



DATE: April 20, 2016
TO: Transportation Commission
FROM: Debra Perkins-Smith, Director, Division of Transportation Development
William Johnson, Performance and Asset Management Branch Manager
SUBJECT: Asset Management Workshop

Purpose

This presentation will familiarize the Transportation Commission members with five assets: surface treatment, bridge, culverts, walls and tunnels. It provides background on the program and sets the stage for a more in-depth discussion in May, regarding the approval by the Commission of the FY20 asset management planning budget for all 11 categories; thereby continuing the 4-year program of projects.

Action

Informational item. Provides information for future Transportation Commission action.

Background

In February, the Commission heard a general overview of the asset management program. The April presentation of five assets continues the in-depth review from March (during which six assets were highlighted), providing information on inventory, condition, performance metrics and targets. Asset management programs must be able to demonstrate with a quantified performance measure the benefit of additional investment. Asset management focuses on capital preservation and replacement and does not fund additional capital projects.

The five assets presented in this workshop include surface treatment, bridge, culverts, walls and tunnels. The surface treatment program repairs, rehabilitates, replaces and preserves CDOT's highways. Colorado's bridges are managed by CDOT with two programs: 1) Bridge Enterprise uses its funds for bridge replacement, and 2) the bridge preservation program uses preventive maintenance and repair to preserve bridges. The culverts program identifies those culverts in need of essential repairs and works to resolve them. The walls program is a new program at CDOT and is working through the initial inventory and condition assessment of walls on CDOT's highways. The tunnels program includes three major tunnels: Eisenhower-Johnson Memorial Tunnel, Hanging Lake Tunnel and Wolf Creek Tunnel, along with 16 smaller tunnels. These tunnels are going through their initial comprehensive condition assessment following the issuance of Federal tunnel rules. Both walls and tunnels are new assets in the Asset Investment Management System (AIMS) model.

Details

Each asset manager will provide a summary of their program status. In May, staff will present their FY20 asset management budget recommendation to Commission for review. The FY20 asset management budget will be finalized during the annual budget cycle in 2019.

Next Steps

During the May TC Workshop William Johnson will present the CDOT Staff Recommendation for the FY20 Asset Management Budget to the Transportation Commission for approval. Additionally, staff expect to have a discussion with the Transportation Commission in subsequent months to discuss progress on metrics identified in Policy Directive 14 to start the budget process for FY18.

Summary of Presentations:

February: Overview - completed

March: Buildings, signals, ITS, road equipment, geohazards and MLOS - completed

April: Surface treatment, bridge, culverts, walls, and tunnels

May: FY20 Planning Budget

Attachments

Attachment A: Asset Management Workshop Presentation





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Transportation



Asset Management Workshop Part 2 of 2

April 20, 2016



Intro & Objectives

Workshop Purpose: To provide information in preparation for future TC action.

Asset Manager Presentations by:

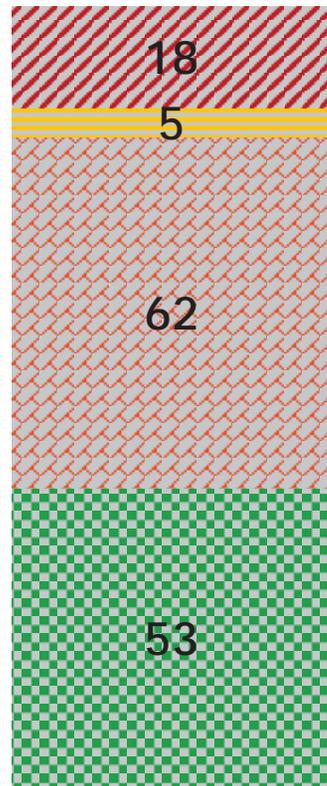
- Surface Treatment
- Bridge
- Culverts
- Walls
- Tunnels



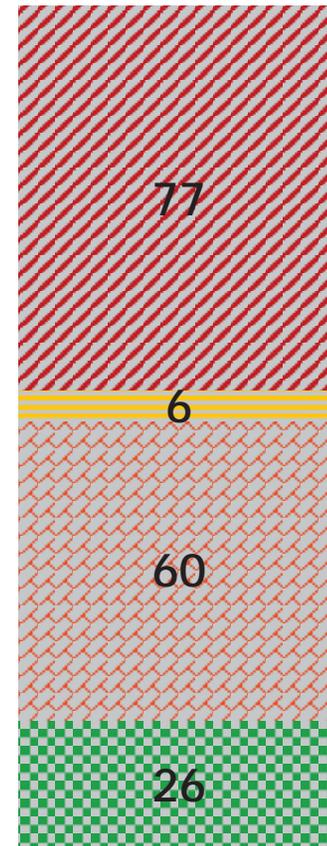
Asset Management Project Status

2015 Asset Management
(138 Project Total)

2016 Asset Management
(169 Projects Total)



As of Mar 18, 2016



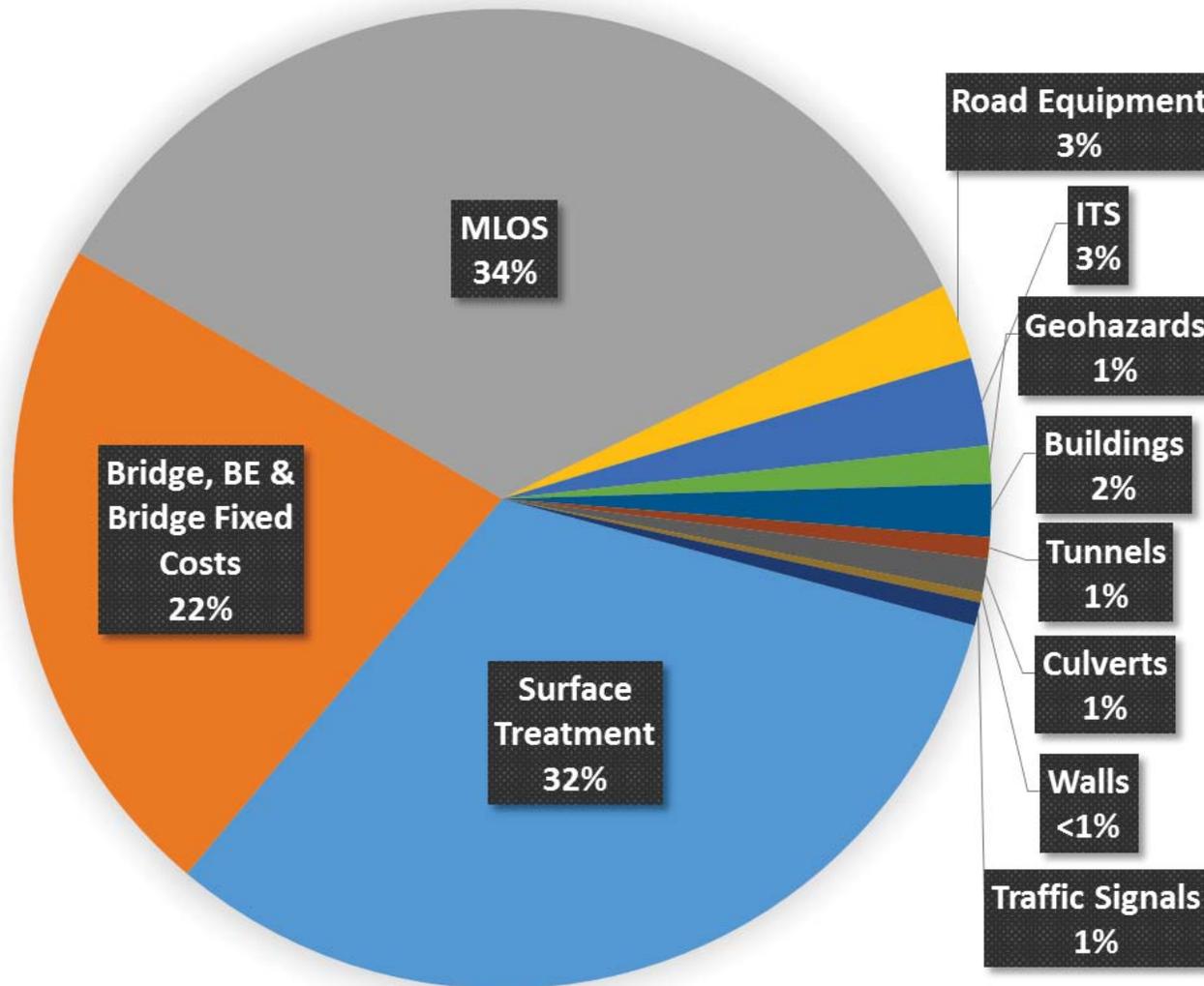
As of Mar 18, 2016

■ Completed
 ■ In Construction
 ■ In Bid/Award
 ■ In Design



Asset Management FY16 Budget Distribution

FY16 Asset Management Planning Budgets Distribution





Surface Treatment: Stephen Henry

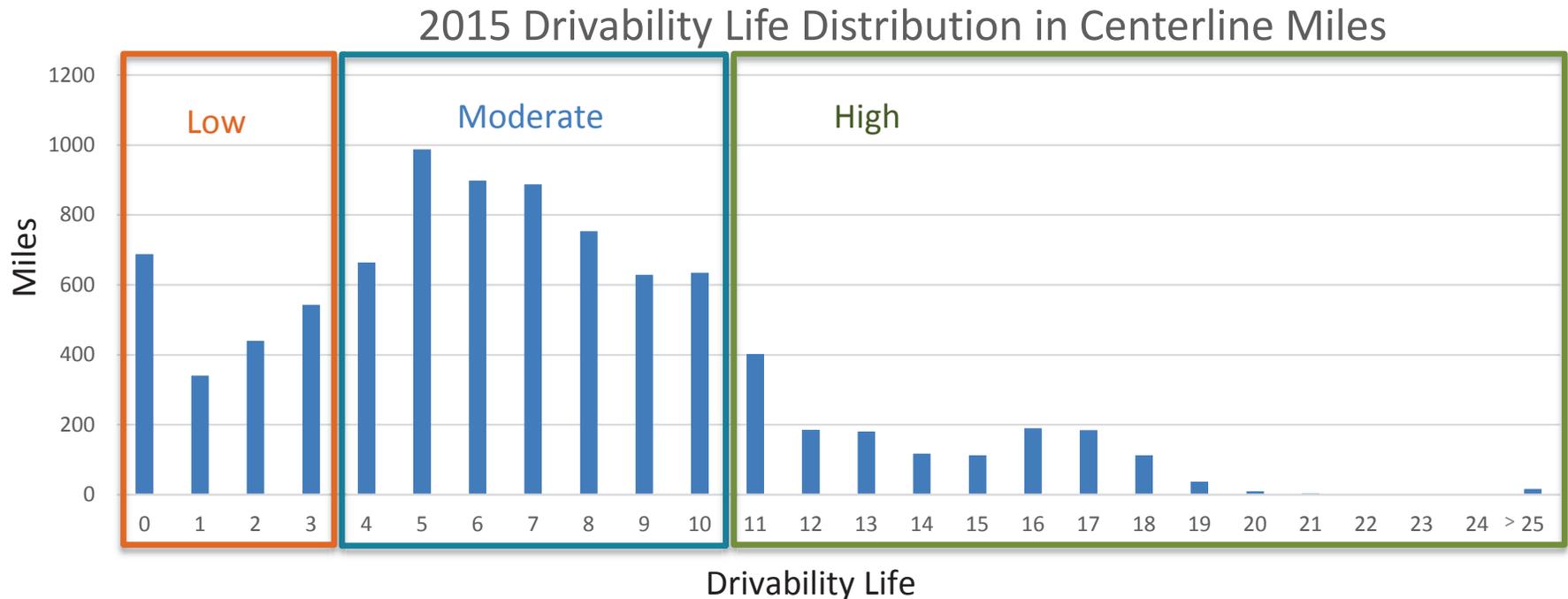
- Repair, rehabilitate, replace, and preserve CDOT’s highways.
- 23,000 lane miles (9,000 centerline miles)
 - 4,000 Interstate
 - 7,000 High Volume
 - 6,000 Medium Volume
 - 6,000 Low Volume

Highway Category	High DL (DL > 10)	Moderate DL (DL 4-10)	Low DL (DL < 4)
Statewide	18%	60%	22%
Interstate	36%	55%	9%
High Volume	22%	61%	17%
Medium Volume	12%	61%	27%
Low Volume	8%	62%	30%



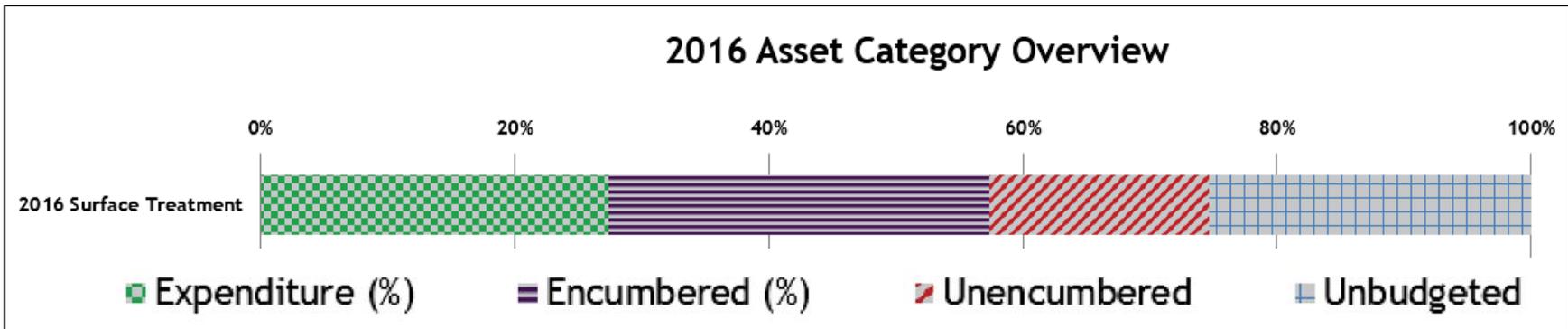
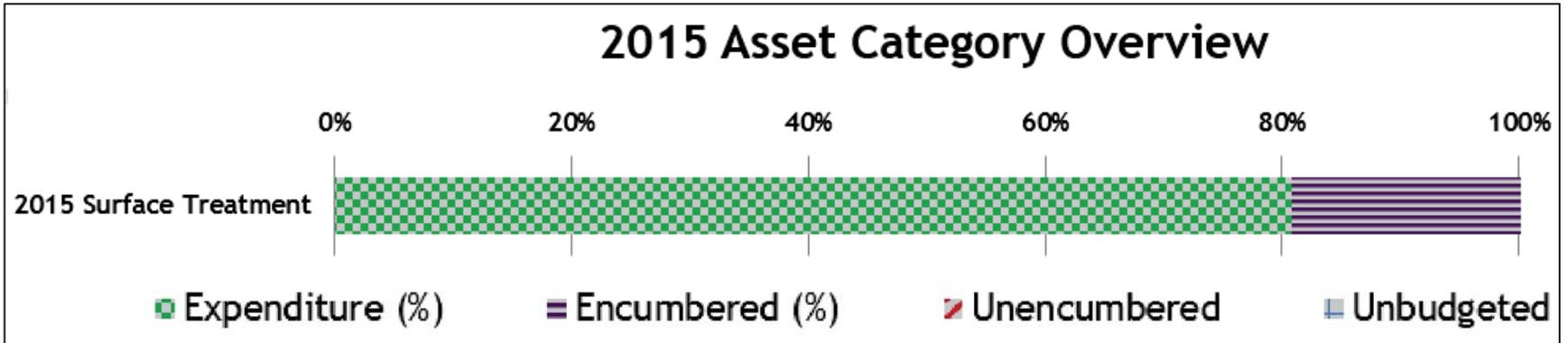
Surface Treatment:

- Drivability Life (DL) is an indication, in years, of how long a highway will have acceptable driving conditions
 - > 10 years DL (High)
 - 4–10 years DL (Moderate)
 - < 4 years DL (Low)





Surface Treatment



Number of Approved Projects vs. Completed Projects, As of March 2016

FY15		FY16	
Number of Projects in Approved Project List	Number of Completed Projects	Number of Projects in Approved Project List	Number of Completed Projects
35	23	43	12

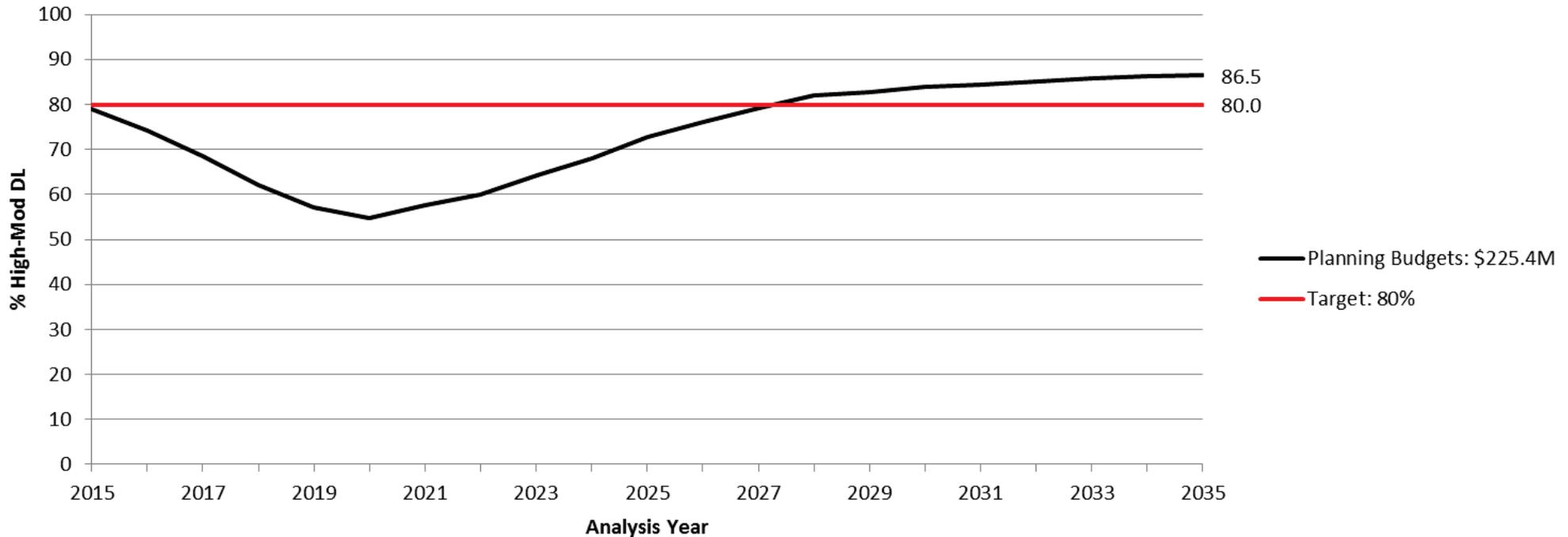


Surface Treatment

FY15-FY19 Asset Management Planning Budgets (in millions)					
Asset Class: Surface Treatment	FY15	FY16	FY17	FY18	FY19
Requested	\$240.0	\$240.0	\$240.0	\$240.0	\$240.0
Allocation	\$235.2	\$235.9	\$242.1	\$231.4	\$225.4

Pavements - Percent High/Moderate Drivability Life

Fiscally Constrained Target is 80%



Metric Description: Drivability Life

Current Performance: 79%

Fiscally Constrained Target: 80%

Forecasted Year to Achieve Target: 2028



Bridge: Michael Collins

- The Bridge Program is composed of two subprograms
 - **Bridge Enterprise Program (CBE)**
 - Bridge Replacements
 - I-70 Viaduct Payments
 - Debt Services
 - Maintenance and Scoping Fees
 - Admin and Legal Fees
 - **Bridge Preservation Program (Staff Bridge)**
 - Bridge Repair Projects
 - Bridge Preservation Projects
 - Bridge Rehabilitation
 - Work for these projects include scour mitigation and repair, deck seal and deck membranes, joint replacement, and essential repairs.
 - Bridge Replacement Projects (that do not qualify for CBE funds)
 - Bridge Inspections
 - Sign, Signal and High Mast Light Inspections



Bridge

- Bridge program inventory includes 3549 bridge structures on the CDOT owned on-system roadway including major vehicular bridges, pedestrian bridges, and railroad bridges. 3437 of these structures are open to major vehicular traffic. These include:
 - 2907 Concrete Structures
 - 445 Steel Structures
 - 159 Timber Structures
 - 38 Other Structures



Bridge

Asset Class: Bridge	FY15	FY16	FY17	FY18	FY19
Allocation	\$ 168.2	\$ 164.1	\$ 163.2	\$ 155.4	\$ 142.5
Bridge Enterprise	\$ 114.9	\$ 124.1	\$ 126.6	\$ 128.6	\$ 130.5
Staff Bridge	\$ 53.3	\$ 40.0	\$ 36.6	\$ 26.8	\$ 12.0

Table 4.1 CDOT RB-AMP Asset Management Metrics and Performance Targets

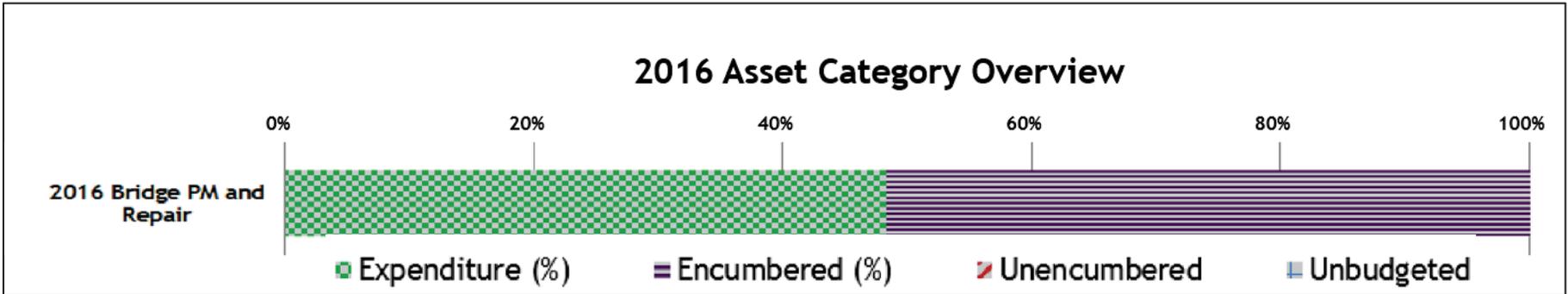
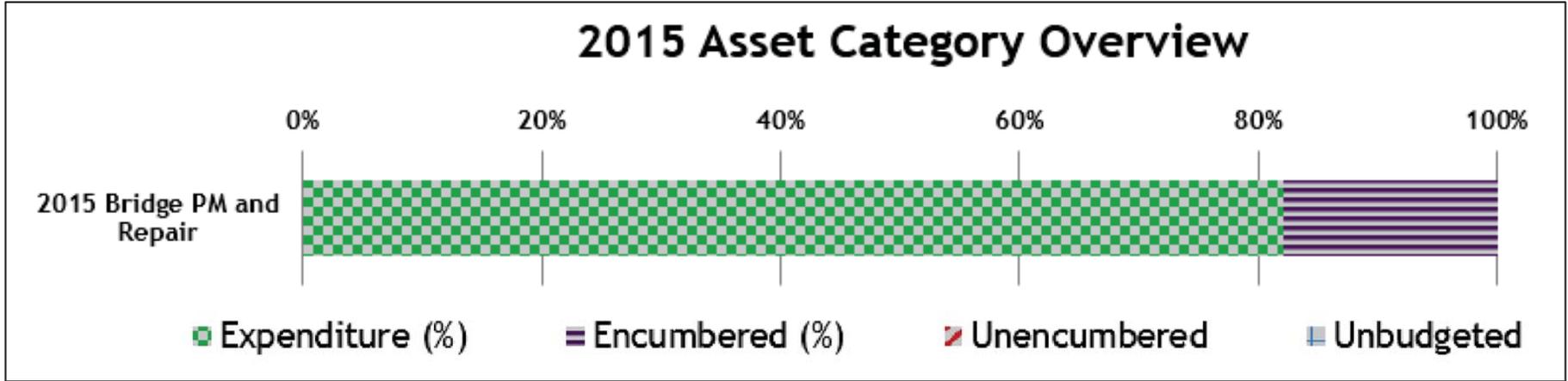
Asset: Bridges		Current Performance	Fiscally Constrained Target	Aspirational Target
Sub-Group	Measure			
BE	Percentage of deck area on structurally deficient CDOT-owned bridges	6%	10%	5%
	Percentage of deck area on structurally deficient bridges on the NHS	5%	10%	5%
Staff Bridge	Percentage of CDOT-owned bridges over waterways that are scour critical	*7%	5%	1%
	Percentage of bridge crossings over Interstates, U.S. routes and Colorado state highways with a vertical clearance less than the statutory maximum vehicle height of 14 feet-6 inches	0.4%	0.4%	0%
	Percentage of bridge crossings over Interstates, U.S. Routes and Colorado state highways with a vertical clearance less than the minimum design requirement of 16 feet-6 inches	4.8%	4.8%	2%
	Percentage of CDOT-owned bridges posted for load	*0.2%	0%	0%
	Percentage of CDOT-owned bridges with a load restriction	1.3%	3%	1%
	Percentage of leaking expansion joint by length on CDOT-owned bridges	*18.8%	15%	5%
	Percentage of CDOT-owned bridge deck area that is unsealed or otherwise unprotected	*31%	30%	5%

Data Last Updated April, 2016

*Currently Not Meeting Fiscally Constrained Target 11



Bridge Preservation



Number of Approved Projects vs. Completed Projects, As of March, 2016

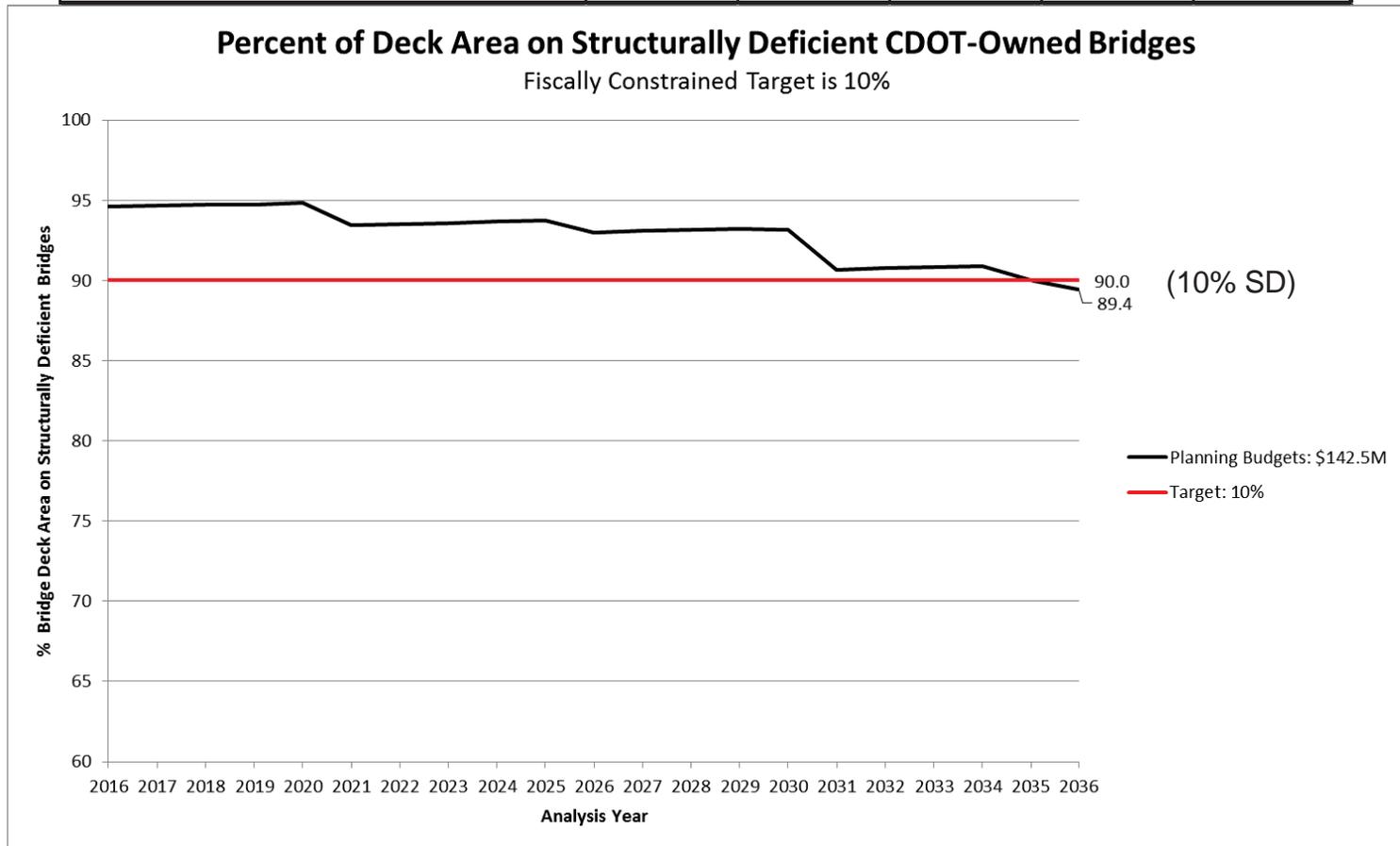
FY15		FY16	
Number of Projects in Approved Project List	Number of Completed Projects	Number of Projects in Approved Project List	Number of Completed Projects
52	24*	52	8*

All Data is Current As Of March, 2016 *Project completion can lag based on multi-year projects and/or bundled projects.



Bridge

FY15-FY19 Asset Management Planning Budgets (in millions)					
Asset Class: Bridge	FY15	FY16	FY17	FY18	FY19
Requested	\$184.6	\$180.0	\$165.0	\$167.0	\$155.0
Allocation	\$168.2	\$164.1	\$163.2	\$155.4	\$142.5



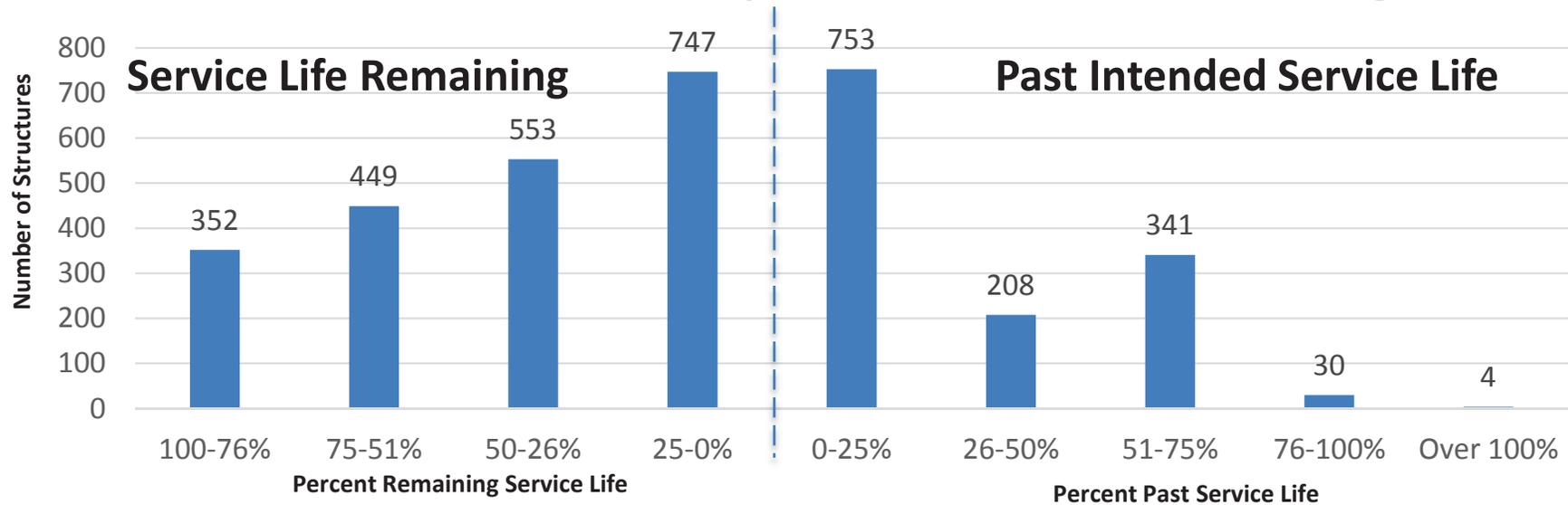
Metric Description: Percentage of deck area on structurally deficient CDOT-owned bridges.
Current Performance: 5.4%
Fiscally Constrained Target: 10%
Currently Achieves Target



Bridge

Preventive Maintenance has Allowed our Inventory to Exceed its Intended Design Service Life

Service Life of Major Vehicular CDOT Owned Bridges



*Estimates are based on structures rated using LRFD

*Assumed 75 Year Service Life LRFD, 50 Year for all other design types

Results of preventive treatment strategy to achieve condition performance targets:

- 39% (1336) CDOT structures past intended service life
- 22% (747) Structures in the last 25% of intended service life
- 4 Structures are over 200% intended service life

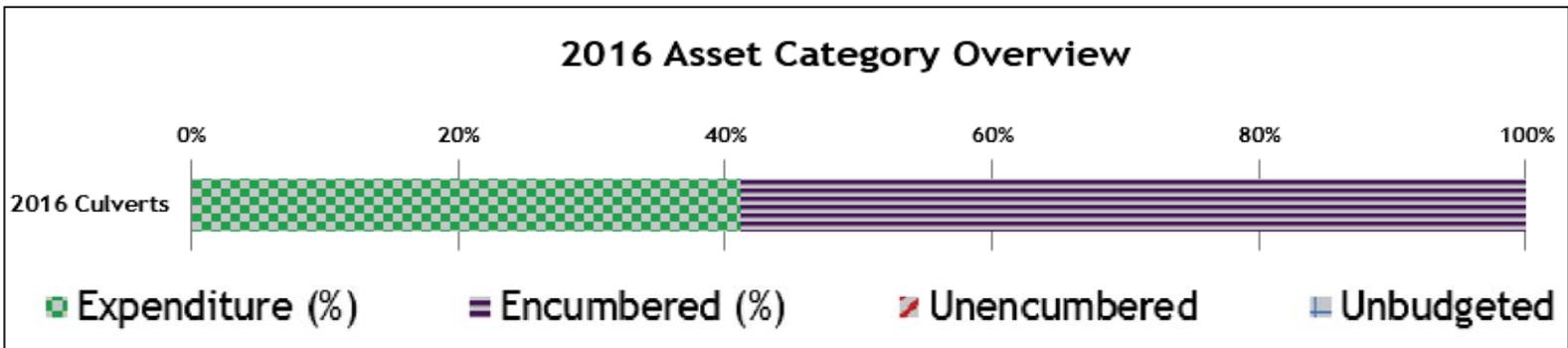
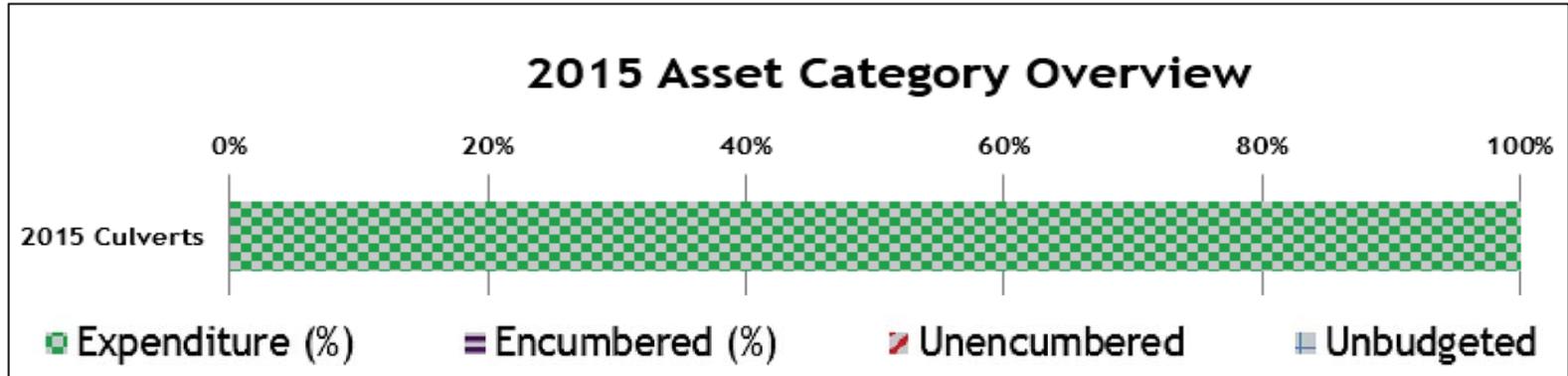


Culverts: Brooke Podhajsky

- The Culverts Program inspects, maintains, repairs, rehabilitates, and replaces CDOT's minor structures (aka culverts)
 - Minor structures are structures spanning between 4' and 20'
 - Approx. 6000 structures
 - The most common structure types are corrugated metal pipes and concrete box culverts. Other types include timber structures, plastic pipes, and arch culverts
- CDOT inspects minor structures using the National Bridge Inspection Standards (NBIS) and the AASHTO Manual for Bridge Element Inspection
- Construction projects include slip-lining, replacement, scour repair/mitigation
- Project selection is based on the critical culverts lists



Culverts



Number of Approved Projects vs. Completed Projects, As of March, 2016

FY15		FY16	
Number of Projects in Approved Project List	Number of Completed Projects	Number of Projects in Approved Project List	Number of Completed Projects
26	12*	15	1*

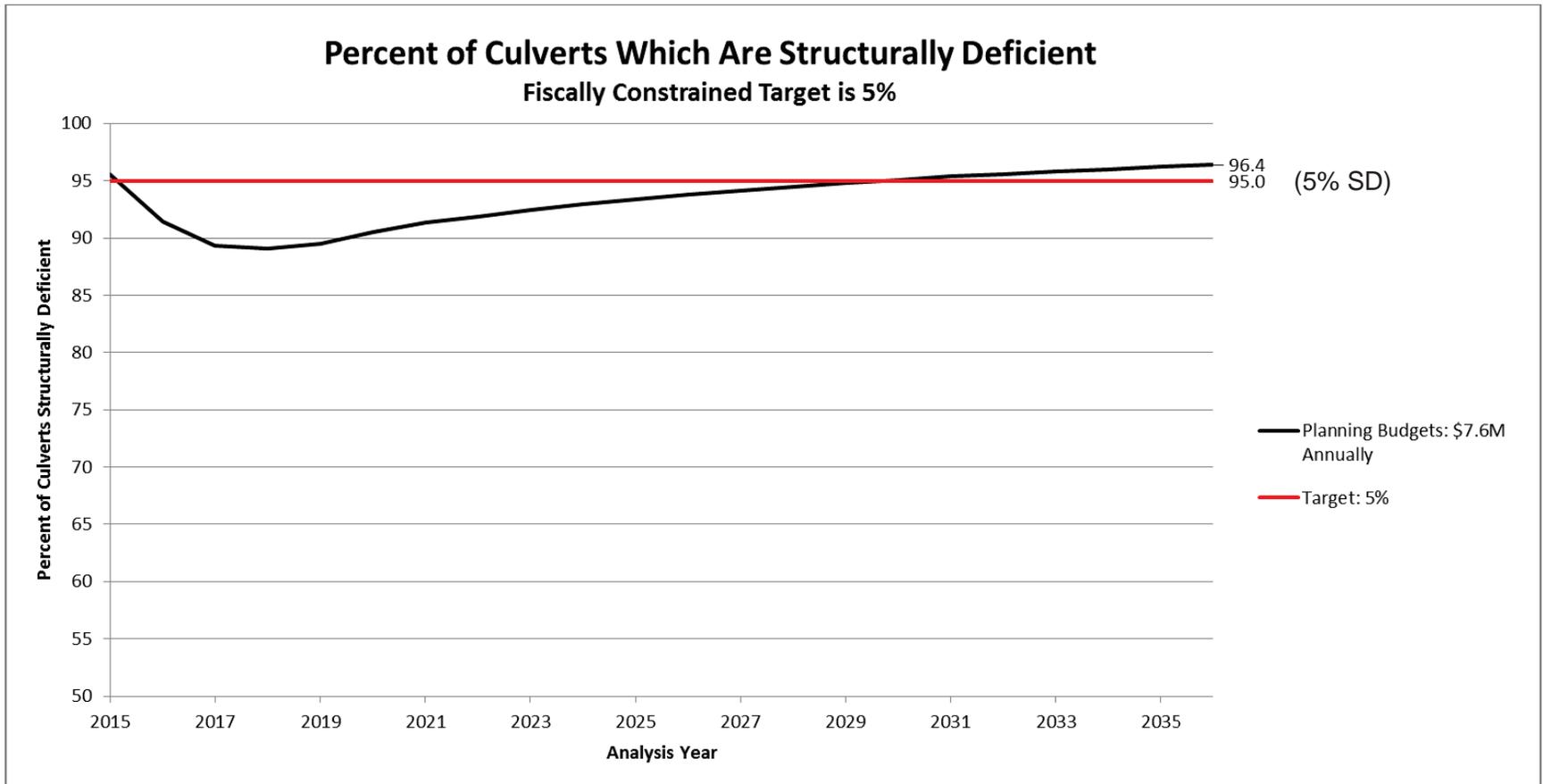
*Project completion can lag based on multi-year projects and/or bundled projects.

All Data is Current As Of March, 2016



Culverts

FY15-FY19 Asset Management Planning Budgets (in millions)					
Asset Class: Culverts	FY15	FY16	FY17	FY18	FY19
Requested	\$10.6	\$12.0	\$11.6	\$11.6	\$12.1
Allocation	\$9.6	\$8.2	\$11.0	\$9.1	\$7.6



Metric Description: Percent Culverts which are structurally deficient (rating 4 or less)

Current Performance: 4.4%

Fiscally Constrained Target: 5%

Forecasted Year to Achieve Target: 2030



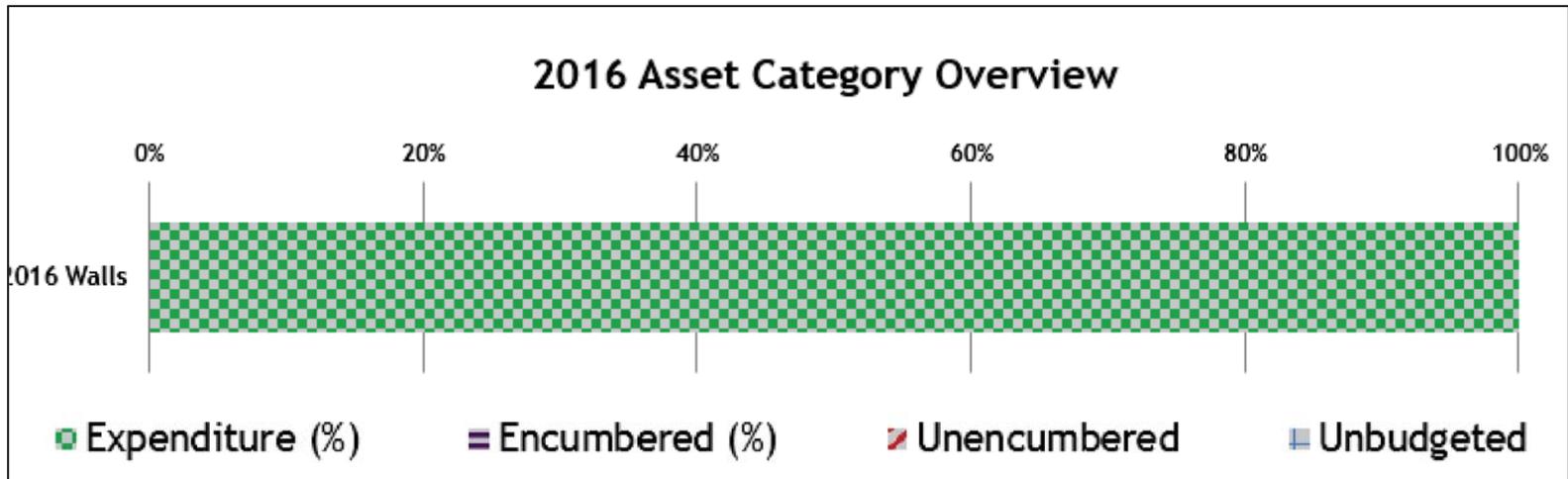
Walls: Brooke Podhajsky

- The Walls Program began in 2014 to inventory and inspect all retaining and noise walls located on or in proximity to CDOT's highway system.
- Wall Types and Functions:
 - Noise Walls
 - Retaining Walls
 - Bridge Retaining Walls (Bridge Walls) – contribute to the structural stability of a bridge by retaining fill that supports the bridge
- Common wall types include mechanically stabilized earth walls (retaining) and post and panel noise walls.
- Over 3000 structures in the current known inventory
- Only 25% of known inventory has been inspected
- Repair, rehabilitation, and replacement project selection has been based on identified needs with collaboration between bridge staff and region staff. Now essential repair findings are also being identified as a result of current inspection efforts.



Walls

N/A: No Program for Walls in FY15



Number of Approved Projects vs. Completed Projects, As of March, 2016			
FY15		FY16	
Number of Projects in Approved Project List	Number of Completed Projects	Number of Projects in Approved Project List	Number of Completed Projects
N/A	N/A	4	0*

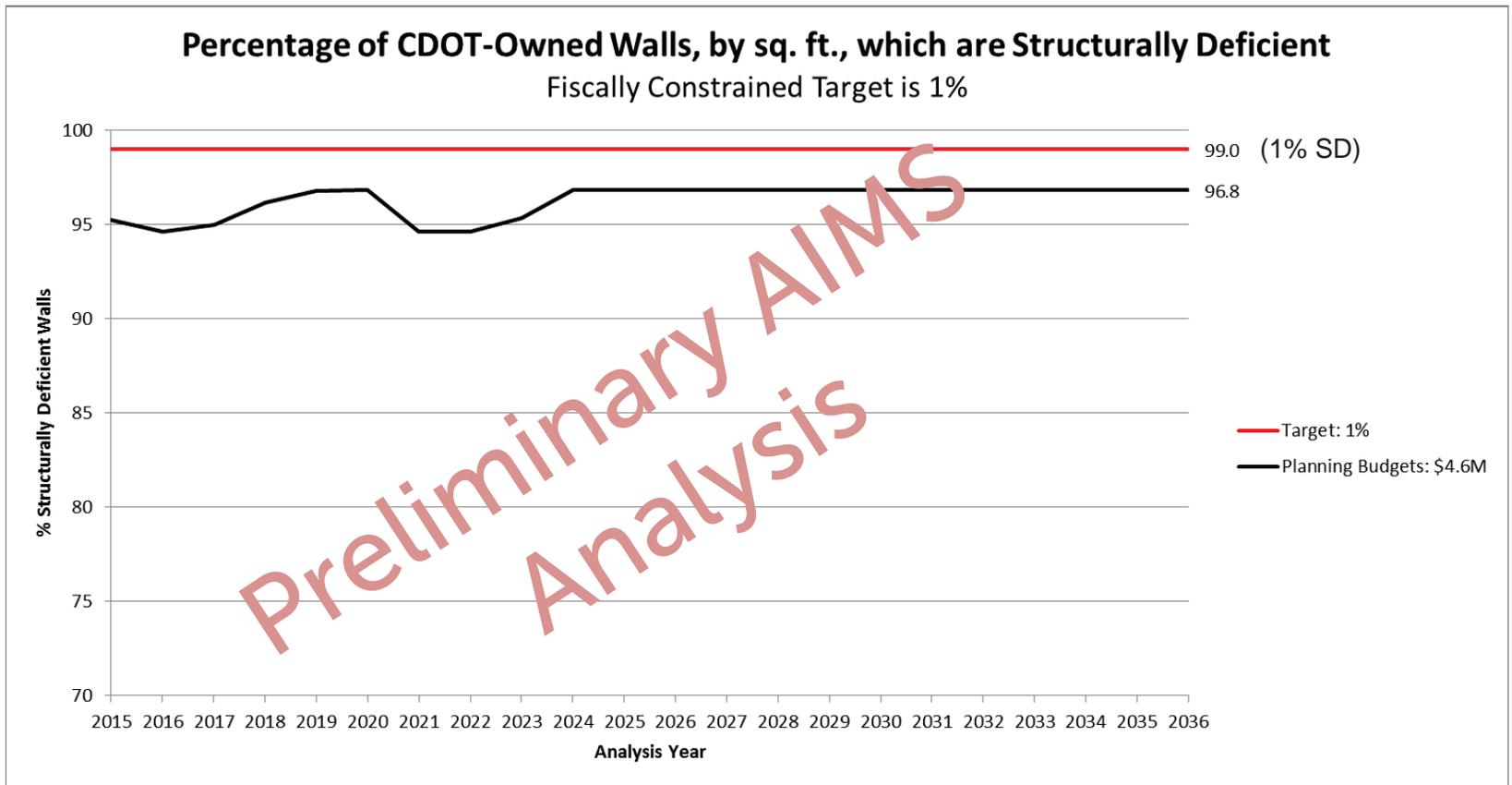
*Project completion can lag based on multi-year projects and/or bundled projects.

All Data is Current As Of March, 2016



Walls

FY15-FY19 Asset Management Planning Budgets (in millions)					
Asset Class: Walls	FY15	FY16	FY17	FY18	FY19
Requested	N/A	\$4.0	\$6.1	\$6.1	\$6.2
Allocation	N/A	\$2.4	\$5.8	\$4.6	\$4.6



Metric Description: Percentage of CDOT-owned walls, by sq. ft., that are structurally deficient (rating 4 or less)

Current Performance: 4.8%

Fiscally Constrained Target: 1%

Estimated Cost To Achieve Target: TBD due to inventory in progress

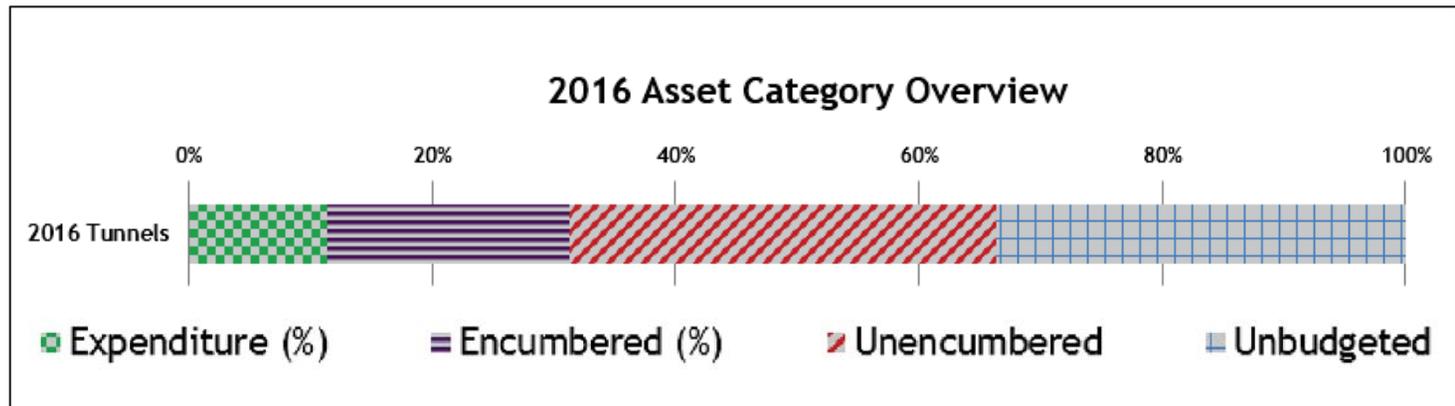
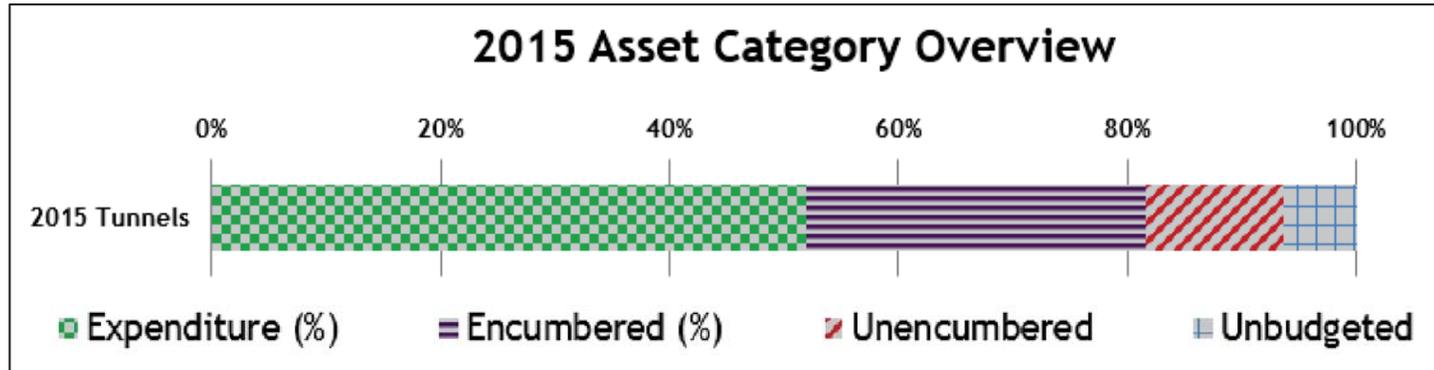


Tunnels: Tyler Weldon

- Tunnel Asset Management is investing in Colorado's 21 On-system tunnels
- Tunnels AIMS model (Dec 2015) is based on 7 critical Tunnel Characteristics – Structural, Civil and Sign Elements and Lighting, Fire/Life Safety/Security, Electrical and Mechanical Systems. The model is one of the most sophisticated analyses completed in AIMS.
- The model and performance metric is based on the National Tunnel Inspection Standard and the 1 to 4 scale.
- The initial AIMS model underscores the significant investment needs at the EJMT. The tunnel is now over 40 years old and needs additional investment.
- Inventory will meet the 2015 Specifications for the National Tunnel Inventory (SNTI). Tunnels around the State will be inspected in the next two years following the new rules.



Tunnels

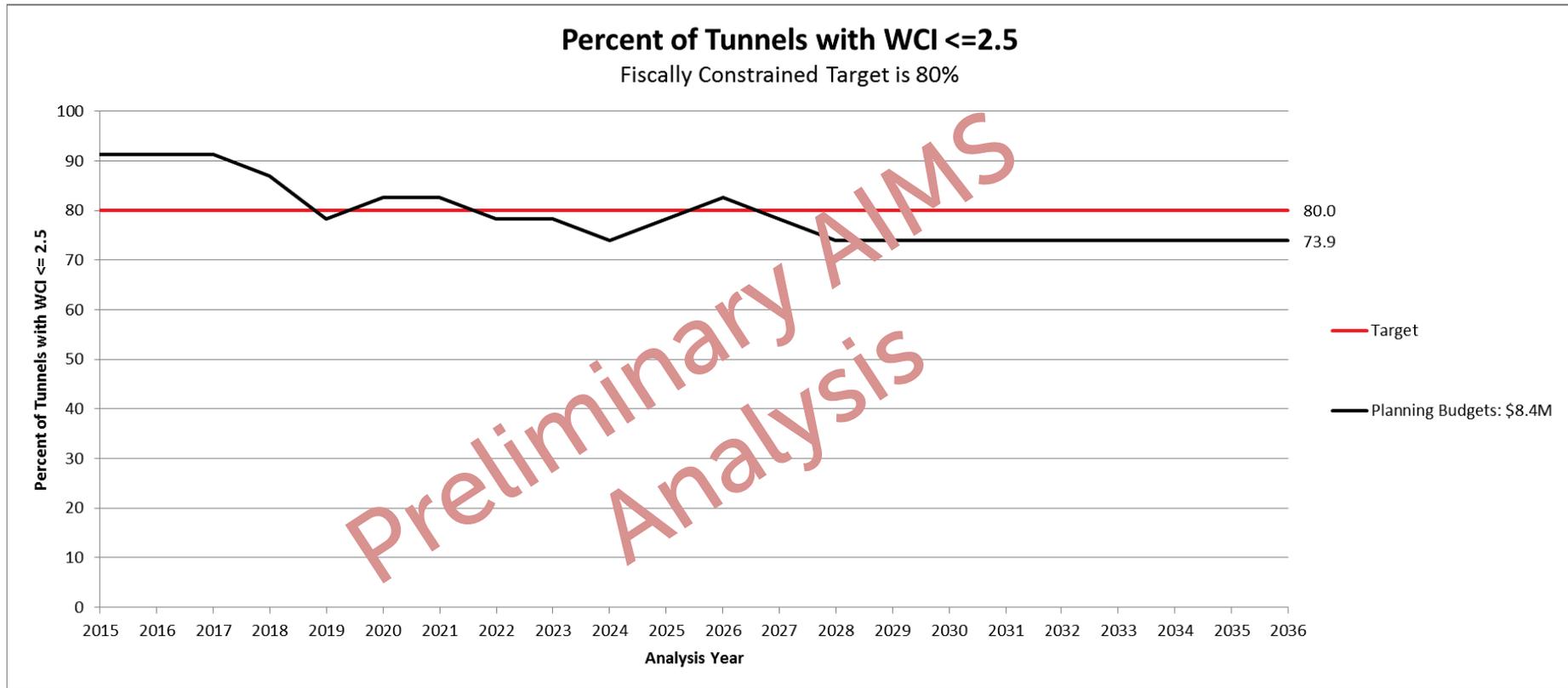


Number of Approved Projects vs. Completed Projects, As of March, 2016			
FY15		FY16	
Number of Projects in Approved Project List	Number of Completed Projects	Number of Projects in Approved Project List	Number of Completed Projects
9	2	9	3



Tunnels

FY15-FY19 Asset Management Planning Budgets (in millions)					
Asset Class: Tunnels	FY15	FY16	FY17	FY18	FY19
Requested	\$12.9	\$7.6	\$8.6	\$8.7	\$10.3
Allocation	\$12.4	\$5.2	\$7.6	\$6.4	\$8.4



Metric Description: Percent of tunnels which have all classes that have Weighted Condition Indexes with a maximum of <=2.5 (out of 1-4)

Current Performance: 91%

Fiscally Constrained Target: 80%

Currently Achieves Target



Status

In general, the Allocations are not sufficient to meet performance goals by 2025.

Continuous Improvement to mitigate limited funding:

Surface Treatment

- A Task Force with the Regions is reviewing forecasted DLs for different types of highways with different traffic loading, material components, and climates to select treatment options with optimal life-cycles based on these factors
- Evaluating the effects of Pavement Preservation on DL through ongoing research:
 - 2 research proposals: Optimization for Managing Low Volume Roads & Innovative Treatments for Low Volume Roads
 - Current Research with CSU: Low Volume Road Treatment Strategies
 - MnROAD/NCAT participation

Bridge

- Identifying the most critical needs by focusing on risk metrics to select projects that achieve the greatest life-cycle at the lowest cost

Culverts

- Bundling culvert replacements with larger bridge and surface treatment projects to lower overall project costs.

In Progress:

Walls

- Completing inventory, refining AIMS Model

Tunnels

- Completing comprehensive inspections per new Federal rules, refining AIMS Model²⁴



Next Steps

May: FY20 Asset Management Planning Budget
Late Summer: PD-14 Report