

Simple Fixes to Extend the Life of Your Bridges





The bridge is laughing at you

What is the Number One Thing That Reduces the Life of Bridges?

- Water and Salt
 - Salt first introduced in 1941/42
 - Has increased steadily until the mid 1970's

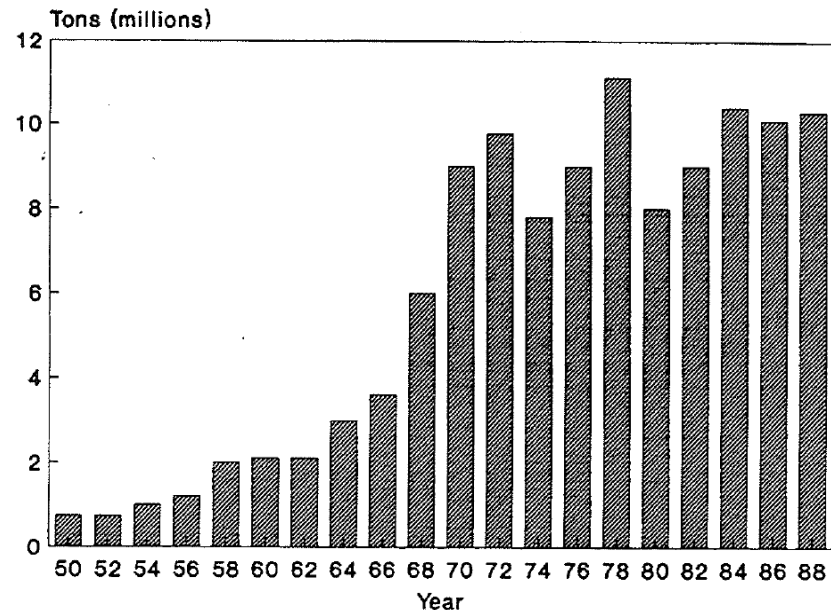


FIGURE 2-1 Trends in highway salt use, 1950–1988 (source: Salt Institute).

Bridge Maintenance 101

- Water and road salt cause...
 - Freeze thaw, corrosion, chloride leaching
- Newer structures can be more susceptible to salt use
 - Better bridge designs, newer technologies



Why Should I Spend Maintenance Money on Bridges?

Road & Bridge Costs (per 100' of 2 Lane Road)

	Cost	Lifespan (years)	Life Cycle Cost
Roadway - Rehabilitation (2' Shoulder)			
Seal coat	\$500	5	\$100
Overlay, 1-1/2"	\$1,600	7	\$229
Overlay, 2"	\$2,100	7	\$300
Crush and Shape with 2" HMA	\$2,250	15	\$150
Roadway - Replacement			
4" HMA, 12' Lanes, 4' Shoulders	\$7,000	20	\$350
Bridge - Rehabilitation (2' Shoulder)			
HMA Crack Treatment	\$200	2	\$100
Mill/Replace HMA, Replace Membrane & Joints	\$28,800	15	\$1,920
Concrete Deck Replacement	\$256,000	35	\$7,314
Deck Replacement, Blast & Paint Steel Beams	\$384,000	35	\$10,971
Superstructure Replacement (Conc/Steel)	\$544,000	45	\$12,089
Bridge - Replacement			
Full Bridge Replacement, Timber, 2' Shoulder	\$570,000	60	\$9,500
Full Bridge Replacement, Timber 6' Shoulder	\$650,000	60	\$10,833
Full Bridge Replacement, Precast Conc, 2' Shoulder	\$870,000	60	\$14,500
Full Bridge Replacement, Precast Conc, 6' Shoulder	\$950,000	60	\$15,833

Costs to Rehabilitate/Replace

- It costs 25 to 50 times more money to replace a bridge than a road
- It costs 1 to 80 times more money to rehabilitate a bridge than a road



Maintenance Isn't Necessary, We'll Just Get Replacement Grants

3 Examples

Crush and Shape

Cost per 100 feet	Life Span	Life Cycle Cost
\$2,250	15 years	\$150/year

Road Replacement

Cost per 100 feet	Life Span	Life Cycle Cost
\$7,000	20 years	\$350/year

Precast Concrete Bridge with 95% Grant Money

Cost per 100 feet	Life Span	Life Cycle Cost to Owner
\$50,000	60 years	\$833/year

Simple Fixes – Concrete Railings & Appurtenances

- Concrete Acrylic Coatings
- Epoxy Injection of Cracks
 - Only for cracks that are stable
 - .005” to .25” crack widths
 - High compressive/tensile strengths
- Urethane Injection of Cracks
 - Can be used on cracks that are stable or moving
 - .005”+ crack width
 - Low structural strength

Costs for Simple Concrete Fixes

- Concrete Acrylic Coating
 - \$200-\$250/5 gallon bucket
- Epoxy Injection
 - Varies with type of crack & system. Small cracks with low-pressure injection systems can be less than \$100 for a few feet of repairs.
- Urethane
 - \$100-\$150/kit covers 5-12 feet of crack

Too Late to Repair



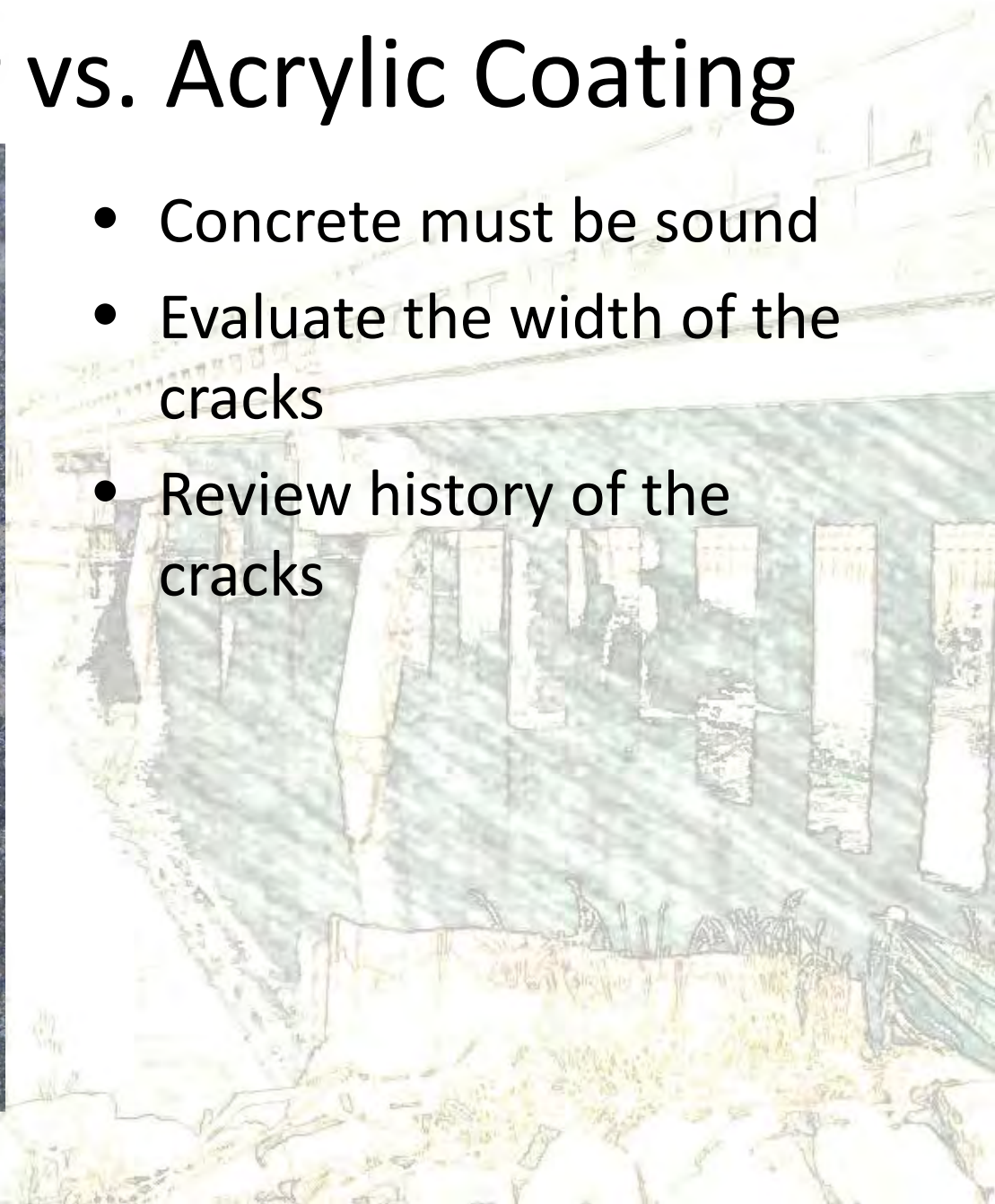
Too Late to Repair



Crack Repair vs. Acrylic Coating



- Concrete must be sound
- Evaluate the width of the cracks
- Review history of the cracks



Good Candidate for Hydrophobic Polyurethane Repair



Good Candidate for Acrylic Coating



Coating Examples



Coating Example



Painting

- Extends the life of a steel bridge
- Fairly expensive for a full MDOT paint job
- Small repairs can be very cost effective
- Don't throw good money after bad
 - Know which bridges to paint
 - Know when to paint



Good Candidate for Painting



Too Late to Paint



Good Candidate for Painting



Too Late to Paint



To Paint or Not to Paint?



Box Beam Bridges

- Keeping the water away from the superstructure will extend the life of your bridge
- Commonly done with a waterproof membrane and wearing course



Is Your Existing Waterproof Membrane Working?



Is Your Existing Waterproof Membrane Working?



- 20 year life expectancy
- Leaks at joints and between beams
- Stalactites forming
- Service life of the membrane may be limited by the wearing surface life

Inadequate Performance by Any Component of the System Can Result in Inadequate Performance of the System



Seal Cracks in a Timely Fashion



Crack Sealing is Continuous Maintenance



Failure to Maintain the Water Proof Membrane Leads to Load Posted Bridges

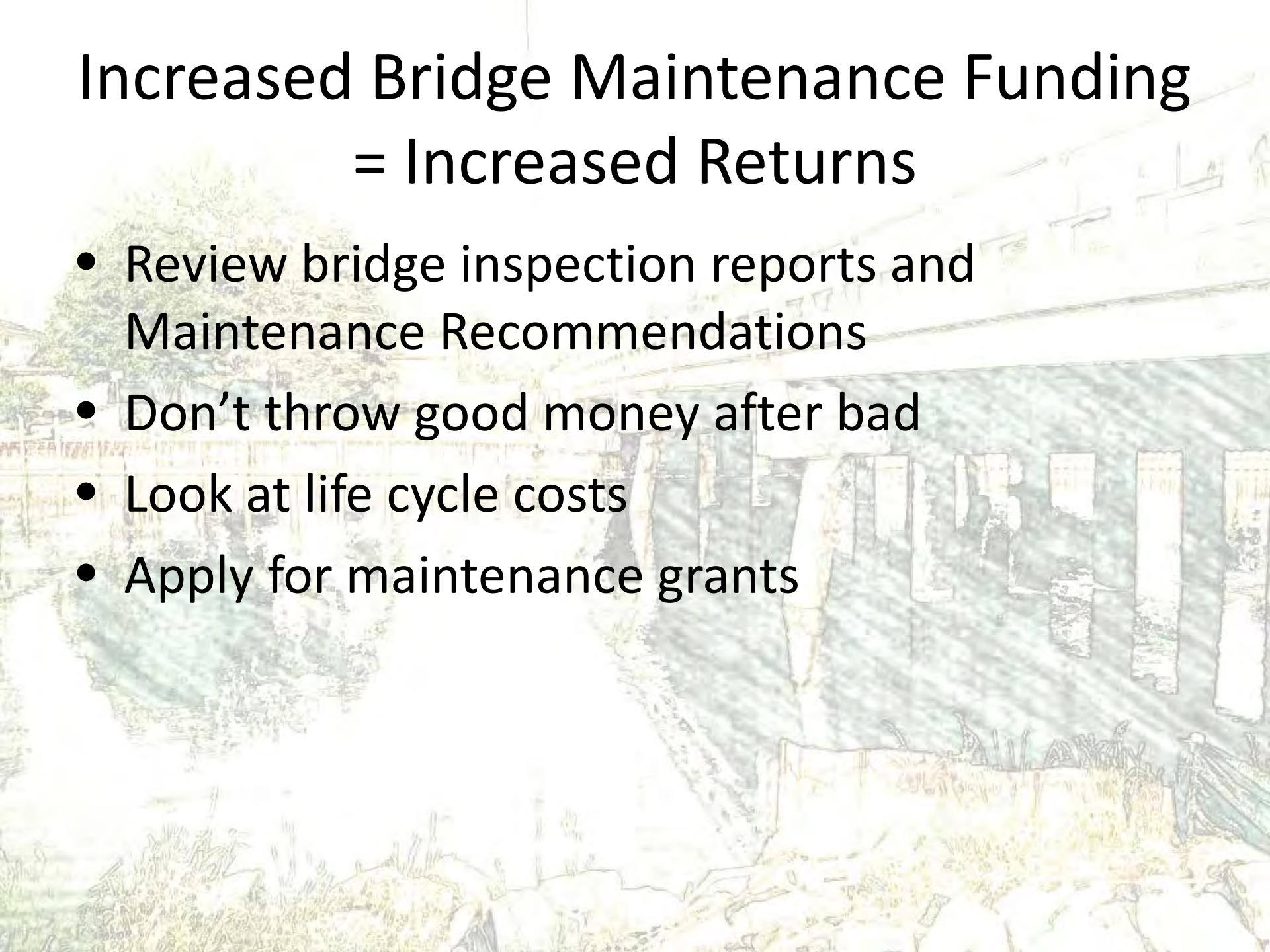


New Water Proof Membrane

- Membranes can bridge and prevent reflection of many moving cracks
- Avoid thin overlays – use 2” minimum thickness
- Continue to maintain the wearing surface after installation, repair cracks as they appear

Increased Bridge Maintenance Funding = Increased Returns

- Review bridge inspection reports and Maintenance Recommendations
- Don't throw good money after bad
- Look at life cycle costs
- Apply for maintenance grants



Questions?

