NORTH CAROLINA
Department of Transportation

Bridge Program Update

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Overview

Funding Overview

Current Condition and Program Goals

Challenges to Continued Progress

Projected Condition and Goal Achievement

Delivery

Current Bridge Funding - Federal

<table>
<tr><th colspan="3">TRUST FUND</th></tr>
<tr><td colspan="2">BRIDGE</td><td>INTERSTATE MAINTENANCE</td><td>STI</td></tr>
<tr><td colspan="2">$50M</td><td rowspan="2">$100M
($10M BRIDGE)</td><td rowspan="2">VARIES</td></tr>
<tr><td>$25M
OFF FEDERAL SYSTEM</td><td>$25M
URESTRICTED</td></tr>
<tr><td colspan="2">REPLACEMENT
PRESERVATION</td><td>REPLACEMENT
PRESERVATION</td><td>NEW OR REPLACEMENT BRIDGES IN CAPITAL PROGRAM</td></tr>
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Current Bridge Funding - State

HIGHWAY FUND		
BRIDGE PROGRAM	**GMR**	**BRIDGE PRESERVATION**
$280M	**$60-70M**	**$80M FY17/18** **$85M FY18/19**
IMPROVEMENTS TO DEFICIENT BRIDGES	BRIDGE MAINTENANCE	PRESERVATION REHABILITATION

15 Year Bridge Program Goals

2014	
State	**% Deficient**
Texas	0.9
Ohio	3.9
California	7.7
Illinois	7.9
Virginia	9.1
New York	10.4
S. Carolina	11.4
Missouri	14.3
N. Carolina	**16.4**
Pennsylvania	23.8

10% Deficient

Statewide
(13,561 Bridges)

2%	6%	15%
Interstate	**Primary**	**Secondary**

Progress Toward Statewide Goal

2014

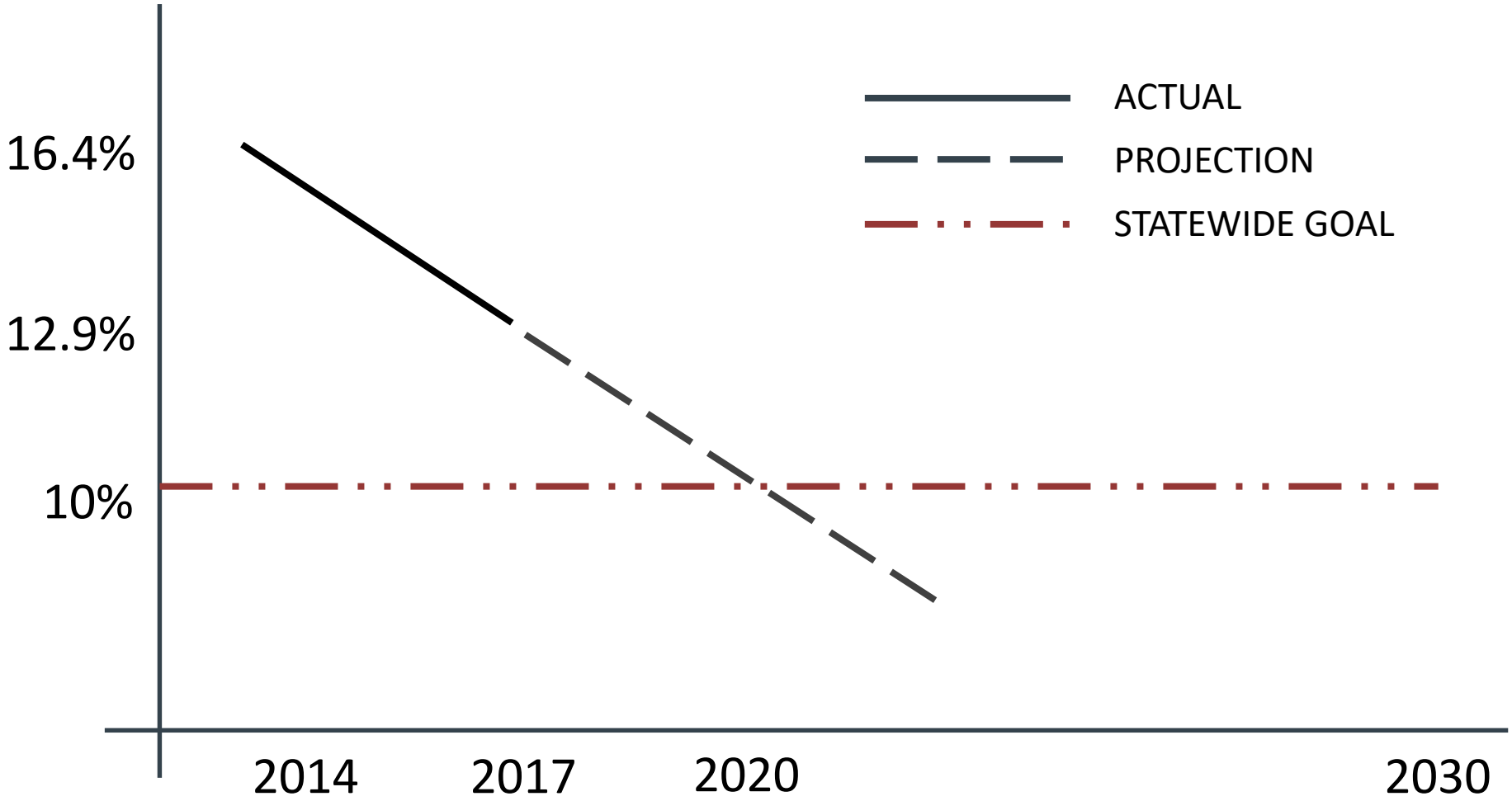
16.4%

2,167 DEFICIENT BRIDGES

CURRENT

12.9%

1,757 DEFICIENT BRIDGES



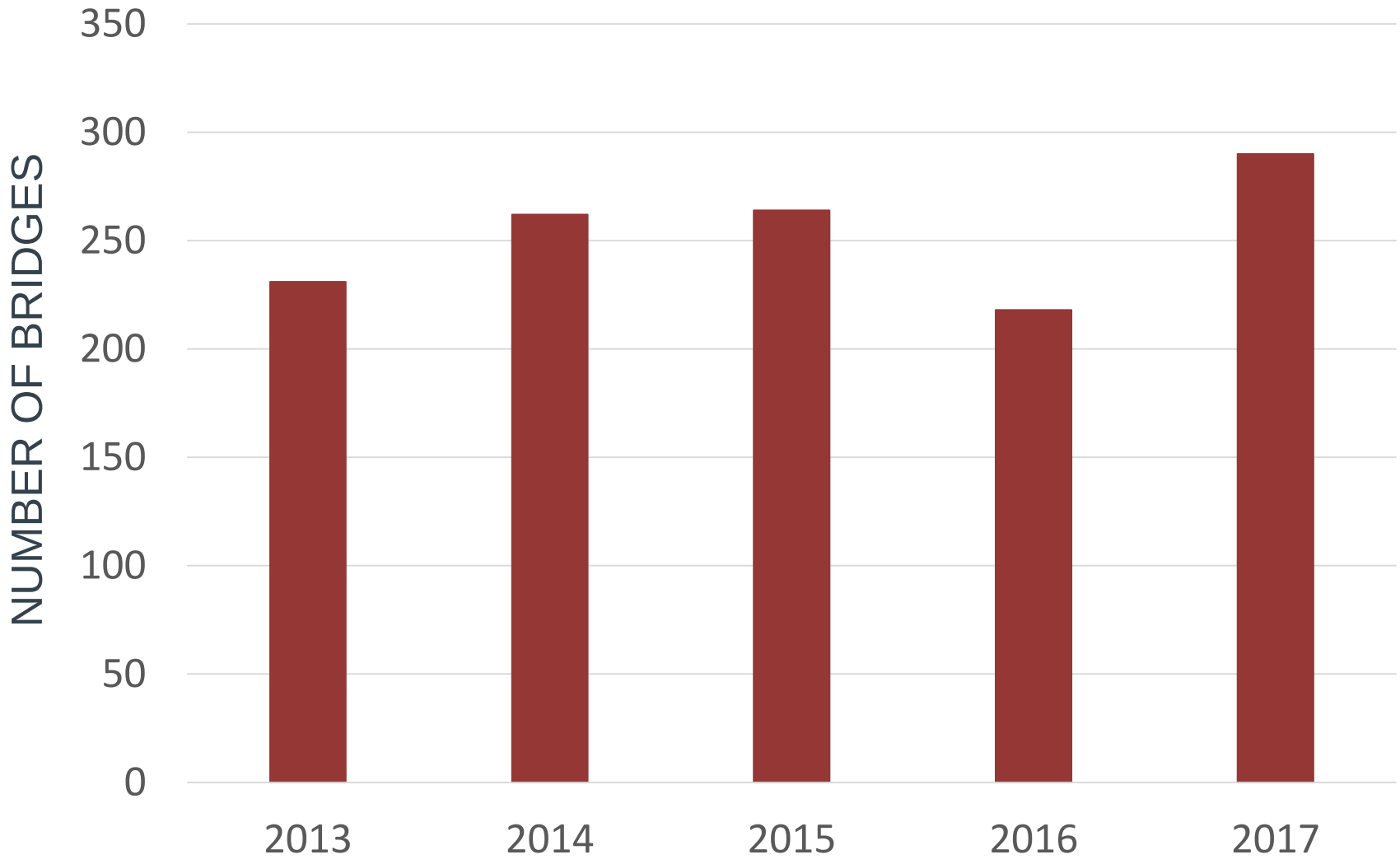
Progress Toward All Goals

GOALS			2014			CURRENT		
10% Deficient			16.4% Deficient			12.9% Deficient		
2%	6%	15%	4%	9%	21%	4%	9%	16%
Interstate	Primary	Secondary	Interstate	Primary	Secondary	Interstate	Primary	Secondary

Challenges Going Forward

- Annual number of bridges becoming deficient
- Number of maintenance items being identified
- High value bridge inventory

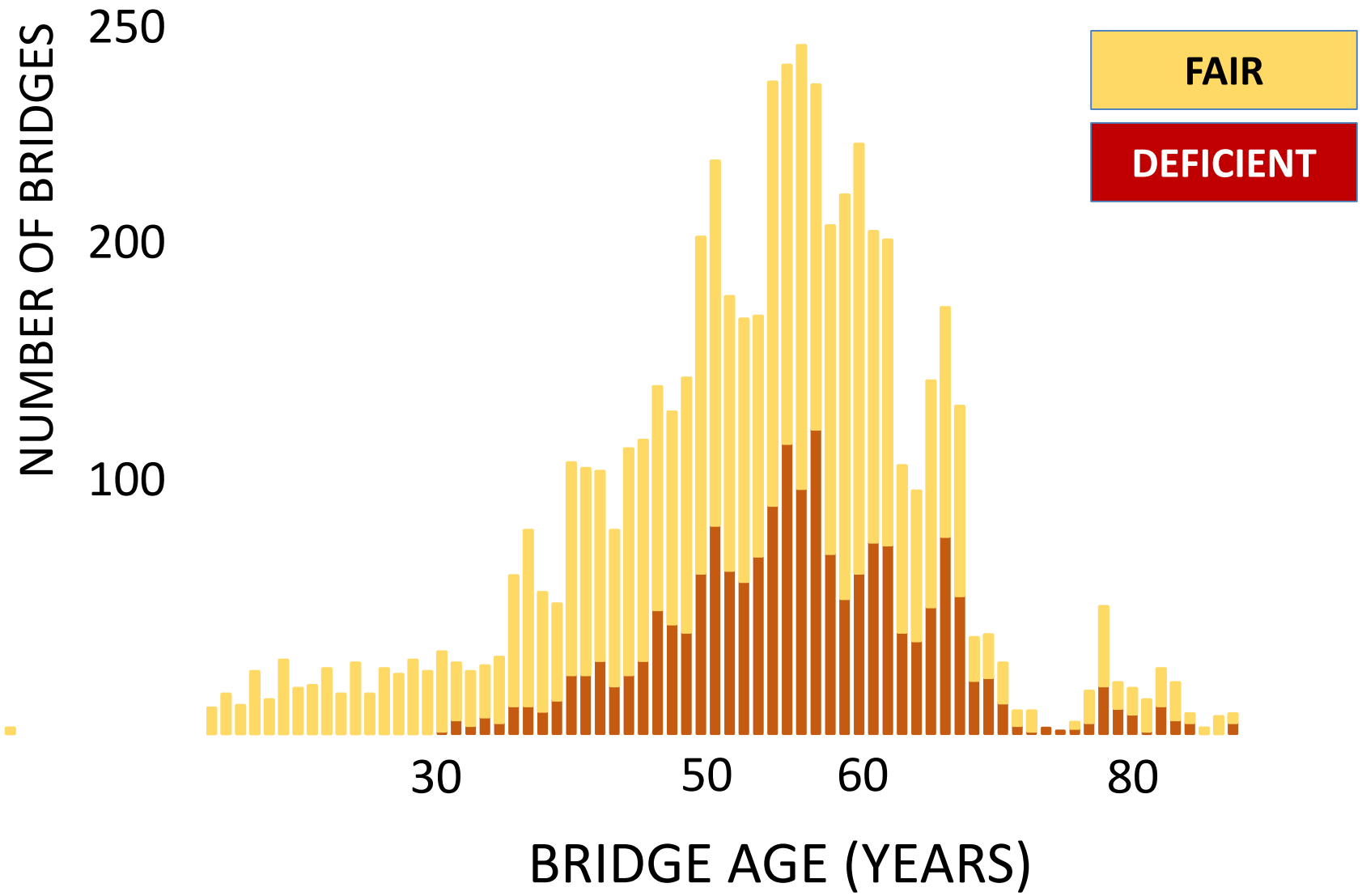
Bridges Becoming Deficient



250
BRIDGES
PER YEAR

290
IN 2017

Fair & Poor Bridge Inventory

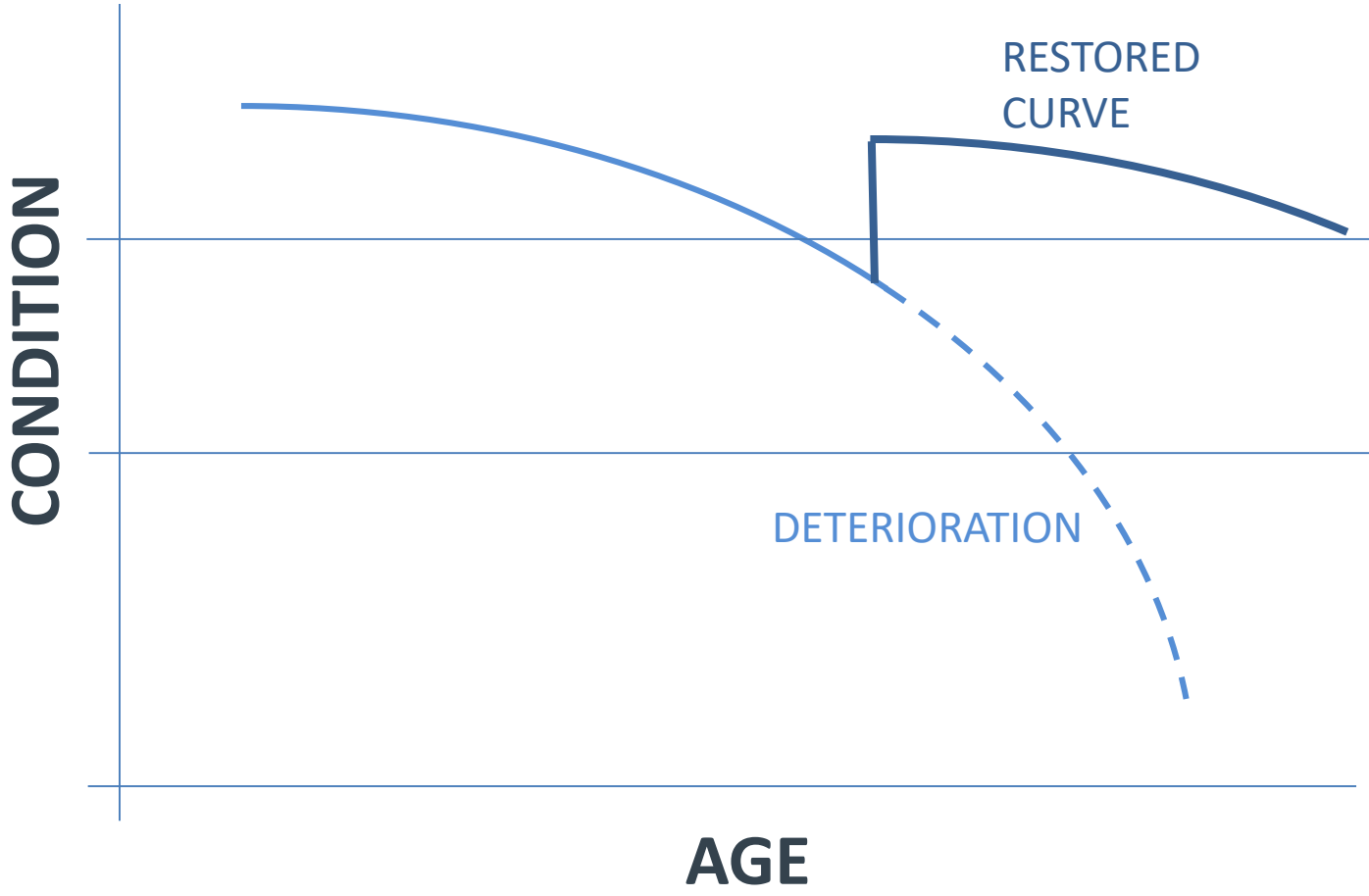


0-30 YEARS	
5,337 BRIDGES	
347	0
LOW $ NEEDS	
30-50 YEARS	
3,073 BRIDGES	
1,083	387
INCREASING $ NEEDS	
50+ YEARS	
5,147 BRIDGES	
2,305	1,370
HIGH $ NEEDS	

Keep Bridges from Becoming Deficient

MAXIMIZE BRIDGE LIFE

LOWER LIFEME COSTS



GOOD CONDITION:
LOW MAINTENANCE

FAIR CONDITION:
INCREASING MAINTENANCE

DEFICIENT CONDTION:
HIGH MAINTENANCE

Types of Maintenance Items

CRITICAL FINDINGS	PRIORITY MAINTENANCE	ROUTINE MAINTENANCE
1,080 IN 24 MONTHS* ON 657 BRIDGES	37,000 IN 24 MONTHS* ON 5,720 BRIDGES	
SAFETY ISSUES, SEVERE LOAD RESTRICTIONS, BRIDGE CLOSURES	LOAD RESTRICTIONS, DEFECTS TO LIKELY CAUSE PROBLEMS IN 2-4 YEARS	PREVENTATIVE AND CYCLICAL MAINTENANCE

* EACH BRIDGE IS INSPECTED EVERY 2 YEARS

Maintenance Items: Critical Findings

SAFETY ISSUE OR SEVERE LOAD RESTRICTIONS

EXAMPLE:
CORROSION RESULTED IN HOLES THROUGH STEEL BEAMS

50% WEIGHT RESTRICTION
REDUCED FROM NO RESTRICTION TO 15 TONS

BRIDGE CREW SPENT **$180,000** TO COMPLETE REPAIRS AND RESTORE LOAD CARRYING CAPACITY

MUST BE DONE

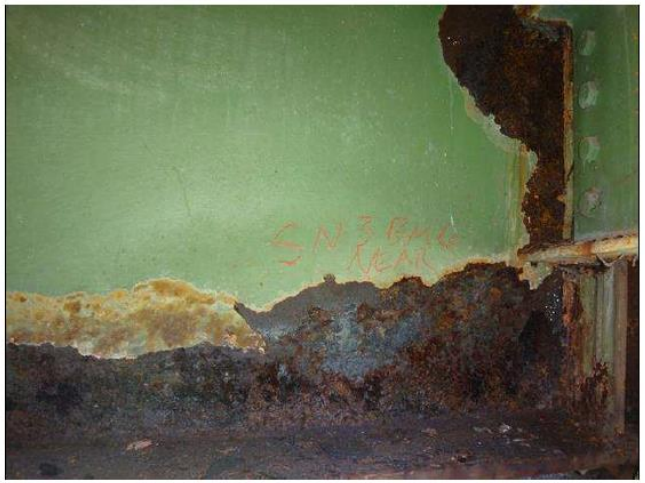
Priority Maintenance Items

EXAMPLE: POTHOLES ON I-40 BRIDGE

REPAIR SPALLS	**OVERLAY DECK**
$25,000 EACH YEAR OR TWO	$300,000 TO OVERLAY
POOR/FAIR CONDITION REMAINS	GOOD CONDITION RESTORED
CONTINUED HIGH MAINTENANCE	LOW MAINTENANCE
BP REPLACEMENT SOON	BP REPLACEMENT DEFERRED
	(PREFERRED)

MUST BE DONE

Priority Maintenance Items



Span 3 Beam 6: [PM] at near half, active corrosion with section loss, at bottom flange [16ft x up to full width - loss<1/16in], at web [16ft x up to full height - avg rem 7/16in], at web stiffener [up to full height x full width - loss<1/16in]

Span 3 Beam 5: at near end, active corrosion with section loss, at bottom flange [6ft x full width - loss<1/16in], at web [6ft x up to full height - avg rem 5/8in], at web stiffener [full height x full width - loss<1/16in]

ISSUE: FINDING THAT COULD CAUSE SAFETY ISSUES AND/OR LOAD POSTINGS IN 2-4 YEARS

EXAMPLE BRIDGE: STEEL BEAM CORROSION

REPAIR WORST STEEL BEAMS	**REPAIR ALL BEAMS AND PAINT**
$50,000 EVERY FEW YEARS	$200,000 TO CONTRACT
FAIR/POOR CONDITION REMAINS	GOOD CONDITION RESTORED
CONTINUED HIGH MAINTENANCE	LOW MAINTENANCE
REPLACEMENT 15-20 YEARS	BP REPLACEMENT DEFERRED
	(PREFERRED)

SHOULD BE DONE

Routine Maintenance Items

Expansion Joint : SPAN (3) FAR JOINT AT ABUTMENT (B) CRACKED AND LEAKING FULL LENGTH ONTO CAP

PREVENTATIVE AND CYCLICAL MAINTENANCE

EXAMPLE: LEAKING BRIDGE JOINTS

IF NOT ADDRESSED: SALTS AND DEBRIS LEAK ONTO BEAMS AND SUPPORTS AND CAUSE DETERIORATION

EFFECT: LEADS TO PAINT FAILURE AND SECTION LOSS OF STEEL BEAMS

SHOULD BE DONE

Challenge: High Value Bridges

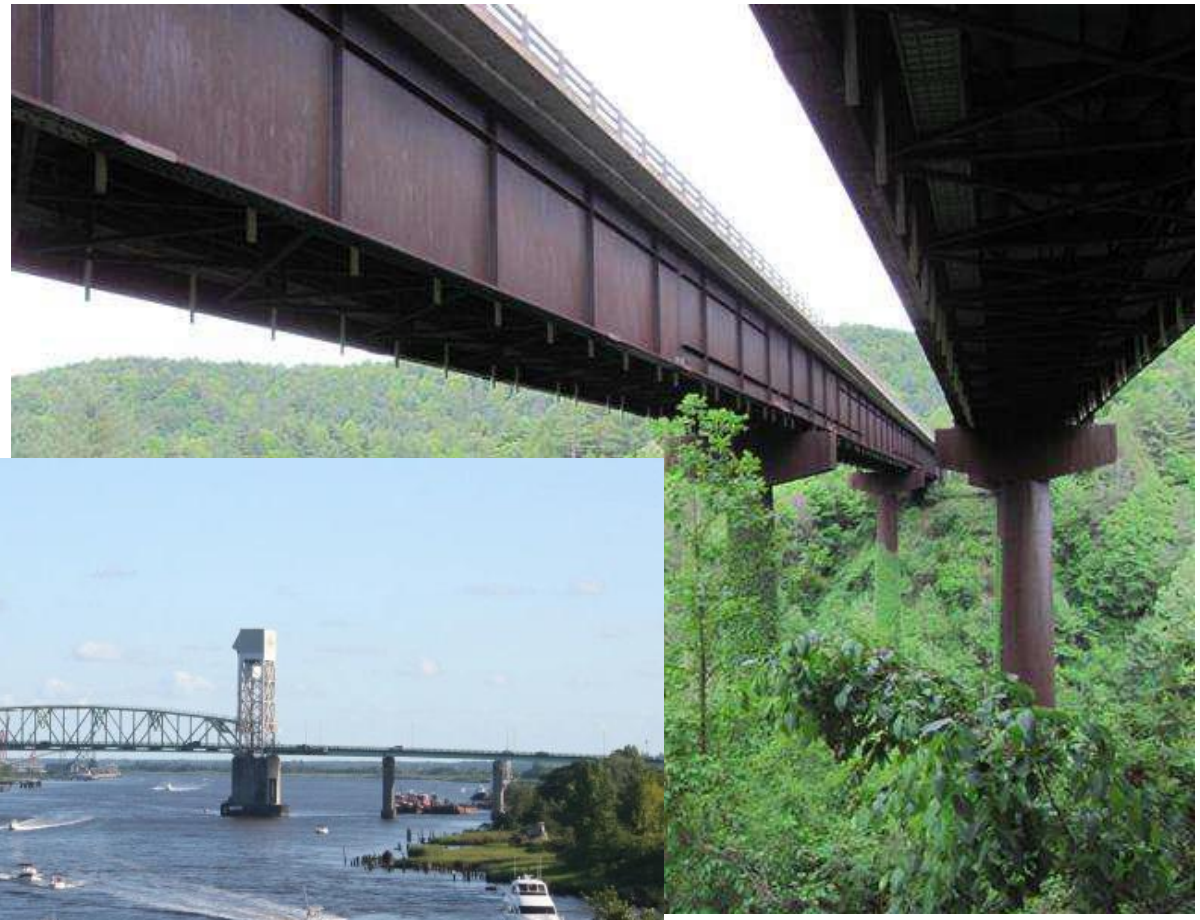
REPLACEMENT COSTS BETWEEN **$20M & $439M**

204 BRIDGES

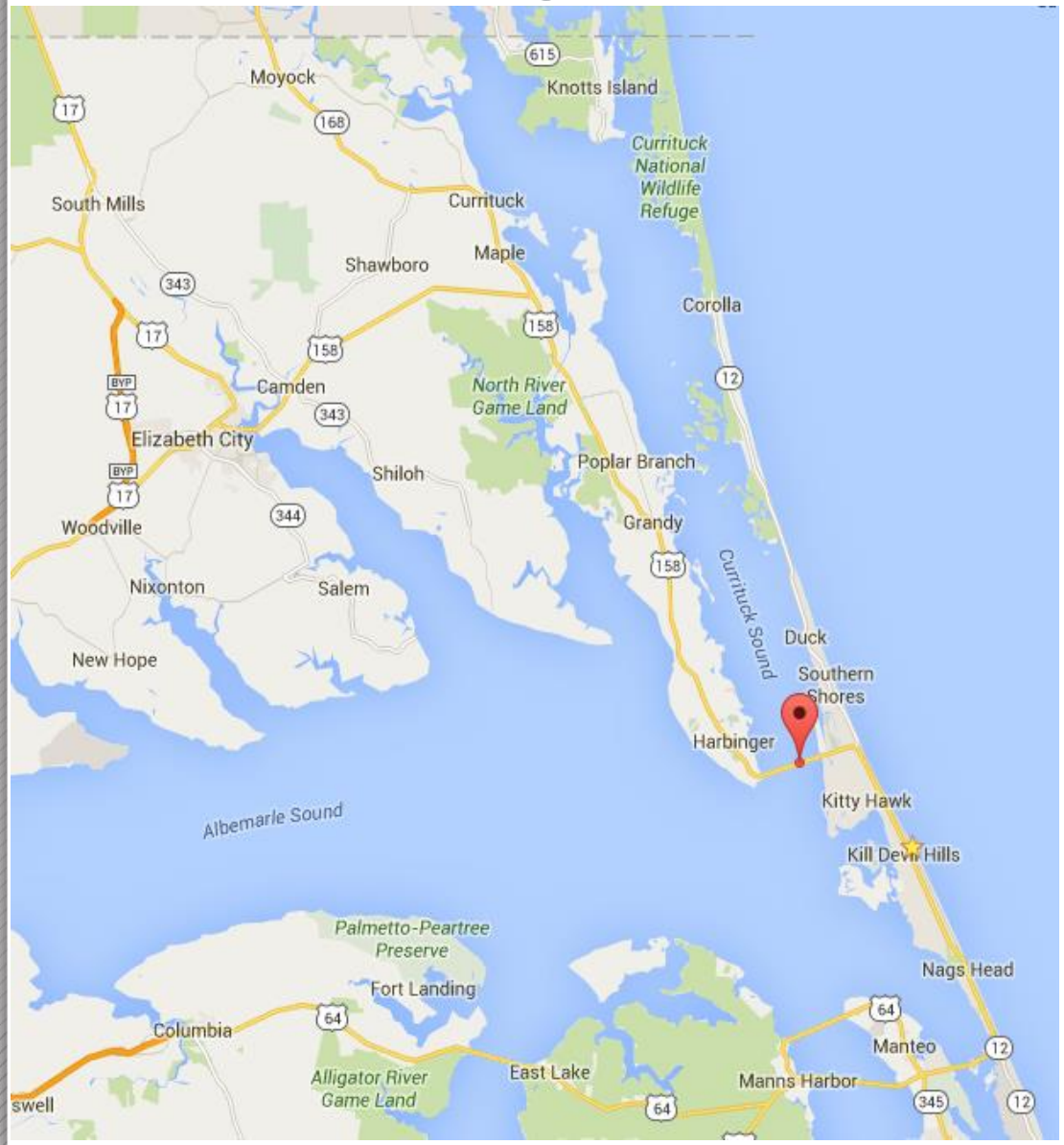
TOTAL REPLACEMENT COST: **$9B**

TOTAL PRESERVATION NEEDS: **$300M**

PROVIDE **KEY CONNECTIVITY** IN OUR TRANSPORTATION SYSTEM



High Value Bridge: Case Study



WRIGHT MEMORIAL BRIDGE
EBL OF US 158 OVER THE CURRITUCK SOUND

2.8 MILE LONG CONNECTER TO THE NORTHERN OUTER BANKS

AVERAGE DAILY TRAFFIC: 12,500

CURRENT CONDITION: DEFICIENT

High Value Bridge: Case Study

WRIGHT MEMORIAL BRIDGE
EBL BUILT 1966

ESTIMATED REPLACEMENT VALUE:
$170M

PRESERVATION NEEDS:

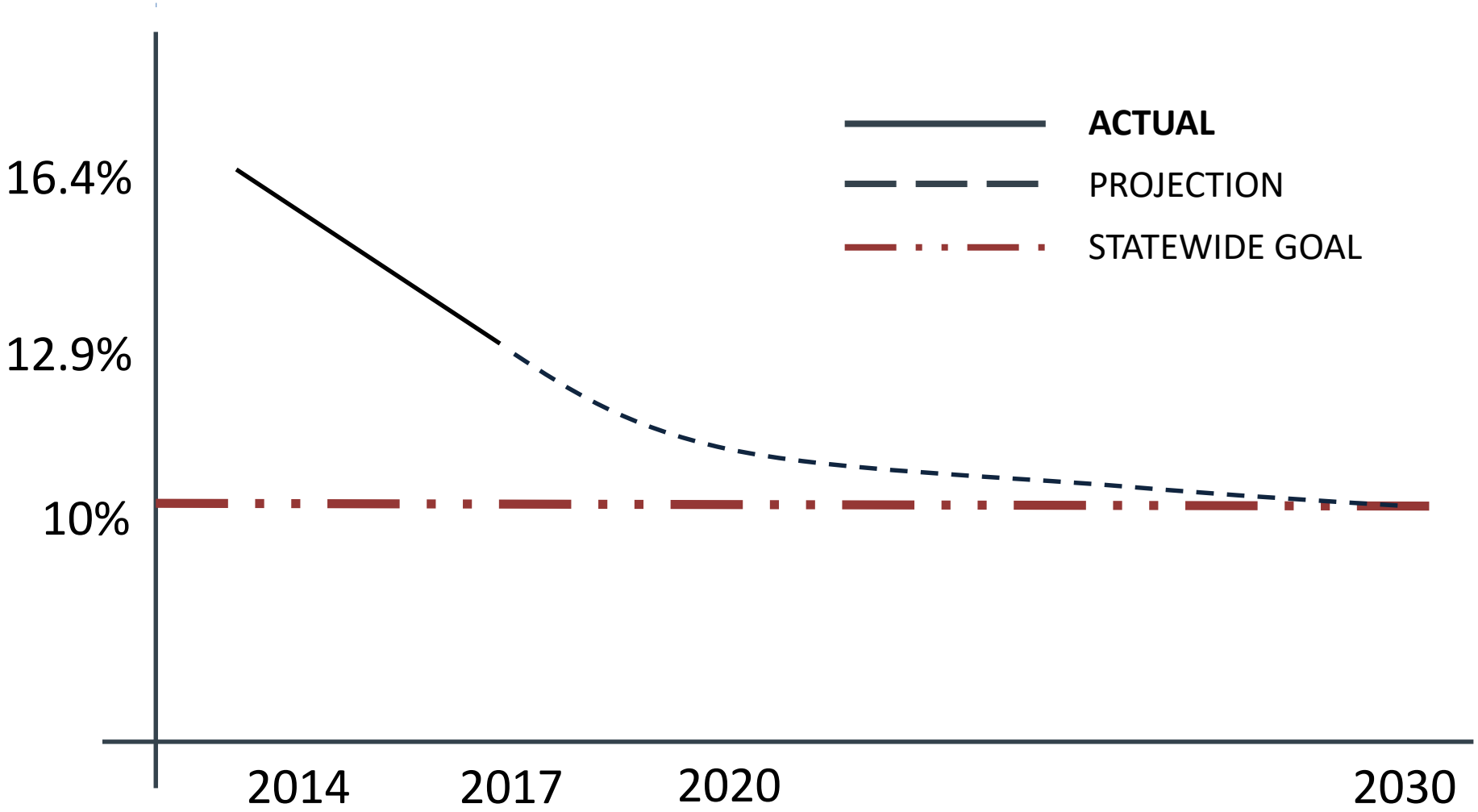
- BRIDGE DECK OVERLAY
- REPAIR OF BRIDGE JOINTS
- EXTENSIVE CONCRETE REPAIRS
- FOUNDATION REPAIRS

PROJECT COST: **$21M**

RESTORED TO GOOD CONDITION

35 YEAR LIFE EXTENSION

Projection to Achieve Goals



VARIABLES
INTERSTATE AND PRIMARY SYSTEM GOALS
DEFICIENT BRIDGE RATE
UNADDRESSED MAINTENANCE
HIGH VALUE BRIDGES

Bridge Program Delivery

REPLACEMENTS
DESIGN BID BUILD
90% OF CONTRACTS
1-2 BRIDGES PER CONTRACT
EXPRESS DESIGN BUILD (EDB)
10% OF CONTRACTS
6-12 BRIDGES PER CONTRACT

CHALLENGES AND/OR PROBLEMS
ROAD CLOSURES OFTEN NEEDED
REGIONAL IMPACTS, E.G., CONFLICTING DETOUR ROUTES
SEASONAL AGRICULTURAL IMPACTS

POTENTIAL SOLUTIONS
BETTER COORDINATION ACROSS DIVISIONS AND CENTRAL
DECREASE NUMBER OF BRIDGES IN EDB CONTRACTS (6-9 PER)
BUNDLE BRIDGES IN DESIGN BID BUILD CONTRACTS (2-4 PER)
FLEXIBLE START DATES WITH COMPRESSED ROAD CLOSURE TIME
INCENTIVES FOR EARLY COMPLETION

Summary

Bridge Funding

- Three programs – replace, preserve, maintain
- Preservation benefits
- Challenges to overcome
- Achieve statewide and system goals by 2030
- Periodically re-evaluate

Program Delivery

- Refine Contracting Methods