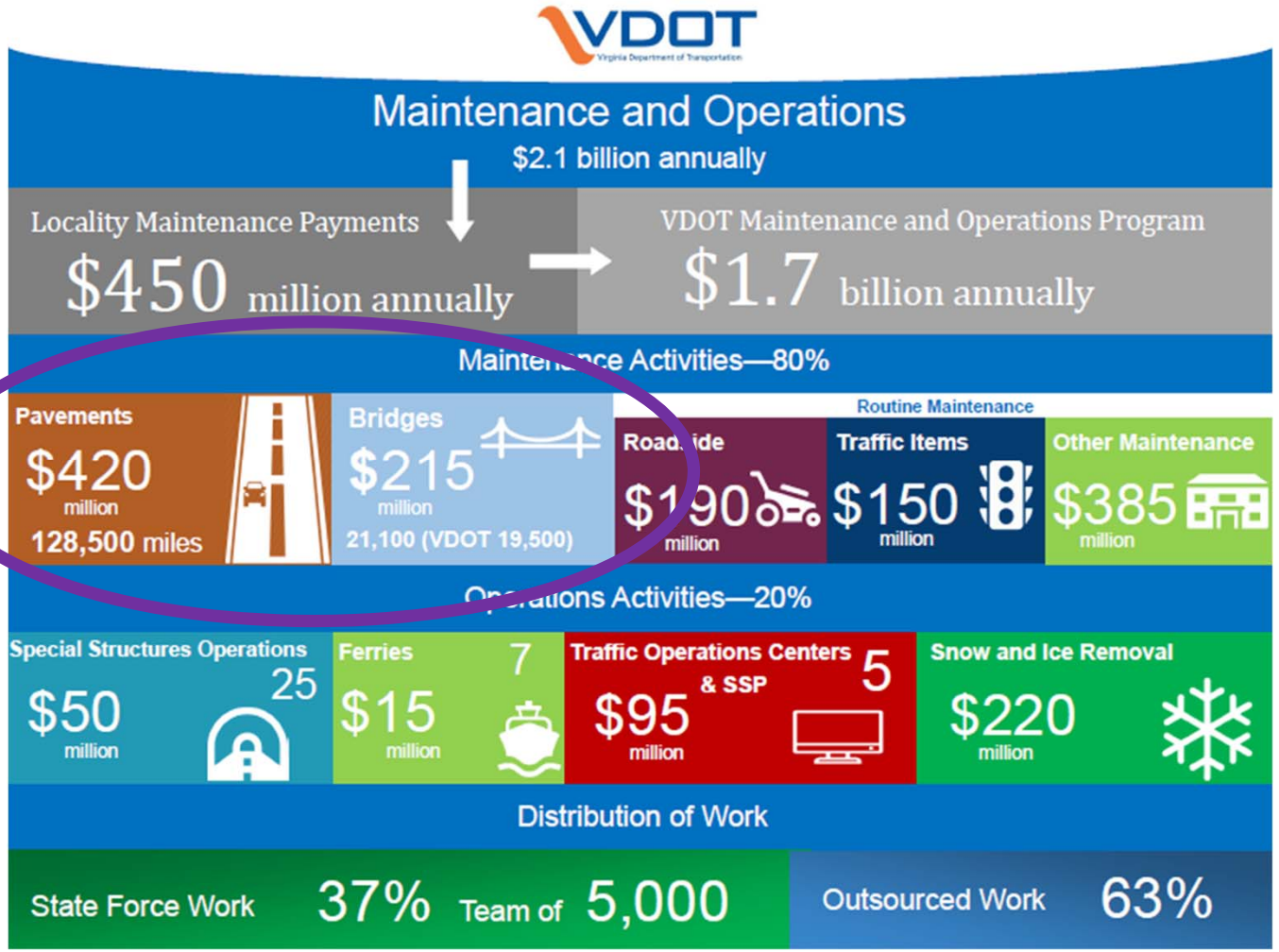

VDOT
Virginia Department of Transportation

COMPREHENSIVE REVIEW
PAVEMENTS AND STRUCTURES

Stephen C. Brich, P.E., Commissioner of Highways

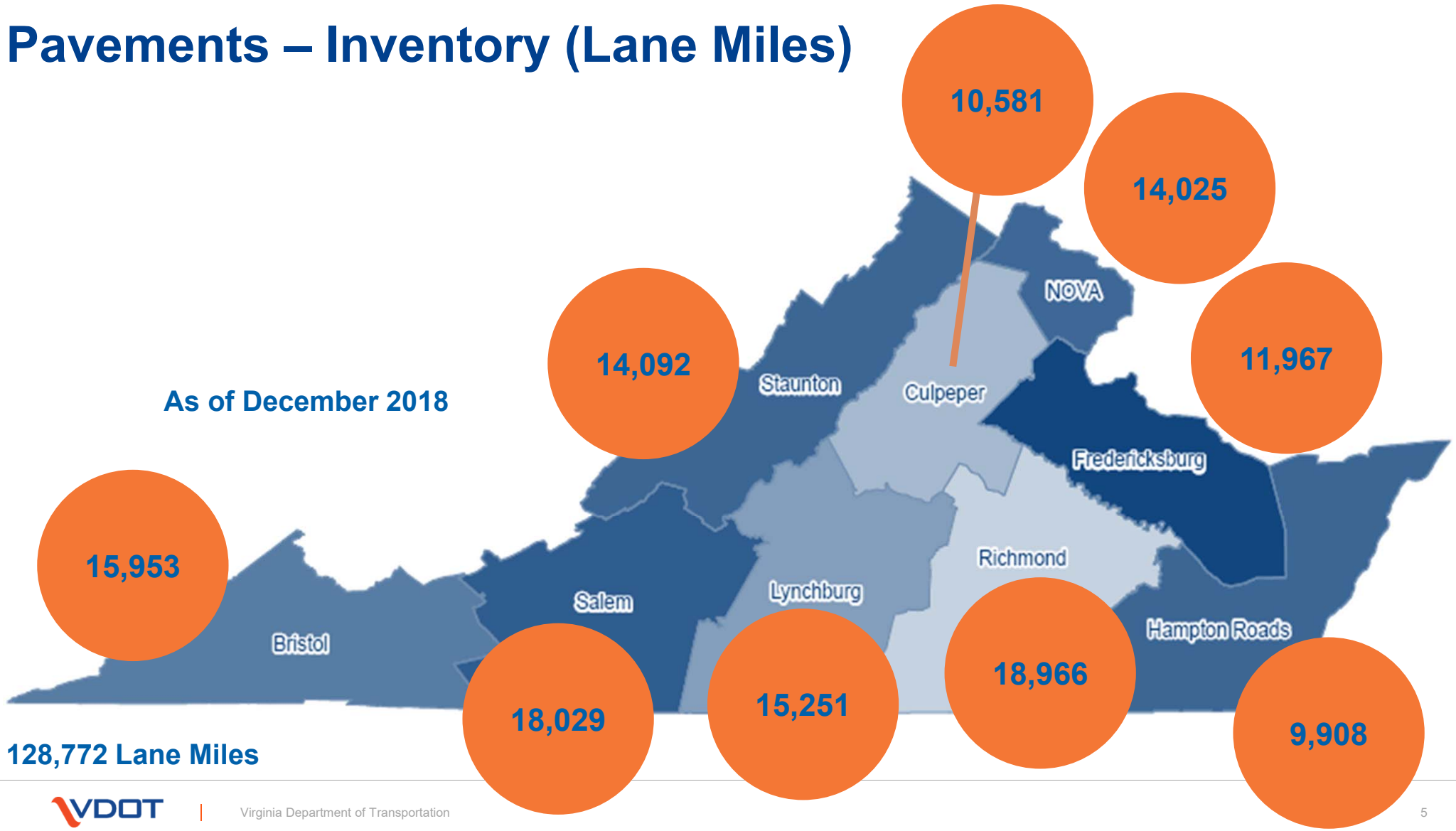
September 17, 2019



Note: Funding and Activities based on previous three fiscal year averages (FY 2016 – FY 2018); numbers are rounded to the nearest $5 million

Pavements

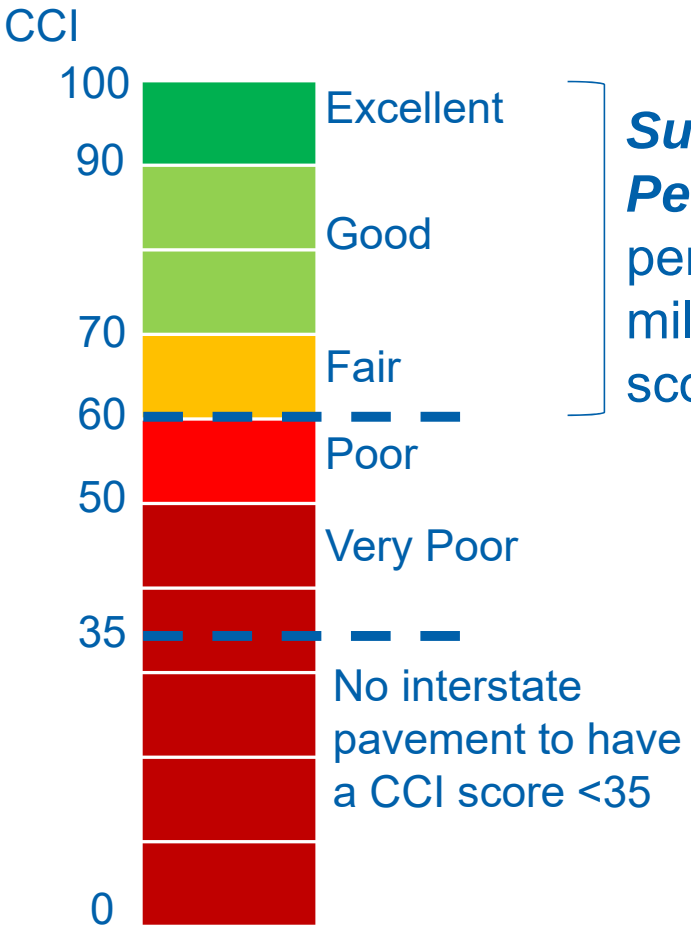
Pavements – Inventory (Lane Miles)



128,772 Lane Miles

Pavement Assessment Process

Pavement Rating – Critical Condition Index



Sufficiency Percentage is the percentage of lane miles with a CCI score ≥ 60

What does CCI look like?

CCI 90-100 (Excellent)

CCI 50-59 (Poor)

CCI<49 (Very Poor)

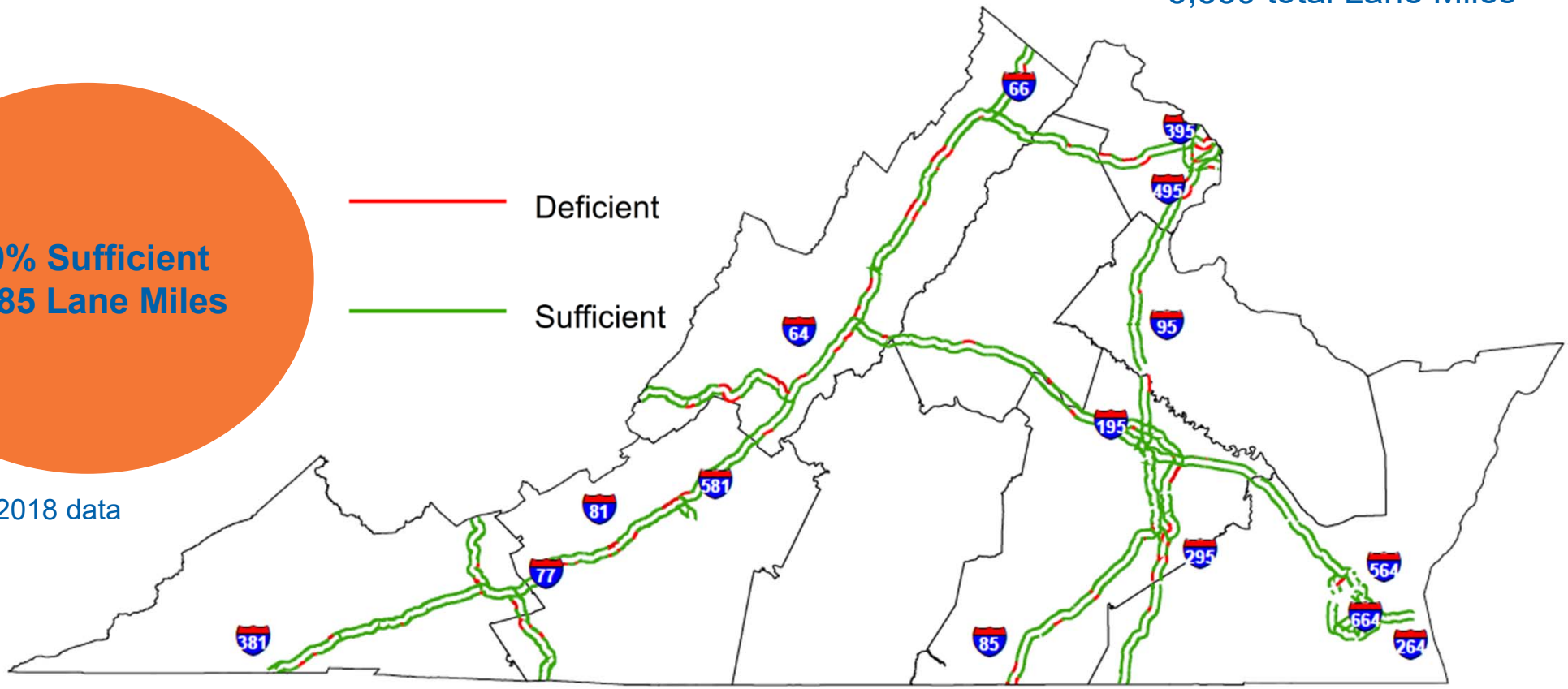
Image shows approximately CCI 35

Current State of the Pavement - Interstate

Current Target 82%
5,539 total Lane Miles

90% Sufficient
4,985 Lane Miles

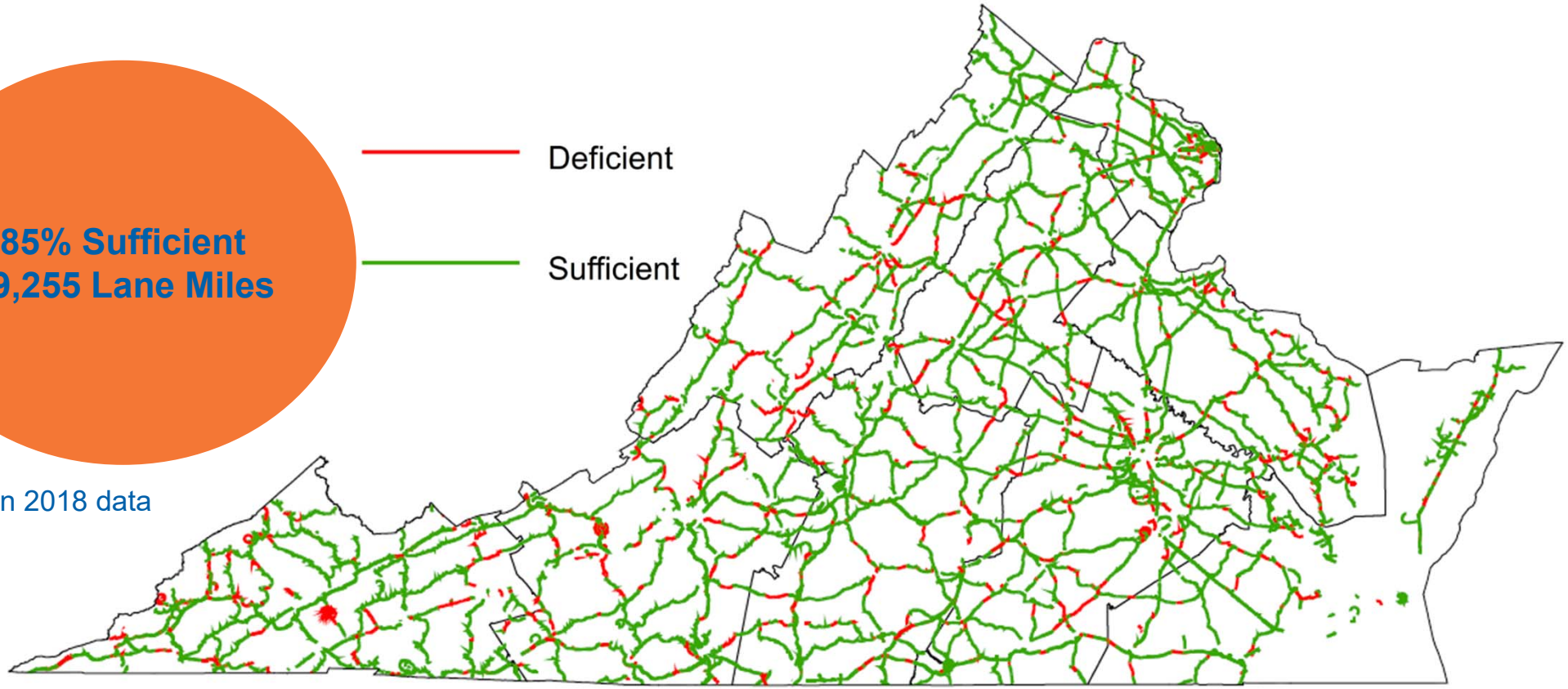
Based on 2018 data



Current State of the Pavement - Primary

Current Target 82%
22,653 total Lane Miles

85% Sufficient
19,255 Lane Miles

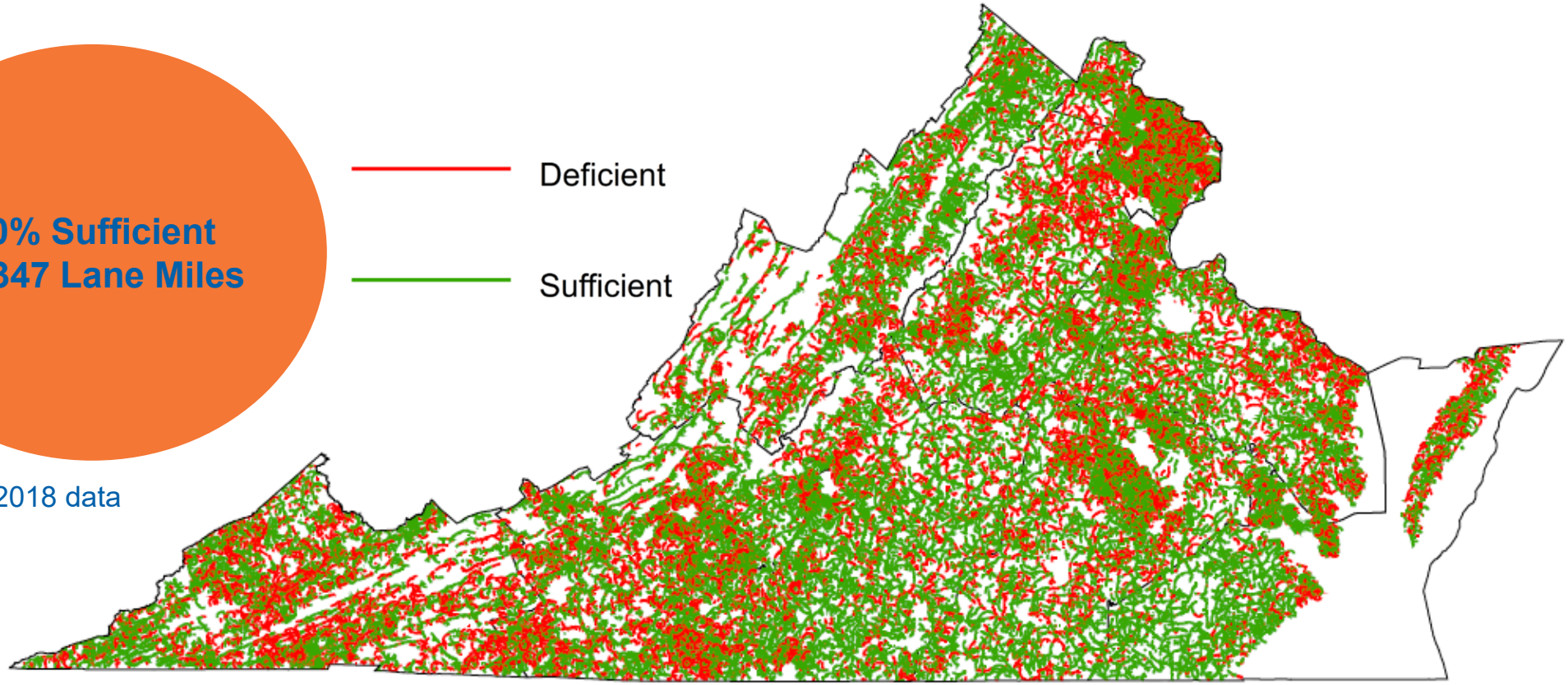


Based on 2018 data

Current State of the Pavement - Secondary

Current Target 65%
100,578 total Lane Miles

60% Sufficient
60,347 Lane Miles



Based on 2018 data

Pavements – Long Term Sustainability

Analysis undertaken to define a sustainable solution

- Reviewed historical performance
- Cost to achieve the current performance targets?
  - Current policy: 82% for Interstate, 82% for Primary, and 65% for Secondary
- Cost to maintain the current performance?
  - Current performance: 90% for Interstate, 85% for Primary, and 60% for Secondary
- What can be achieved with different investment levels?
  - Current investment: $60M Interstate, $165M Primary, $200M Secondary
- What if tiered targets were considered for the Interstate, Primary and Secondary systems?
- Evaluated different analysis time periods
  - Minimum of 20 years
- Assessed employing different maintenance strategies

Pavements – Long Term Sustainability

Performance Measure Description	Current Policy (% Sufficiency)	Current Condition (% Sufficiency)
Interstate	82% No Section CCI less than 35	90%
Primary	82%	85%
Secondary	65%	60%

Note: Presented to the CTB in June 2017 and June 2018

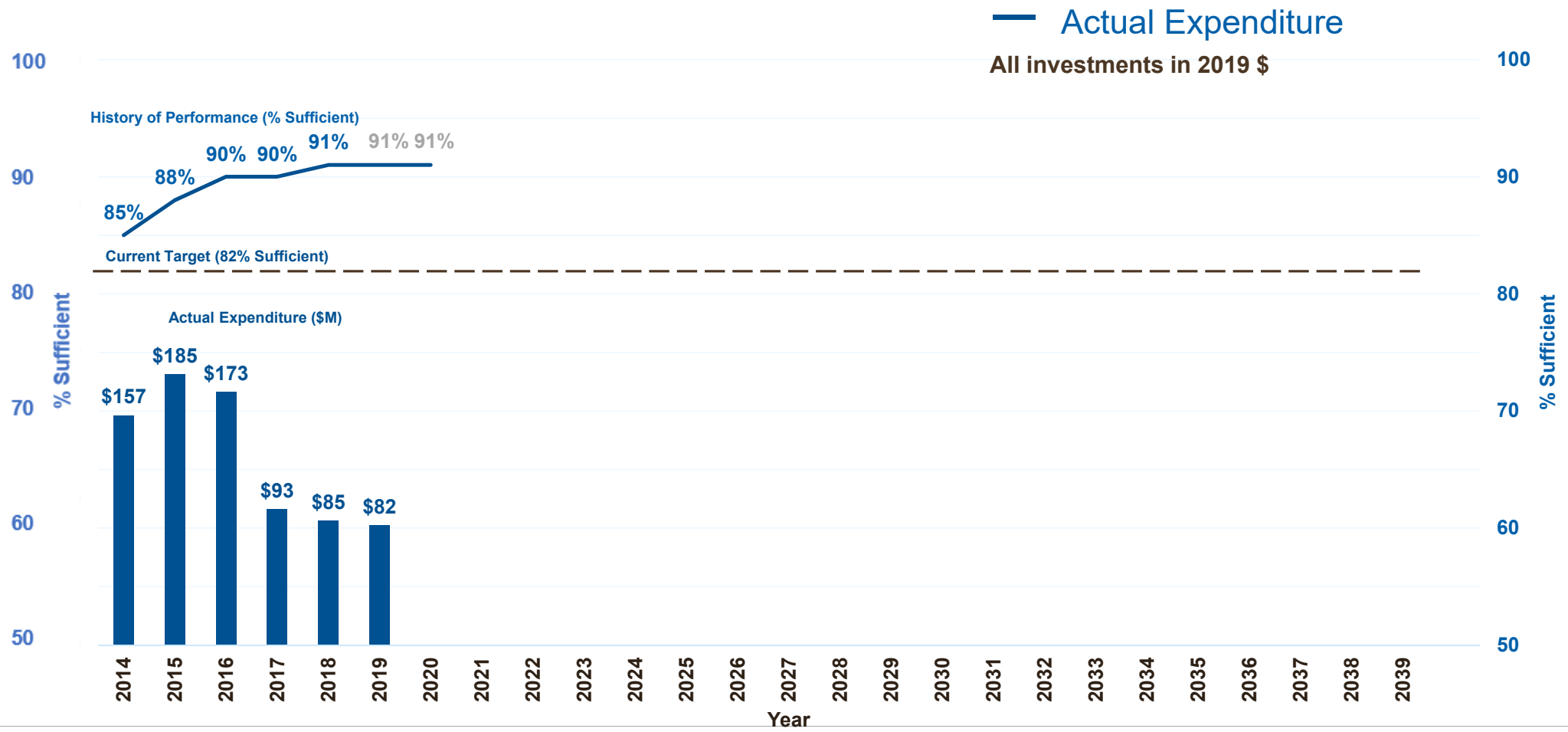
Interstate – Comparison 90% vs. 82% Sufficiency

Interstate Current Investment: $60M per year, FY 2020

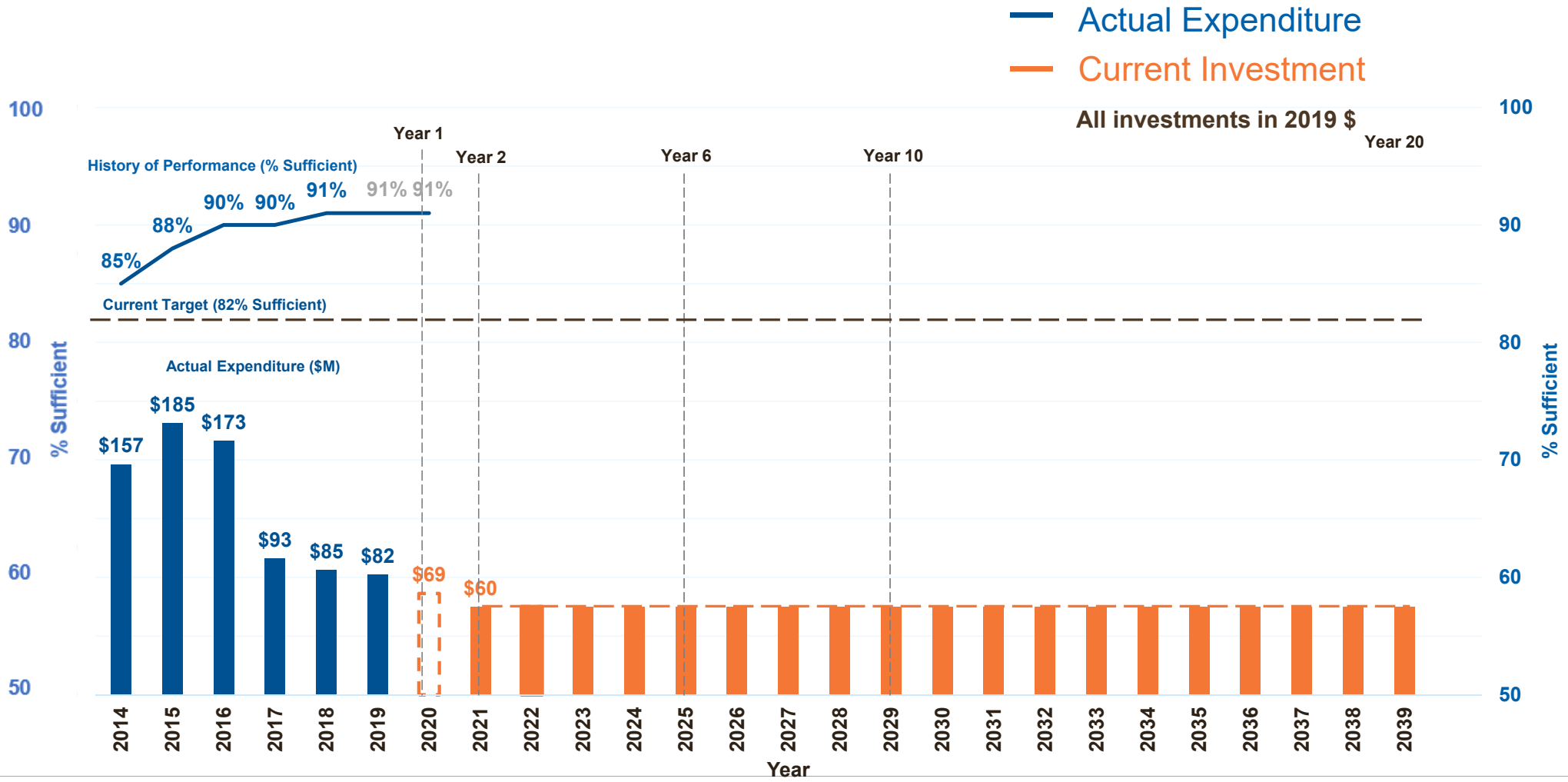
Avg. Cost per Year, Millions				Net Present Value
Interstate System	Years 1-6	Years 7-20	Total, Billions	Total, Billions
90%	$ 113	$ 97	$ 2.04	$ 1.41
82%	$ 88	$ 111	$ 2.08	$ 1.40

*All amounts in 2019 dollars.

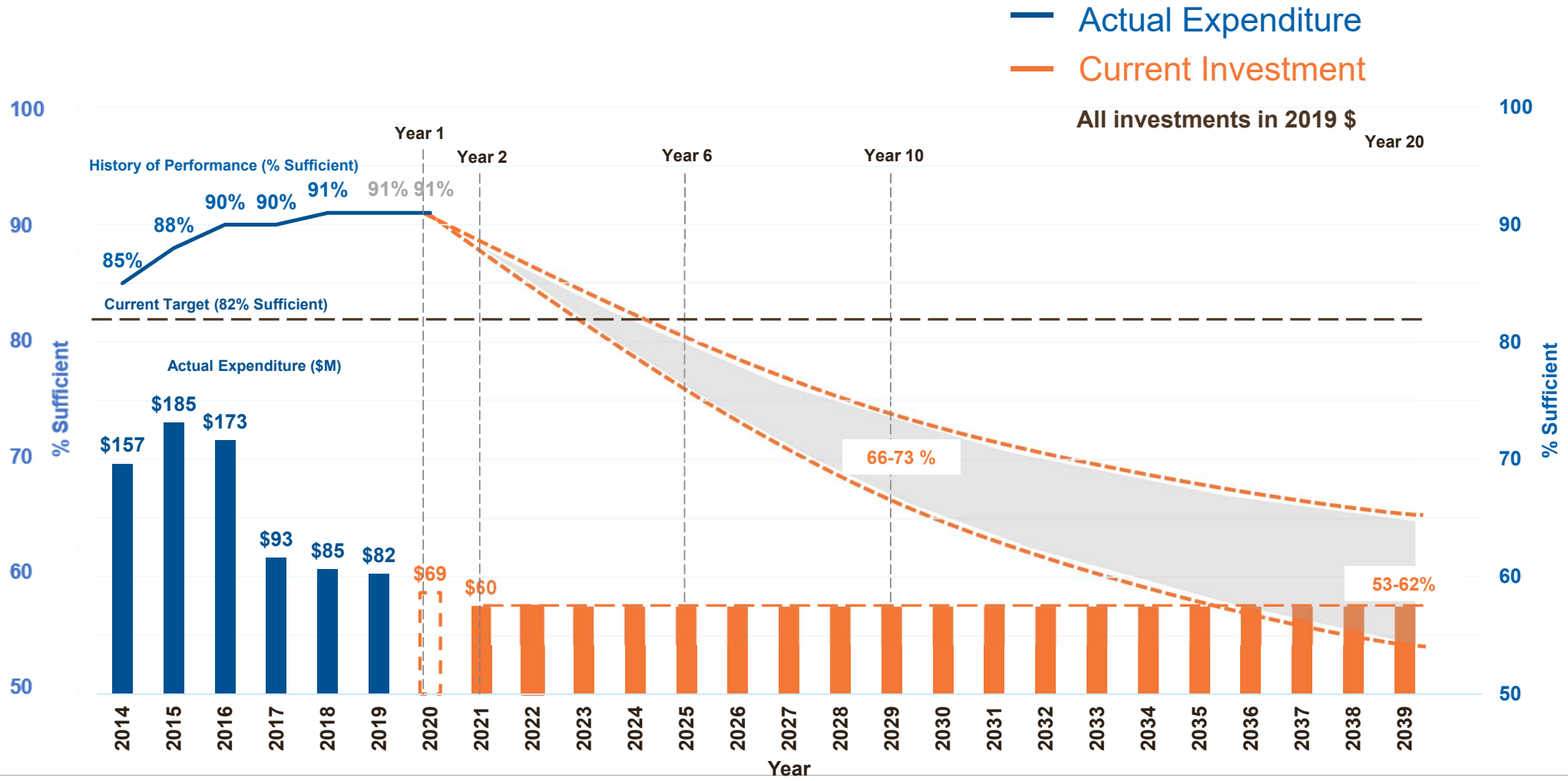
Interstate Network – 20 Year Outlook



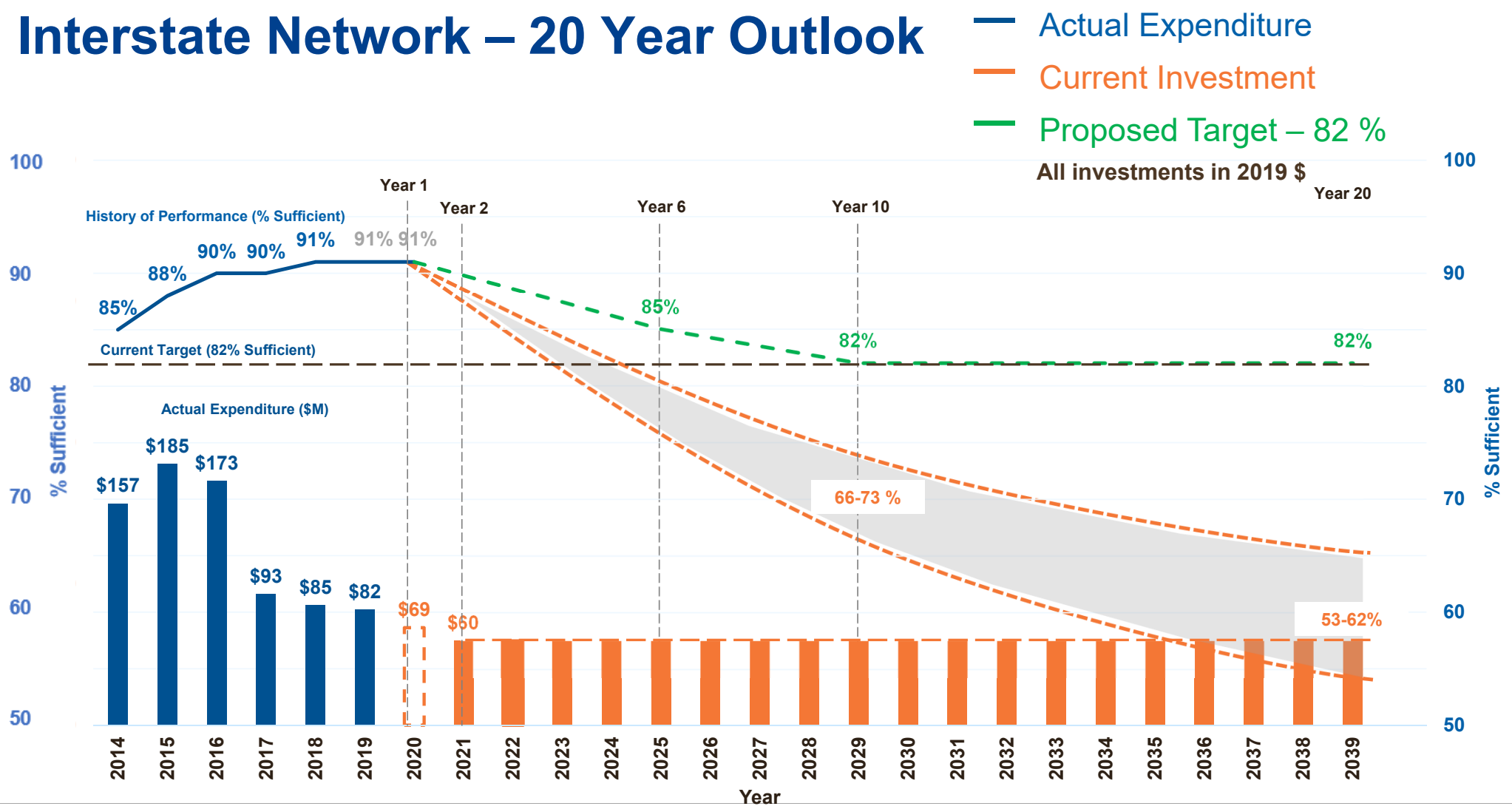
Interstate Network – 20 Year Outlook



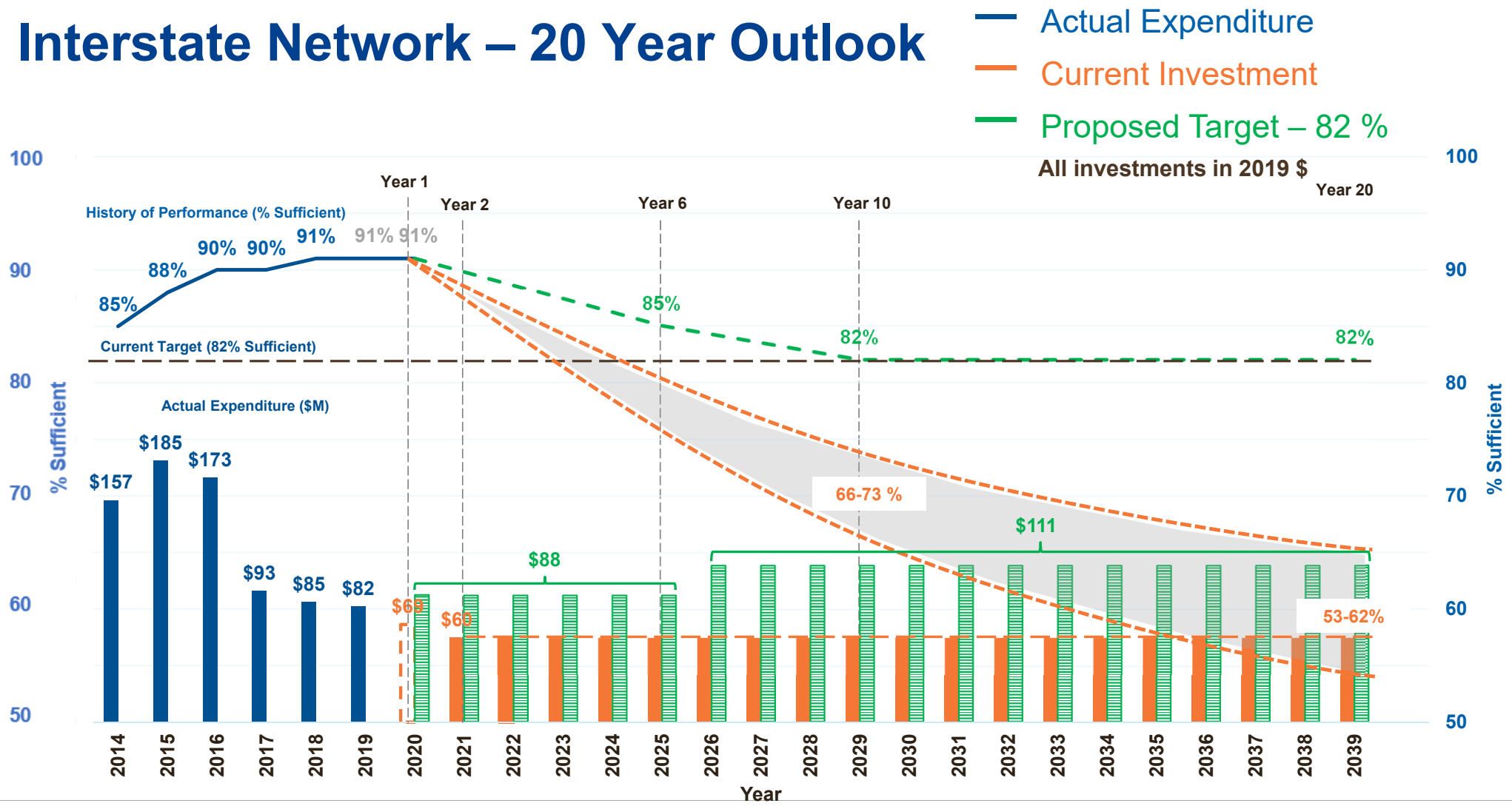
Interstate Network – 20 Year Outlook



Interstate Network – 20 Year Outlook



Interstate Network – 20 Year Outlook



Secondary Network –Tiered Approach

- **Secondary**
  - Over 100,000 LM
  - Not meeting target (65%)
    - Current sufficiency: 60%
  - Top 5% of Secondary (~ 5,000 LM)
    - Over 75% truck traffic
    - Around 60% vehicle miles traveled

Secondary Current Condition and Traffic

AADT	Current %. Suff.	% Network	% Truck	% VMT
Above 3,500	54.8	5	75	59
Above 5,000	55.2	4	70	54

- **Why should we differentiate between high volume Secondary and low volume Primary?**

Primary and Secondary Network –Tiered Approach

Primary Current Condition and Traffic

AADT	Current %. Suff.	% Network	% Truck	% VMT
Above 3,500	85.1	68	94	95
Above 5,000	85.1	62	90	91

Secondary Current Condition and Traffic

AADT	Current %. Suff.	% Network	% Truck	% VMT
Above 3,500	54.8	5	75	59
Above 5,000	55.2	4	70	54

Primary and Secondary Network –Tiered Approach

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Secondary Current Condition and Traffic

AADT	Current %. Suff.	% Network	% Truck	% VMT
Above 3,500	54.8	5	75	59
Above 5,000	55.2	4	70	54

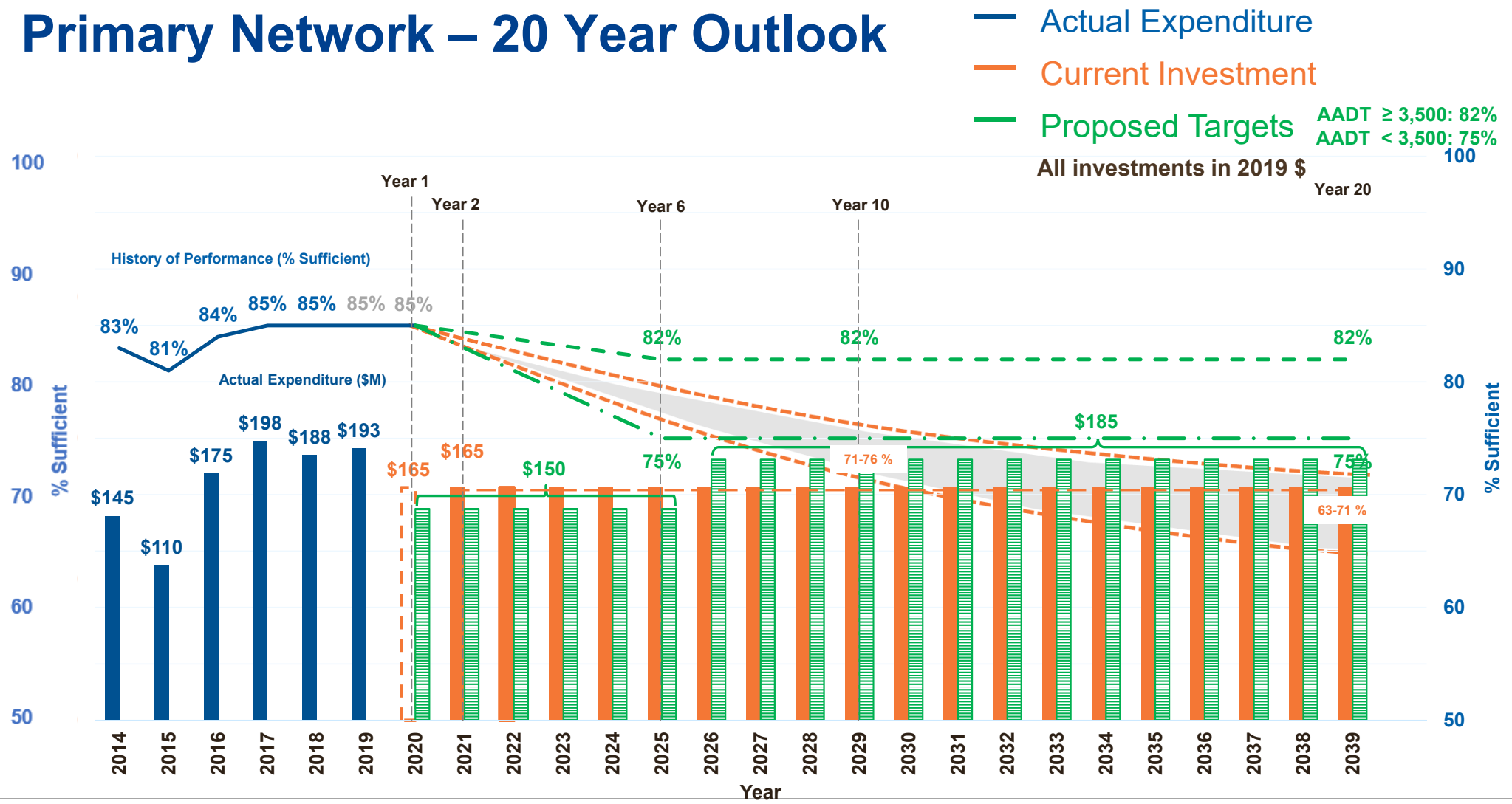
Primary Current Investment: $165M per year, FY 2020

% Suff. for ≥ 3,500	% Suff. for < 3,500	Avg. Total Cost
82%	75%	$150M

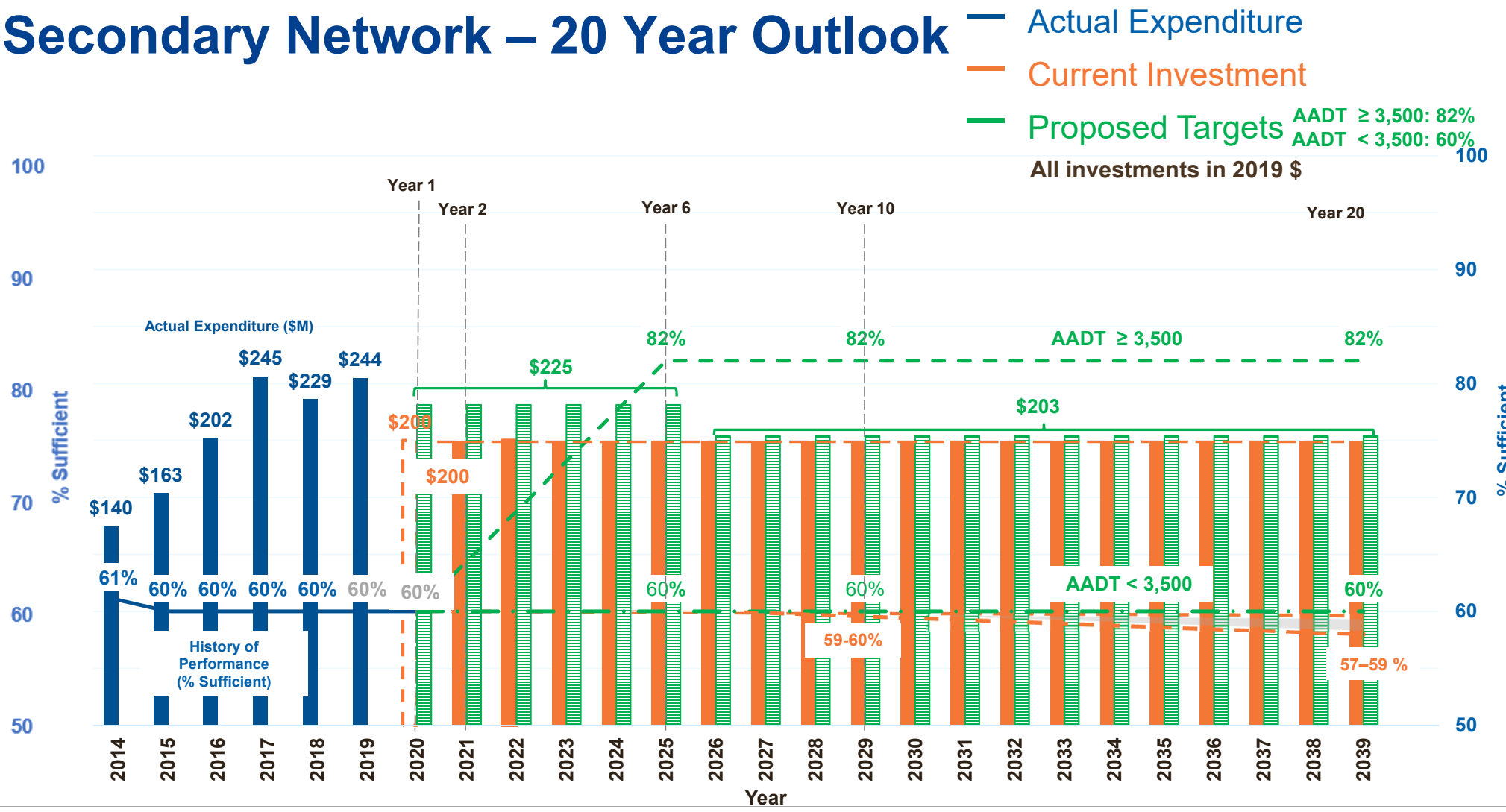
Secondary Current Investment: $200M per year, FY 2020

AADT ≥ 3,500	AADT < 3,500	Avg. Total Cost
82%	60%	$225M
75%		$221M
70%		$219M
65%		$215M

Primary Network – 20 Year Outlook



Secondary Network – 20 Year Outlook



Summary - Pavement Investment Options

Current investment: $425M per year, FY 2020

Targets, % Sufficiency			Avg. Total Cost per Year, $ Millions					
			Years 1-6			Years 7-20		
IS	PR	SC	IS	PR	SC	IS	PR	SC
Current Investment – Current Policy			88	171	227	111	193	203
82%	82%	65%	$486			$507		
			($61)			($82)		
Current Investment – Proposed Target			88	150	225	111	185	203
82%	82% for ≥ 3,500 75% for < 3,500	82% for ≥ 3,500 60% for < 3,500	$463			$499		
			($38)			($74)		

Current Policy

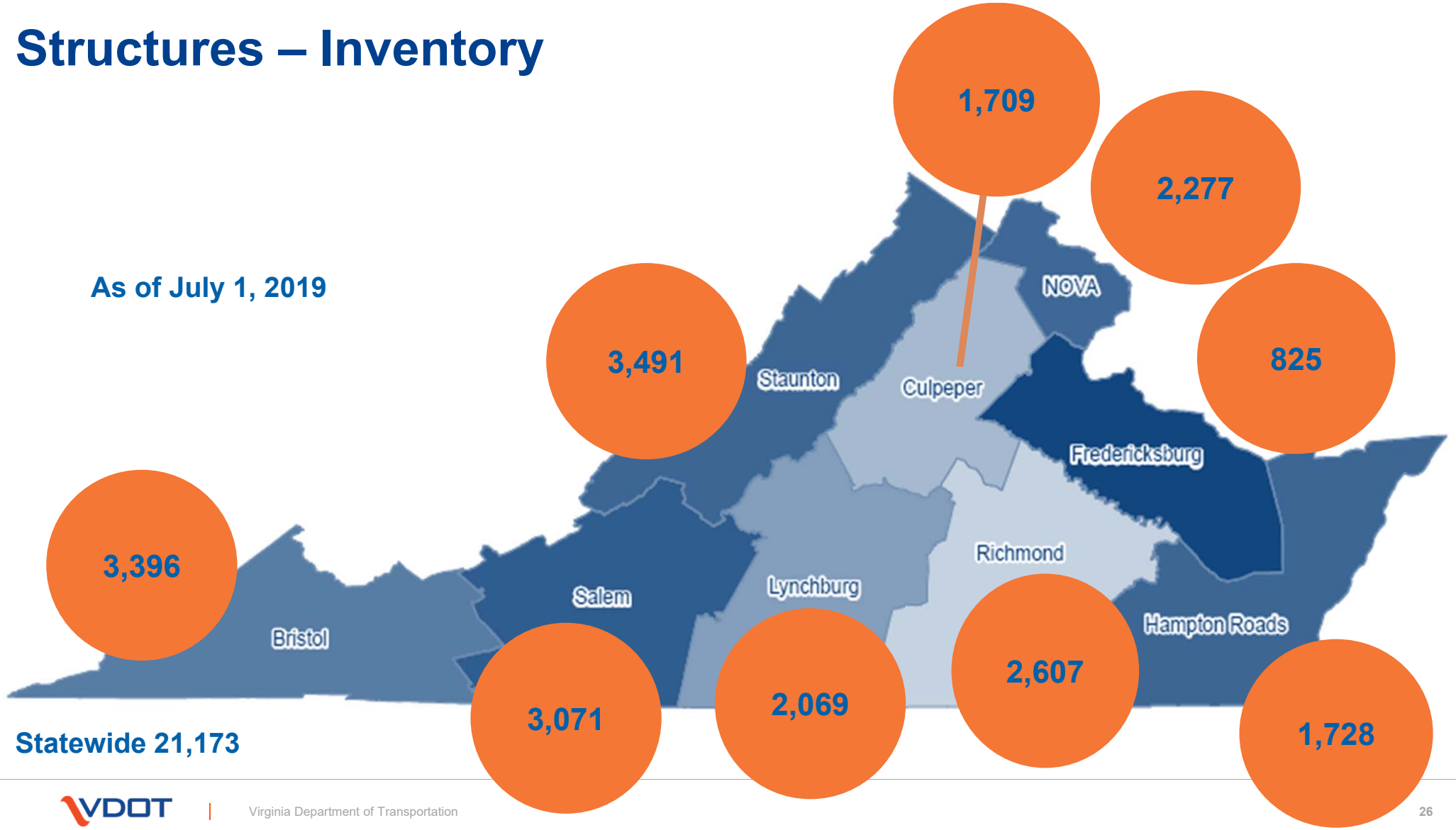
Proposed Targets

*All amounts in 2019 dollars

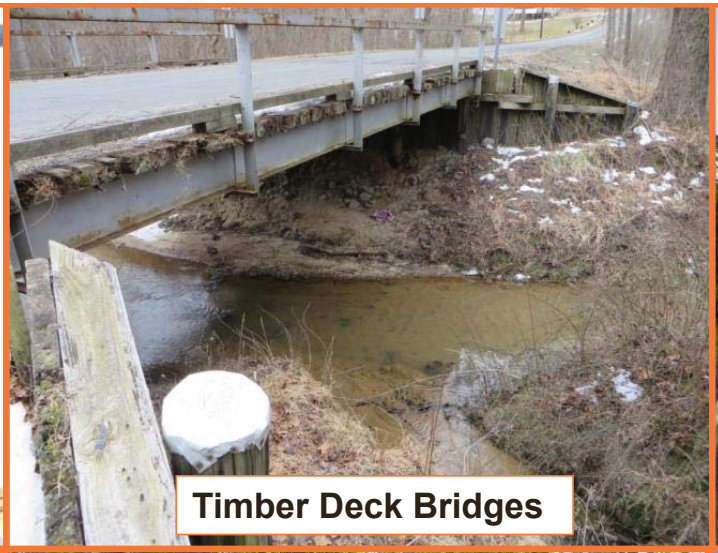
Structures

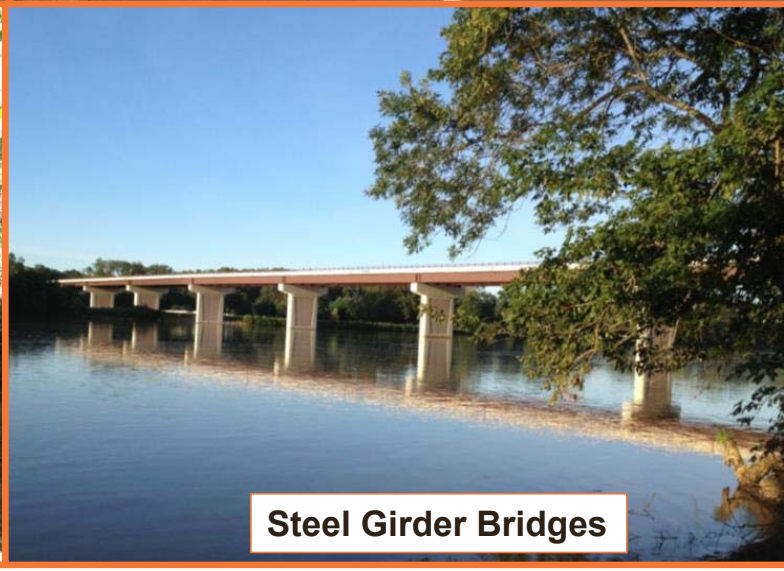
Structures – Inventory

As of July 1, 2019



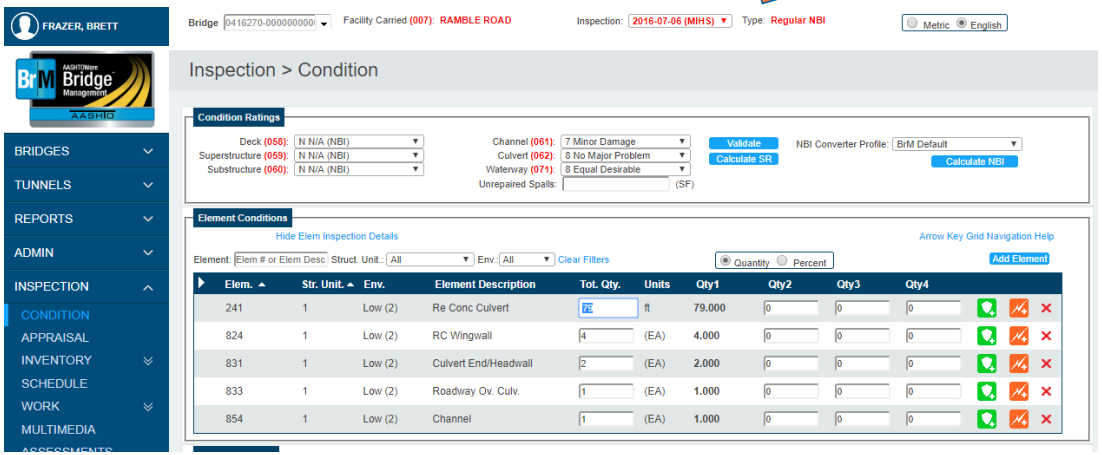
Statewide 21,173





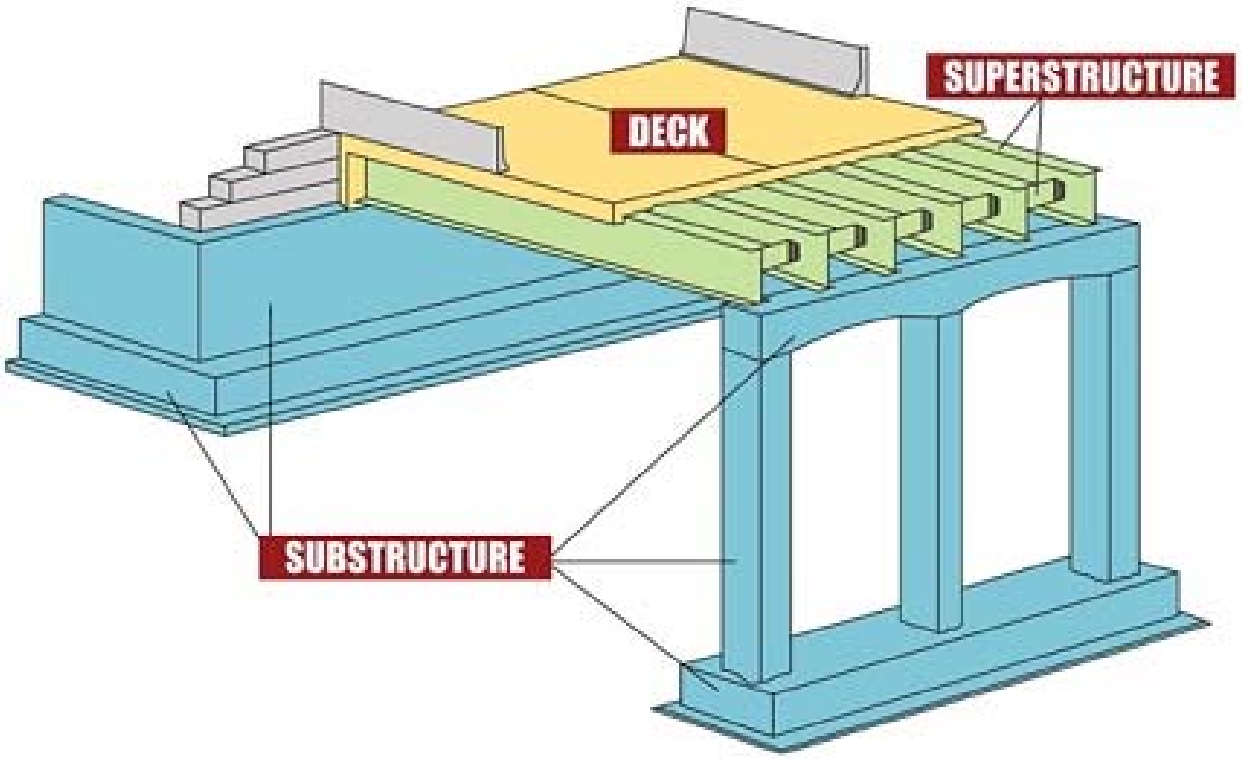
Structures Inventory – by Type

Structure Inspection & Assessment Process



Rating – General Condition Rating (GCR)

Condition Category	General Condition Rating (GCR)	Description
Good	9	Excellent
	8	Very Good
	7	Good
Fair	6	Satisfactory
	5	Fair
Poor (Structurally Deficient)	4	Poor
	3	Serious
	2	Critical
	1	Imminent Failure
	0	Failed



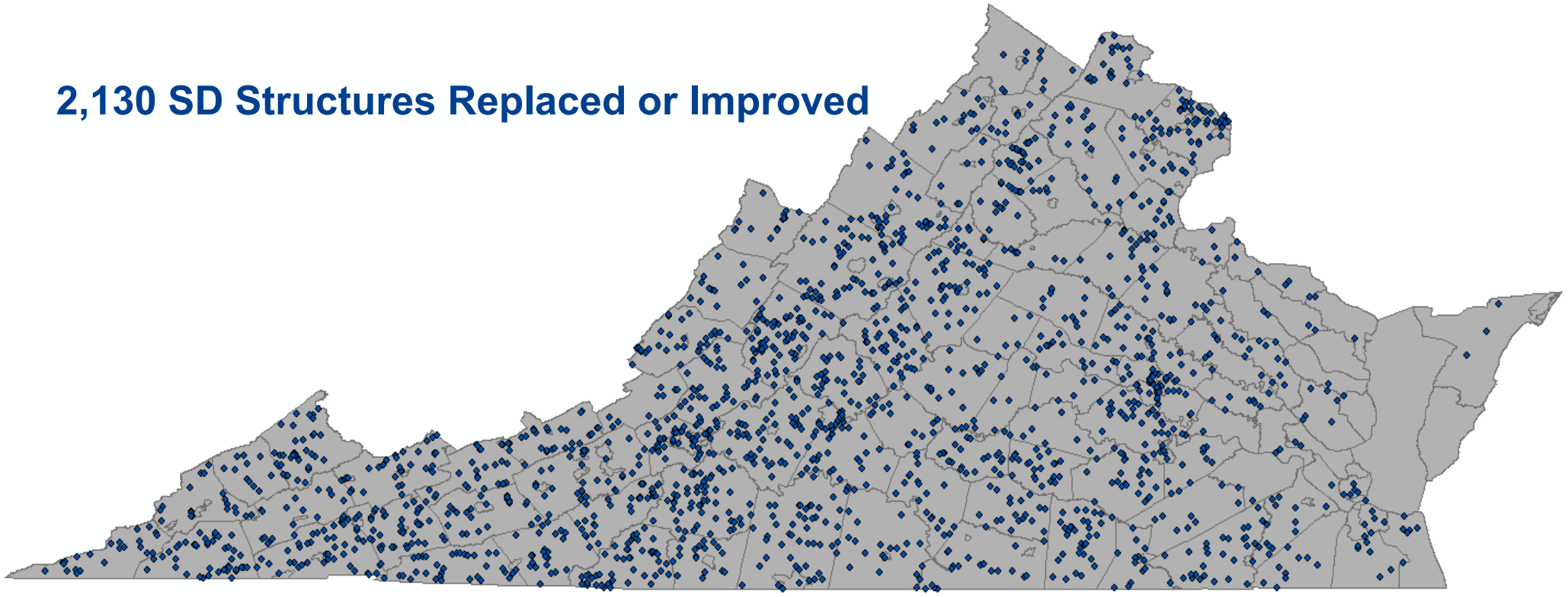
Components of a Bridge

Examples of Good, Fair, and Poor Bridges

Good	Fair on the "CUSP" of Poor	Poor (Structurally Deficient)
		
		

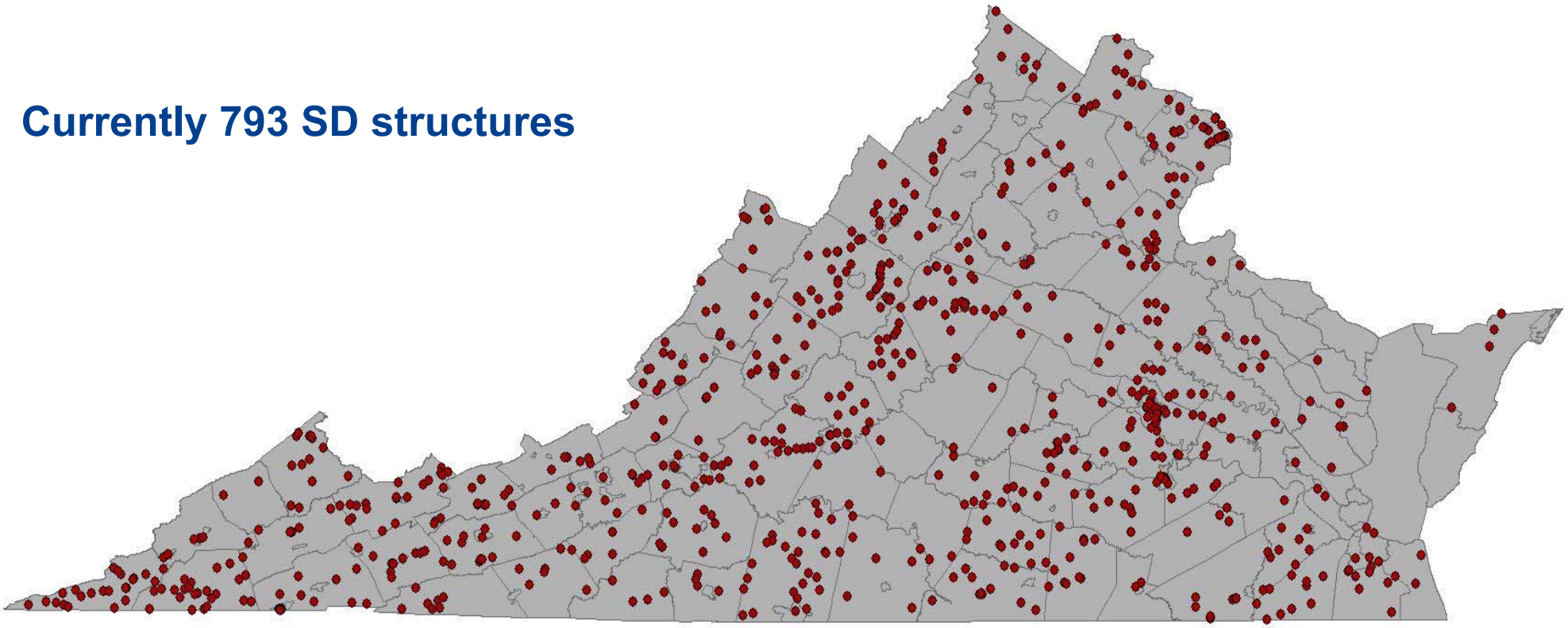
Structurally Deficient (SD) Structures Improved Since 2010

2,130 SD Structures Replaced or Improved



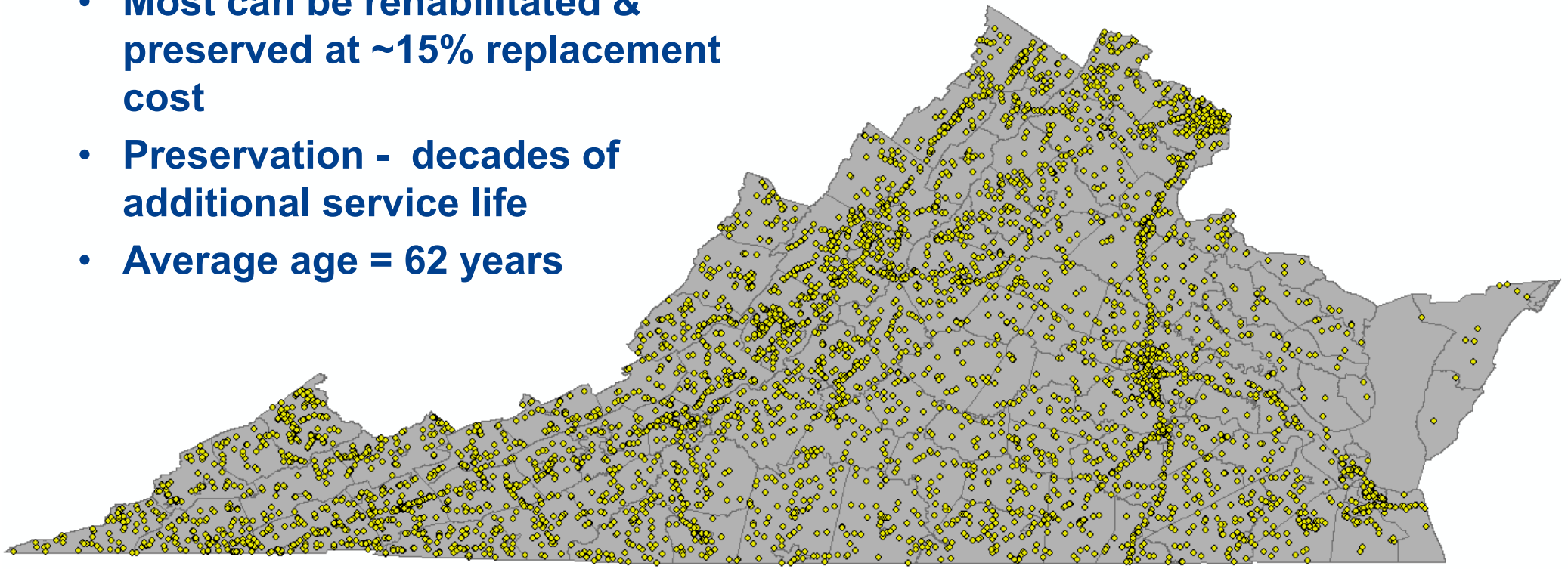
2019 SD Structures – Significant Improvement Since 2010

Currently 793 SD structures



Next Challenge - 4,440 Structures on CUSP

- One inspection rating from becoming Poor (SD)
- Most can be rehabilitated & preserved at ~15% replacement cost
- Preservation - decades of additional service life
- Average age = 62 years



Structures – Long Term Sustainability

Analysis undertaken to define a sustainable solution

- Reviewed historical performance
- Cost to achieve the current performance targets?
  - Current policy: 99% for Interstate, 96% for Primary, and 94% for Secondary
  - Current policy: 95.5% NBI and All Structures Not Structurally Deficient (SD)
- Cost to maintain the current performance?
  - Current performance: 99% for Interstate, 97% for Primary, and 96% for Secondary
- Reviewed overall condition of the inventory
- Is the best strategy for improved long term performance preservation?
  - Reviewed: 75% preservation and 25% replacement
  - No posting on Interstate
- Evaluated different analysis time periods
  - Minimum 20 years

Structures – Long Term Sustainability

Performance Measure Description	Current Policy (% Not-SD)	Current Condition (% Not-SD)
All Systems	95.5%	95.6%
Interstate	99%	98.8%
Primary	96%	96.8%
Secondary	94%	95.7%

Note: Presented to the CTB in June 2017 and June 2018

Overall Funding Scenario

Current Investment

Maintenance and Operations	$215M
State of Good Repair	$225M
Total	**$440M**

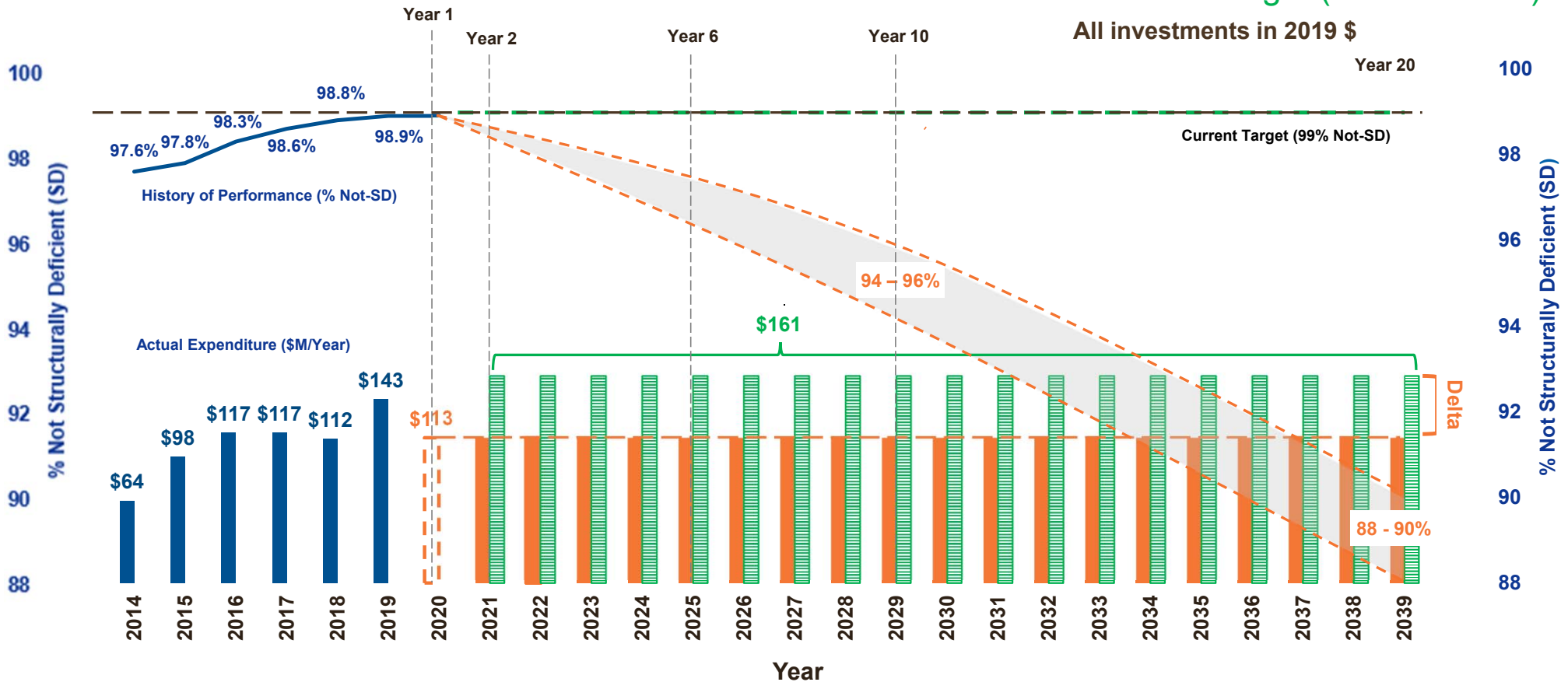
Fixed Costs

Inspection (Federal Requirement)	$38M
Routine Maintenance	$10M
Emergencies	$8M
Total	**$56M**

Total Available $384M

Interstate Network

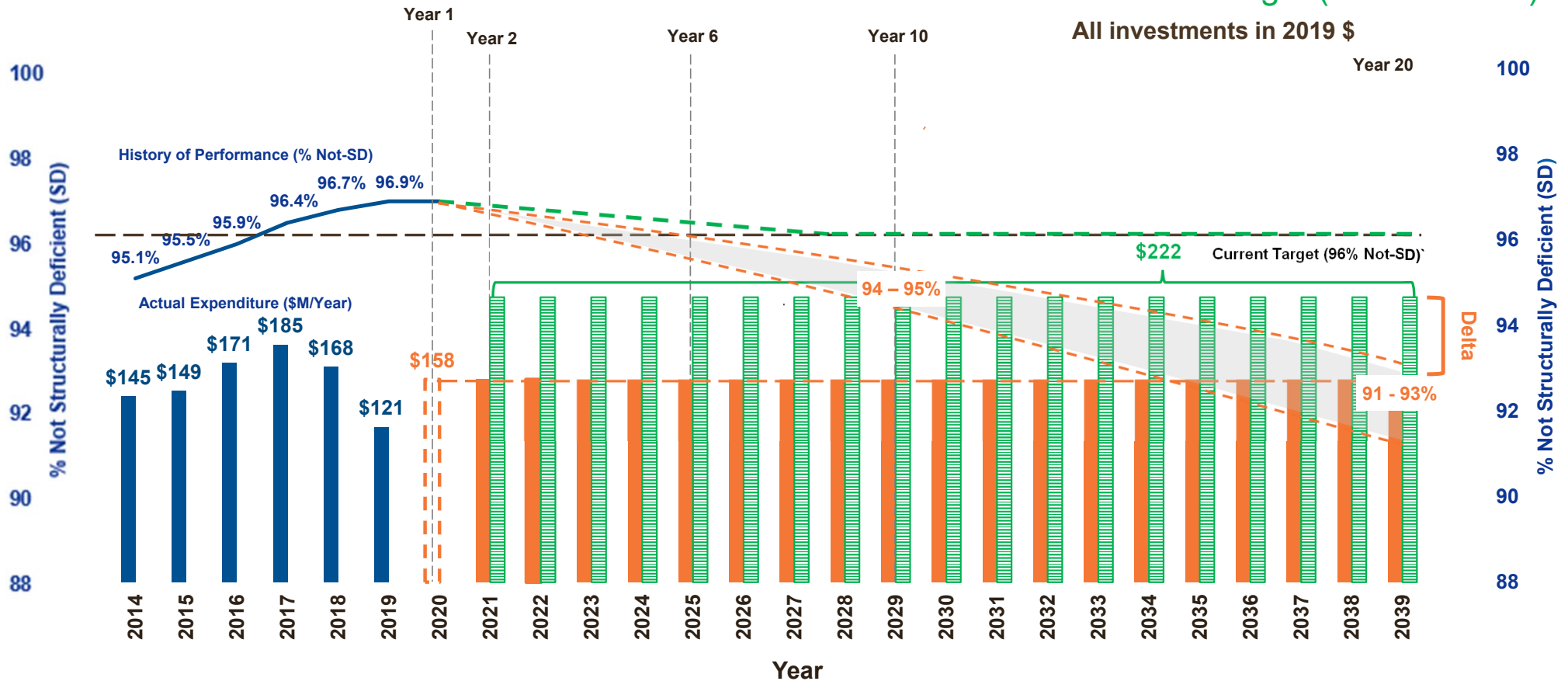
Current Investment : $113M/Year



- Excludes Special Structures
- Delta = $48M

Primary Network

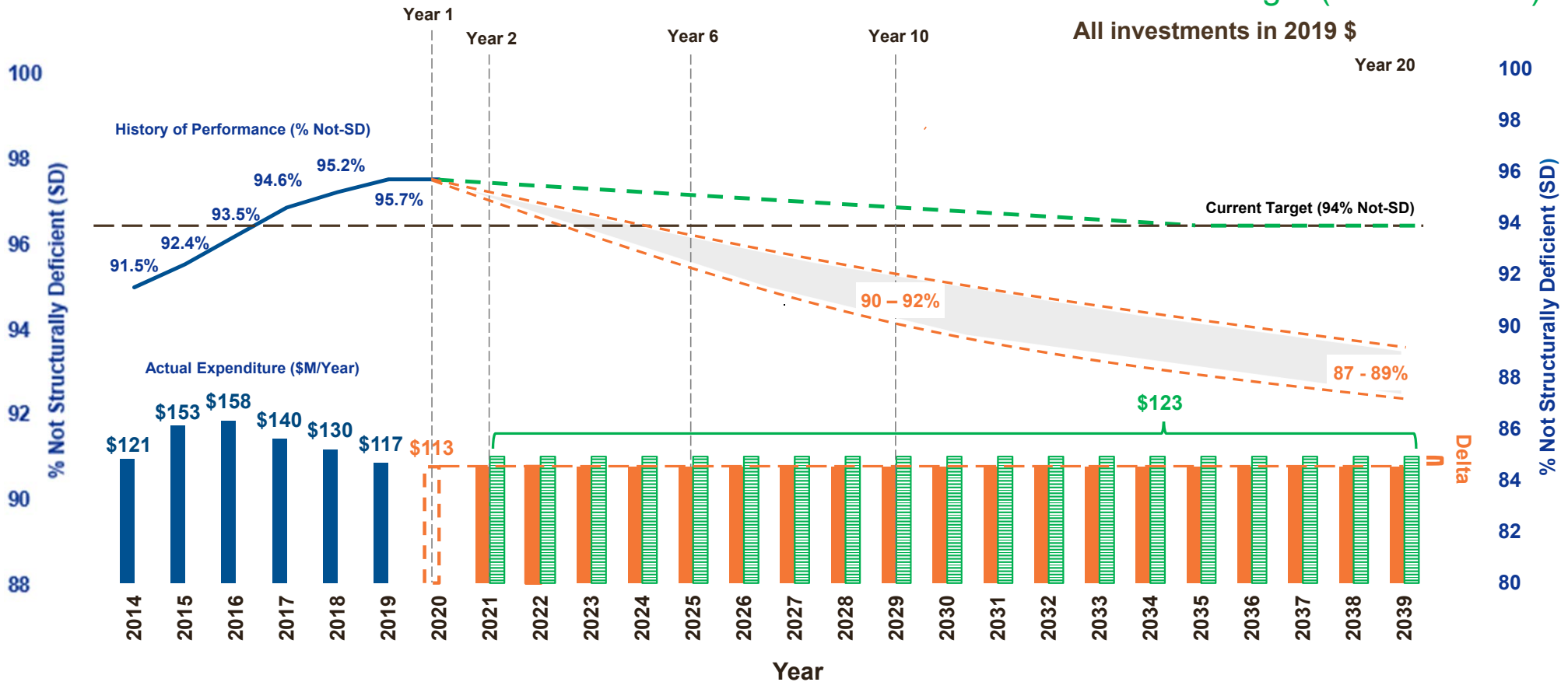
Anticipated Available Funding: $158M/Year



- Excludes Special Structures
- Delta = $64M

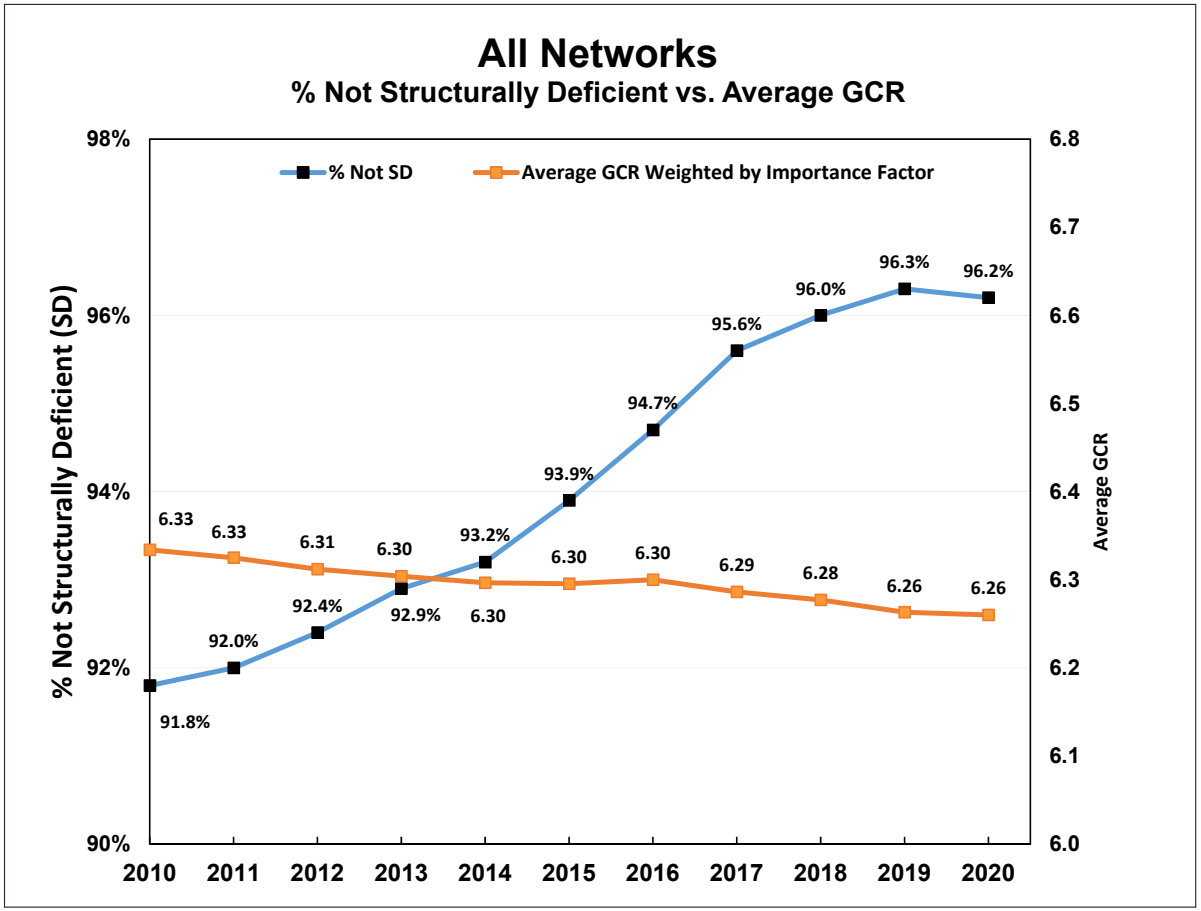
Secondary Network

Anticipated Available Funding: $113M/Year



- Excludes Special Structures
- Delta = $10M

Overall Inventory Condition - Historical



Long Term Sustainability - Preservation Approach

- Focus on overall inventory condition
  - Not “Worst First”
- Current performance levels - an additional $122M/year to maintain
  - “Worst First” cost higher than proactive preservation
- Preservation approach maintains long term acceptable level of service
  - Uses existing funding level
  - Consistent with industry best practices - Focus on balanced approach
- Remaining SDs are safe
  - Will continue to be monitored and programmed appropriately

Overall Funding Scenario

Preservation Activities and Investment Levels Evaluated (75%)

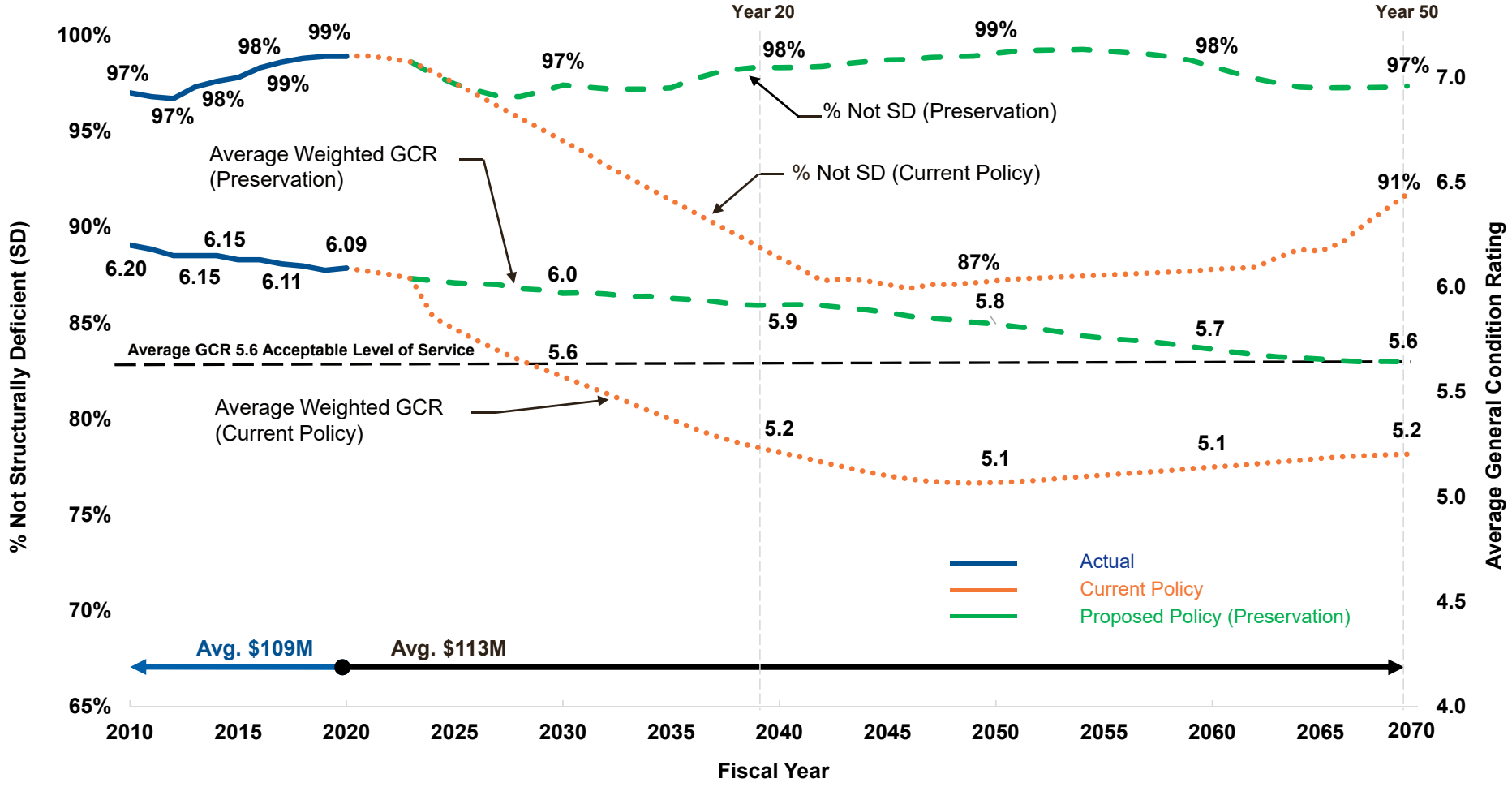
- Deck repair and preservation (overlays & joints)
- Superstructure repair (beam ends) and preservation
- Substructure repair and preservation
- Culvert (liners)

Replacement Activities (25%)

- Components or whole structures

Interstate Network – 50 Year Outlook

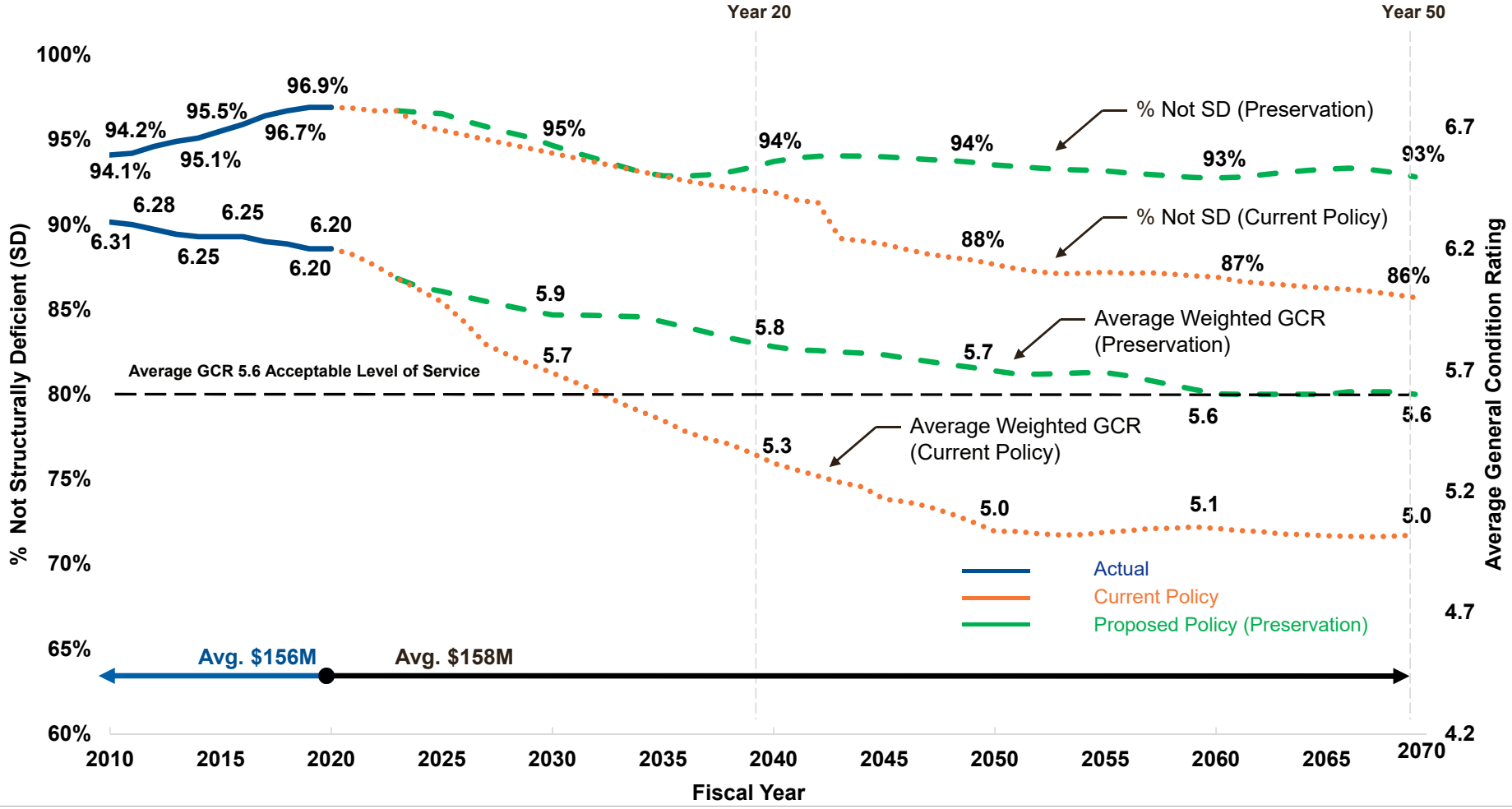
2,404 Structures (12%)
26M SF Deck Area (28%)



- **All Future Expenditures are in 2019 Dollars**
- **Excludes Special Structures**

Primary Network – 50 Year Outlook

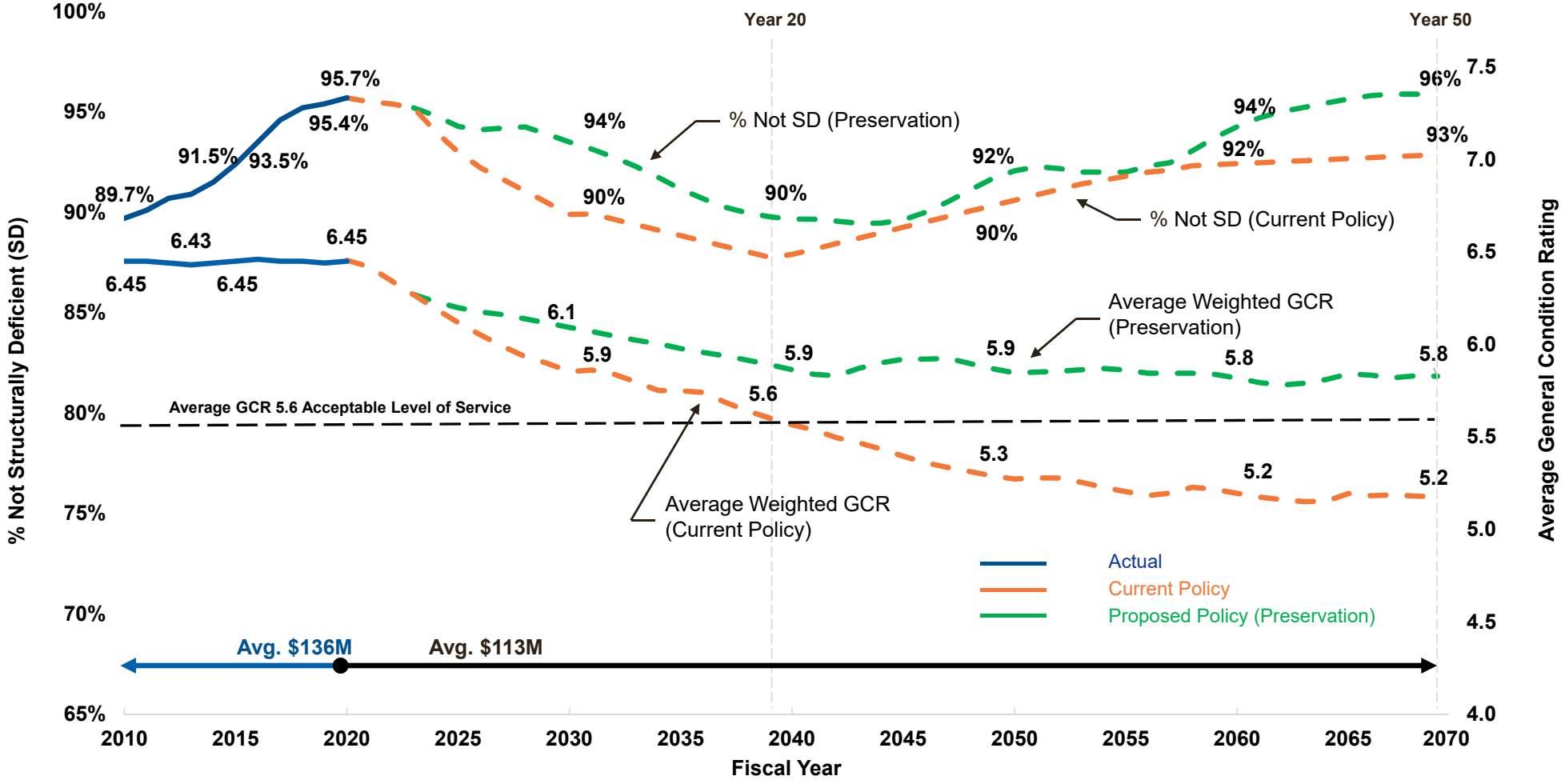
5,808 Structures (27%)
40M SF Deck Area (42%)



- **All Future Expenditures are in 2019 Dollars**
- **Excludes Special Structures**

Secondary Network – 50 Year Outlook

12,961 Structures (61%)
29M SF Deck Area (30%)



- **All Future Expenditures are in 2019 Dollars**
- **Excludes Special Structures**

Summary - Structures Investment Options

Current investment: $384M per year, FY 2020

Targets, % Not-SD				Avg. Total Cost per Year, $ Millions		
				Years 1-50		
IS	PR	SC	All Systems Average GCR	IS	PR	SC
Current Investment – Current Policy				161	222	123
99%	96%	94%	N/A	$506		
				($122)		
Current Investment – Proposed Target				113	158	113
97% No Postings	93%	90%	Average GCR ≥ 5.6	$384		
				$0		

Current Policy

Proposed Target

*All amounts in 2019 dollars

Maintenance and Operations Program Timeline

Description	Date
Special Structures and Routine Maintenance/Operations	October 2019
Comprehensive Review and Approval Request	November 2019
Submission to General Assembly	December 2019


VDOT
Virginia Department of Transportation