



# Bridge Management

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**Carmen Swanwick, SE**  
UDOT Chief Structural Engineer



# Presentation Outline

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- Bridge Management
- Bridge Inventory
- Bridge Condition
- Bridge Planning
- Bridge Performance Measures
- Bridge Funding Projections
- Bridge Programs

# Bridge Management





# Bridge Management

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- Objective
  - Preserve bridges to minimize whole life cost
  - Operate in a financially sustainable manner
  - Provide a framework to improve performance on a long-term basis
  - Predict condition outcomes of different funding levels
- Strategy
  - Work on every bridge over a 20-year period
  - Manage to a state of good repair (define thresholds)
  - Prioritize funding to system

# Bridge Inventory

## UDOT STRUCTURES 2015 Annual Bridge Report

The Bridge Management  
Division inspects and manages

**2,971**

**BRIDGES**

including **state** and **locally**  
owned public bridges

The **State** owns  
**1,895** bridges

The other **1,076**  
bridges are divided among  
140 Agencies

Region 1 **589**

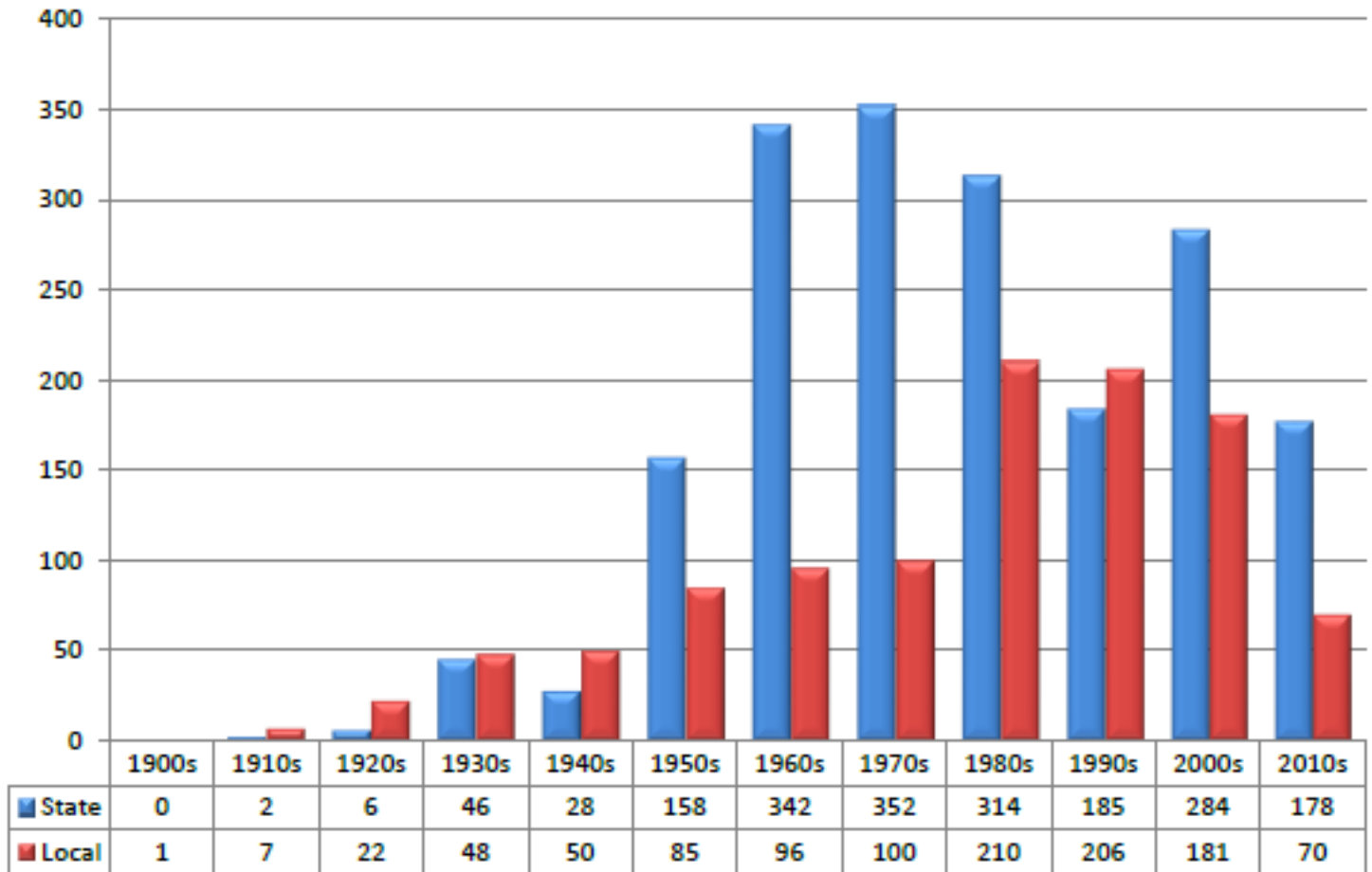
Region 2 **831**

Region 3 **491**

Region 4 **1,060**

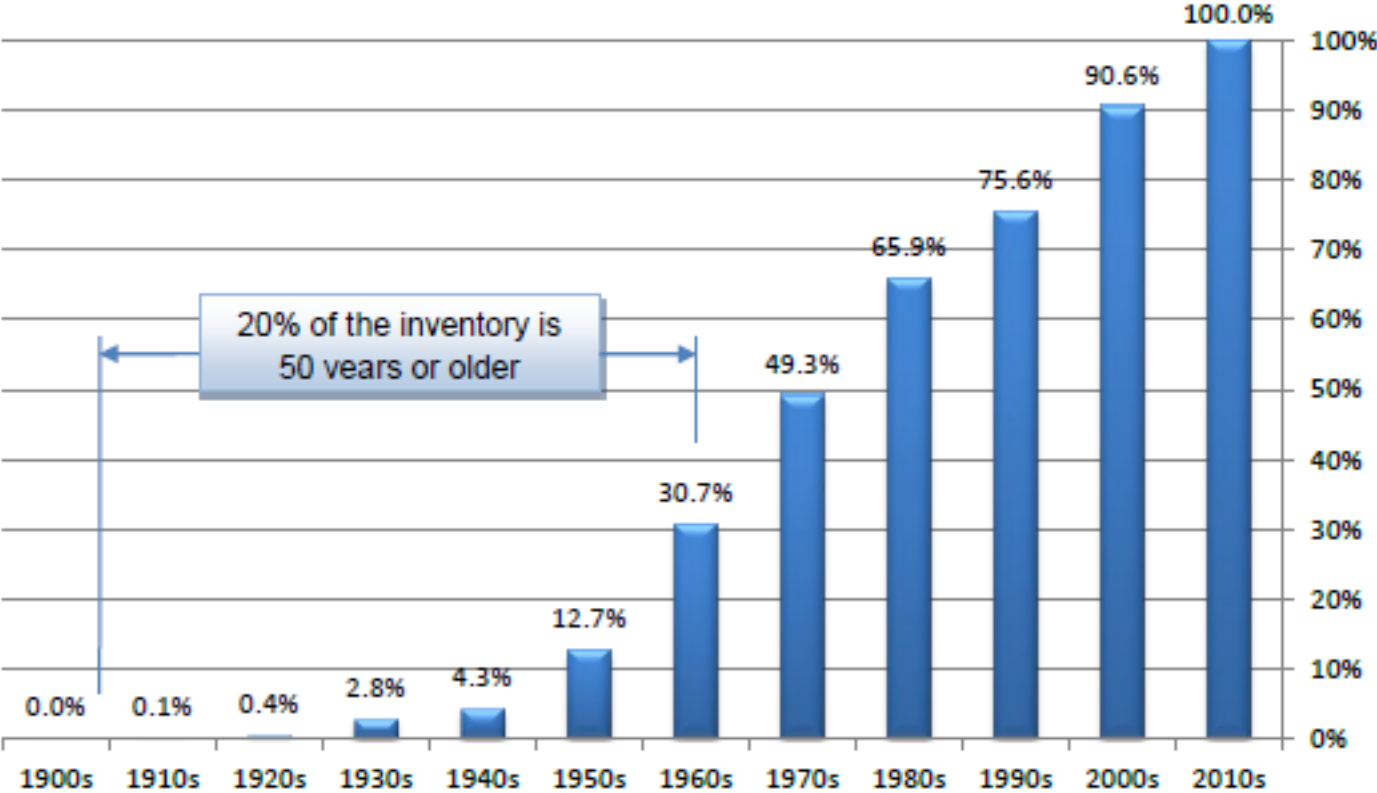
# Bridge Inventory

## Age of In-Service Bridges



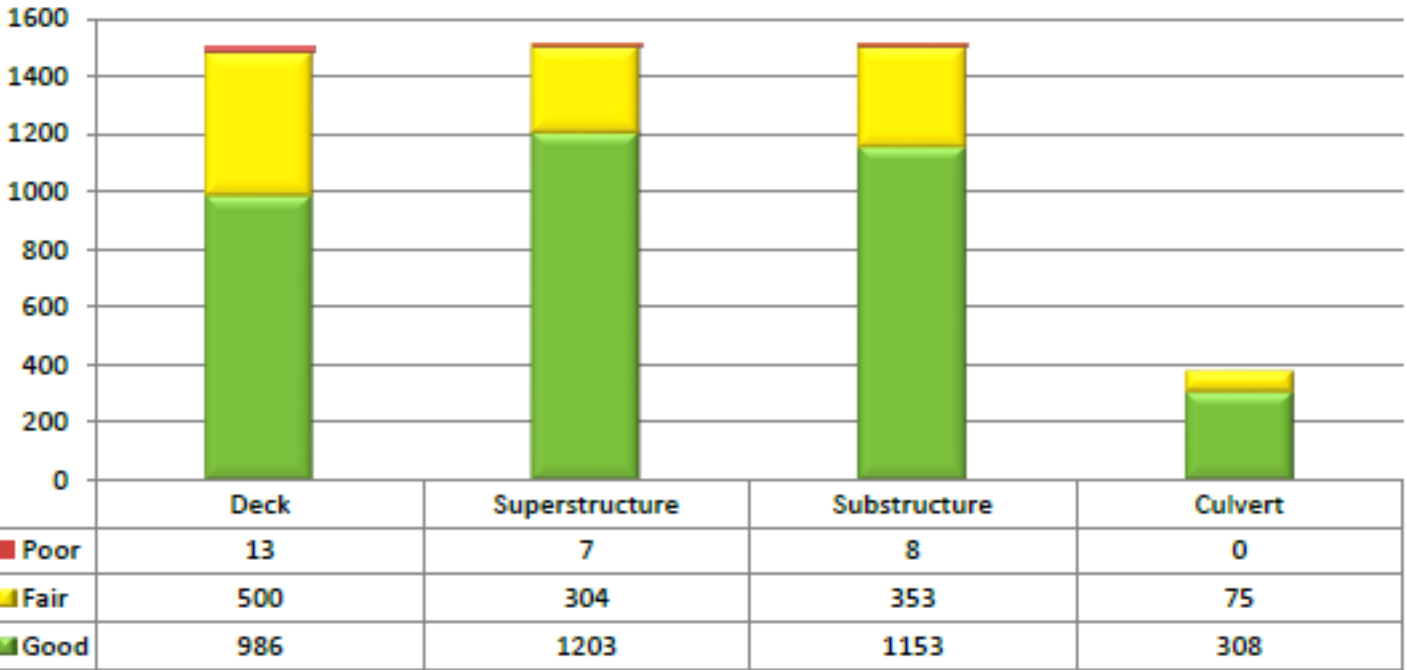
Structures by Year Built

# Bridge Inventory



Cumulative Age Distribution of State Owned Structures by Year Built

# Bridge Condition

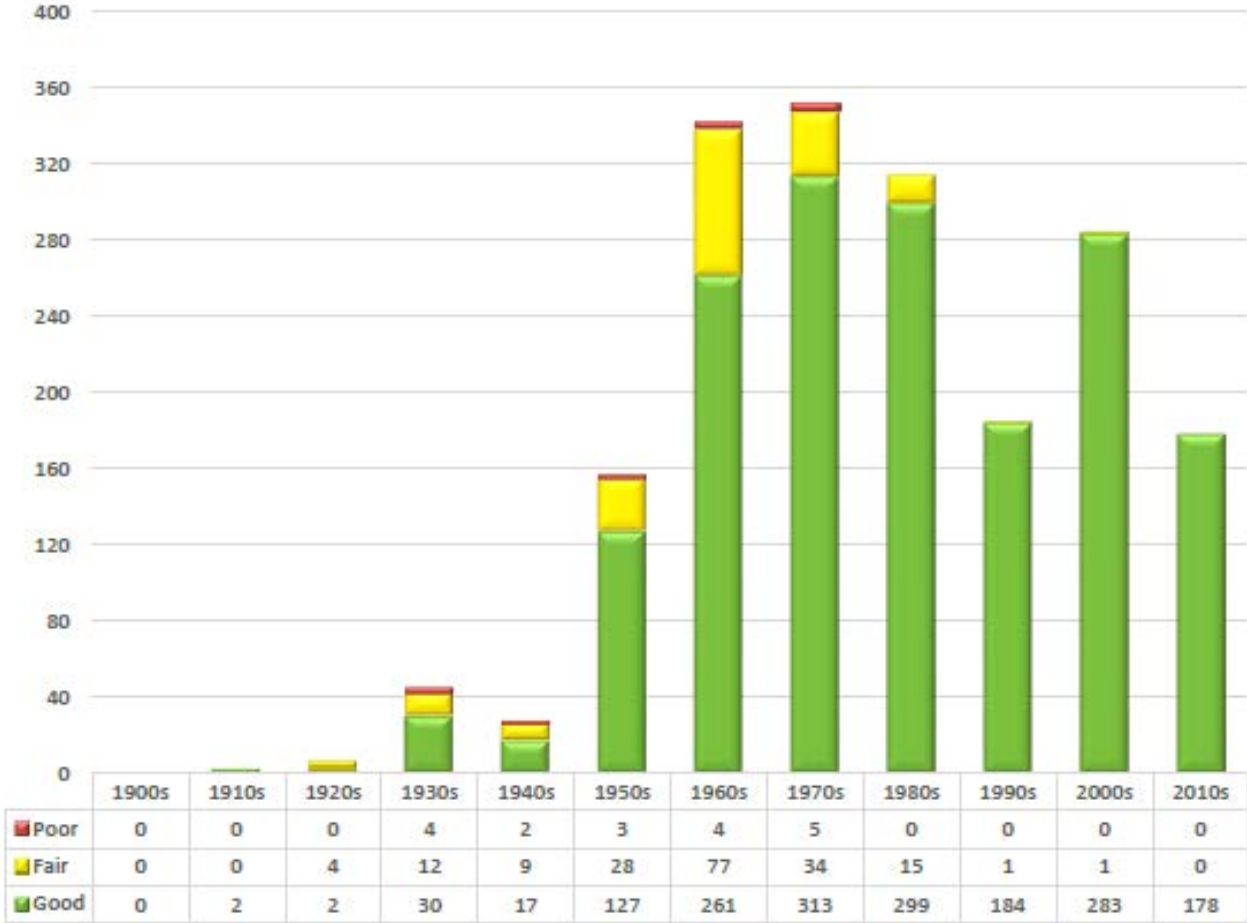


Note: OR-61 and OR-288 have a Superstructure, Substructure, and Culvert NBIS Component (carry water over I-215). Tunnels are included under Culvert.

Overall Structure Conditions by NBIS Components

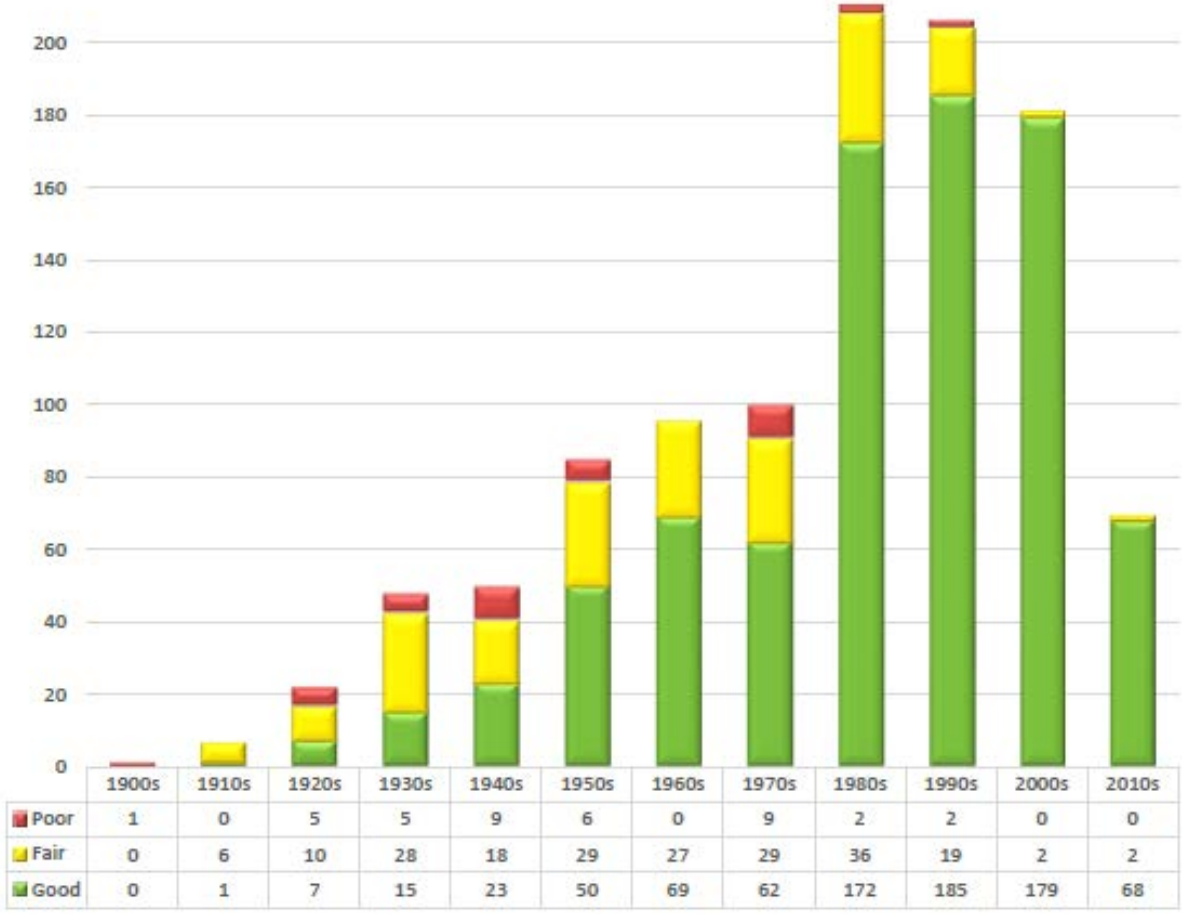


# Bridge Condition



State Owned Bridge Health Indexes by Decade

# Bridge Condition



Locally Owned Bridge Health Indexes by Decade



# Bridge Condition

## Bridge Programs

### Management Strategy

**Good (1,196)**

Service life extended through **preservation** treatments

**Fair (681)**

Condition improved by **rehabilitation** treatments

**Poor (18)**

**Replacement** required - currently, all poor bridges are programmed for replacement

# Bridge Planning

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- Address the needs of the existing in-service bridge inventory
- Prioritize the use of available funds

# Bridge Planning

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- Prioritization process
- Multi-objective prioritization (BHI)
  - Importance factors
  - Vulnerability
  - Criticality
  - Load rating
- Deterioration models
- Life cycle cost analysis
- Risk analysis

# Bridge Performance Measures

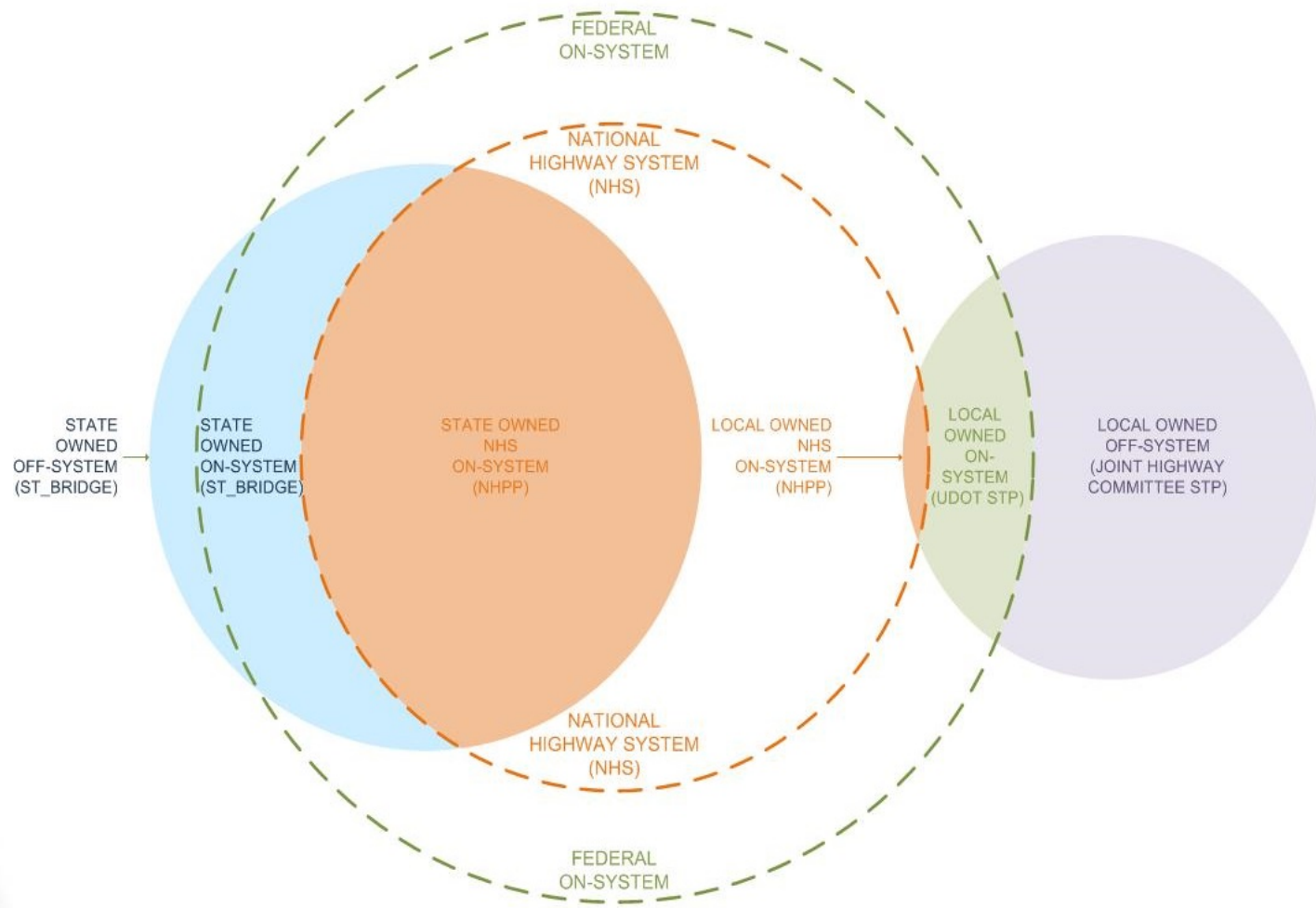


Diagram of Structures by Ownership and Funding

# Bridge Performance Measures

## MAP-21 Funding

Type	Count	SD Count	Count Percentage	Deck Area (SF)	SD Deck Area (SF)	Deck Area Percentage
NHS	1,311	12	0.9%	14,135,373	124,206	0.9%
Non-NHS	584	6	1.0%	3,375,115	44,461	1.3%
Total	1,895	18	0.9%	17,510,488	168,667	1.0%

Note: Culverts are included in this table, which affect structure count but not deck area.

Table 3-2

### Structurally Deficient, State Owned Bridges in Utah

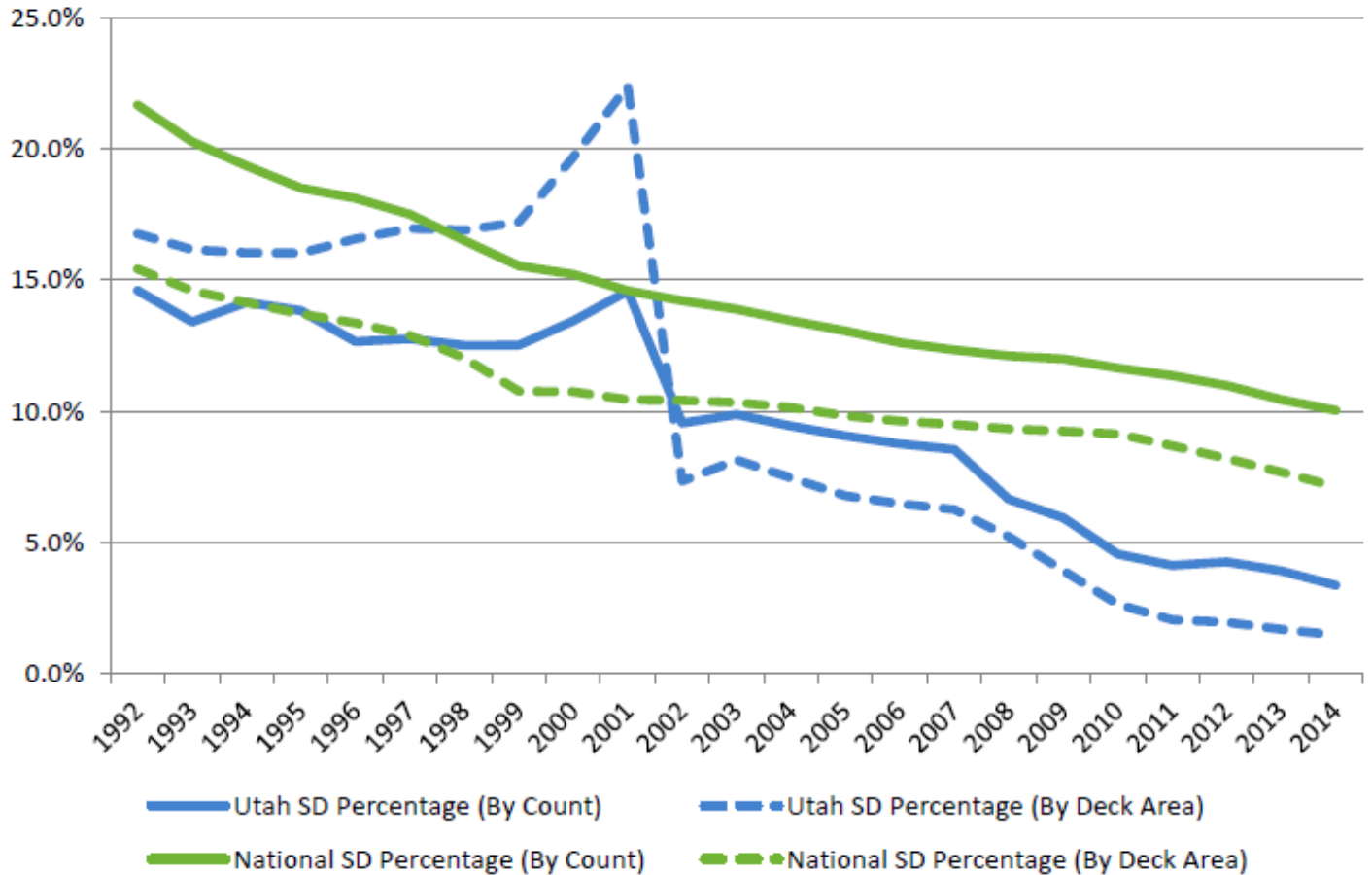
Type	Count	SD Count	Count Percentage	Deck Area (SF)	SD Deck Area (SF)	Deck Area Percentage
NHS	8	0	0.0%	9,652	0	0.0%
Non-NHS	1,068	59	5.5%	2,603,410	63,464	2.6%
Total	1,076	59	5.5%	2,613,062	63,464	2.6%

Note: Culverts are included in this table, which affect structure count but not deck area.

### Structurally Deficient, Locally Owned Bridges in Utah

# Bridge Performance Measures

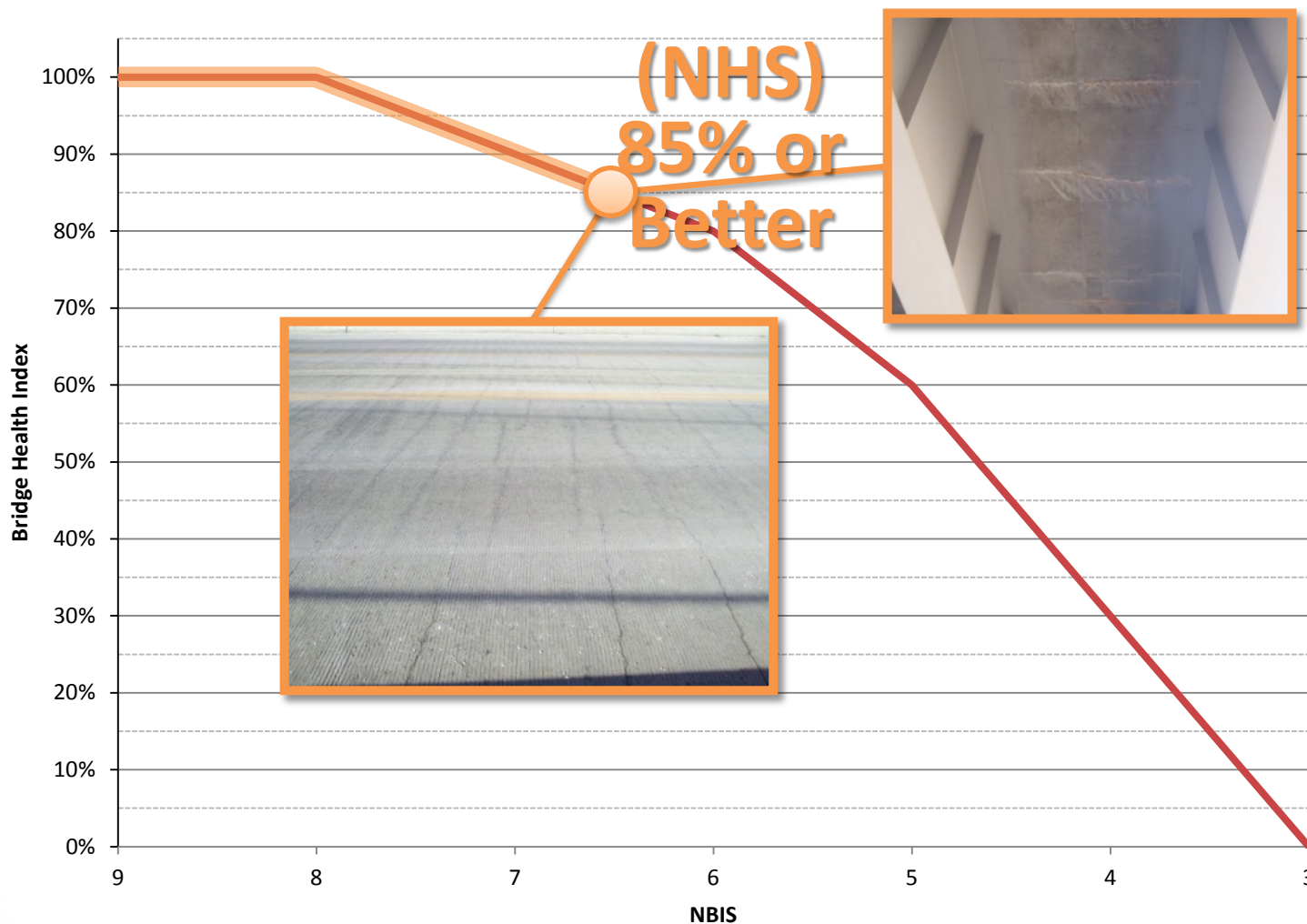
## Historical Data



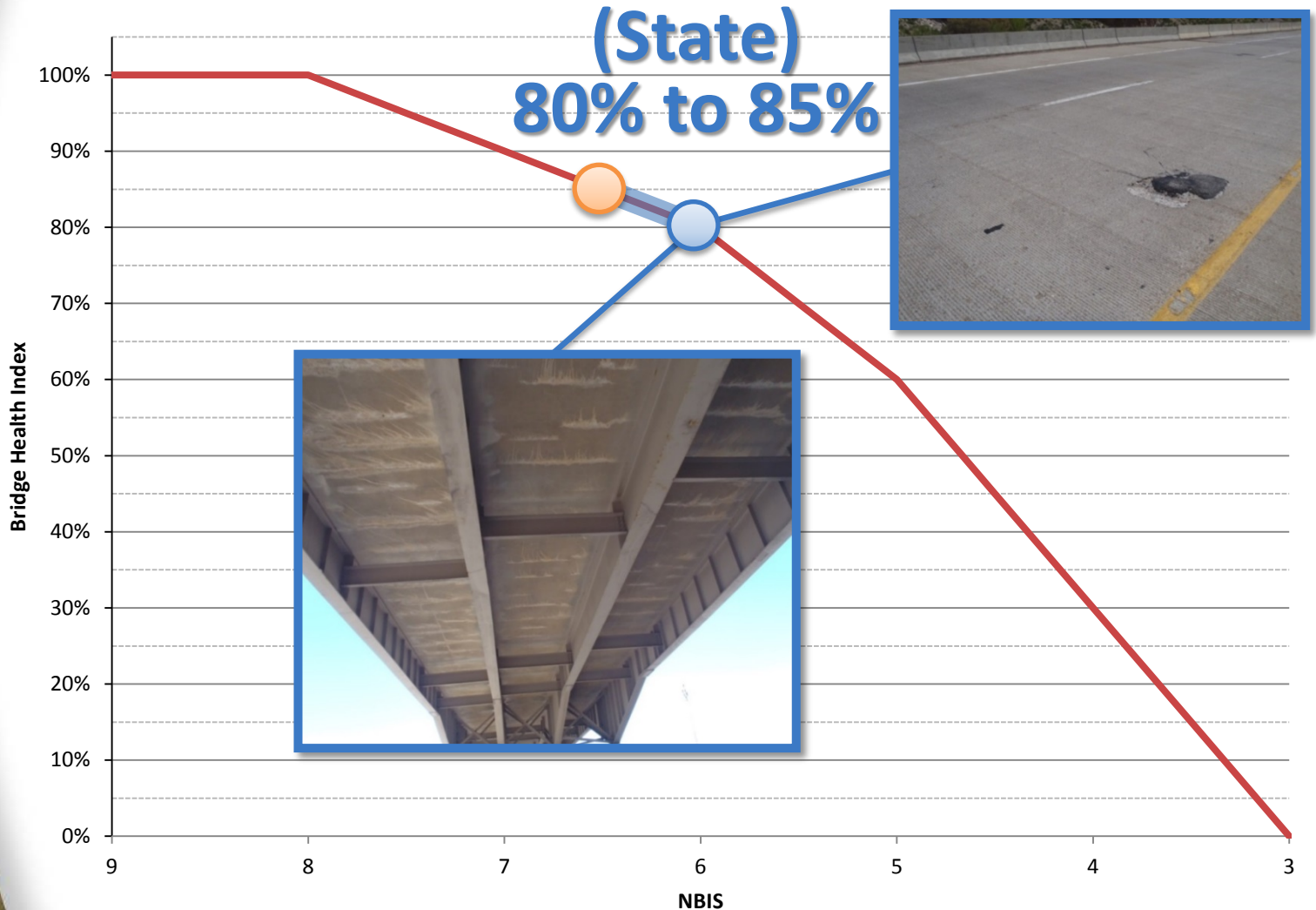
Percentage of Structurally Deficient Bridges – Utah vs. Nation



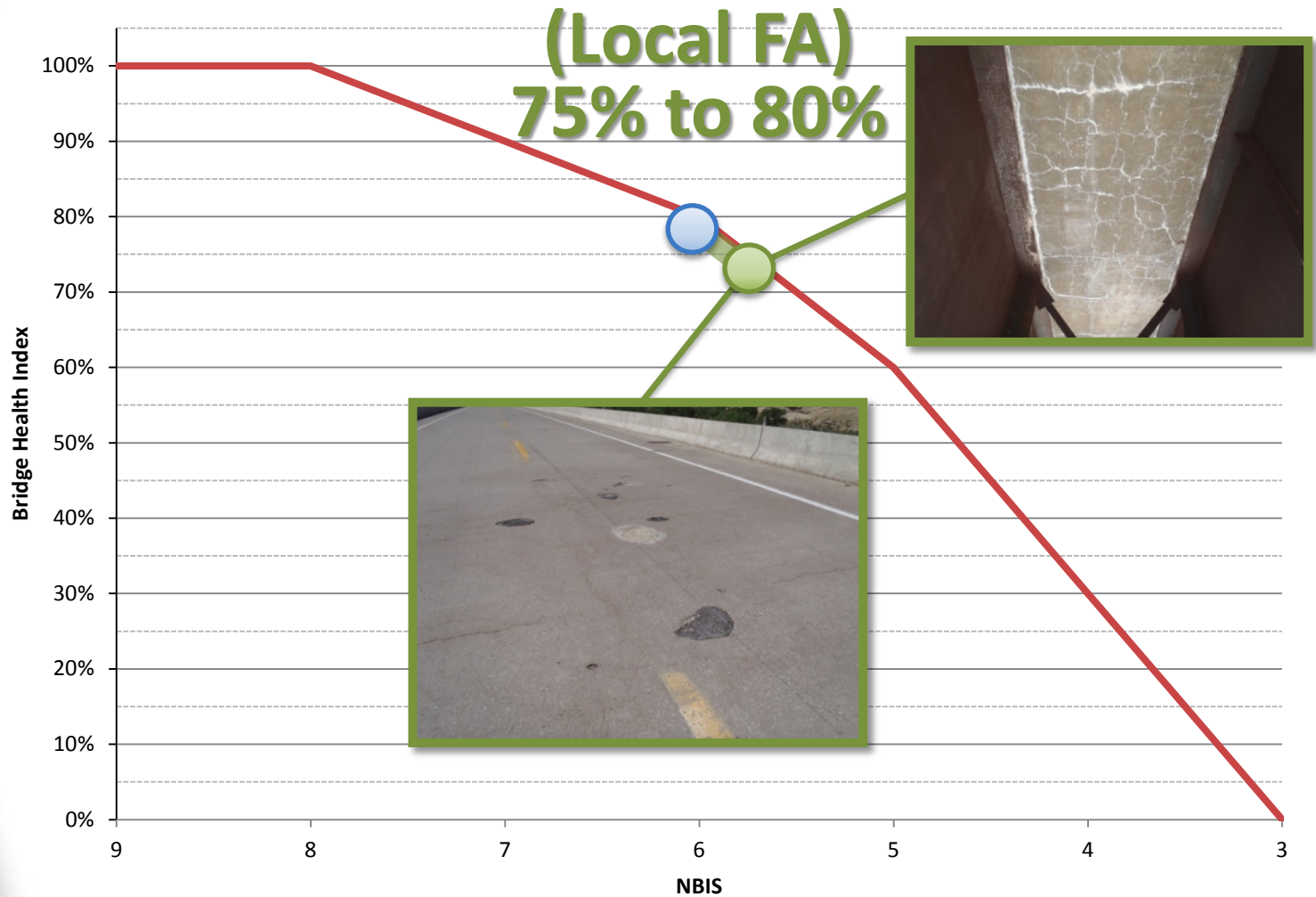
# Bridge Performance Measures



# Bridge Performance Measures

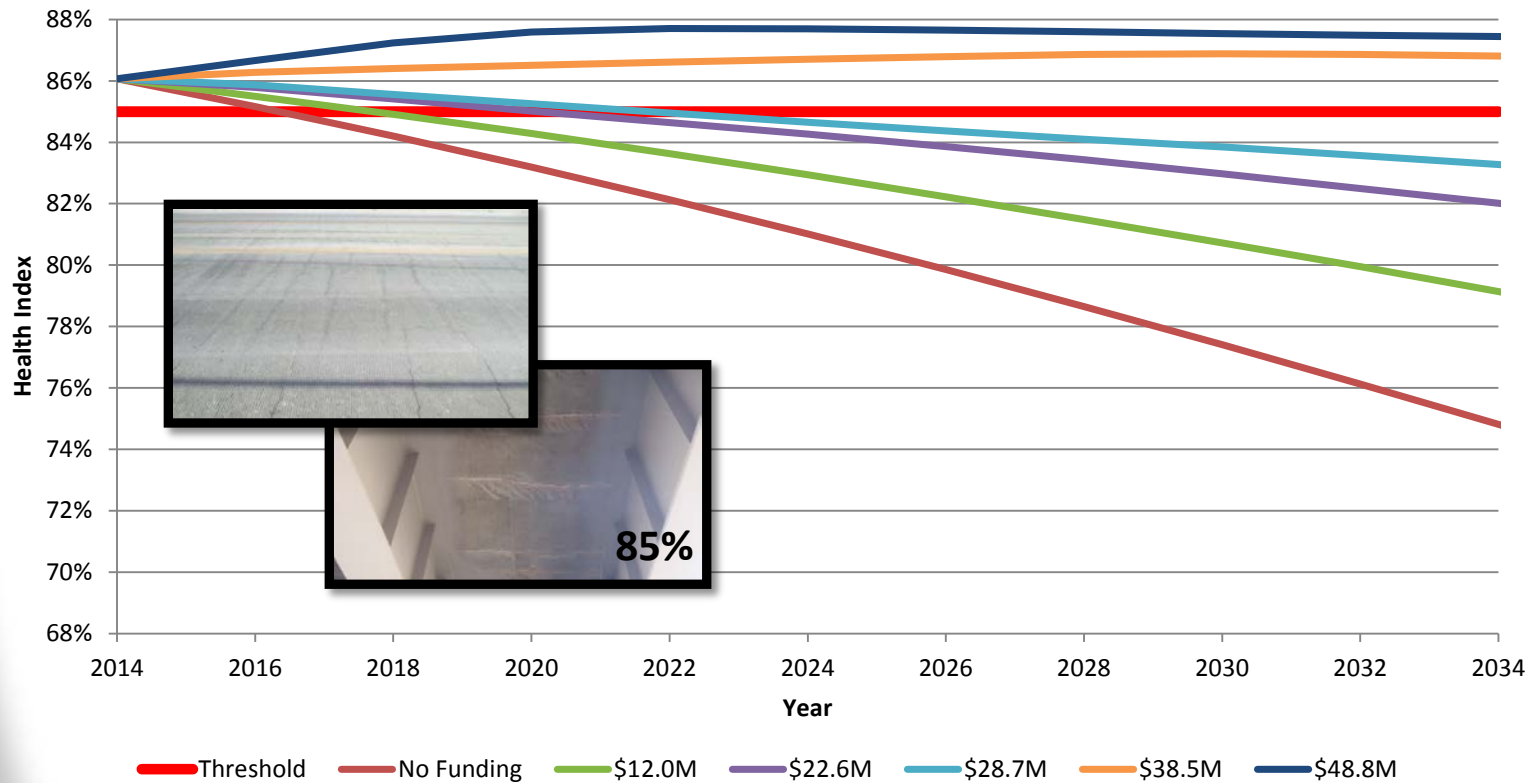


# Bridge Performance Measures



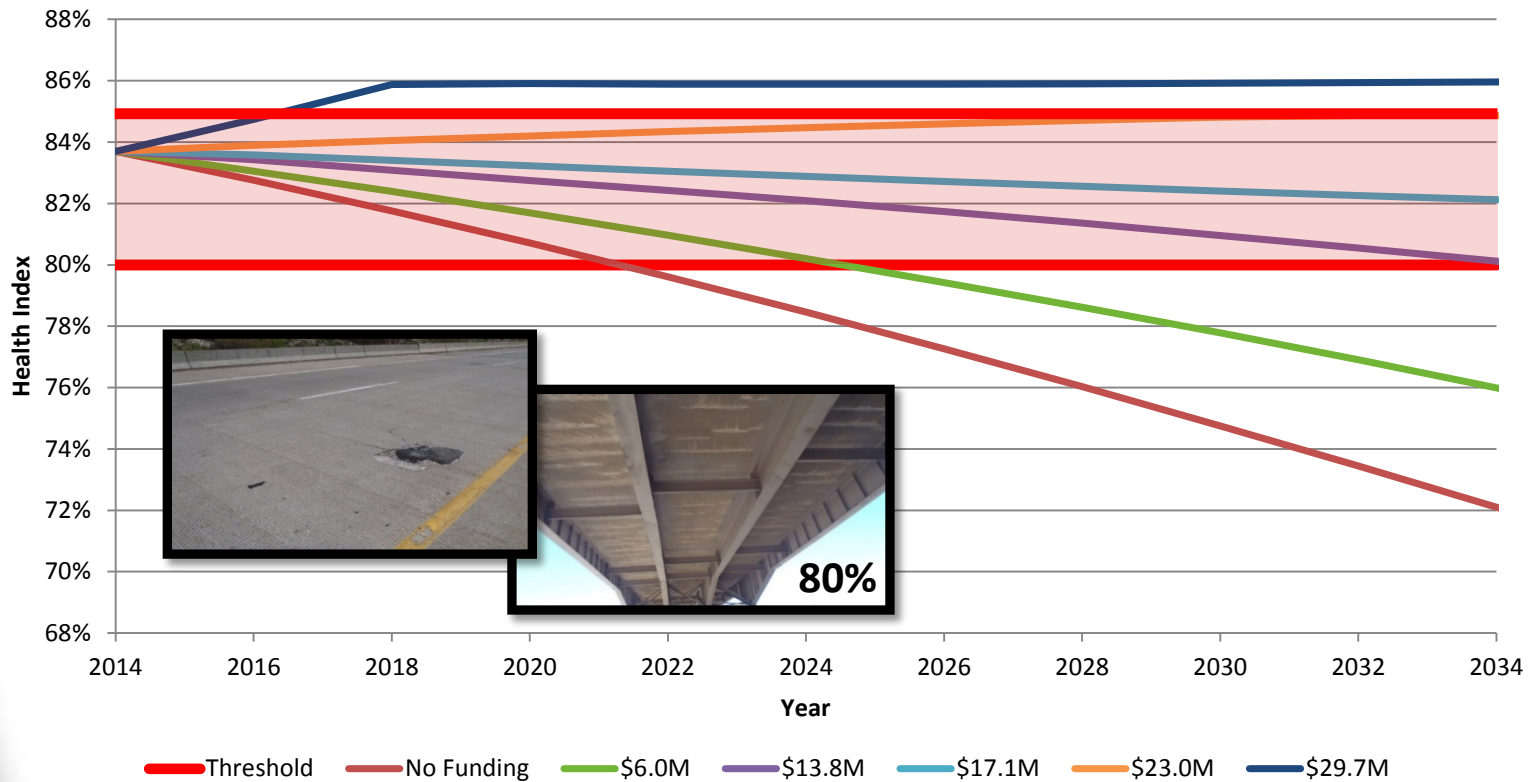
# Bridge Funding Projections

Projected System Health over Time  
NHS Inventory



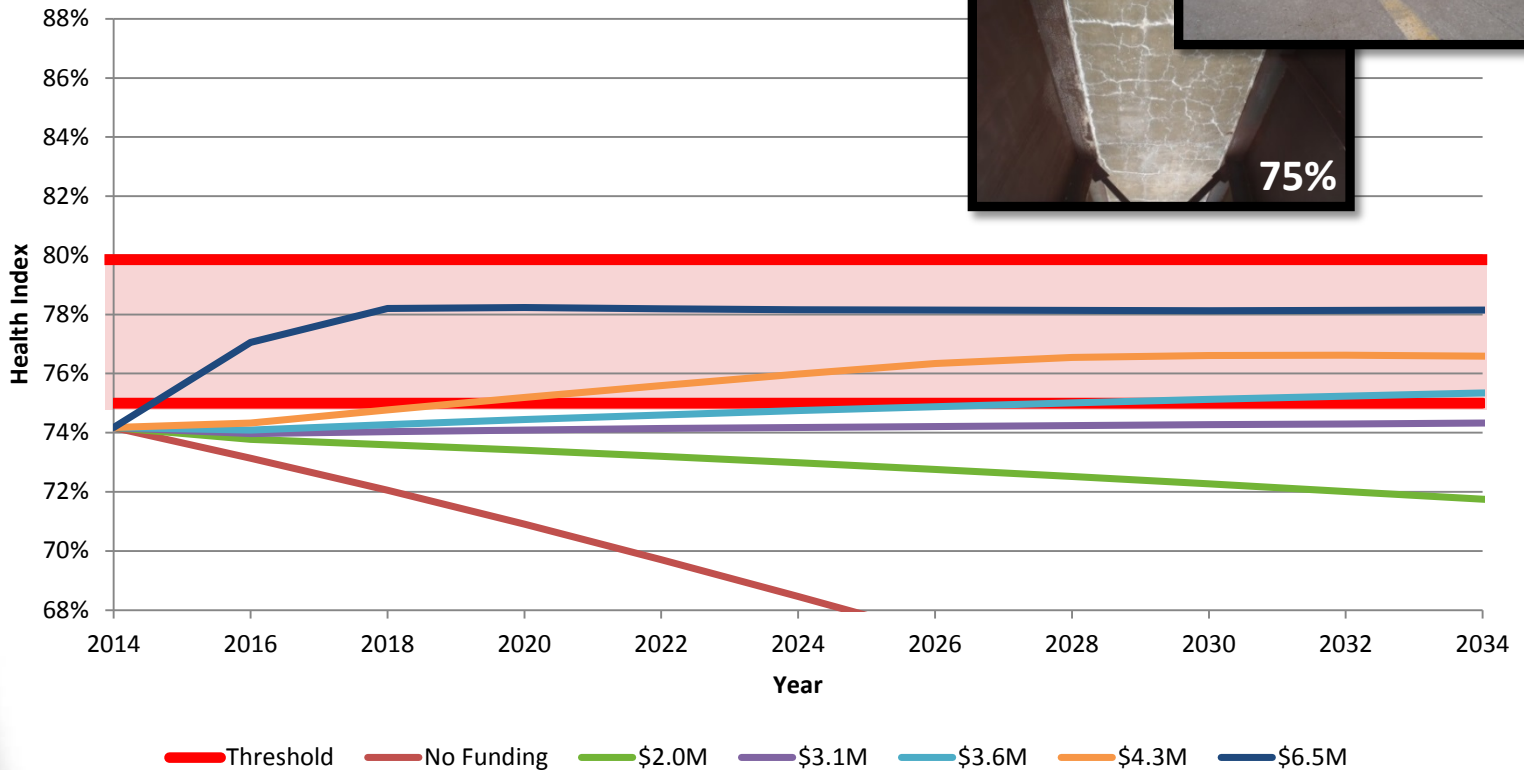
# Bridge Funding Projections

## Projected System Health over Time State Inventory



# Bridge Funding Projections

Projected System Health over Time  
Local FA Inventory



# Bridge Funding Projections

Priority	Scenario 1 Structures Only	Scenario 2 60% Optimal	Scenario 3 75% Optimal	Scenario 4 Optimal	Scenario 5 129% Optimal
1) NHS Repl.	\$12.0M	\$12.0M	\$12.0M	<b>\$12.0M</b>	\$22.3M
2) State Repl.	\$6.0M	\$7.8M	\$7.8M	<b>\$7.8M</b>	\$14.5M
3) Local FA Repl.	\$2.0M	\$2.6M	\$2.6M	<b>\$2.6M</b>	\$4.8M
4) NHS Pres./Rehab.	-	\$10.6M	\$16.7M	<b>\$26.5M</b>	\$26.5M
5) State Pres./Rehab.	-	\$6.0M	\$9.3M	<b>\$15.2M</b>	\$15.2M
6) Local FA Pres./Rehab.	-	\$0.5M	\$1.0M	<b>\$1.7M</b>	\$1.7M
Total	\$20.0M	\$39.5M	\$49.4M	<b>\$65.8M</b>	\$85.0M

# Bridge Funding Projections

## NHS Inventory Condition Comparison in 2034

**Optimal Funding**  
BHI = 86.8%

Health Index	Good (100-80)		Fair (80-60)		Poor (<60)	
NBIS Component	8	7	6	5	4	3
Deck	189	739	523	42	4	0
Superstructure	546	649	305	34	2	0
Substructure	373	734	386	30	2	0
Culvert	104	194	78	9	0	0

**Replacements Only**  
BHI = 77.8%

Health Index	Good (100-80)		Fair (80-60)		Poor (<60)	
NBIS Component	8	7	6	5	4	3
Deck	189	506	437	240	125	0
Superstructure	546	444	255	193	50	0
Substructure	373	502	322	170	67	0
Culvert	104	133	66	50	0	0



# Bridge Programs

## *Funding*

	Funding				
	2015	2016	2017	2018	2019
Replacement/ Rehabilitation	\$15.2M	\$14.8M	\$19.8M	\$20.7M	\$21.0M
Preservation	\$3.5M	\$11.7M	\$21.7M	\$30.8M	\$30.8M
Total	\$18.7M	\$26.5M	\$41.5M	\$51.5M	\$51.5M

# Bridge Programs

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- Bridge Replacement/Rehabilitation Program
  - Structure inspection program
  - Load rating program
- Bridge Preservation Program
  - Bridge maintenance program
  - Bridge scour program
  - Concrete deck protection
  - Painted steel protection systems
  - Parapet replacement



**Thank you**



**Questions?**