

# Pavement Maintenance

## Tricks of the Trade

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**Presented by:**  
Kyle Potvin, P.E.



providing engineering solutions to improve pavement performance

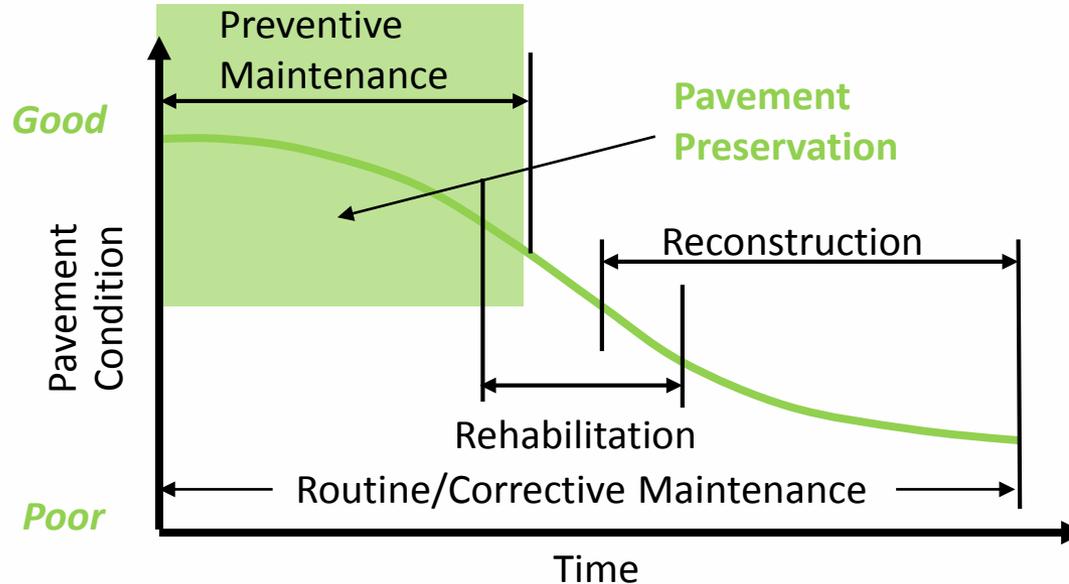
# Presentation Overview

- Overview of Maintenance Types.
- Maintenance on Asphalt Concrete (AC).
- Maintenance on Portland Cement Concrete (PCC).
- Utilizing Results from Louisiana's APMS
- Questions



# Overview of Maintenance Types

- Preventive maintenance refers to work activity on pavements when they are still in relatively good condition and serviceable.
- Routine/Corrective maintenance addresses immediate needs.



# Common Maintenance Work Types



<b>Maintenance Work Types</b>	
<b>AC Surfaced Pavements</b>	<b>PCC Surfaced Pavements</b>
Crack Sealing - AC	Crack Sealing - PCC
Full-Depth AC Crack Repair	Joint Resealing
Partial-Depth AC Patch	Partial-Depth PCC Patch
Full-Depth AC Patch	Full-Depth PCC Patch
Surface Treatments	Slab Replacement



# AC Pavement Distresses and Work Types

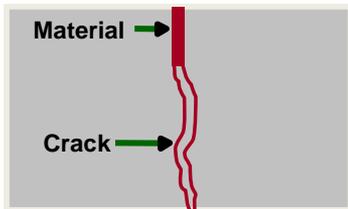
Distress Type	Severity Level	Work Type	Distress Type	Severity Level	Work Type
Alligator Cracking	Low	Monitor	Patching	Low	Monitor
	Medium	Full-Depth AC Patch		Medium	Monitor
	High	Full-Depth AC Patch		High	Full-Depth AC Patch
Bleeding	N/A	Monitor	Polished Aggregate	N/A	Monitor
Block Cracking	Low	Monitor	Raveling	Low	Surface Treatment
	Medium	Crack Sealing - AC		Medium	Surface Treatment
	High	Full-Depth AC Crack Repair		High	Surface Treatment
Corrugation	Low	Monitor	Rutting	Low	Monitor
	Medium	Partial-Depth AC Patch		Medium	Full-Depth AC Patch
	High	Partial-Depth AC Patch		High	Full-Depth AC Patch
Depression	Low	Monitor	Shoving	Low	Monitor
	Medium	Monitor		Medium	Partial-Depth AC Patch
	High	Partial-Depth AC Patch		High	Partial-Depth AC Patch
Jet Blast	N/A	Monitor	Slippage Cracking	N/A	Full-Depth AC Patch
Joint Reflection Cracking	Low	Monitor	Swelling	Low	Monitor
	Medium	Crack Sealing - AC		Medium	Full-Depth AC Patch
	High	Full-Depth AC Crack Repair		High	Full-Depth AC Patch
L&T Cracking	Low	Monitor	Weathering	Low	Surface Treatment
	Medium	Crack Sealing - AC		Medium	Surface Treatment
	High	Full-Depth AC Crack Repair		High	Surface Treatment
Oil Spillage	N/A	Partial-Depth AC Patch			



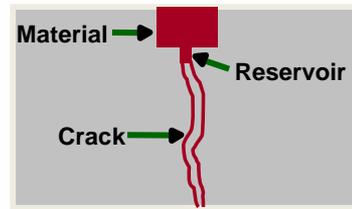
# Crack Sealing - AC

- Many Configurations Are Utilized.

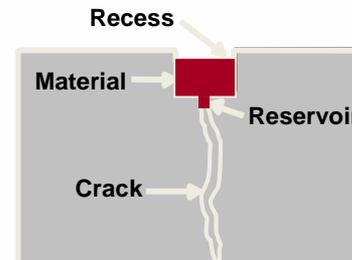
Simple Flush Fill



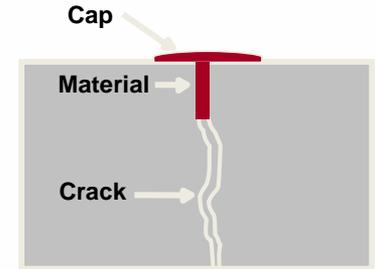
Standard Reservoir and Flush



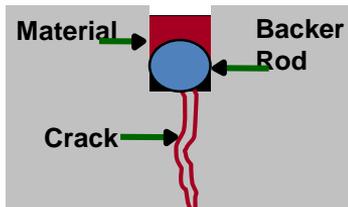
Standard Reservoir and Recess



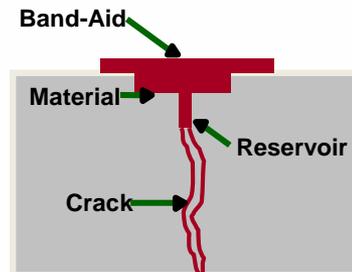
Capped



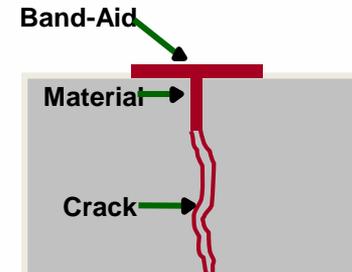
Deep Reservoir and Recess



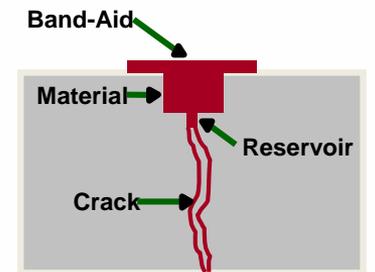
Shallow Recessed Band-Aid



Simple Band-Aid



Standard Recessed Band-Aid



# Crack Sealing - AC



Illustration of Crack Routing, Cleaning, and Sealing



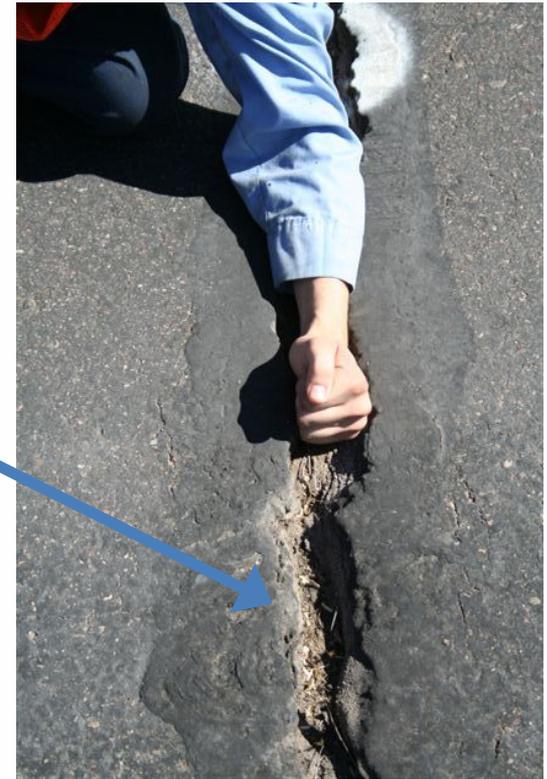
# Crack Sealing – Choosing A Good Candidate



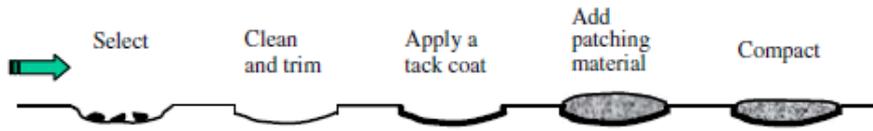
YES!



NO!



# Full Depth AC Crack Repair



The Sequence of Operations for Small Patching Repairs



# Surface Treatments – Weathering



Loss of Fine Aggregate or AC

Common Emulsion Seal Application



# Surface Treatments – Weathering

- Other types of surface treatments commonly used:
  - Fog Seals
  - Rejuvenators
  - Emulsion Seals
  - GSB-88 (Gilsonite)



# Surface Treatments – Raveling



Loss of Coarse Aggregate

Common Slurry Seal Application



# Surface Treatments – Raveling

- Other types of surface treatments commonly used:
  - Microsurfacing
  - Thin Milling and Overlay
  - Other Thicker Treatments with Coarse Aggregate



# Keys to Success – AC Maintenance

- Select Appropriate Candidates.
  - Overall Pavement Condition
  - Work Types
- Repair Underlying Distress Properly (STs).
- Remove Loose Material.
- Clean the Repair Area.
- Make sure the Repair Area is Dry for a Good Bond.
- Use a Bonding Agent if Necessary.
- Make Sure Area is Ready Before Opening to Traffic.



# PCC Pavement Distresses and Work Types



Distress Type	Severity Level	Maintenance Action	Distress Type	Severity Level	Maintenance Action
Alkali - Silica Reactivity (ASR)	Low	Monitor	LTD Cracking	Low	Monitor
	Medium	Full-Depth PCC Patch		Medium	Crack Sealing – PCC
	High	Slab Replacement		High	Slab Replacement
Blow-Up	Low	Full-Depth PCC Patch	Patching	Low	Monitor
	Medium	Full-Depth PCC Patch		Medium	Monitor
	High	Slab Replacement		High	Partial-Depth PCC Patch
Corner Break	Low	Monitor	Popouts	N/A	Monitor
	Medium	Full-Depth PCC Patch	Pumping	N/A	Monitor
	High	Full-Depth PCC Patch	Scaling	Low	Monitor
Durability Cracking	Low	Monitor		Medium	Partial-Depth PCC Patch
	Medium	Full-Depth PCC Patch		High	Slab Replacement
	High	Slab Replacement	Shattered Slab	Low	Monitor
Faulting	Low	Monitor		Medium	Slab Replacement
	Medium	Slab Replacement		High	Slab Replacement
	High	Slab Replacement	Shrinkage	N/A	Monitor
Joint Seal Damage	Low	Monitor	Spalling	Low	Monitor
	Medium	Joint Resealing – PCC		Medium	Partial-Depth PCC Patch
	High	Joint Resealing – PCC		High	Partial-Depth PCC Patch



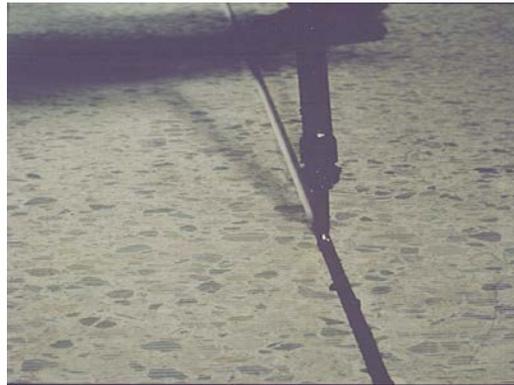
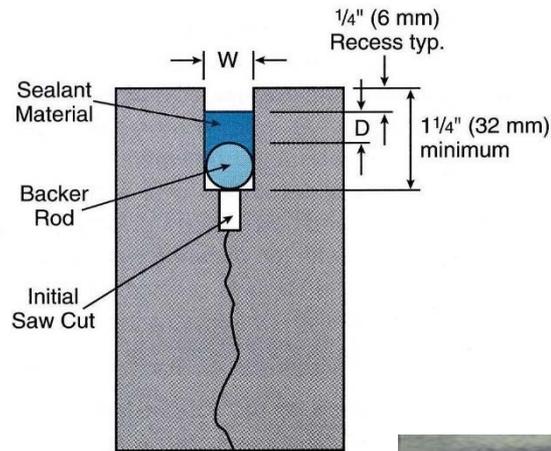
# Crack Sealing - PCC

- Common Repair for LTD Cracking



# Joint Resealing

- Common Repair for Poor Performing Joint Sealant.



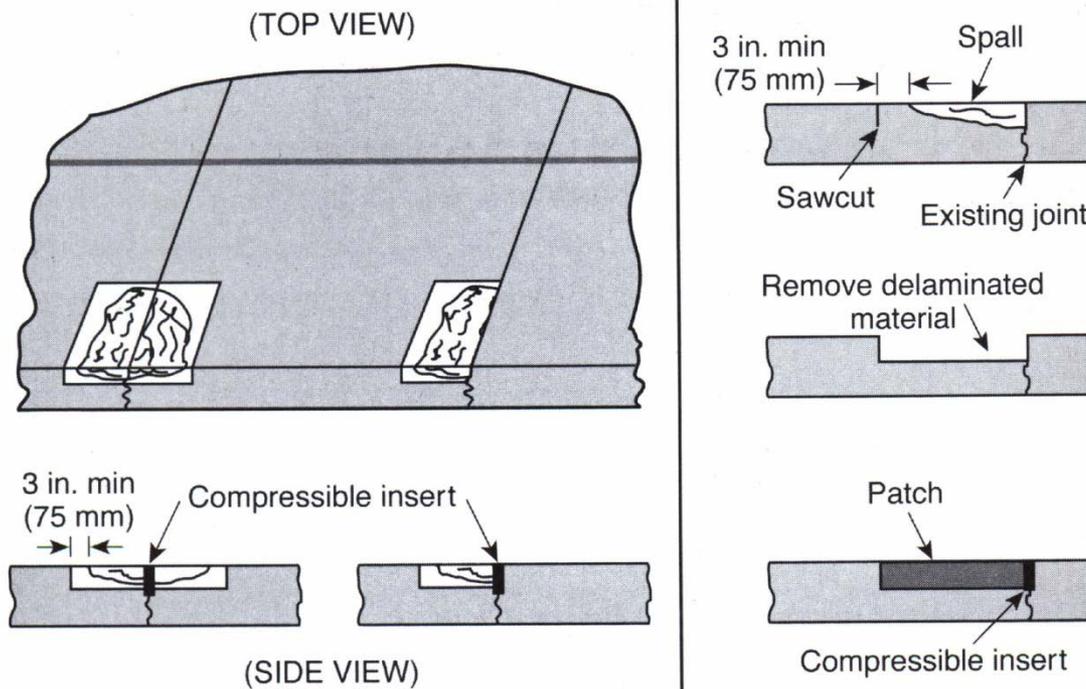
# Keys to Success – PCC Crack and Joint Sealing

- Select Appropriate Candidates.
  - Overall Pavement Condition
- Remove Old and/or Loose Material.
- Clean the Repair Area.
- Make sure the Repair Area is Dry for a Good Bond.
- Make Sure Area is Ready Before Opening to Traffic.



# Partial - Depth PCC Patch

- Common Repair for Spalling (Joint and Corner) and FOD Producers.
- Address Distress in the Upper 1/3<sup>rd</sup> of the Slab.



# Partial - Depth PCC Patch



# Full - Depth PCC Patch & Slab Replacement

- Common Repair for Shattered Slabs, Blow-Ups, Extensive FOD Producers, Higher Severity LTD Cracking and Corner Breaks.
- Address Distresses Extending More Than 1/3<sup>rd</sup> the Slab Depth.



# Full - Depth PCC Patch & Slab Replacement



# Keys to Success – Partial and Full Depth Repairs

- Select Appropriate Candidates.
  - Overall Pavement Condition
  - Work Types
- Identify the Correct Repair Area.
- Remove Loose Material.
- Clean the Repair Area.
- Make sure the Repair Area is Dry for a Good Bond.
- Maintain Original Joint Layout and Load Transfer.
- Make Sure Area is Ready Before Opening to Traffic.



# Utilizing Results from Louisiana's APMS

- APMS Analysis Process
  - Identify Current and Estimate Future Pavement Condition.
  - Identify Candidates for Maintenance
  - Use PCI Distress Quantities to Estimate Viable Maintenance Needs.
- Results Presented in Executive Summary Reports and Web-Based Solution.



# Utilizing Results from Louisiana's APMS

- Example Output from APMS

Branch	Section	Distress Type	Severity	Work Description	Work Quantity	Work Unit	Unit Cost	PCI Before	PCI After	Work Cost	
ATERMDA	10	L&T Cracking	M	Crack Sealing AC	4,512	lf	\$3.48	78	89	\$15,702	
		Oil Spillage	N/A	Partial Depth AC Patch	122	sf	\$75.58	78	89	\$9,221	
	30	Joint Seal Damage	M	Joint Sealing	1,327	ft	\$3.64	88	94	\$4,831	
		Joint Spall	M	Partial-Depth PCC Patch	21	sf	\$165.36	88	94	\$3,415	
		LTD Cracking	M	Crack Sealing	22	ft	\$3.64	88	94	\$80	
RW1836DA	20C	ASR	M	Partial-Depth PCC Patch	297	sf	\$165.36	84	92	\$49,045	
		Corner Spall	M	Partial-Depth PCC Patch	42	sf	\$165.36	84	92	\$6,865	
		Corner Spall	H	Partial-Depth PCC Patch	10	sf	\$165.36	84	92	\$1,716	
		Joint Seal Damage	M	Joint Sealing	5,186	ft	\$3.64	84	92	\$18,876	
		Joint Seal Damage	H	Joint Sealing	5,186	ft	\$3.64	84	92	\$18,876	
	20E	ASR	M	Partial-Depth PCC Patch	340	sf	\$165.36	87	97	\$56,281	
		Joint Seal Damage	M	Joint Sealing	5,192	ft	\$3.64	87	97	\$18,900	
		Joint Spall	M	Partial-Depth PCC Patch	14	sf	\$165.36	87	97	\$2,364	
		Joint Spall	H	Partial-Depth PCC Patch	18	sf	\$165.36	87	97	\$2,954	
	20W	ASR	M	Partial-Depth PCC Patch	681	sf	\$165.36	85	96	\$112,562	
		Joint Seal Damage	M	Joint Sealing	2,533	ft	\$3.64	85	96	\$9,219	
		Joint Spall	M	Partial-Depth PCC Patch	14	sf	\$165.36	85	96	\$2,364	
	TWADA	10	Corner Spall	M	Partial-Depth PCC Patch	11	sf	\$165.36	86	96	\$1,817
			Corner Spall	H	Partial-Depth PCC Patch	11	sf	\$165.36	86	96	\$1,817
Joint Seal Damage			M	Joint Sealing	3,270	ft	\$3.64	86	96	\$11,903	
Joint Seal Damage			H	Joint Sealing	4,905	ft	\$3.64	86	96	\$17,854	
LTD Cracking			M	Crack Sealing	50	ft	\$3.64	86	96	\$182	



# Utilizing Results from Louisiana's APMS (cont.)

- Evaluating the Benefit Gained.

Branch	Section	Distress Type	Severity	Work Description	Work Quantity	Work Unit	Unit Cost	PCI Before	PCI After	Work Cost
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- Evaluating the Benefit Gained.

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	Oil Spillage	N/A	Partial Depth AC Patch	122	sf	\$75.58	78	89	\$9,221	\$24,923	\$2,265.68
30	Joint Seal Damage	M	Joint Sealing	1,327	ft	\$3.64	88	94	\$4,831		
	Joint Spall	M	Partial-Depth PCC Patch	21	sf	\$165.36	88	94	\$3,415		
	LTD Cracking	M	Crack Sealing	22	ft	\$3.64	88	94	\$80	\$8,326	\$1,387.67
20C	ASR	M	Partial-Depth PCC Patch	297	sf	\$165.36	84	92	\$49,045		
	Corner Spall	M	Partial-Depth PCC Patch	42	sf	\$165.36	84	92	\$6,865		
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	LTD Cracking	M	Crack Sealing	50	ft	\$3.64	86	96	\$182	\$33,573	\$3,357.30





# Questions?

Thank you!

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providing engineering solutions to improve pavement performance