

20 Years of Hydrodemolition of Bridge Decks in Missouri

Patrick Martens, PE
Bridge Preservation and Inspection Services
April 11, 2018

Outline

- **Why Use Hydrodemolition?**
- **Start of Total Surface Hydrodemolition in Missouri**
- **Missouri Installations**
- **Major Projects**
- **Specifications in Missouri**
- **Very Early Strength Latex Modified Concrete**
- **Summary**



Hydrodemolition Robot



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

Why Use Hydrodemolition?

- Concrete Removal
- Surface Preparation
- Process uses:
 - * Direct Impact
 - * Pressurization of Cracks
 - * Rapid Erosion



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

I am from
Missouri, you
have to show
me!



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

Start of Total
Surface
Hydrodemolition
in Missouri



Franklin County , MO



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

Start of Total Surface Hydrodemolition in Missouri

- ❑ **Bridge Lo868, St. Mary's Way over IS 44, Franklin County
(Maintenance Project) – 1996**
- ❑ **Bridge Lo896, Route 100 over IS 44, Franklin County
(Maintenance Project) – 1997**
- ❑ **Various Maintenance Projects in St. Louis Area – 1997, 1999**
- ❑ **Bridge A0174, IS 44 over Pickerel Creek, Greene County
(first programmed job) – 1998**
- ❑ **MoDOT Research Report on Hydrodemolition and Repair of Bridge Decks
(December 2002, Wenzlick)**

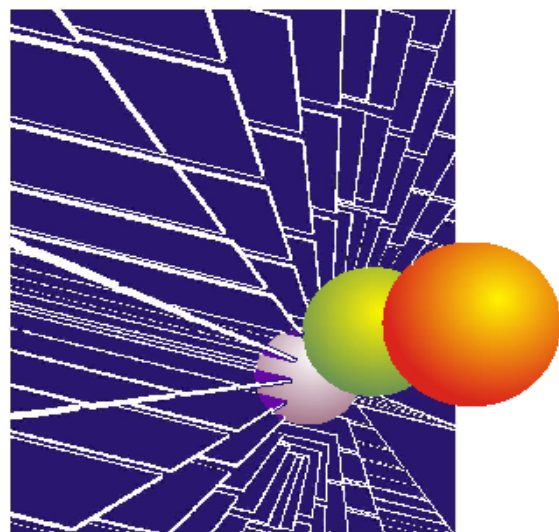
MoDOT

Research, Development and Technology

RDT 02-002

Hydrodemolition and Repair of Bridge Decks

RI 97-025



December, 2002



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



MISSOURI INSTALLATIONS

Including Latex Modified Concrete Overlays

Missouri Hydrodemolition Deck Work (154 bridges)

- NW District – 3
- NE District – 9
- KC District – 15
- Central District – 16
- SL District – 95
- SW District – 14
- SE District – 2

T.S. Hydrodemolition Work (SY) per District

- NW District – 3855 SY
- NE District – 6354 SY
- KC District – 20,283 SY
- CD District – 19,784 SY
- SL District – 232,597 SY
- SW District – 69,223 SY
- SE District – 1266 SY
- TOTAL – Over 350,000 SY (Since 1996)

LATEX MODIFIED CONCRETE

You are thinking
about hiring me to be
your latex salesman.



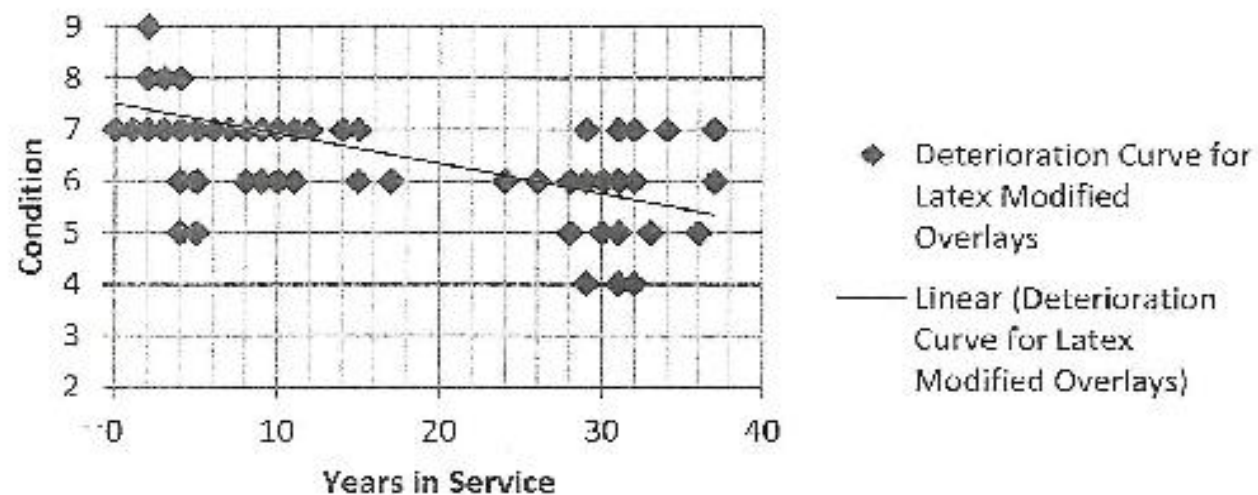
NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

Overlays

- **Over 300,000 SY Latex / Very Early Strength Latex**
- **Probably well over 30,000 cubic yards of LMC/VESLMC**
- **Other Dense Overlays – Low Slump, Low P, Microsilica Concrete**

Deterioration Curve for Latex Modified Overlays



Notable T.S. Hydro/LMC Installations

- **St. Mary's Road over I-44, Franklin County (first total surface install 1996)**
- **First Programmed Job I-44 over Pickerel Creek, Greene County (1998)**
- **MO 141 – 5 bridges in Jefferson/St. Louis Counties (2001)**
- **US 65 – bridge in Grundy County (2002)**
- **Route A – 3 bridges in Jefferson County (2007)**
- **I-70 in Kansas City (2011) – 6100 SY + on 15 bridges**
- **US 50 / Lamine River (2013)– 4390 SY**

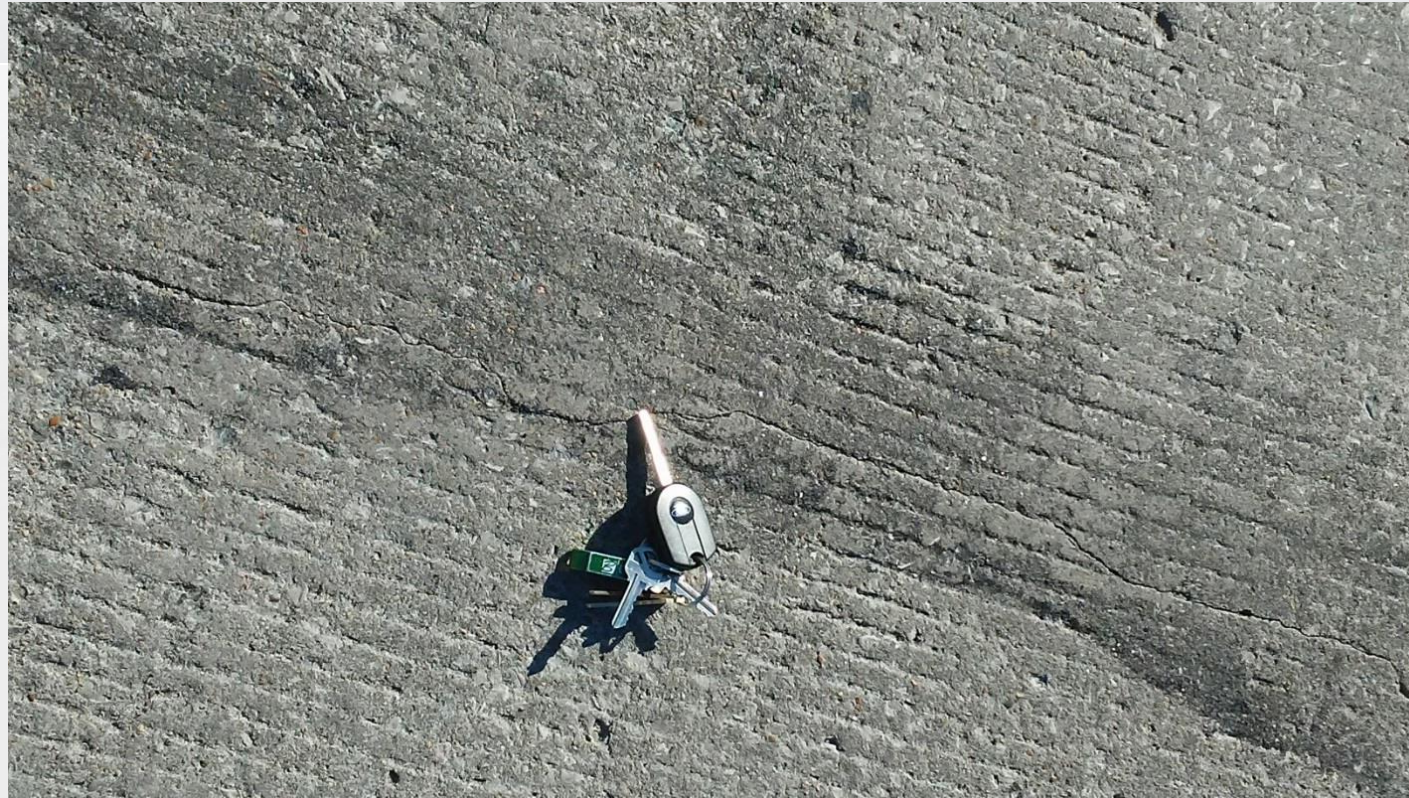


St. Mary's Way
Franklin County MO (1996 Install)



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



St. Mary's Way
Franklin County MO





St. Mary's Way
Franklin County MO



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

**A0174 Greene Co 1-30-17
44E @ Pickerel Cr
13% deck patches Sp 1 looking west**

(1998 Install)



**A0174 Greene Co 1-30-17
44W @ Pickerel Cr
Sp 2 looking east (6% patches)**





**A0174 Greene Co 1-30-17
44W@ Pickerel Cr
Bottom Sp 1 looking west
27% saturation**



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



Jefferson County
MO 141 (2001 Install)



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



Jefferson County
MO 141



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



Jefferson County
MO 141



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



St. Louis County
MO 141





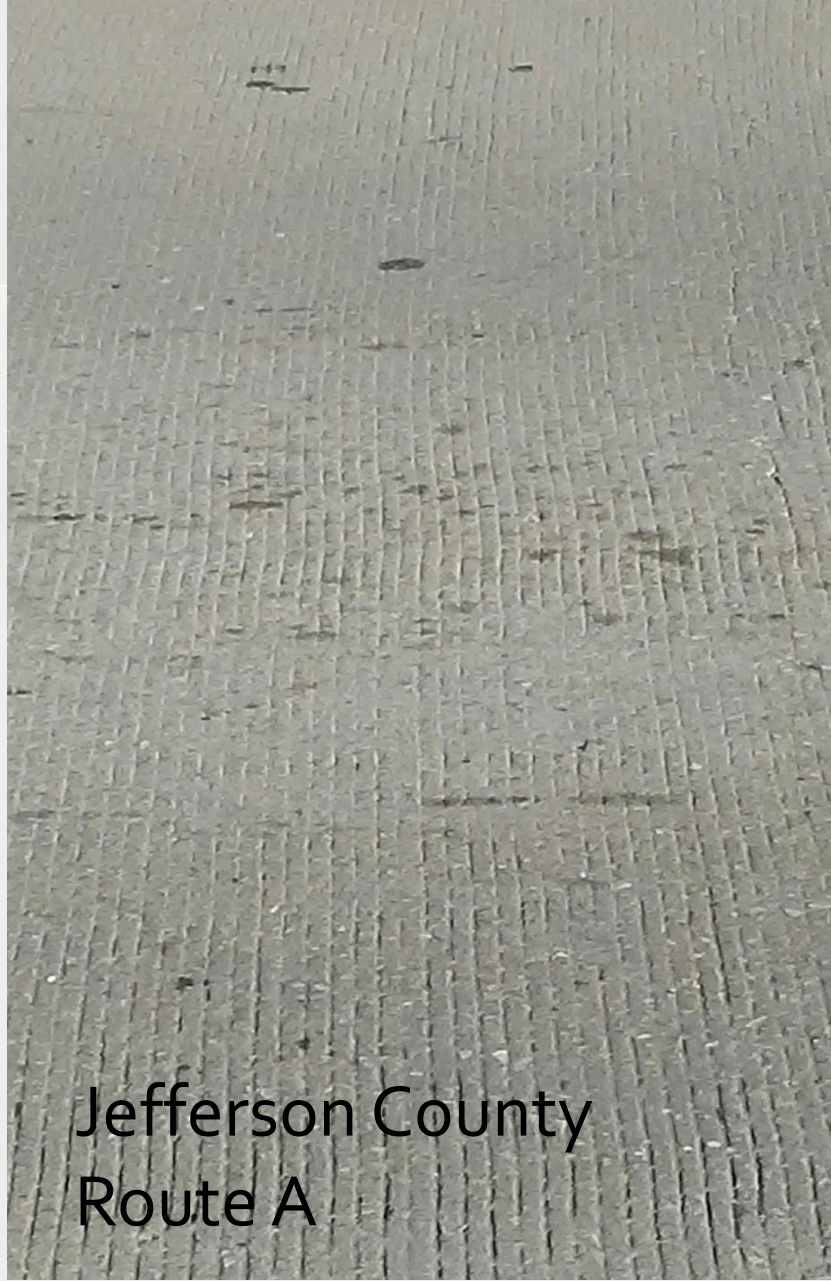
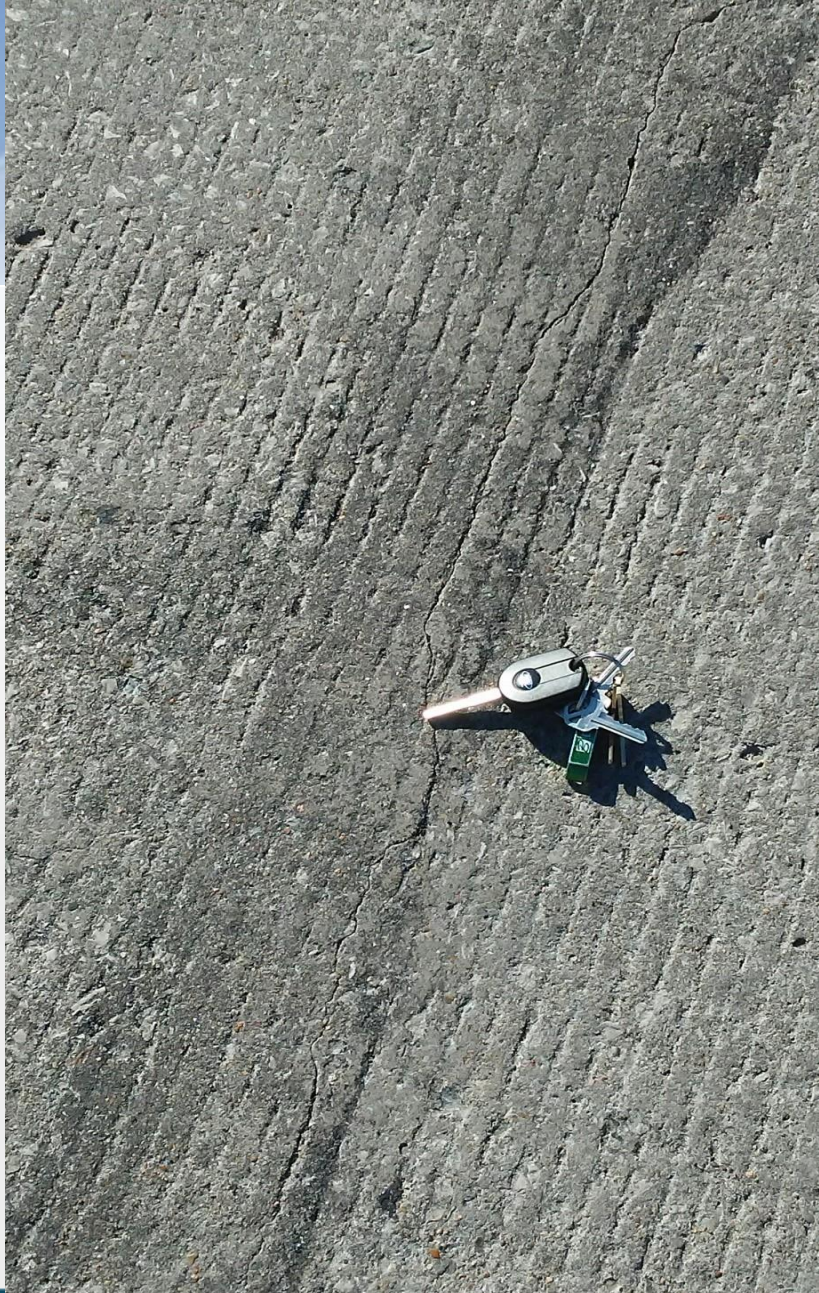
A2571 Rte. 65 Grundy
South End Deck Looking North
3-6-18 (2002 Install)





Jefferson County
Route A (2007 Install)





Jefferson County
Route A

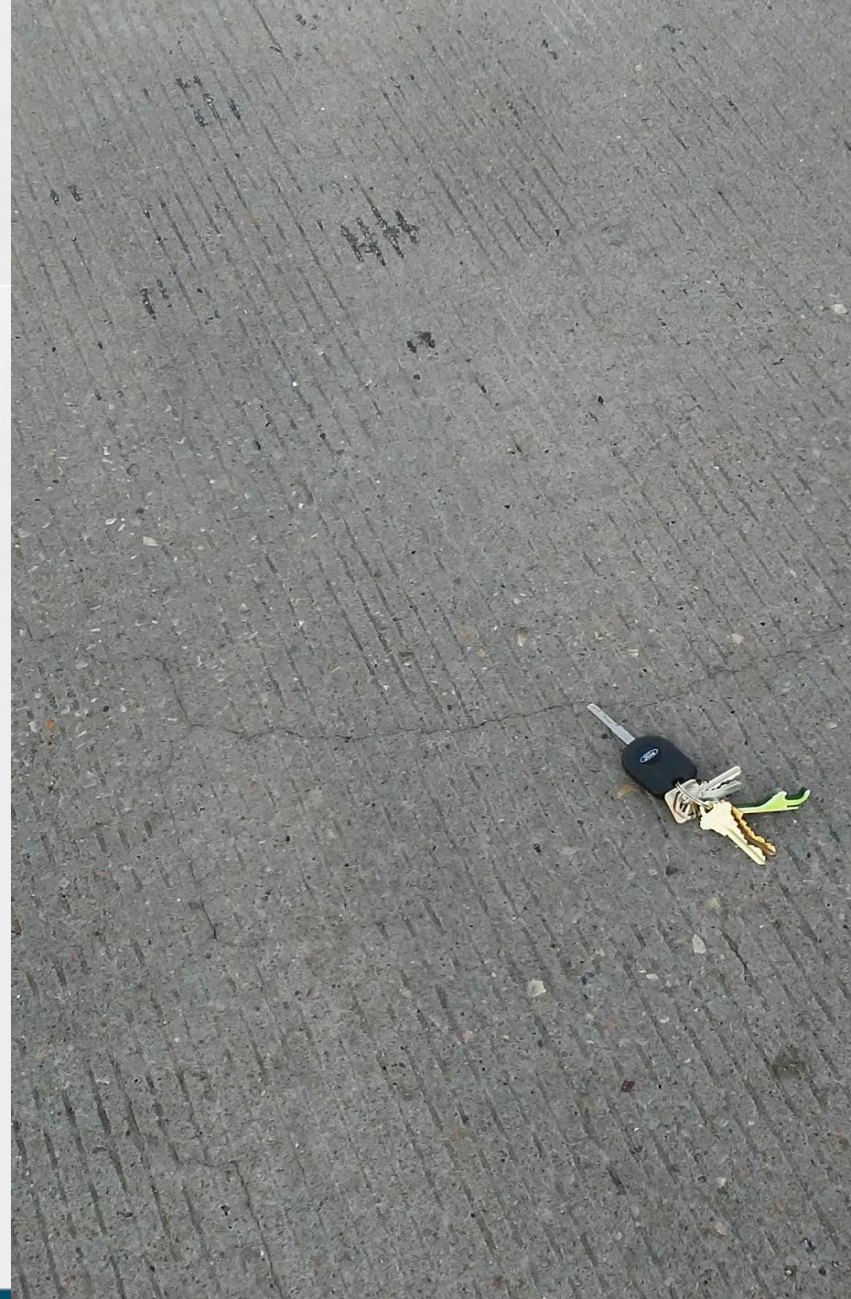


NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



Jefferson County
Route A





Jackson County,
I-70 / US 40 (2011 Install)





Jackson
County,
I-70 @ Sterling



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



Morgan County
US 50 (2013 Install)



Major Projects (with LMC/VESLMC)

- Major Jobs include:
 - Poplar Street Bridge Approach (E & W) – 51,000 SY + (2005,2006, 2011)
 - 3rd Street Viaduct (5) Downtown St. Louis – 56,000 SY + (2016-2017)
 - Truman Lake Bridges (4) in Benton County – 40,000 SY + (2009)
 - MO 185 / Bourbeuse River, Franklin County – 9700 SY + (2004)

I-64 WB
St. Louis City
Poplar Street Approach
(2011 install)



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER



**A3689 Benton Rte MO 83 (Truman Lake)
(2009 Install)**



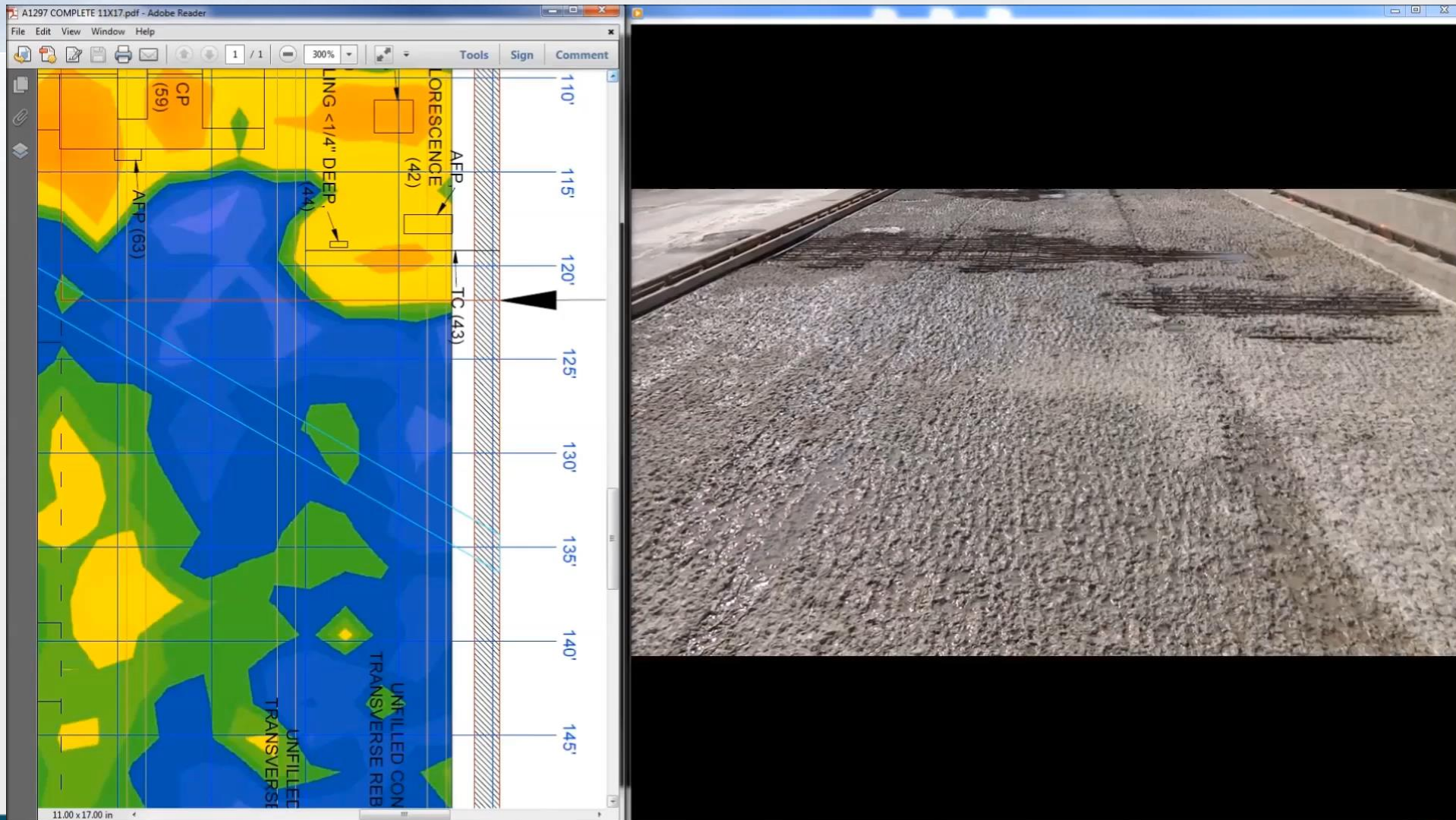
NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

Evolution of Specifications

- Bar Exposure (waiving of clearance requirements)
- Payment for Monolithic Repair
- Zoned Repairs for Continuous Concrete Structures + Hydro Prep
- Deck Testing for Chlorides
- Removal of Pre-existing (debonded) Patches

GPR Scan vs. Actual Removals



Very Early Strength Latex Modified Concrete

- Poplar Street Approach Complex (St. Louis City)
- I-270 over Ladue Road (St. Louis County)
- I-70 EB over 5th Street (St. Charles County)
- I-55 NB (partial) over BNSF RR (Jefferson County)
- I-44/55 Interchange (St. Louis City)
- Approximately 40,000 SY of VESLMC
- 20 bridges +/-

A1501 EB (East end)

- **High Production Hydro Equipment**
- **VESLMC**
- **Installed 2005**
- **NBI 4 Rated Deck**



Poplar Street Approach Complex



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

A1501 09-12-05
Hydrodemolition/rapid set latex (8/05).



Poplar Street Approach (EB Ramp Entrance)

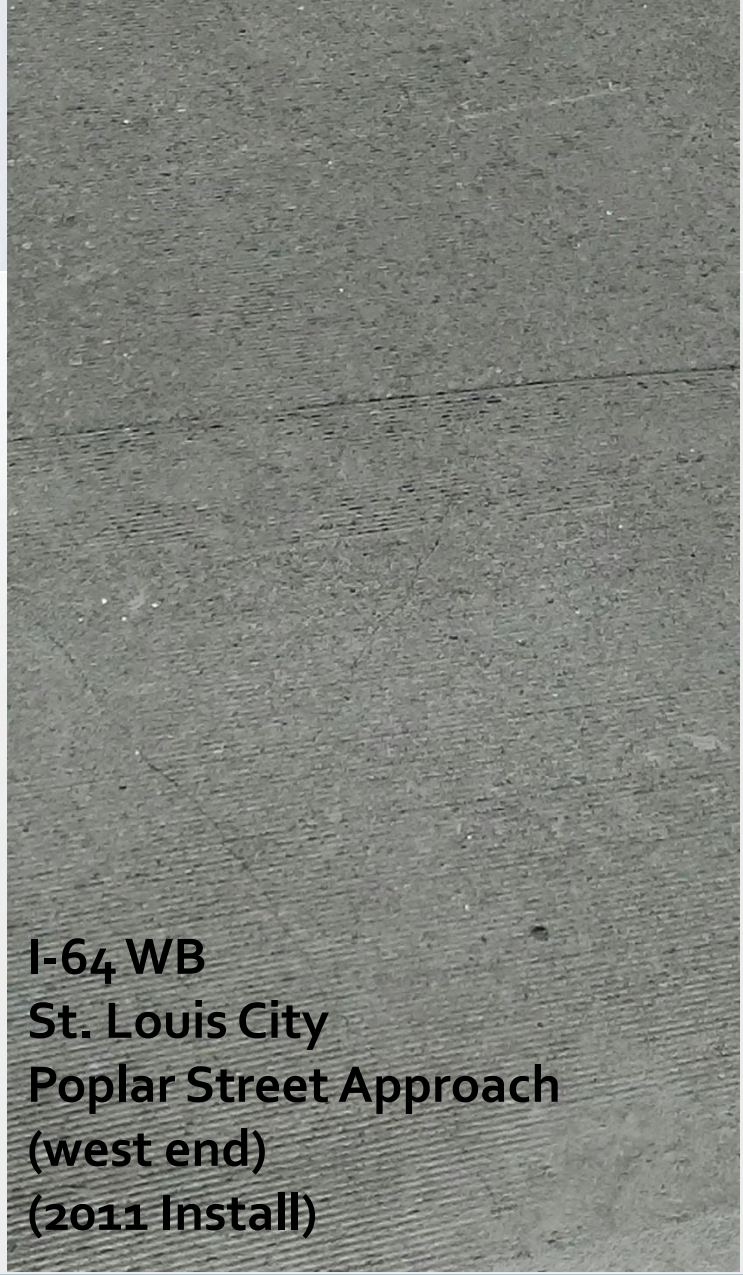


NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

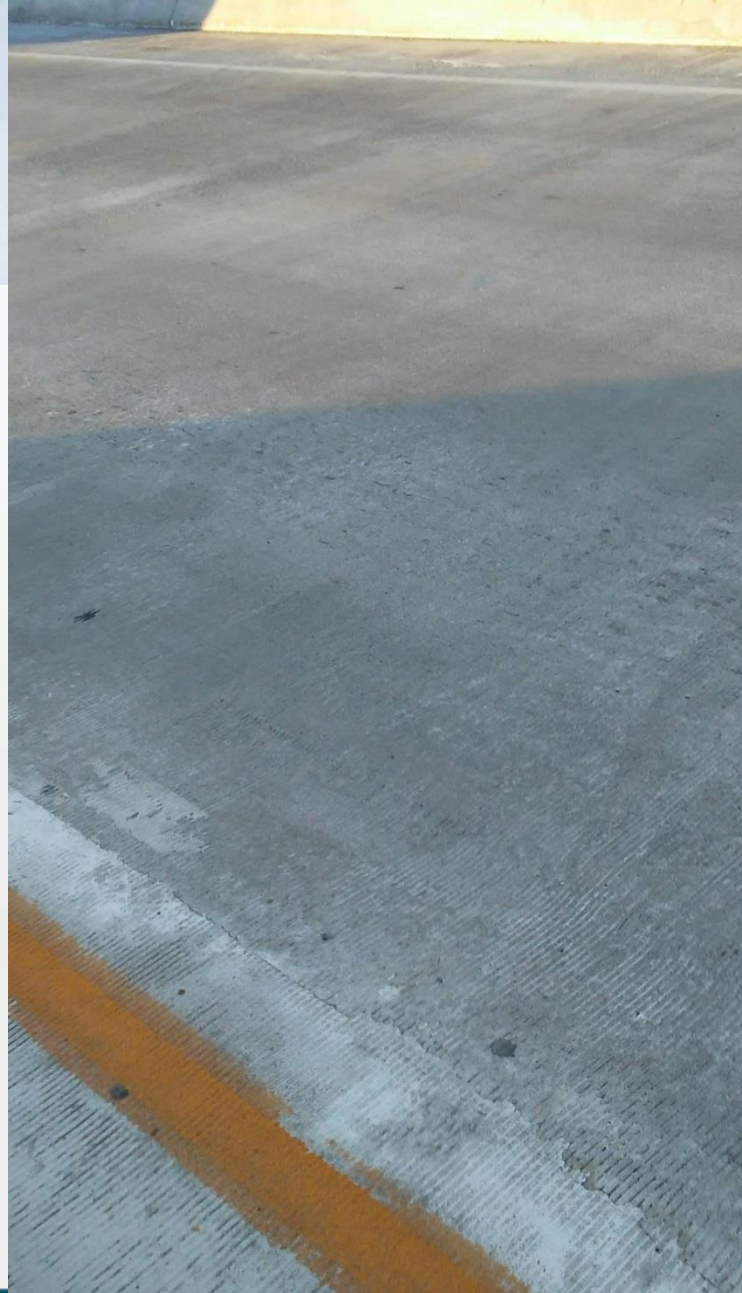
PRACTICES WE CAN NOT AFFORD TO DEFER



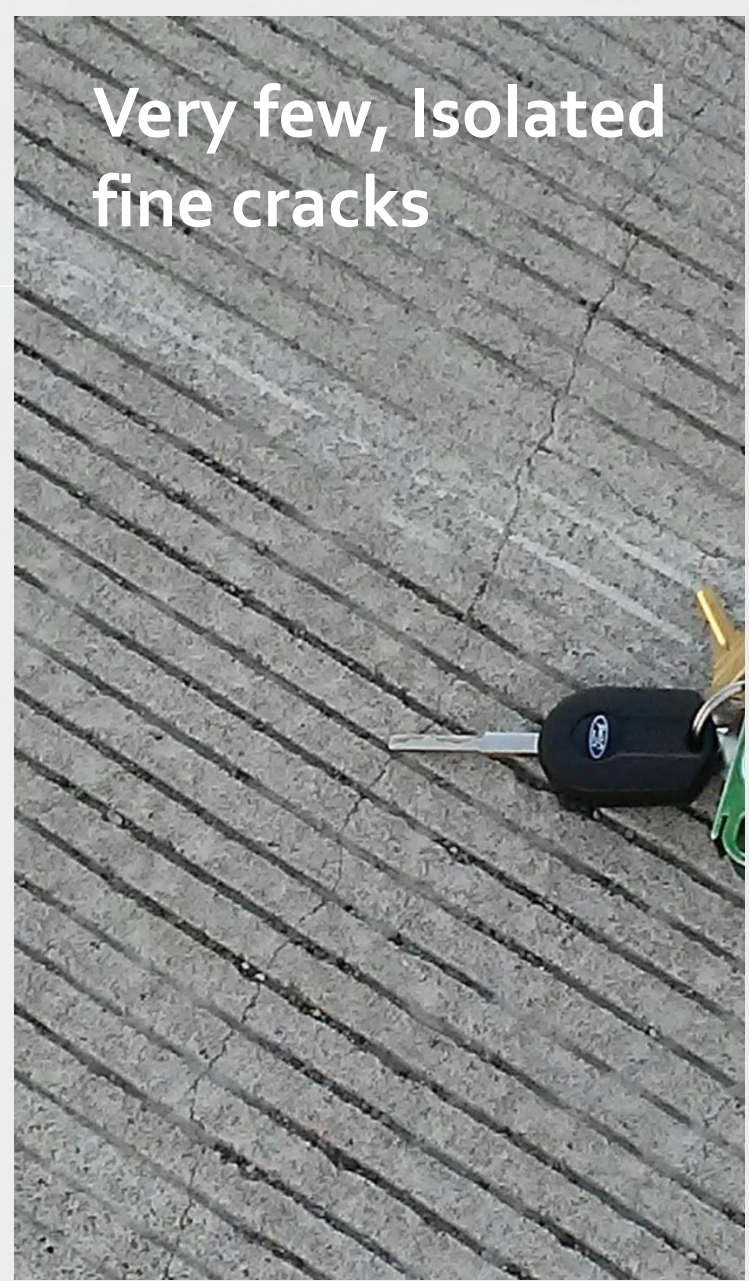
I-64 WB
St. Louis City
Poplar Street Approach
(west end)
(2011 Install)



US 50 (Lindbergh Blvd)
St. Louis County
2015



Very few, Isolated
fine cracks



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER

SUMMARY

- Fast Track Hydro Preferred Treatment
- Valuable Process in MODOT Deck Rehabilitation and Preservation Process
- Installations are Standing Test of Time
- Specifications continue to evolve
- VES-LMC is Viable for Strategic Traffic Locations

SUMMARY

- Fast Track Hydro Preferred Treatment
- Valuable Process in MODOT Deck Rehabilitation and Preservation Process
- Installations are Standing Test of Time
- Specifications continue to evolve
- VES-LMC is Viable for Strategic Traffic Locations

**** Every agency should have this process in their tool box!!!**

And you want to
be my latex
salesman!

Questions?



NATIONAL BRIDGE PRESERVATION PARTNERSHIP CONFERENCE 2018

PRACTICES WE CAN NOT AFFORD TO DEFER