sakonnet River Bridge in extreme exposure areas

# Lightweight Pneumatically-Applied Mortar (#2272)

- A previous study looked at cenospheres (hollow micro-balloons produced during the coal burning process) as a lightweight aggregate for concrete
- This project looked at modifying shotcrete to create material that would lessen deadload and reduce rebound



# Self-Healing Concrete (#2296)

- This project looked at creating concrete that could heal itself beyond the fine cracks that self-seal with normal hydration products
- Tiny **capsules containing repair chemicals** are introduced into the mix, which are designed to fracture when the concrete cracks
- The **chemical contents react** and fill the crack; initial results indicate an **improvement** in strength, as well as **sealing** the crack

# Questions



# End of Module 3