

# All Structures Summary

	On-System	Off-System
Major Bridges & Tunnels	3,566	4,890
– Major Vehicle Bridges	3,447	4,701
– Other Overhead Bridges	99	178
– Tunnels	20	11
Culverts & Minor Bridges	6,626	
Signs/Signals/HML's	5,574	
– Overhead Signs	1,144	
– Mast Arm Signals	4,147	
– High Mast Lights	283	
Walls in inventory <sup>1</sup>	1,207	
Total	16,973	4,890

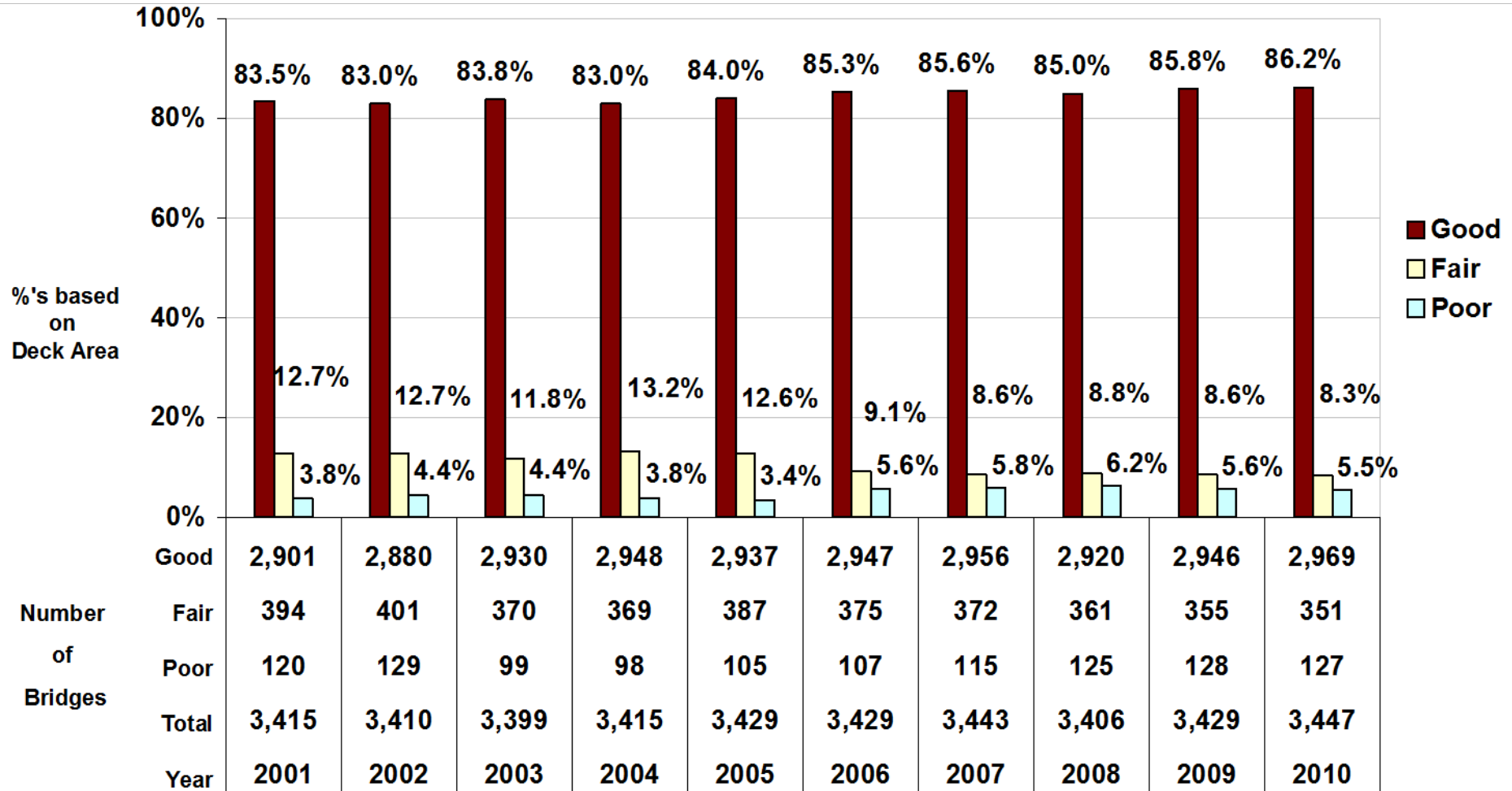
4/1/10 reporting used database for Major Bridges & Tunnels

8/17/10 inventory for all other structures

<sup>1</sup> –Retaining walls & sound barriers identified & assigned structure numbers since 2000.

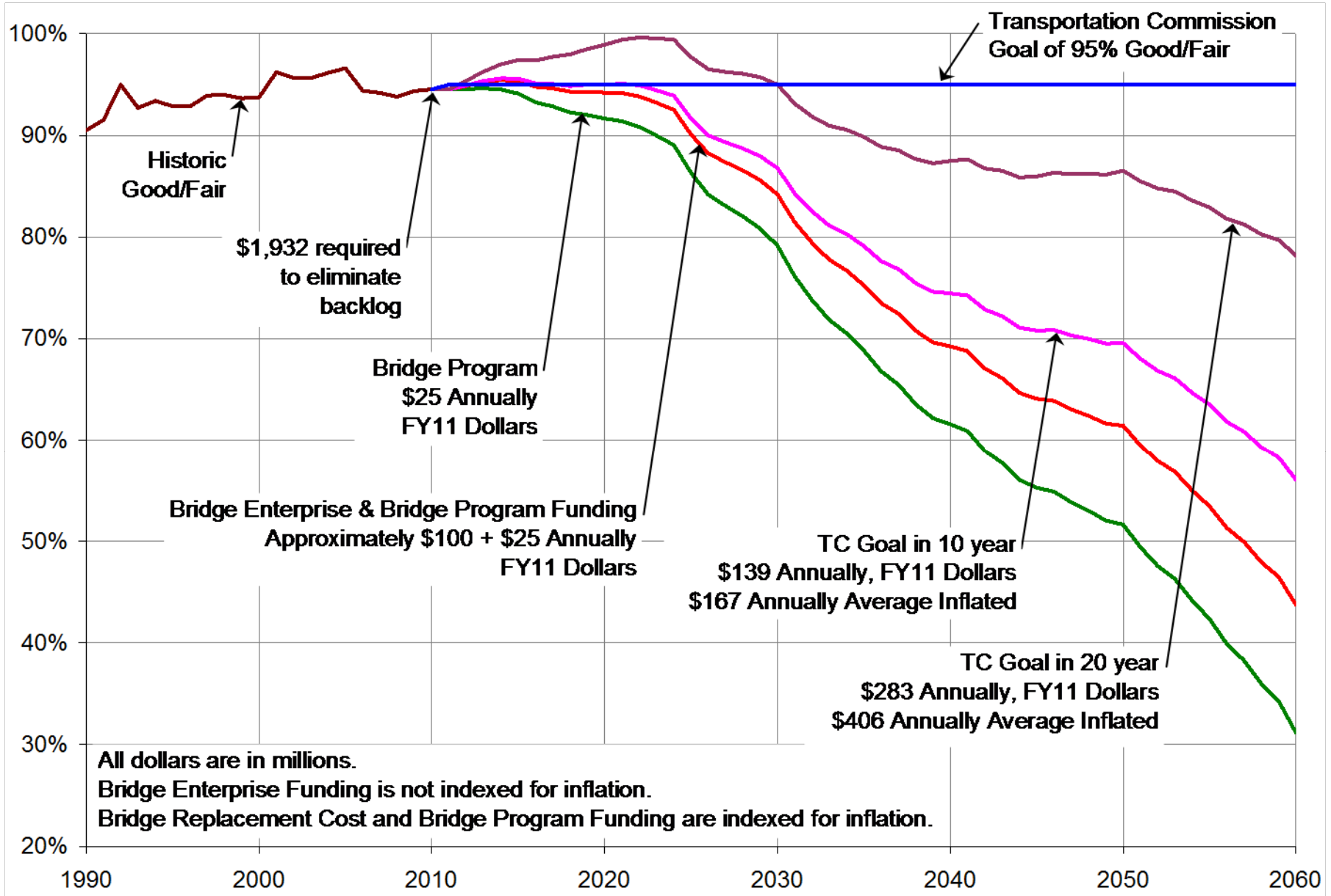
# On-System Bridge Condition

(All CDOT Owned Major Vehicular Bridges)



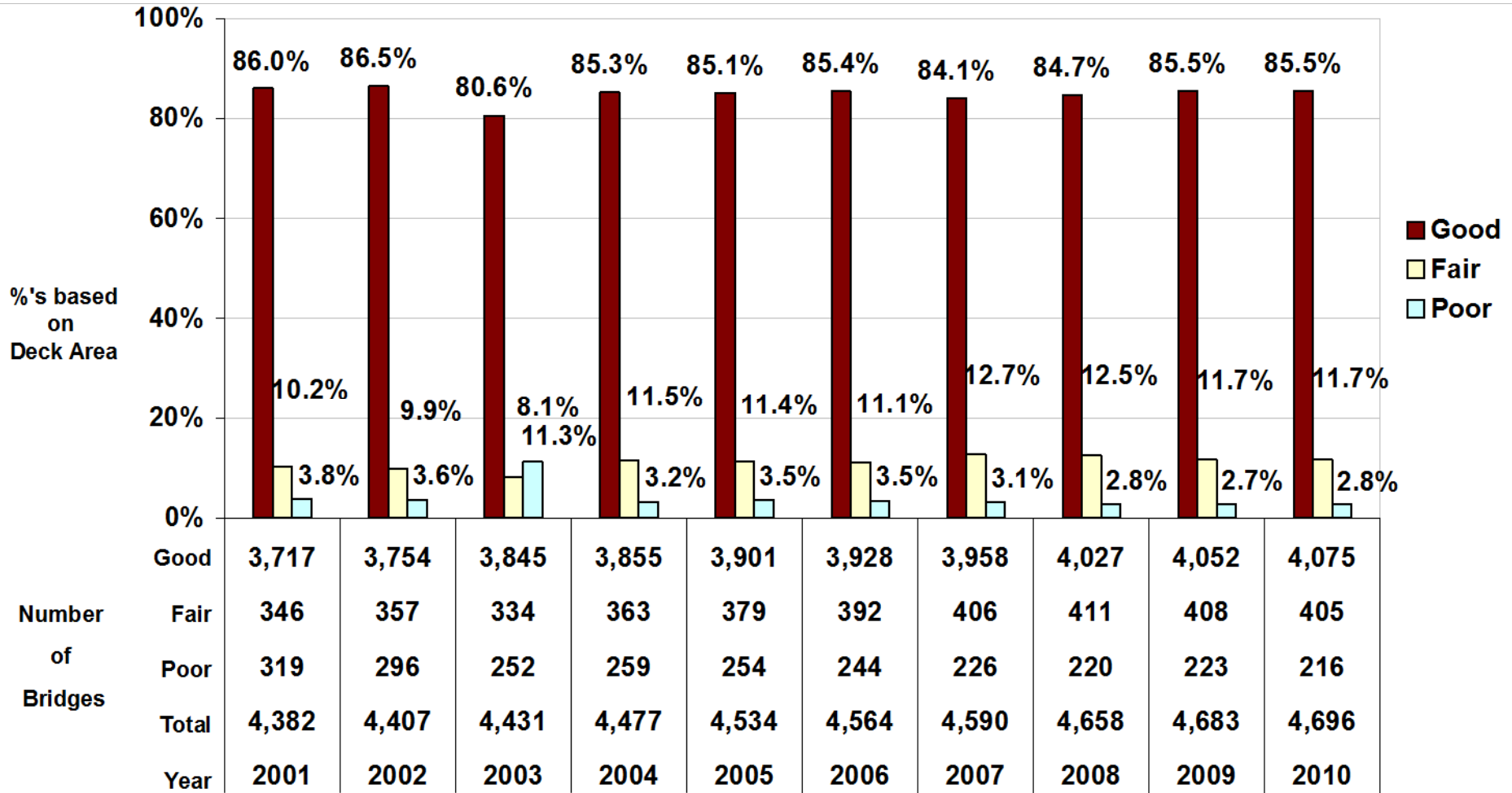
Poor = Sufficiency Rating of less than 50 AND Structurally Deficient (SD) OR Functionally Obsolete (FO)  
 Fair = Sufficiency Rating of 50 to 80 AND Structurally Deficient (SD) OR Functionally Obsolete (FO)  
 Good = Remaining Bridges NOT Rated Fair or Poor (NOT SD or FO and/or above 80)

# Percent Good/Fair 70 Year Projected Trends



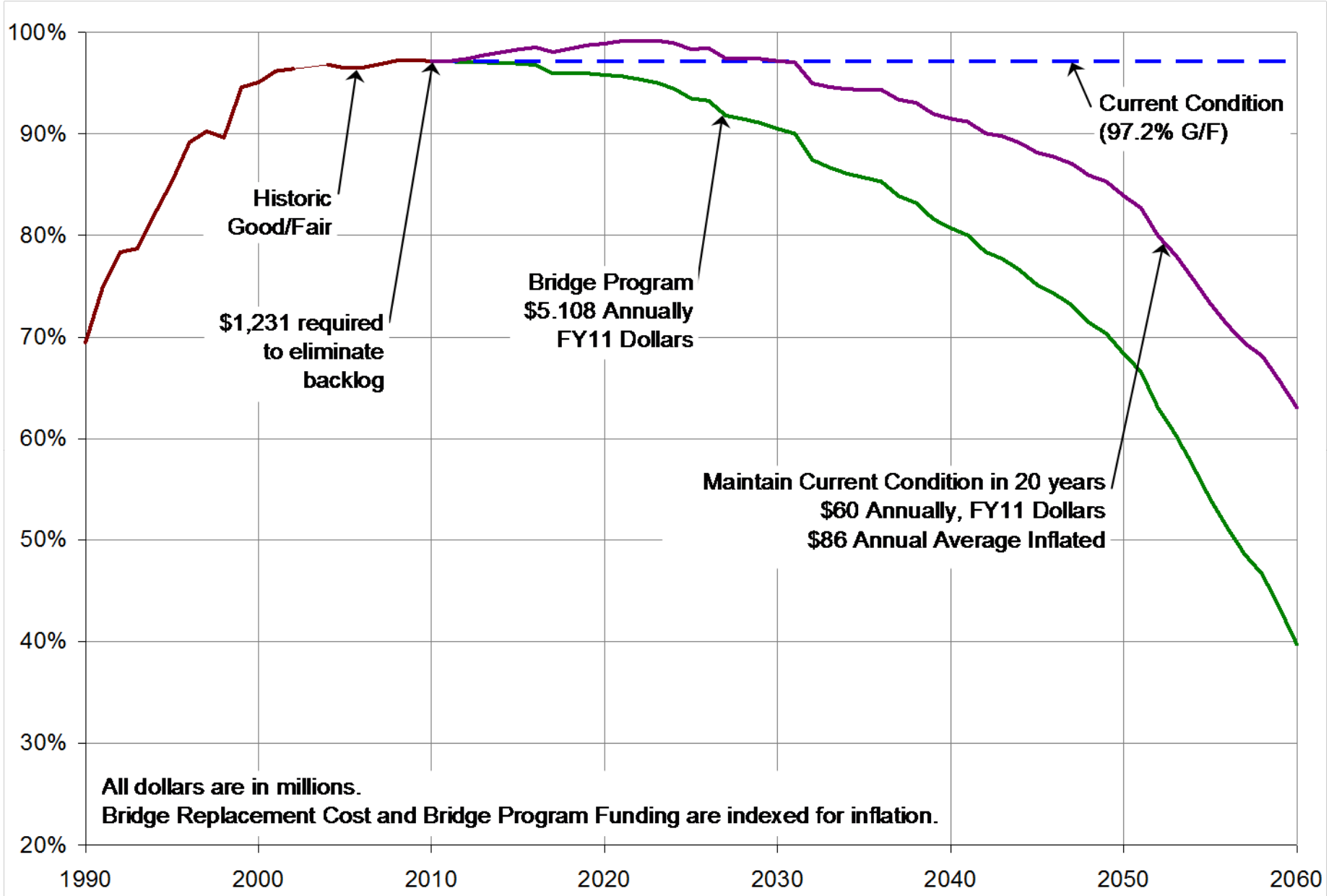
# Off-System Bridge Condition

(All City and County Owned Major Vehicular Bridges)



Poor = Sufficiency Rating of less than 50 AND Structurally Deficient (SD) OR Functionally Obsolete (FO)  
 Fair = Sufficiency Rating of 50 to 80 AND Structurally Deficient (SD) OR Functionally Obsolete (FO)  
 Good = Remaining Bridges NOT Rated Fair or Poor (NOT SD or FO and/or above 80)

# Percent Good/Fair 70 Year Projected Trends



# Bridge Program Funding

(in millions)

Fiscal Year	On System	Off System	Total
2008	\$39.1	\$8.5	\$47.6
2009	\$28.7	\$6.1	\$34.8
2010	\$39.7	\$8.5	\$48.2
<b>2011</b>	<b>\$40.4</b>	<b>\$8.6</b>	<b>\$49.0</b>
2012	\$40.6	\$8.8	\$49.4

FY 10-12 based on 8/18/10 budget and BE workshops

**Highway Maintenance  
Levels of Service**

**manual**

*prepared for*

**Colorado Department of Transportation**

*prepared by*

**Cambridge Systematics, Inc.**

*December 22, 1999*

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*manual*

# Highway Maintenance Levels of Service

*prepared for*

Colorado Department of Transportation

*prepared by*

Cambridge Systematics, Inc.  
150 CambridgePark Drive, Suite 4000  
Cambridge, Massachusetts 02140

*December 22, 1999*

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## Introduction

This manual provides guidance on maintenance levels of service (LOS) implemented by the Colorado Department of Transportation (CDOT) as part of its maintenance performance budgeting and maintenance program management.

The LOS guidelines in this manual are described in terms of five major grade levels: A through D, and F. For finer gradations of LOS as they are applied in practice, plus-and-minus “shoulder grades” are employed. There are 16 such shoulder grades in all: 15 letter grades ranging from A+ through F-, and a 16<sup>th</sup> level denoting the absolute floor or bottom of the grading scale.

These LOS grades are related to specific, measurable conditions of highway features or systems where appropriate. In some cases, as with customer-service or training activities, the levels of service are related to a measure of activity performance: e.g., a response time, or a frequency of performance.

## Maintenance Program Areas

This manual is organized by Maintenance Program Area (MPA). CDOT includes nine MPAs in its maintenance program:

1. Planning and Training;
2. Roadway Surfacing;
3. Roadside Structures;
4. Roadside Appearance;
5. Traffic Services;
6. Structure Maintenance;
7. Snow and Ice Control;
8. Material, Equipment and Buildings; and
9. Tunnel Activities.



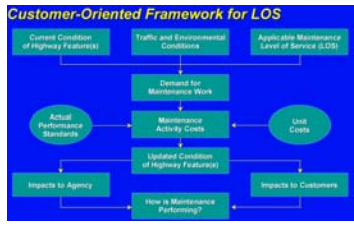
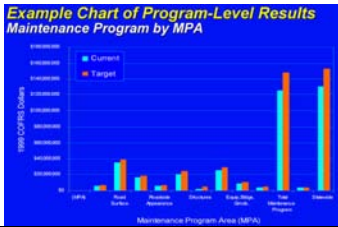
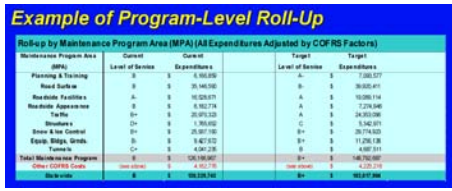
Each program comprises a set of maintenance activities. In many cases, these activities are performed on specific highway features or systems: e.g., pavement, guardrail, drainage structures, signals, or roadside vegetation. By determining the current condition of each of these items through annual surveys, CDOT can develop trends in LOS among maintenance sections and maintenance program areas. Current LOS levels can be used as a baseline for establishing target LOS in future years, and for estimating the changes in maintenance effort and costs that are needed to achieve these projected LOS.

## Organization of Manual

This Manual is organized by MPA and by highway feature or system, or by maintenance activity, as appropriate. Each MPA constitutes a chapter in the Manual.

- The first page of each chapter summarizes LOS A through D and F for the maintenance program area overall. Photographs are included to illustrate either example conditions typifying each level of service, or the types of activities and facilities that are the focus of work conducted in that program area.
- Subsequent pages in each chapter describe LOS A through D and F for each of the surveyed features and systems, or each of the maintenance activities, included in that MPA. These descriptions provide guidelines for the conditions, response times, system reliabilities, or frequencies of work that can characterize each level of service. Of course, actual conditions at a particular site may vary in some respects from the descriptions provided herein, and judgment needs to be exercised. Nevertheless, the types of factors cited in each definition suggest the items that should be considered in determining maintenance LOS.
- The Manual pages are printed single-sided and are dated in the footer to enable them to be bound in a loose-leaf binder if desired, and for individual pages to be updated easily when needed.

# MPA: Planning & Scheduling

Example Planning & Scheduling Items	LOS	Description
<p>Training</p> 	<h1>A</h1>	<p>Effective planning coordinates scheduled maintenance needs with unscheduled requirements, so that program targets are met while providing immediate response. Annual survey of maintenance conditions is performed. Updates of training are provided to all staff and selected managers attend at least one professional workshop annually.</p>
<p>MMS Reporting</p> 	<h1>B</h1>	<p>Planning and coordination allows most program targets to be met, while providing immediate response to unscheduled tasks most of the time. Annual survey of maintenance conditions is performed. Updates of staff training and selected management attendance at workshops are provided every 1-2 years.</p>
<p>Performance Budgeting</p> 	<h1>C</h1>	<p>Planning and coordination allows many program targets to be met, while providing immediate response to unscheduled tasks in many instances. Survey of maintenance conditions is performed biennially. Updates of staff training and selected management attendance at workshops are provided every 2-3 years.</p>
<p>Program Budget Allocation</p> 	<h1>D</h1>	<p>Planning and coordination are minimal, focusing on critical program targets to be met, while providing immediate response to unscheduled tasks in selected instances. Survey of maintenance conditions is performed every 3 years. Updates of staff training and selected management attendance at workshops are provided every 4-5 years.</p>
<p>Program Summary</p> 	<h1>F</h1>	<p>Planning and coordination are ad hoc, short-term and uncoordinated. Program targets are not met, particularly when immediate response must be given to unscheduled tasks. Survey of maintenance conditions is performed irregularly or not at all. Updates of staff training and workshop attendance are sporadic.</p>

## Maintenance Program Area: **Planning & Scheduling**

Budgeted Activity: **Planning, Scheduling, Inspection**

Number: **102**






<b>A</b>	Activity 102 includes planning and scheduling of the maintenance work program, routine nighttime inspections and inspection of work sites, annual surveys of highway inventory to establish current service levels, and other administrative duties by field personnel. These functions are performed at an excellent level, leading to very effective program performance: Actual costs are within five percent of planned expenditures, and all MPA LOS targets are met or exceeded (excluding winter maintenance and emergencies).
<b>B</b>	Activity 102 includes planning and scheduling of the maintenance work program, routine nighttime inspections and inspection of work sites, annual surveys of highway inventory to establish current service levels, and other administrative duties by field personnel. These functions are performed at a high level, leading to positive program performance: Actual costs are within ten percent of planned expenditures, and most MPA LOS targets are met or exceeded (excluding winter maintenance and emergencies).
<b>C</b>	Activity 102 includes planning and scheduling of the maintenance work program, routine nighttime inspections and inspection of work sites, annual surveys of highway inventory to establish current service levels, and other administrative duties by field personnel. These functions are performed at a good level, leading to solid program performance: Actual costs are within 15 percent of planned expenditures, and LOS accomplishments by MPA either meet / exceed or are within one shoulder grade (i.e., one step out of 16) of target (excluding winter maintenance and emergencies).
<b>D</b>	Activity 102 includes planning and scheduling of the maintenance work program, routine nighttime inspections and inspection of work sites, annual surveys of highway inventory to establish current service levels, and other administrative duties by field personnel. These functions are performed at a fair level, leading to mixed program performance: Actual costs are within 20 percent of planned expenditures; while some LOS accomplishments by MPA meet or exceed target, several fall two or more shoulder grades (i.e., two or more steps out of 16) below target (excluding winter maintenance and emergencies).
<b>F</b>	Activity 102 includes planning and scheduling of the maintenance work program, routine nighttime inspections and inspection of work sites, annual surveys of highway inventory to establish current service levels, and other administrative duties by field personnel. These functions are performed at a poor level, leading to substandard program performance: Actual costs are more than 20 percent off from planned expenditures; few LOS accomplishments by MPA meet or exceed target, and several fall two or more shoulder grades (i.e., two or more steps out of 16) below target (excluding winter maintenance and emergencies).

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**Maintenance Program Area: Planning & Scheduling**
**Budgeted Activity: Training, Meetings**
**Number: 103**

<b>A</b>	Activity 103 includes all personnel training, safety classes, and informational meetings. Compliance with established training program objectives is excellent. Informational meetings are well attended. All personnel attend the Maintenance Academy at least annually for refresher training.
<b>B</b>	Activity 103 includes all personnel training, safety classes, and informational meetings. Compliance with established training program objectives is very high. Most informational meetings are well attended. At least 95 percent of personnel attend the Maintenance Academy annually for refresher training.
<b>C</b>	Activity 103 includes all personnel training, safety classes, and informational meetings. Compliance with established training program objectives is generally good. The majority of informational meetings are well attended. At least 90 percent of personnel attend the Maintenance Academy annually for refresher training.
<b>D</b>	Activity 103 includes all personnel training, safety classes, and informational meetings. Compliance with established training program objectives is fair. Informational meetings are either held infrequently or are not well attended. At least 80 percent of personnel attend the Maintenance Academy annually for refresher training.
<b>F</b>	Activity 103 includes all personnel training, safety classes, and informational meetings. Compliance with established training program objectives is poor. Informational meetings are rare and have spotty attendance. Less than 80 percent of personnel attend the Maintenance Academy annually for refresher training.

# MPA: Roadway Surface

Illustration	LOS	Description
	<p><b>A</b></p>	<p>The structure, smoothness, and durability of the pavement surface are excellent. The surface is free of potholes and exhibits little or no cracking. Past repairs (e.g., patches, sealed cracks) are in excellent condition. There is little or no drop-off from the pavement or shoulder edge. Surface materials properties have not degraded.</p>
	<p><b>B</b></p>	<p>The pavement is in overall good structural condition, offers a satisfactory ride, and exhibits sound materials quality. Occurrences of distress such as cracking, potholes, rutting, and materials problems are infrequent and minor. Past repairs are in good condition, with limited need for rework. Edge drop-offs are infrequent.</p>
	<p><b>C</b></p>	<p>Pavement shows moderate problems with structural deterioration (e.g., cracking, potholes, past repairs), ride quality (excessive rutting, roughness, edge drop-off), or materials degradation (oxidation of asphalt surface, flushing / bleeding, or loss of material through raveling).</p>
	<p><b>D</b></p>	<p>Pavement deterioration is significant, with up to half of the pavement area exhibiting one or more types of serious distress: structural deterioration (e.g., large areas or numbers of cracks, potholes), ride quality (e.g., deep ruts, surface roughness, edge drop-off), and materials degradation. Surface condition may affect speed and vehicle handling.</p>
	<p><b>F</b></p>	<p>Pavement is deteriorated over more than half its area. The integrity of the surface and the ride quality it offers are degraded by extensive damage (cracking, potholes), deformation (rutting, roughness), degradation of the asphalt concrete (raveling, flushing / bleeding, or oxidation), or edge drop-off. Speed and vehicle handling likely affected.</p>

## Maintenance Program Area: **Roadway Surface**

Survey Item: **Surface Defects**

Budgeted Activities: **152**

<b>A</b>	Road pavement is generally free of surface defects, where surface defects include the following: potholes, previously filled but now reopened potholes, spalls, delaminations, or areas of shoving or corrugation greater than <u>  </u> inch deep. Approximate limits for levels of service are as follows, expressed in average number of defects per lane mile: A+, fewer than 0.3; A, up to 1.9; A-, up to 3.4.
<b>B</b>	Road pavement has a small number of surface defects, where surface defects include the following: potholes, previously filled but now reopened potholes, spalls, delaminations, or areas of shoving or corrugation greater than <u>  </u> inch deep. Approximate limits for levels of service are as follows, expressed in average number of defects per lane mile: B+, up to 5.0; B, up to 7.2; B-, up to 9.4.
<b>C</b>	Road pavement has a moderate number of surface defects, where surface defects include the following: potholes, previously filled but now reopened potholes, spalls, delaminations, or areas of shoving or corrugation greater than <u>  </u> inch deep. Approximate limits for levels of service are as follows, expressed in average number of defects per lane mile: C+, up to 11.7; C, up to 13.9; C-, up to 16.1.
<b>D</b>	Road pavement has a large number of surface defects, where surface defects include the following: potholes, previously filled but now reopened potholes, spalls, delaminations, or areas of shoving or corrugation greater than <u>  </u> inch deep. Approximate limits for levels of service are as follows, expressed in average number of defects per lane mile: D+, up to 18.3; D, up to 23.3; D-, up to 28.3.
<b>F</b>	Road pavement has an excessive number of surface defects, where surface defects include the following: potholes, previously filled but now reopened potholes, spalls, delaminations, or areas of shoving or corrugation greater than <u>  </u> inch deep. Approximate limits for levels of service are as follows, expressed in average number of defects per lane mile: F+, up to 33.3; F, up to 40; F-, more than 40.



## Maintenance Program Area: Roadway Surface

Survey Item: Ruts > 1.5 inches Deep

Budgeted Activities: 154

A	Road pavement is essentially free of ruts greater than 1.5 inches in depth. Ruts are channels formed in the wheel paths of a pavement due to the action of studded tires or to weakness of the pavement structure. Ruts greater than 1.5 inches deep are substantial and require maintenance. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with ruts greater than 1.5 inches deep: A+, less than 0.01% (essentially zero); A, up to 0.8%; A-, up to 1.7%.
B	Road pavement has a small length of rutting greater than 1.5 inches in depth. Ruts are channels formed in the wheel paths of a pavement due to the action of studded tires or to weakness of the pavement structure. Ruts greater than 1.5 inches deep are substantial and require maintenance. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with ruts greater than 1.5 inches deep: B+, up to 2.5%; B, up to 4.2%; B-, up to 5.8%.
C	Road pavement has a moderate length of rutting greater than 1.5 inches in depth. Ruts are channels formed in the wheel paths of a pavement due to the action of studded tires or to weakness of the pavement structure. Ruts greater than 1.5 inches deep are substantial and require maintenance. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with ruts greater than 1.5 inches deep: C+, up to 7.5%; C, up to 9.2%; C-, up to 10.8%.
D	Road pavement has a significant length of rutting greater than 1.5 inches in depth. Ruts are channels formed in the wheel paths of a pavement due to the action of studded tires or to weakness of the pavement structure. Ruts greater than 1.5 inches deep are substantial and require maintenance. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with ruts greater than 1.5 inches deep: D+, up to 12.5%; D, up to 15.8%; D-, up to 19.2%.
F	Road pavement has excessive rutting greater than 1.5 inches in depth. Ruts are channels formed in the wheel paths of a pavement due to the action of studded tires or to weakness of the pavement structure. Ruts greater than 1.5 inches deep are substantial and require maintenance. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with ruts greater than 1.5 inches deep: F+, up to 22.5%; F, up to 40%; F-, more than 40%.

## Maintenance Program Area: Roadway Surface

Survey Item: **Unsealed Cracks and Joints**

Budgeted Activities: **156**

A	Pavement surface has a small degree of unsealed linear / random cracks or nonfunctioning pavement joints. Unsealed cracks include open or previously sealed cracks that have reopened or from which the sealant has been lost. Nonfunctioning joints include those in which joint filler has been stripped or is not in good condition, or joints that are clogged with debris or weeds. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with unsealed cracks or joints: A+, less than 3.4%; A, up to 6.8%; A-, up to 10.4%.
B	Pavement surface has a moderate degree of unsealed linear / random cracks or nonfunctioning pavement joints. Unsealed cracks include open or previously sealed cracks that have reopened or from which the sealant has been lost. Nonfunctioning joints include those in which joint filler has been stripped or is not in good condition, or joints that are clogged with debris or weeds. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with unsealed cracks or joints: B+, up to 14.2%; B, up to 18.2%; B-, up to 22.5%.
C	Pavement surface has a substantial degree of unsealed linear / random cracks or nonfunctioning pavement joints. Unsealed cracks include open or previously sealed cracks that have reopened or from which the sealant has been lost. Nonfunctioning joints include those in which joint filler has been stripped or is not in good condition, or joints that are clogged with debris or weeds. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with unsealed cracks or joints: C+, up to 27.1%; C, up to 32.2%; C-, up to 37.9%.
D	Pavement surface is half-covered with unsealed linear / random cracks or nonfunctioning pavement joints. Unsealed cracks include open or previously sealed cracks that have reopened or from which the sealant has been lost. Nonfunctioning joints include those in which joint filler has been stripped or is not in good condition, or joints that are clogged with debris or weeds. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with unsealed cracks or joints: D+, up to 44.3%; D, up to 51.8%; D-, up to 60.5%.
F	Pavement surface is more than half-covered with unsealed linear / random cracks or nonfunctioning pavement joints. Unsealed cracks include open or previously sealed cracks that have reopened or from which the sealant has been lost. Nonfunctioning joints include those in which joint filler has been stripped or is not in good condition, or joints that are clogged with debris or weeds. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with unsealed cracks or joints: F+, up to 70.8%; F, up to 83.2%; F-, more than 83.2%.

## Maintenance Program Area: Roadway Surface

Survey Item: **Pavement Surface Raveling**

Budgeted Activities: **160**

<p style="text-align: center; font-size: 2em;"><b>A</b></p>	<p>Asphalt pavement exhibits little or no surface raveling. Raveling is a loss of asphalt binder that retains the aggregate at the pavement surface which, if allowed to progress, causing loosening of the stones. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing raveling: A+, less than 2.5%; A, up to 4.2%; A-, up to 5.8%.</p>
<p style="text-align: center; font-size: 2em;"><b>B</b></p>	<p>Asphalt pavement exhibits minor surface raveling. Raveling is a loss of asphalt binder that retains the aggregate at the pavement surface which, if allowed to progress, causing loosening of the stones. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing raveling: B+, up to 7.5%; B, up to 10.0%; B-, up to 12.5%.</p>
<p style="text-align: center; font-size: 2em;"><b>C</b></p>	<p>Asphalt pavement exhibits moderate surface raveling. Raveling is a loss of asphalt binder that retains the aggregate at the pavement surface which, if allowed to progress, causing loosening of the stones. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing raveling: C+, up to 15.0%; C, up to 20.0%; C-, up to 24.9%.</p>
<p style="text-align: center; font-size: 2em;"><b>D</b></p>	<p>Asphalt pavement exhibits a large amount of surface raveling. Raveling is a loss of asphalt binder that retains the aggregate at the pavement surface which, if allowed to progress, causing loosening of the stones. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing raveling: D+, up to 30.0%; D, up to 40.0%; D-, up to 48.0%.</p>
<p style="text-align: center; font-size: 2em;"><b>F</b></p>	<p>Asphalt pavement exhibits excessive surface raveling. Raveling is a loss of asphalt binder that retains the aggregate at the pavement surface which, if allowed to progress, causing loosening of the stones. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing raveling: F+, up to 60.0%; F, up to 80.0%; F-, more than 80.0%.</p>

## Maintenance Program Area: Roadway Surface

Survey Item: **Asphalt Surface Oxidation**

Budgeted Activities: **161**

A	Asphalt pavement exhibits little or no surface oxidation. Oxidation is an aging or "drying out" of the asphalt concrete surface that can lead to brittleness and loss of durability. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing oxidation: A+, less than 2.5%; A, up to 4.2%; A-, up to 5.8%.
B	Asphalt pavement exhibits minor surface oxidation. Oxidation is an aging or "drying out" of the asphalt concrete surface that can lead to brittleness and loss of durability. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing oxidation: B+, up to 7.5%; B, up to 11.7%; B-, up to 15.8%.
C	Asphalt pavement exhibits moderate surface oxidation. Oxidation is an aging or "drying out" of the asphalt concrete surface that can lead to brittleness and loss of durability. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing oxidation: C+, up to 20.0%; C, up to 26.7%; C-, up to 33.3%.
D	Asphalt pavement exhibits large areas of surface oxidation. Oxidation is an aging or "drying out" of the asphalt concrete surface that can lead to brittleness and loss of durability. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing oxidation: D+, up to 40.0%; D, up to 50.0%; D-, up to 60.0%.
F	Asphalt pavement exhibits excessive areas of surface oxidation. Oxidation is an aging or "drying out" of the asphalt concrete surface that can lead to brittleness and loss of durability. Approximate limits for levels of service are as follows, expressed in average percent of pavement area showing oxidation: F+, up to 70.0%; F, up to 85.0%; F-, more than 85.0%.

## Maintenance Program Area: **Roadway Surface**

Survey Item: **Shoulder Drop-off > 1.5 inches**

Budgeted Activities: **162**

<b>A</b>	Pavement shoulder exhibits little or no drop-off that is more than 1.5 inches but less than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off between 1.5 and 2.5 inches high: A+, less than 2.5%; A, up to 4.2%; A-, up to 5.8%.
<b>B</b>	Pavement shoulder exhibits a minor amount of shoulder drop-off that is more than 1.5 inches but less than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off between 1.5 and 2.5 inches high: B+, up to 7.5%; B, up to 11.7%; B-, up to 15.8%.
<b>C</b>	Pavement shoulder exhibits a moderate amount of shoulder drop-off that is more than 1.5 inches but less than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off between 1.5 and 2.5 inches high: C+, up to 20.0%; C, up to 26.7%; C-, up to 33.3%.
<b>D</b>	Pavement shoulder exhibits a large amount of shoulder drop-off that is more than 1.5 inches but less than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off between 1.5 and 2.5 inches high: D+, up to 40.0%; D, up to 50.0%; D-, up to 60.0%.
<b>F</b>	Pavement shoulder exhibits an excessive amount of shoulder drop-off that is more than 1.5 inches but less than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off between 1.5 and 2.5 inches high: F+, up to 70.0%; F, up to 85.0%; F-, more than 85.0%.

## Maintenance Program Area: **Roadway Surface**

Survey Item: **Shoulder Drop-off > 2.5 inches**

Budgeted Activities: **163**

<b>A</b>	Pavement shoulder exhibits little or no drop-off that is more than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off greater than 2.5 inches high: A+, less than 2.5%; A, up to 4.2%; A-, up to 5.8%.
<b>B</b>	Pavement shoulder exhibits a minor amount of shoulder drop-off that is more than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off greater than 2.5 inches high: B+, up to 7.5%; B, up to 11.7%; B-, up to 15.8%.
<b>C</b>	Pavement shoulder exhibits a moderate amount of shoulder drop-off that is more than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off greater than 2.5 inches high: C+, up to 20.0%; C, up to 26.7%; C-, up to 33.3%.
<b>D</b>	Pavement shoulder exhibits a large amount of shoulder drop-off that is more than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off greater than 2.5 inches high: D+, up to 40.0%; D, up to 50.0%; D-, up to 60.0%.
<b>F</b>	Pavement shoulder exhibits an excessive amount of shoulder drop-off that is more than 2.5 inches high. Shoulder drop-off refers to the difference in elevation between the paved shoulder surface and the adjacent ground surface. Approximate limits for levels of service are as follows, expressed in average percent of pavement shoulder with drop-off greater than 2.5 inches high: F+, up to 70.0%; F, up to 85.0%; F-, more than 85.0%.






## Maintenance Program Area: Roadway Surface

Survey Item: **Severe Alligator Cracking**

Budgeted Activities: **164**

A	Pavement exhibits little or no severe alligator cracking. Alligator cracking occurs in the wheel paths of asphalt surfaces and indicates fatigue or a structure too weak to carry the traffic loads imposed. Severe alligator cracking causes the surface to be broken up into small pieces and can hasten failure of the pavement base. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with severe alligator cracking: A+, less than 2.5%; A, up to 4.2%; A-, up to 5.8%.
B	Pavement exhibits a minor degree of severe alligator cracking. Alligator cracking occurs in the wheel paths of asphalt surfaces and indicates fatigue or a structure too weak to carry the traffic loads imposed. Severe alligator cracking causes the surface to be broken up into small pieces and can hasten failure of the pavement base. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with severe alligator cracking: B+, up to 7.5%; B, up to 10.8%; B-, up to 14.2%.
C	Pavement exhibits a moderate degree of severe alligator cracking. Alligator cracking occurs in the wheel paths of asphalt surfaces and indicates fatigue or a structure too weak to carry the traffic loads imposed. Severe alligator cracking causes the surface to be broken up into small pieces and can hasten failure of the pavement base. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with severe alligator cracking: C+, up to 17.5%; C, up to 22.5%; C-, up to 27.5%.
D	Pavement exhibits a high degree of severe alligator cracking. Alligator cracking occurs in the wheel paths of asphalt surfaces and indicates fatigue or a structure too weak to carry the traffic loads imposed. Severe alligator cracking causes the surface to be broken up into small pieces and can hasten failure of the pavement base. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with severe alligator cracking: D+, up to 32.5%; D, up to 38.3%; D-, up to 44.2%.
F	Pavement exhibits an excessive degree of severe alligator cracking. Alligator cracking occurs in the wheel paths of asphalt surfaces and indicates fatigue or a structure too weak to carry the traffic loads imposed. Severe alligator cracking causes the surface to be broken up into small pieces and can hasten failure of the pavement base. Approximate limits for levels of service are as follows, expressed in average percent of pavement area with severe alligator cracking: F+, up to 50.0%; F, up to 53.0%; F-, more than 53.0%.

# MPA: Roadside Facilities

Example Roadside Facilities Items	LOS	Description
<p>Litter Pickup</p> 	<p><b>A</b></p>	<p>Condition of drainage inlets, structures, and ditches, right-of-way fences, roadside slopes, and noise walls is excellent, with no damage or defacement. Drainage inlets and ditches are free of debris. Very few or no effects of slope failures or washouts have affected the road in the past year. There is no litter or debris on travel way or shoulder.</p>
<p>Surface Free of Debris</p> 	<p><b>B</b></p>	<p>Roadside facilities show only minor deterioration. Blockages of drainage inlets and ditches are infrequent. Maintenance of fencing or of sound walls is needed in only a few locations. There are scattered pieces of litter or occasional roadway / shoulder debris. A small number of slope failures / washouts affect the road annually.</p>
<p>Debris Moved Off Shoulder</p> 	<p><b>C</b></p>	<p>Roadside facilities show moderate deterioration. Several drainage structures are blocked with silt or debris. Fencing or sound walls require maintenance at a number of locations. Slope failures / washouts affect road availability. Limited patches of litter or sand or debris on the travel way or shoulder occur.</p>
<p>Sound Wall</p> 	<p><b>D</b></p>	<p>A significant level of deterioration has occurred in roadside facilities, including blocked or silted drainage features, damaged right-of-way fencing, damaged or defaced sound walls, and a high annual frequency of slope failures and washouts. There are several patches of unsightly litter or sand / debris on the travel way / shoulder.</p>
<p>Slope Maintenance</p> 	<p><b>F</b></p>	<p>More than half of roadside facilities require maintenance. The condition and intended functions of these facilities are impeded by extensive blockages of drainage inlets and roadside ditches, damaged fencing, damaged or defaced sound walls, or frequent slope failures / washouts. A lot of sand, debris, and litter cover the road and roadside.</p>



## Maintenance Program Area: Roadside Facilities

Survey Item: **Drainage Inlets & Structures**

Budgeted Activities: **202**

<b>A</b>	Drainage inlets and structures are largely free of silt or other blockage. The percentage of inlets that are blocked, and of drainage structures (e.g., culverts, catch basins) in which silt accumulation is more than 25 percent of depth, is very small. Approximate limits for levels of service are as follows, expressed in average percent of drainage structures that are blocked: A+, less than 2.5%; A, up to 4.2%; A-, up to 5.8%.
<b>B</b>	Most drainage inlets and structures are free of silt or other blockage. The percentage of inlets that are blocked, and of drainage structures (e.g., culverts, catch basins) in which silt accumulation is more than 25 percent of depth, is small. Approximate limits for levels of service are as follows, expressed in average percent of drainage structures that are blocked: B+, up to 7.5%; B, up to 10.0%; B-, up to 12.5%.
<b>C</b>	The percentage of inlets that are blocked, and of drainage structures (e.g., culverts, catch basins) in which silt accumulation is more than 25 percent of depth, is moderate. Approximate limits for levels of service are as follows, expressed in average percent of drainage structures that are blocked: C+, up to 15.0%; C, up to 17.5%; C-, up to 19.9%.
<b>D</b>	The percentage of inlets that are blocked, and of drainage structures (e.g., culverts, catch basins) in which silt accumulation is more than 25 percent of depth, is significant. Approximate limits for levels of service are as follows, expressed in average percent of drainage structures that are blocked: D+, up to 22.5%; D, up to 25.0%; D-, up to 27.5%.
<b>F</b>	The percentage of inlets that are blocked, and of drainage structures (e.g., culverts, catch basins) in which silt accumulation is more than 25 percent of depth, is high. Approximate limits for levels of service are as follows, expressed in average percent of drainage structures that are blocked: F+, up to 30.0%; F, up to 50.0%; F-, more than 50.0%.

## Maintenance Program Area: Roadside Facilities

Survey Item: **Drainage Ditches**

Budgeted Activities: **206**

<p style="text-align: center; font-size: 2em;"><b>A</b></p>	<p>Drainage ditches are largely free of debris or silt accumulation. Approximate limits for levels of service are as follows, expressed as the percentage of ditch length with silt accumulation more than 25 percent of ditch depth or other blockage: A+, less than 2.5%; A, up to 4.2%; A-, up to 5.8%.</p>
<p style="text-align: center; font-size: 2em;"><b>B</b></p>	<p>Drainage ditches are mostly free of debris or silt accumulation, although a small number of blockages exist. Approximate limits for levels of service are as follows, expressed as the percentage of ditch length with silt accumulation more than 25 percent of ditch depth or other blockage: B+, up to 7.5%; B, up to 10.0%; B-, up to 12.5%.</p>
<p style="text-align: center; font-size: 2em;"><b>C</b></p>	<p>There are moderate lengths of drainage ditches that are blocked with silt or debris. Approximate limits for levels of service are as follows, expressed as the percentage of ditch length with silt accumulation more than 25 percent of ditch depth or other blockage: C+, up to 15.0%; C, up to 17.5%; C-, up to 19.9%.</p>
<p style="text-align: center; font-size: 2em;"><b>D</b></p>	<p>There are significant lengths of drainage ditches that are blocked with silt or debris. Approximate limits for levels of service are as follows, expressed as the percentage of ditch length with silt accumulation more than 25 percent of ditch depth or other blockage: D+, up to 22.5%; D, up to 25.0%; D-, up to 27.5%.</p>
<p style="text-align: center; font-size: 2em;"><b>F</b></p>	<p>There are long lengths of drainage ditches that are blocked with silt or debris. Approximate limits for levels of service are as follows, expressed as the percentage of ditch length with silt accumulation more than 25 percent of ditch depth or other blockage: F+, up to 30.0%; F, up to 50.0%; F-, more than 50.0%.</p>

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**Maintenance Program Area: Roadside Facilities**
**Survey Item: Slope Failures****Budgeted Activities: 210**

<b>A</b>	Very few or no incidents of slope failures or washouts affect the road annually. Approximate limits for levels of service are as follows, expressed as the annual average number of failures or washouts per 20-mile road length: A+, essentially zero; A, up to 1.0; A-, up to 1.3.
<b>B</b>	A small number of slope failures or washouts affect the road annually. Approximate limits for levels of service are as follows, expressed as the annual average number of failures or washouts per 20-mile road length: B+, up to 1.7; B, up to 2.0; B-, up to 2.7.
<b>C</b>	A moderate number of slope failures or washouts affect the road annually. Approximate limits for levels of service are as follows, expressed as the annual average number of failures or washouts per 20-mile road length: C+, up to 3.8; C, up to 5.5; C-, up to 7.8.
<b>D</b>	There is a high annual frequency of slope failures and washouts. Approximate limits for levels of service are as follows, expressed as the annual average number of failures or washouts per 20-mile road length: D+, up to 10.9; D, up to 15.1; D-, up to 20.7
<b>F</b>	The number of slope failures or washouts annually is very high. Approximate limits for levels of service are as follows, expressed as the annual average number of failures or washouts per 20-mile road length: F+, up to 28.2; F, up to 38.2; F-, more than 38.2.

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**Maintenance Program Area: Roadside Facilities**
**Survey Item: Fencing****Budgeted Activities: 216**

<b>A</b>	Fence condition is excellent, with few or no locations of damaged or missing fencing. Approximate limits for levels of service are as follows, expressed as the percent of fence length requiring maintenance, repair, or replacement: A+, less than 0.05% (essentially zero); A, up to 1.9%; A-, up to 3.7%.
<b>B</b>	Fence condition is good, with only a few locations of damaged or missing fencing. Approximate limits for levels of service are as follows, expressed as the percent of fence length requiring maintenance, repair, or replacement: B+, up to 5.5%; B, up to 8.7%; B-, up to 11.8%.
<b>C</b>	Fence condition is fair, with a number of locations of damaged or missing fencing. Approximate limits for levels of service are as follows, expressed as the percent of fence length requiring maintenance, repair, or replacement: C+, up to 15.0%; C, up to 20.0%; C-, up to 24.9%.
<b>D</b>	Fence condition is marginal, with many locations of damaged or missing fencing. Approximate limits for levels of service are as follows, expressed as the percent of fence length requiring maintenance, repair, or replacement: D+, up to 30.0%; D, up to 43.3%; D-, up to 56.7%.
<b>F</b>	Fence condition is poor, with more than half of the fence damaged or missing. Approximate limits for levels of service are as follows, expressed as the percent of fence length requiring maintenance, repair, or replacement: F+, up to 70.0%; F, up to 80.0%; F-, more than 80.0%.

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**Maintenance Program Area: Roadside Facilities**
**Survey Item: Sound Barriers****Budgeted Activities: 217**

<b>A</b>	Sound barriers are in excellent condition, requiring little or no maintenance. Approximate limits for levels of service are as follows, expressed as the percent of sound barrier length requiring maintenance repairs: A+, less than 0.05% (essentially zero); A, up to 1.9%; A-, up to 3.7%.
<b>B</b>	Sound barriers are in good condition, requiring little maintenance. Approximate limits for levels of service are as follows, expressed as the percent of sound barrier length requiring maintenance repairs: B+, up to 5.5%; B, up to 8.7%; B-, up to 11.3%.
<b>C</b>	Sound barriers require a moderate amount of maintenance. Approximate limits for levels of service are as follows, expressed as the percent of sound barrier length requiring maintenance repairs: C+, up to 15.0%; C, up to 20.0%; C-, up to 24.9%.
<b>D</b>	Sound barriers require a significant amount of maintenance. Approximate limits for levels of service are as follows, expressed as the percent of sound barrier length requiring maintenance repairs: D+, up to 30.0%; D, up to 43.3%; D-, up to 56.7%.
<b>F</b>	Sound barriers require an extensive amount of maintenance. Approximate limits for levels of service are as follows, expressed as the percent of sound barrier length requiring maintenance repairs: F+, up to 70.0%; F, up to 80.0%; F-, more than 80.0%.

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**Maintenance Program Area: Roadside Facilities**
**Survey Item: Roadside Litter, Debris**
**Budgeted Activities: 218, 218.10**

<b>A</b>	There is no litter or debris on the roadside or shoulder. Approximate limits for levels of service are as follows, expressed as the percent of roadside area affected by litter: A+, zero; A, up to 1.4%; A-, up to 2.9%.
<b>B</b>	There are scattered pieces of litter or occasional instances of debris on the shoulder or roadside. Approximate limits for levels of service are as follows, expressed as the percent of roadside area affected by litter: B+, up to 4.6%; B, up to 6.5%; B-, up to 8.6%.
<b>C</b>	Limited areas of litter or debris occur. Approximate limits for levels of service are as follows, expressed as the percent of roadside area affected by litter: C+, up to 11.1%; C, up to 14.0%; C-, up to 17.6%.
<b>D</b>	Several areas of litter or debris occur. Approximate limits for levels of service are as follows, expressed as the percent of roadside area affected by litter: D+, up to 21.9%; D, up to 27.1%; D-, up to 33.7%.
<b>F</b>	Much of the roadside is covered with litter or debris. Approximate limits for levels of service are as follows, expressed as the percent of roadside area affected by litter: F+, up to 42.0%; F, up to 52.6%; F-, more than 52.6%.

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**Maintenance Program Area: Roadside Facilities**
**Survey Item: Roadway Debris****Budgeted Activities: 220**

<b>A</b>	There is no litter or debris on the roadway. Approximate limits for levels of service are as follows, expressed as the percent of roadway area affected by debris: A+, zero; A, up to 1.4%; A-, up to 2.9%.
<b>B</b>	There are scattered locations of debris on the roadway. Approximate limits for levels of service are as follows, expressed as the percent of roadway area affected by debris: B+, up to 4.6%; B, up to 6.5%; B-, up to 8.6%.
<b>C</b>	Limited areas of debris occur. Approximate limits for levels of service are as follows, expressed as the percent of roadway area affected by debris: C+, up to 11.1%; C, up to 14.0%; C-, up to 17.6%.
<b>D</b>	Several areas of debris occur. Approximate limits for levels of service are as follows, expressed as the percent of roadway area affected by debris: D+, up to 21.9%; D, up to 27.1%; D-, up to 33.7%.
<b>F</b>	Much of the roadway is covered with debris. Approximate limits for levels of service are as follows, expressed as the percent of roadway area affected by debris: F+, up to 42.0%; F, up to 52.6%; F-, more than 52.6%.






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**Maintenance Program Area: Roadside Facilities**
**Survey Item: Shoulder with Sand****Budgeted Activities: 222**

<b>A</b>	There is no sand on the shoulder. Approximate limits for levels of service are as follows, expressed as the percent of shoulder area affected by sand: A+, zero; A, up to 1.4%; A-, up to 2.9%.
<b>B</b>	There is a small amount of sand on the shoulder. Approximate limits for levels of service are as follows, expressed as the percent of shoulder area affected by sand: B+, up to 4.6%; B, up to 6.5%; B-, up to 8.6%.
<b>C</b>	Several areas of sand occur. Approximate limits for levels of service are as follows, expressed as the percent of shoulder area affected by sand: C+, up to 11.1%; C, up to 14.0%; C-, up to 17.6%.
<b>D</b>	Moderate areas of sand occur. Approximate limits for levels of service are as follows, expressed as the percent of shoulder area affected by sand: D+, up to 21.9%; D, up to 27.1%; D-, up to 33.7%.
<b>F</b>	Much of the shoulder is covered with sand. Approximate limits for levels of service are as follows, expressed as the percent of shoulder area affected by sand: F+, up to 42.0%; F, up to 52.6%; F-, more than 52.6%.



# MPA: Roadside Appearance

Example Roadside Appearance Items	LOS	Description
<p>Grass Mowing</p> 	<p><b>A</b></p>	<p>Road appearance is excellent, characterized by well tended landscaping and vegetation, grass mowing at intended locations and schedules, and absence of noxious weeds.</p>
<p>Vegetation Control</p> 	<p><b>B</b></p>	<p>Road appearance is superior, with only infrequent or minor instances of unkempt or infested landscaping and other vegetation, grass requiring mowing, or scattered occurrences of noxious weeds.</p>
<p>Vegetation Needs Control</p> 	<p><b>C</b></p>	<p>Appearance overall is good, but with one or more of the following problems: grass requiring mowing; selected areas of landscaping or vegetation requiring trimming or treatment; and locations where noxious weeds are present.</p>
<p>Vegetation Control</p> 	<p><b>D</b></p>	<p>A significant number of items detract from road appearance, including high grass requiring mowing, a number of landscaped or vegetated areas requiring trimming or treatment, and noxious weeds affecting up to half of road length.</p>
<p>Vegetation Control</p> 	<p><b>F</b></p>	<p>Road appearance is extensively degraded by situations such as excessively high grass requiring mowing, landscaping and vegetation requiring trimming or treatment, and noxious weeds affecting most of the road length.</p>

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 Maintenance Program Area: **Roadside Appearance**
Survey Item: **Grass Mowing**Budgeted Activities: **252, 253, 254**

<b>A</b>	Roadside appearance is excellent, with grass regularly mowed and trimmed at intended locations.
<b>B</b>	Roadside appearance is superior, with only infrequent or minor instances of grass requiring mowing or trimming, and quick correction of these situations.
<b>C</b>	Roadside appearance is good overall, but areas exist where grass requires mowing or trimming.
<b>D</b>	High grass requiring mowing or untrimmed grass along most or all of the road length detracts from its appearance.
<b>F</b>	Excessively high or untrimmed grass significantly degrades roadside appearance, and may present problems affecting visual sight distances or fire hazard.

## Maintenance Program Area: **Roadside Appearance**

Survey Item: **noxious weeds**

Budgeted Activities: **25**

<b>A</b>	Roadside appearance is excellent, with noxious weeds absent. Approximate limits for levels of service are as follows, expressed as the percentage of highway length along which noxious weeds are present: A+, less than 5.5%; A, up to 8.7%; A-, up to 11.8%.
<b>B</b>	Roadside appearance is superior, with only scattered occurrences of noxious weeds. Approximate limits for levels of service are as follows, expressed as the percentage of highway length along which noxious weeds are present: B+, up to 15.0%; B, up to 20.0%; B-, up to 25.0%.
<b>C</b>	Roadside appearance is good overall, but noxious weeds are present at several locations. Approximate limits for levels of service are as follows, expressed as the percentage of highway length along which noxious weeds are present: C+, up to 30.0%; C, up to 35.0%; C-, up to 39.9%.
<b>D</b>	Noxious weeds affect roadside for up to half the road segment length. Approximate limits for levels of service are as follows, expressed as the percentage of highway length along which noxious weeds are present: D+, up to 45.0%; D, up to 50.0%; D-, up to 55.0%.
<b>F</b>	Noxious weeds affect most of the road length. Approximate limits for levels of service are as follows, expressed as the percentage of highway length along which noxious weeds are present: F+, up to 60.0%; F, up to 70.0%; F-, more than 55.0%.






## Maintenance Program Area: **Roadside Appearance**

Survey Item: **landscaping Appearance**

Budgeted Activities: **25 , 2**

<b>A</b>	Roadside appearance is excellent, characterized by well-tended landscaping and vegetation. Approximate limits for levels of service are as follows, expressed as the percent of landscaping area requiring maintenance (activity 258), or as the percent of trees and shrubs requiring maintenance (activity 260): A+, less than 3.7%; A, up to 7.1%; A-, up to 10.7%.
<b>B</b>	Roadside appearance is superior, characterized by well-tended landscaping and vegetation with only infrequent or minor instances of unkempt areas. Approximate limits for levels of service are as follows, expressed as the percent of landscaping area requiring maintenance (activity 258), or as the percent of trees and shrubs requiring maintenance (activity 260): B+, up to 14.5%; B, up to 18.5%; B-, up to 22.8%.
<b>C</b>	The overall appearance of the roadside is good, but selected areas of landscaping and vegetation require trimming or treatment. Approximate limits for levels of service are as follows, expressed as the percent of landscaping area requiring maintenance (activity 258), or as the percent of trees and shrubs requiring maintenance (activity 260): C+, up to 27.4%; C, up to 32.5%; C-, up to 38.2%.
<b>D</b>	Several areas of landscaping and vegetation detract from roadside appearance and require trimming or treatment. Approximate limits for levels of service are as follows, expressed as the percent of landscaping area requiring maintenance (activity 258), or as the percent of trees and shrubs requiring maintenance (activity 260): D+, up to 44.6%; D, up to 52.1%; D-, up to 60.8%.
<b>F</b>	Roadside appearance is degraded by areas of landscaping and vegetation that require extensive trimming or treatment. Approximate limits for levels of service are as follows, expressed as the percent of landscaping area requiring maintenance (activity 258), or as the percent of trees and shrubs requiring maintenance (activity 260): F+, up to 71.1%; F, up to 83.5%; F-, more than 83.5%.

# MPA: Traffic Services

Example Traffic Services Items	LOS	Description
<p>Signs, Sign Lighting</p> 	<p><b>A</b></p>	<p>Traffic devices are in excellent physical and operating condition. Lights and signals are intact and working. Signs are undamaged, clean and unfaded, and very legible. Lane dividers and other pavement markings are distinct and visible both daytime and nighttime. Guardrail, appurtenances, and ITS devices meet spec and are fully functional.</p>
<p>Traffic Signals</p> 	<p><b>B</b></p>	<p>Traffic devices are in superior physical and operating condition, with only minor or infrequent problems. A small number of lights, signals, and signs may be damaged or not fully functional. Pavement markings are visible day and night, with little obliteration. Guardrail, appurtenances, and ITS devices may have a few problem locations.</p>
<p>Pavement Striping</p> 	<p><b>C</b></p>	<p>Traffic devices are in overall good condition, but a moderate number of problems may exist: e.g., damaged lighting, sign, and signal posts, standards, and loops; burned-out lamps; signs or pavement markings not completely visible at both day and night; and guardrails, appurtenances, and ITS devices that are missing or not up to spec.</p>
<p>High-Mast Lighting</p> 	<p><b>D</b></p>	<p>Traffic devices exhibit a number of problems with missing, broken, non-functioning, or not-to-spec items: e.g., signs that are bent, broken, or not legible; pavement markings that are not fully visible day and night; signals and lighting that are damaged or not working; and guardrails, appurtenances and ITS devices that are missing or not-to-spec.</p>
<p>Delineator Posts</p> 	<p><b>F</b></p>	<p>An extensive number of missing, broken, non-functioning, or not-to-spec items affect traffic devices: e.g., signs that are damaged or not legible; pavement markings that are obliterated; signals and lighting that are damaged or not working; and damaged, missing, or non-working appurtenances, sections of guardrail, and ITS devices.</p>

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**Maintenance Program Area: Traffic Services**
**Survey Item: Traffic Signs****Budgeted Activities: 302, 303**

<b>A</b>	Traffic signs are in excellent condition. The sign board is undamaged, clean, unfaded, and clearly readable in day or night. Sign supports and breakaway devices are undamaged and otherwise in good condition. Approximate limits for levels of service, expressed in percent of signs that are faded, have damaged or non-working components, or cannot be easily read at night, are as follows: A+, less than 0.05% (essentially zero); A, up to 1.0%; A-, up to 2%.
<b>B</b>	Traffic signs are in superior condition, with only infrequent problems. A small percentage of sign boards are damaged, faded, or not readable at day or night. A small percentage of supports or breakaway devices are damaged or not working. Approximate limits for levels of service, expressed in percent of signs that are faded, have damaged or non-working components, or cannot be easily read at night, are as follows: B+, up to 3.0%; B, up to 4.5%; B-, up to 6.0%.
<b>C</b>	Traffic signs are in good condition overall, but a moderate number of problems exist in one or more of the following areas: Sign boards are damaged, faded, or not easily readable at day or night. Supports or breakaway devices are damaged or not working. Approximate limits for levels of service, expressed in percent of signs that are faded, have damaged or non-working components, or cannot be easily read at night, are as follows: C+, up to 7.5%; C, up to 9.2%; C-, up to 10.7%.
<b>D</b>	A significant number of traffic signs exhibit problems in one or more of the following areas: Sign boards are damaged, faded, or not easily readable at day or night. Supports or breakaway devices are damaged or not working. Approximate limits for levels of service, expressed in percent of signs that are faded, have damaged or non-working components, or cannot be easily read at night, are as follows: D+, up to 12.5%; D, up to 14.3%; D-, up to 16.2%.
<b>F</b>	An extensive number of traffic signs exhibit problems in one or more of the following areas: Sign boards are damaged, faded, or not easily readable at day or night. Supports or breakaway devices are damaged or not working. Approximate limits for levels of service, expressed in percent of signs that are faded, have damaged or non-working components, or cannot be easily read at night, are as follows: F+, up to 18.0%; F, up to 20.0%; F-, more than 20.0%.

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**Maintenance Program Area: Traffic Services**
**Survey Item: Delineators, Mile Markers**
**Budgeted Activities: 304**

<b>A</b>	Delineator posts and reflectors and mile markers are in excellent condition. Few or none are missing, posts are straight and undamaged, and reflectors and mile markers are easily visible. Approximate limits for levels of service are as follows, expressed as the percent of delineators and mile markers that are missing or defective: A+, less than 2.5%; A, up to 4.2%; A-, up to 5.8%.
<b>B</b>	Delineator posts and reflectors and mile markers are in superior condition. A small number are missing, or have posts that are bent or damaged, or have reflectors or mile markers that are not easily visible. Approximate limits for levels of service are as follows, expressed as the percent of delineators and mile markers that are missing or defective: B+, up to 7.5%; B, up to 9.2%; B-, up to 10.8%.
<b>C</b>	Delineator posts and reflectors and mile markers are in overall good condition. However, a moderate number are missing, or have posts that are bent or damaged, or have reflectors or mile markers that are not easily visible. Approximate limits for levels of service are as follows, expressed as the percent of delineators and mile markers that are missing or defective: C+, up to 12.5%; C, up to 14.2%; C-, up to 15.7%.
<b>D</b>	A significant number of delineator posts and reflectors and mile markers are missing, or have posts that are bent or damaged, or have reflectors or mile markers that are not easily visible. Approximate limits for levels of service are as follows, expressed as the percent of delineators and mile markers that are missing or defective: D+, up to 17.5%; D, up to 19.2%; D-, up to 20.8%.
<b>F</b>	An extensive number of delineator posts and reflectors and mile markers are missing, or have posts that are bent or damaged, or have reflectors or mile markers that are not easily visible. Approximate limits for levels of service are as follows, expressed as the percent of delineators and mile markers that are missing or defective: F+, up to 22.5%; F, up to 30.0%; F-, more than 30.0%.

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**Maintenance Program Area: Traffic Services**
**Survey Item: Steel Guardrail**
**Budgeted Activities: 306**

<p style="text-align: center; font-size: 2em; font-weight: bold;">A</p>	<p>The condition of steel guardrail overall is excellent. Posts and rail conform to spec regarding deviation from proper alignment and amount of damage sustained. Approximate limits for levels of service are as follows, expressed as the percent of steel guard rail length out of spec or not functional: A+, less than 0.1% (essentially zero); A, up to 1.9%; A-, up to 3.7%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">B</p>	<p>The condition of steel guardrail overall is superior. Posts and rail for the most part conform to spec regarding deviation from proper alignment and amount of damage sustained, with very few deviations. Approximate limits for levels of service are as follows, expressed as the percent of steel guard rail length out of spec or not functional: B+, up to 5.5%; B, up to 7.8%; B-, up to 10.2%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">C</p>	<p>The condition of steel guardrail overall is good, but a number of problems exist. At several locations posts and rail do not conform to spec regarding deviation from proper alignment and amount of damage sustained. Approximate limits for levels of service are as follows, expressed as the percent of steel guard rail length out of spec or not functional: C+, up to 12.5%; C, up to 14.2%; C-, up to 15.7%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">D</p>	<p>The condition of steel guardrail overall is fair. A number of posts and rails do not conform to spec regarding deviation from proper alignment and amount of damage sustained. Approximate limits for levels of service are as follows, expressed as the percent of steel guard rail length out of spec or not functional: D+, up to 17.5%; D, up to 19.0%; D-, up to 20.5%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">F</p>	<p>The condition of steel guardrail overall is marginal. Many posts and rails do not conform to spec regarding deviation from proper alignment and amount of damage sustained. Approximate limits for levels of service are as follows, expressed as the percent of steel guard rail length out of spec or not functional: F+, up to 22.0%; F, up to 25.0%; F-, more than 25.0%.</p>



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**Maintenance Program Area: Traffic Services**
**Survey Item: Concrete Guardrail**
**Budgeted Activities: 307**

<p style="text-align: center; font-size: 2em; font-weight: bold;">A</p>	<p>The condition of concrete guardrail overall is excellent. Posts and rail conform to spec regarding amount of damage and deterioration sustained. Approximate limits for levels of service are as follows, expressed as the percent of concrete guard rail length not conforming to spec or not functional: A+, less than 0.1% (essentially zero); A, up to 1.9%; A-, up to 3.7%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">B</p>	<p>The condition of concrete guardrail overall is superior. Posts and rail for the most part conform to spec regarding amount of damage and deterioration sustained, with very few deviations. Approximate limits for levels of service are as follows, expressed as the percent of concrete guard rail length not conforming to spec or not functional: B+, up to 5.5%; B, up to 7.8%; B-, up to 10.2%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">C</p>	<p>The condition of concrete guardrail overall is good, but a number of problems exist. At several locations posts and rail do not conform to spec regarding amount of damage and deterioration sustained. Approximate limits for levels of service are as follows, expressed as the percent of concrete guard rail length not conforming to spec or not functional: C+, up to 12.5%; C, up to 14.2%; C-, up to 15.7%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">D</p>	<p>The condition of concrete guardrail overall is fair. A number of posts and rails do not conform to spec regarding amount of damage and deterioration sustained. Approximate limits for levels of service are as follows, expressed as the percent of concrete guard rail length not conforming to spec or not functional: D+, up to 17.5%; D, up to 19.0%; D-, up to 20.5%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">F</p>	<p>The condition of concrete guardrail overall is marginal. Many posts and rails do not conform to spec regarding amount of damage and deterioration sustained. Approximate limits for levels of service are as follows, expressed as the percent of concrete guard rail length not conforming to spec or not functional: F+, up to 22.0%; F, up to 25.0%; F-, more than 25.0%.</p>

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**Maintenance Program Area: Traffic Services**
**Survey Item: Striping, Markings**
**Budgeted Activities: 308, 310**

<b>A</b>	Pavement striping and other markings are in generally excellent condition, with high visibility and reflectivity in daytime and nighttime, and little or no wearing or obliteration. Approximate limits for levels of service are as follows, expressed as a percent of striping and other pavement markings that are worn or not easily visible: A+, less than 5.0%; A, up to 9.2%; A-, up to 13.3%.
<b>B</b>	Pavement striping and other markings are in generally good condition, visible in daytime and nighttime, and showing only minor wearing or obliteration. Approximate limits for levels of service are as follows, expressed as a percent of striping and other pavement markings that are worn or not easily visible: B+, up to 17.5%; B, up to 22.5%; B-, up to 27.5%.
<b>C</b>	Pavement striping and other markings are in fair condition, generally visible in daytime and nighttime, but with noticeable wearing, obliteration, or loss of reflectivity. Approximate limits for levels of service are as follows, expressed as a percent of striping and other pavement markings that are worn or not easily visible: C+, up to 32.5%; C, up to 36.7%; C-, up to 40.7%.
<b>D</b>	Pavement striping and other markings are in marginal condition, with noticeable wearing, obliteration, or loss of reflectivity in almost half of the markings. Approximate limits for levels of service are as follows, expressed as a percent of striping and other pavement markings that are worn or not easily visible: D+, up to 45.0%; D, up to 48.3%; D-, up to 45.7%.
<b>F</b>	Pavement striping and markings are essentially worn or obliterated. Markings that are still present are not easily visible. Approximate limits for levels of service are as follows, expressed as a percent of striping and other pavement markings that are worn or not easily visible: F+, up to 55.0%; F, up to 75.0%; F-, more than 75.0%.

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**Maintenance Program Area: Traffic Services**
**Survey Item: Sign Lighting****Budgeted Activities: 312**

<b>A</b>	Lighting for signs is in excellent physical and operating condition. Lamps are intact and working. Approximate limits for levels of service are as follows, expressed as the percent of sign lighting not working: A+, less than 1.0%; A, up to 2.7%; A-, up to 4.3%.
<b>B</b>	Lighting for signs is in very good physical and operating condition. Lamps are intact and working in most cases, with few instances of damage or failed lamps. Approximate limits for levels of service are as follows, expressed as the percent of sign lighting not working: B+, up to 6.0%; B, up to 8.2%; B-, up to 10.3%.
<b>C</b>	Lighting for signs is in good physical and operating condition. Lamps are intact and working in many cases, but with several instances of damaged or failed lamps. Approximate limits for levels of service are as follows, expressed as the percent of sign lighting not working: C+, up to 12.5%; C, up to 15.0%; C-, up to 17.4%.
<b>D</b>	Lighting for signs is in fair physical and operating condition. While the majority of lamps are intact and working, about one-quarter of them are damaged or failed. Approximate limits for levels of service are as follows, expressed as the percent of sign lighting not working: D+, up to 20.0%; D, up to 24.0%; D-, up to 28.0%.
<b>F</b>	Lighting for signs is in poor physical and operating condition. About one-third of lamps are damaged or failed. Approximate limits for levels of service are as follows, expressed as the percent of sign lighting not working: F+, up to 32.0%; F, up to 35.0%; F-, up to 40.0%.

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**Maintenance Program Area: Traffic Services**
**Survey Item: Traffic Signals**
**Budgeted Activities: 314**

<b>A</b>	Traffic signals are in excellent physical and operating condition. Lamps and signal timing are working properly; there is little or no structural damage to posts, arms, and standards; and loops in pavement are undamaged. Approximate limits for levels of service are as follows, expressed as the percent of signals with structural or electrical components damaged or not working properly: A+, less than 0.05% (essentially zero); A, up to 0.7%; A-, up to 1.4%.
<b>B</b>	Traffic signals are in very good physical and operating condition. Lamps and signal timing are for the most part working properly; there is little or no structural damage to posts, arms, and standards; and loops in pavement are largely undamaged. Approximate limits for levels of service are as follows, expressed as the percent of signals with structural or electrical components damaged or not working properly: B+, up to 2.0%; B, up to 2.7%; B-, up to 3.3%.
<b>C</b>	Traffic signals are in good physical and operating condition. Lamps and signal timing are largely working properly; structural damage to posts, arms, and standards is infrequent; and loops in pavement are largely undamaged. Approximate limits for levels of service are as follows, expressed as the percent of signals with structural or electrical components damaged or not working properly: C+, up to 4.0%; C, up to 5.2%; C-, up to 6.2%.
<b>D</b>	Traffic signals are in fair physical and operating condition, with about ten percent exhibiting one or more of the following problems: lamps and signal timing are not working properly; there is structural damage to posts, arms, and standards; or loops in pavement are damaged. Approximate limits for levels of service are as follows, expressed as the percent of signals with structural or electrical components damaged or not working properly: D+, up to 7.5%; D, up to 10.0%; D-, up to 12.5%.
<b>F</b>	Traffic signals are in poor physical and operating condition, with more than ten percent exhibiting one or more of the following problems: lamps and signal timing are not working properly; there is structural damage to posts, arms, and standards; or loops in pavement are damaged. Approximate limits for levels of service are as follows, expressed as the percent of signals with structural or electrical components damaged or not working properly: F+, up to 15.0%; F, up to 20.0%; F-, more than 20.0%.

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**Maintenance Program Area: Traffic Services**
**Survey Item: Energy Attenuators**
**Budgeted Activities: 316**






<p style="text-align: center; font-size: 2em; font-weight: bold;">A</p>	<p>Energy attenuators are in excellent condition, positioned and filled properly and completely functional. Approximate limits for levels of service are as follows, expressed as the percent of attenuator locations requiring maintenance attention: A+, less than 1.2%; A, up to 2.5%; A-, up to 3.9%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">B</p>	<p>Energy attenuators are in very good condition, with most locations having attenuators positioned and filled properly and completely functional. Approximate limits for levels of service are as follows, expressed as the percent of attenuator locations requiring maintenance attention: B+, up to 5.3%; B, up to 6.7%; B-, up to 8.3%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">C</p>	<p>Energy attenuators are in good condition, with many locations having attenuators positioned and filled properly and completely functional. Approximate limits for levels of service are as follows, expressed as the percent of attenuator locations requiring maintenance attention: C+, up to 10.0%; C, up to 11.9%; C-, up to 13.9%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">D</p>	<p>Energy attenuators are in fair condition. While many locations have attenuators positioned and filled properly and completely functional, a significant number do not. Approximate limits for levels of service are as follows, expressed as the percent of attenuator locations requiring maintenance attention: D+, up to 16.0%; D, up to 18.5%; D-, up to 21.2%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">F</p>	<p>Energy attenuators are in poor condition. While the majority of locations have attenuators positioned and filled properly and completely functional, a significant number do not. Approximate limits for levels of service are as follows, expressed as the percent of attenuator locations requiring maintenance attention: F+, up to 24.2%; F, up to 27.7%; F-, more than 27.7%.</p>

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**Maintenance Program Area: Traffic Services**
**Survey Item: Electrical Systems, Wires**
**Budgeted Activities: 320**

<b>A</b>	Electrical systems comprising surveillance cameras, variable message signs, other ITS devices, and associated wiring are in excellent working order, with few or no instances of non-working components. Approximate limits for levels of service are as follows, expressed as the percent of devices or components that are not functional: A+, less than 1.2%; A, up to 2.5%; A-, up to 3.9%.
<b>B</b>	Electrical systems comprising surveillance cameras, variable message signs, other ITS devices, and associated wiring are in good working order, with a few instances of non-working components. Approximate limits for levels of service are as follows, expressed as the percent of devices or components that are not functional: B+, up to 5.3%; B, up to 6.7%; B-, up to 8.3%.
<b>C</b>	Electrical systems comprising surveillance cameras, variable message signs, other ITS devices, and associated wiring are in fair working order, with a number of non-working components. Approximate limits for levels of service are as follows, expressed as the percent of devices or components that are not functional: C+, up to 10.0%; C, up to 11.9%; C-, up to 13.9%.
<b>D</b>	Electrical systems comprising surveillance cameras, variable message signs, other ITS devices, and associated wiring have more than fifteen percent of components not working. Approximate limits for levels of service are as follows, expressed as the percent of devices or components that are not functional: D+, up to 16.0%; D, up to 18.5%; D-, up to 21.2%.
<b>F</b>	Electrical systems comprising surveillance cameras, variable message signs, other ITS devices, and associated wiring are in poor working order, with more than twenty percent of components not working. Approximate limits for levels of service are as follows, expressed as the percent of devices or components that are not functional: F+, up to 24.2%; F, up to 27.7%; F-, more than 27.7%.

# MPA: Structure Maintenance

Illustration	LOS	Description
	<p><b>A</b></p>	<p>Maintenance items of bridges are in excellent condition. Decks, deck features, and weep holes are clean. Deck, curbs, expansion joints, and railings are in good condition with all defects repaired. Bearings are clean and serviced. Paint coating on bridge steel is intact. Bridge structure, approaches, and slopes do not require maintenance.</p>
	<p><b>B</b></p>	<p>Maintenance items of bridges are in superior condition. Decks, deck features, and weep holes are mostly clean, with little debris or need for washing. Minor or infrequent defects occur in deck surface, railings, expansion joints, structure, approaches, or slopes. A small percentage of bearings and of painted steel require maintenance.</p>
	<p><b>C</b></p>	<p>Maintenance items of bridges are in good condition, but some features require work: e.g., cleaning or washing of decks, curbs, and weep holes; patching of deck surface; and repair, servicing, or painting of expansion devices, railings, bearings, structural members, approaches, or slopes.</p>
	<p><b>D</b></p>	<p>A significant number of bridge features require maintenance. Decks, deck features, and weep holes must be cleaned or washed. Decks, curbs, expansion joints, or railings may impede use and require repair. Bearings must be cleaned and serviced. Bridge steel requires painting. Bridge structure, approaches, and slopes need repair.</p>
	<p><b>F</b></p>	<p>An extensive number of bridge features require maintenance of potentially major distress. Decks, curbs, expansion joints, or railings require repair and may pose a safety hazard. Bearings must be cleaned and serviced. Bridge steel requires painting to allay structural deterioration. Bridge structure, approaches, and slopes need repair.</p>

## Maintenance Program Area: **Structures**

Survey Item: **Bridge Inspection**

Budgeted Activities: **351**

<b>A</b>	Bridges are inspected at least every two years to conform to federal regulation, and in some cases more frequently. Approximate limits for levels of service are as follows, expressed as the average interval, in years, between successive inspections of a bridge: A+, at least every 1.7 years; A, up to 1.8 years; A-, up to (and including) 2.0 years.
<b>B</b>	Many bridges are inspected every two years to conform to federal regulation, but in some cases the interval between inspections is greater. Approximate limits for levels of service are as follows, expressed as the average interval, in years, between successive inspections of a bridge: B+, up to 2.2 years; B, up to 2.3 years; B-, up to 2.5 years.
<b>C</b>	Bridges are inspected on average every 2.5 to 3.0 years, exceeding the limits specified in federal regulation. Approximate limits for levels of service are as follows, expressed as the average interval, in years, between successive inspections of a bridge: C+, up 2.7 years; C, up to 2.8 years; C-, up to 3 years.
<b>D</b>	Bridges are inspected on average about every 3.5 years, exceeding the limits specified in federal regulation. Approximate limits for levels of service are as follows, expressed as the average interval, in years, between successive inspections of a bridge: D+, up 3.2 years; D, up to 3.3 years; D-, up to 3.5 years.
<b>F</b>	Bridges are inspected on average every 3.5 to 4 years or more, exceeding the limits specified in federal regulation. Approximate limits for levels of service are as follows, expressed as the average interval, in years, between successive inspections of a bridge: F+, up 3.7 years; F, up to 3.8 years; F-, more than 3.8 years.



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**Maintenance Program Area: Structures**
**Survey Item: Bridge Cleaning**
**Budgeted Activities: 352**

<p style="text-align: center; font-size: 2em; font-weight: bold;">A</p>	<p>Bridge decks are largely free of debris and residue from snow and ice operations. Approximate limits for levels of service are as follows, expressed as percent of bridge decks requiring cleaning: A+, less than 3%; A, up to 7%; A-, up to 10%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">B</p>	<p>Bridge decks are moderately free of debris and residue from snow and ice operations. Approximate limits for levels of service are as follows, expressed as percent of bridge decks requiring cleaning: B+, up to 13%; B, up to 17%; B-, up to 20%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">C</p>	<p>Approximately one-quarter of the bridge decks require cleaning of debris or residue from snow and ice operations. Approximate limits for levels of service are as follows, expressed as percent of bridge decks requiring cleaning: C+, up to 23%; C, up to 27%; C-, up to 30%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">D</p>	<p>One-third or more of the bridge decks require cleaning of debris or residue from snow and ice operations. Approximate limits for levels of service are as follows, expressed as percent of bridge decks requiring cleaning: D+, up to 33%; D, up to 37%; D-, up to 40%.</p>
<p style="text-align: center; font-size: 2em; font-weight: bold;">F</p>	<p>Almost half of the bridge decks require cleaning of debris or residue from snow and ice operations. Approximate limits for levels of service are as follows, expressed as percent of bridge decks requiring cleaning: F+, up to 43%; F, up to 47%; F-, more than 47%.</p>

## Maintenance Program Area: **Structures**

Survey Item: **Bridge Decks**

Budgeted Activities: **353**

<b>A</b>	Bridge decks are in excellent condition, with few instances of surface defects. Defects on concrete or overlaid concrete decks include spalls or potholes, cracking, or small areas of delamination or exposure of the underlying rebar; and on timber decks, small areas of decay, splitting, crushing, or infestation. Approximate limits for levels of service are as follows, expressed as the percent of deck elements with defects requiring maintenance: A+, less than 3%; A, up to 7%; A-, up to 10%.
<b>B</b>	Bridge decks are in generally good condition, but there are a number of instances of surface defects. Defects on concrete or overlaid concrete decks include spalls or potholes, cracking, or small areas of delamination or exposure of the underlying rebar; and on timber decks, small areas of decay, splitting, crushing, or infestation. Approximate limits for levels of service are as follows, expressed as the percent of deck elements with defects requiring maintenance: B+, up to 13%; B, up to 17%; B-, up to 20%.
<b>C</b>	Bridge decks are in generally fair condition, with a moderate number of decks with surface defects. Defects on concrete or overlaid concrete decks include spalls or potholes, cracking, or small areas of delamination or exposure of the underlying rebar; and on timber decks, small areas of decay, splitting, crushing, or infestation. Approximate limits for levels of service are as follows, expressed as the percent of deck elements with defects requiring maintenance: C+, up to 23%; C, up to 27%; C-, up to 30%.
<b>D</b>	Bridge decks are in generally marginal condition, with a large number of decks having surface defects. Defects on concrete or overlaid concrete decks include spalls or potholes, cracking, or small areas of delamination or exposure of the underlying rebar; and on timber decks, small areas of decay, splitting, crushing, or infestation. Approximate limits for levels of service are as follows, expressed as the percent of deck elements with defects requiring maintenance: D+, up to 33%; D, up to 37%; D-, up to 40%.
<b>F</b>	Bridge decks are in poor condition, with almost half of the decks having surface defects. Defects on concrete or overlaid concrete decks include spalls or potholes, cracking, or small areas of delamination or exposure of the underlying rebar; and on timber decks, small areas of decay, splitting, crushing, or infestation. Approximate limits for levels of service are as follows, expressed as the percent of deck elements with defects requiring maintenance: F+, up to 43%; F, up to 47%; F-, more than 47%.

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**Maintenance Program Area: Structures**
**Survey Item: Bridge Superstructure**
**Budgeted Activities: 354**

<b>A</b>	Bridge superstructures are in excellent condition, with little or no repair needed to steel, concrete, or timber members or features. Approximate limits for levels of service are as follows, expressed as the percent of superstructure elements requiring maintenance: A+, less than 3%; A, up to 7%; A-, up to 10%.
<b>B</b>	Bridge superstructures are in generally good condition, but repairs are needed to some steel, concrete, or timber superstructures. Approximate limits for levels of service are as follows, expressed as the percent of superstructure elements requiring maintenance: B+, up to 13%; B, up to 17%; B-, up to 20%.
<b>C</b>	Bridge superstructures are in generally fair condition, with repairs needed to several steel, concrete, or timber superstructures. Approximate limits for levels of service are as follows, expressed as the percent of superstructure elements requiring maintenance: C+, up to 23%; C, up to 27%; C-, up to 30%.
<b>D</b>	Bridge superstructures are in marginal condition, with repairs needed to many steel, concrete, or timber superstructures. Approximate limits for levels of service are as follows, expressed as the percent of superstructure elements requiring maintenance: D+, up to 33%; D, up to 37%; D-, up to 40%.
<b>F</b>	Bridge superstructures are in poor condition, with repairs needed to almost half of the steel, concrete, or timber superstructures. Approximate limits for levels of service are as follows, expressed as the percent of superstructure elements requiring maintenance: F+, up to 43%; F, up to 47%; F-, more than 47%.

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**Maintenance Program Area: Structures**
**Survey Item: Bridge Painting**
**Budgeted Activities: 355**

<p style="text-align: center; font-size: 2em;"><b>A</b></p>	<p>The condition of paint or coating on steel members, features, and railings is excellent, with tight adherence of the coating and few instances of unprotected metal or corrosion. Approximate limits for levels of service are as follows, expressed as the percent of bridge elements requiring painting by maintenance: A+, less than 3%; A, up to 7%; A-, up to 10%.</p>
<p style="text-align: center; font-size: 2em;"><b>B</b></p>	<p>The condition of paint or coating on steel members, features, and railings is generally good, with some occurrences of rust or surface pitting, flaking paint, or corrosion. Approximate limits for levels of service are as follows, expressed as the percent of bridge elements requiring painting by maintenance: B+, up to 13%; B, up to 17%; B-, up to 20%.</p>
<p style="text-align: center; font-size: 2em;"><b>C</b></p>	<p>The condition of paint or coating on steel members, features, and railings is generally fair, with some occurrences of serious rusting, flaking paint, weathering, or corrosion. Approximate limits for levels of service are as follows, expressed as the percent of bridge elements requiring painting by maintenance: C+, up to 23%; C, up to 27%; C-, up to 30%.</p>
<p style="text-align: center; font-size: 2em;"><b>D</b></p>	<p>The condition of paint or coating on steel members, features, and railings is marginal, with several occurrences of serious rusting, corrosion, and loss of integrity of the paint or coating. Steel section loss may occur in some cases. Approximate limits for levels of service are as follows, expressed as the percent of bridge elements requiring painting by maintenance: D+, up to 33%; D, up to 37%; D-, up to 40%.</p>
<p style="text-align: center; font-size: 2em;"><b>F</b></p>	<p>The condition of paint or coating on steel members, features, and railings is poor, with many occurrences of serious rusting and corrosion, deterioration of the paint or coating, and loss of steel section. Section loss in some cases may be serious enough to warrant structural analysis. Approximate limits for levels of service are as follows, expressed as the percent of bridge elements requiring painting by maintenance: F+, up to 43%; F, up to 47%; F-, more than 47%.</p>

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**Maintenance Program Area: Structures**
**Survey Item: Bridge Curbs, Railings**
**Budgeted Activities: 356**

<b>A</b>	Bridge railings, curbs, and wheel guards are in excellent condition, with few instances of damaged, deteriorated, or missing curbs, guards, posts or rails. Approximate limits for levels of service are as follows, expressed as the percent of curb, wheel guard, and railing elements requiring maintenance: A+, less than 3%; A, up to 7%; A-, up to 10%.
<b>B</b>	Bridge railings, curbs, and wheel guards are in generally good condition, with a number of damaged, deteriorated, or missing curbs, guards, posts or rails. Approximate limits for levels of service are as follows, expressed as the percent of curb, wheel guard, and railing elements requiring maintenance: B+, up to 13%; B, up to 17%; B-, up to 20%.
<b>C</b>	Bridge railings, curbs, and wheel guards are in generally satisfactory condition, but several bridges have damaged, deteriorated, or missing curbs, guards, posts or rails. Approximate limits for levels of service are as follows, expressed as the percent of curb, wheel guard, and railing elements requiring maintenance: C+, up to 23%; C, up to 27%; C-, up to 30%.
<b>D</b>	Bridge railings, curbs, and wheel guards are in marginal condition, with many locations of damaged, deteriorated, or missing curbs, guards, posts or rails. Approximate limits for levels of service are as follows, expressed as the percent of curb, wheel guard, and railing elements requiring maintenance: D+, up to 33%; D, up to 37%; D-, up to 40%.
<b>F</b>	Bridge railings, curbs, and wheel guards are in poor condition, with almost half of curbs, guards, posts or rails damaged, deteriorated, or missing. Approximate limits for levels of service are as follows, expressed as the percent of curb, wheel guard, and railing elements requiring maintenance: F+, up to 43%; F, up to 47%; F-, more than 47%.

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**Maintenance Program Area: Structures**
**Survey Item: Bridge Bearings**
**Budgeted Activities: 357**

<b>A</b>	<p>Bridge bearings are in excellent condition. All or almost all bearings are clean and well lubricated, and function properly. Paint or coating (if applicable) is in good condition. Approximate limits for levels of service are as follows, expressed in percent of bearing elements requiring maintenance: A+, less than 3%; A, up to 7%; A-, up to 10%.</p>
<b>B</b>	<p>Bridge bearings are in good condition. Most bearings are clean and well lubricated, and function properly. Paint or coating (if applicable) is in good condition. Approximate limits for levels of service are as follows, expressed in percent of bearing elements requiring maintenance: B+, up to 13%; B, up to 17%; B-, up to 20%.</p>
<b>C</b>	<p>Bridge bearings are in fair condition. While many bearings are clean and well lubricated, function properly, and have protective coatings intact, a number require maintenance to address deficiencies in one or more of these characteristics. Approximate limits for levels of service are as follows, expressed in percent of bearing elements requiring maintenance: C+, up to 23%; C, up to 27%; C-, up to 30%.</p>
<b>D</b>	<p>Bridge bearings are in marginal condition. Many bearing elements require cleaning, lubrication, or painting. Approximate limits for levels of service are as follows, expressed in percent of bearing elements requiring maintenance: D+, up to 33%; D, up to 37%; D-, up to 40%.</p>
<b>F</b>	<p>Bridge bearings are in poor condition. Almost half require cleaning, lubrication, or painting. Approximate limits for levels of service are as follows, expressed in percent of bearing elements requiring maintenance: F+, up to 43%; F, up to 47%; F-, more than 47%.</p>

## Maintenance Program Area: **Structures**

Survey Item: **Bridge Substructure**

Budgeted Activities: **358**

<b>A</b>	Bridge substructures are in excellent condition. Substructure elements such as abutments, columns or piers, pier caps, pier walls, and pile caps show little or no surface deterioration (cracking, spalls), evidence of corrosion, or structural damage. Approximate limits for levels of service are as follows, expressed as the percent of substructure elements requiring maintenance: A+, less than 3%; A, up to 7%; A-, up to 10%.
<b>B</b>	Bridge substructures are in good condition. Substructure elements such as abutments, columns or piers, pier caps, pier walls, and pile caps exhibit some instances of surface deterioration (cracking, spalls), evidence of corrosion, or structural damage. Approximate limits for levels of service are as follows, expressed as the percent of substructure elements requiring maintenance: B+, up to 13%; B, up to 17%; B-, up to 20%.
<b>C</b>	Bridge substructures are in fair condition. Substructure elements such as abutments, columns or piers, pier caps, pier walls, and pile caps exhibit a number of occurrences of surface deterioration (cracking, spalls), evidence of corrosion, or structural damage. Approximate limits for levels of service are as follows, expressed as the percent of substructure elements requiring maintenance: C+, up to 23%; C, up to 27%; C-, up to 30%.
<b>D</b>	Bridge substructures are in marginal condition. Substructure elements such as abutments, columns or piers, pier caps, pier walls, and pile caps exhibit a large number of occurrences of surface deterioration (cracking, spalls), evidence of corrosion, or structural damage. Approximate limits for levels of service are as follows, expressed as the percent of substructure elements requiring maintenance: D+, up to 33%; D, up to 37%; D-, up to 40%.
<b>F</b>	Bridge substructures are in poor condition. Almost half of the substructure elements such as abutments, columns or piers, pier caps, pier walls, and pile caps exhibit surface deterioration (cracking, spalls), evidence of corrosion, or structural damage. Approximate limits for levels of service are as follows, expressed as the percent of substructure elements requiring maintenance: F+, up to 43%; F, up to 47%; F-, more than 47%.

## Maintenance Program Area: **Structures**

Survey Item: **Bridge Approaches, Slopes**

Budgeted Activities: **360**

<p style="text-align: center; font-size: 2em;"><b>A</b></p>	<p>Bridge approaches and slopes beneath the superstructure are in excellent condition. Approach slabs have not settled and show no sign of deterioration other than superficial surface cracks. Approach slopes are well tended and slope cover is in excellent condition. Approximate limits for levels of service are as follows, expressed as the percent of approach elements that require maintenance: A+, less than 3%; A, up to 7%; A-, up to 10%.</p>
<p style="text-align: center; font-size: 2em;"><b>B</b></p>	<p>Bridge approaches and slopes beneath the superstructure are in good condition. Approach slabs may show minor cracking or spalling, and some settlement may have occurred. Slopes have cover that is in good condition with only minor defects. Approximate limits for levels of service are as follows, expressed as the percent of approach elements that require maintenance: B+, up to 13%; B, up to 17%; B-, up to 20%.</p>
<p style="text-align: center; font-size: 2em;"><b>C</b></p>	<p>Bridge approaches and slopes beneath the superstructure are in fair condition. Approach slabs may show extensive cracking or spalling. Approach settlement creates a noticeable bump at the bridge. The paved areas covering slopes need moderate repair. Approximate limits for levels of service are as follows, expressed as the percent of approach elements that require maintenance: C+, up to 23%; C, up to 27%; C-, up to 30%.</p>
<p style="text-align: center; font-size: 2em;"><b>D</b></p>	<p>Bridge approaches and slopes beneath the superstructure are in marginal condition. Approach slabs are cracked full-depth or have deep spalls. Approach settlement creates a bump at the bridge that may require mudjacking, grinding, or a wedge patch. The paved areas covering slopes need significant repair. Approximate limits for levels of service are as follows, expressed as the percent of approach elements that require maintenance: D+, up to 33%; D, up to 37%; D-, up to 40%.</p>
<p style="text-align: center; font-size: 2em;"><b>F</b></p>	<p>Bridge approaches and beneath the superstructure are in poor condition. Approach slabs on almost half the bridges are broken or have settled excessively, requiring remedy. Paved areas covering slopes require extensive repairs or replacement. Approximate limits for levels of service are as follows, expressed as the percent of approach elements that require maintenance: F+, up to 43%; F, up to 47%; F-, more than 47%.</p>








## Maintenance Program Area: **Structures**

Survey Item: **Bridge Deck Expansion Joints**

Budgeted Activities: **364**

<b>A</b>	Deck expansion joints are in excellent condition. Joint components are for the most part secure, undamaged, and in correct alignment. No problems are caused by any debris in the joint. The adjacent deck or header is sound. Approximate limits for levels of service are as follows, expressed as the percent of expansion joint elements that require maintenance: A+, less than 3%; A, up to 7%; A-, up to 10%.
<b>B</b>	Deck expansion joints are in good condition. Most joint components are secure, undamaged, and in correct alignment, although some problems with partial damage to joints, debris, seepage, or minor damage to adjacent deck areas are present. Approximate limits for levels of service are as follows, expressed as the percent of expansion joint elements that require maintenance: B+, up to 13%; B, up to 17%; B-, up to 20%.
<b>C</b>	Deck expansion joints are in fair condition. Several joint components exhibit defects, significant debris, seepage, bent or misaligned fingers, or ripped or stripped glands. Adjacent deck areas show minor cracking or spalling. Approximate limits for levels of service are as follows, expressed as the percent of expansion joint elements that require maintenance: C+, up to 23%; C, up to 27%; C-, up to 30%.
<b>D</b>	Deck expansion joints are in marginal condition. Many joint components exhibit defects, significant debris, seepage, bent or misaligned fingers, ripped or stripped glands, or corrosion of steel armor plating. Adjacent deck areas are cracked or spalled. Approximate limits for levels of service are as follows, expressed as the percent of expansion joint elements that require maintenance: D+, up to 33%; D, up to 37%; D-, up to 40%.
<b>F</b>	Deck expansion joints are in poor condition. Joint components exhibit serious damage or failure, significant debris, seepage, bent or misaligned fingers, ripped or stripped glands, or corrosion of steel armor plates. Adjacent deck areas are extensively cracked or spalled. Approximate limits for levels of service are as follows, expressed as the percent of expansion joint elements that require maintenance: F+, up to 43%; F, up to 47%; F-, more than 47%.

# MPA: Snow and Ice Control

Illustrations	LOS	Description
<p>LOS A</p> 	<p><b>A</b></p>	<p>Plowing and chemicals or abrasives applications proactively maintain very high levels of mobility throughout storms (refer to accompanying tables). Snow drifts and localized ice patches are treated quickly to avoid closures and hazards. Proactive avalanche control minimizes traffic interruptions and avoids unanticipated road closures.</p>
<p>LOS B</p> 	<p><b>B</b></p>	<p>Plowing and abrasives or chemicals applications maintain high levels of mobility as much as possible (refer to accompanying tables). Snow drifts and localized ice patches may be treated during storm with abrasives or chemicals. Proactive avalanche control minimizes traffic interruptions and avoids unanticipated road closures.</p>
<p>LOS C</p> 	<p><b>C</b></p>	<p>Plowing and abrasives or chemicals applications maintain good levels of mobility on high-standard roads (refer to accompanying tables). Snow drifts and localized ice patches are treated as soon as possible at end of storm. Avalanche control focuses on high-priority locations and situations.</p>
<p>LOS D</p> 	<p><b>D</b></p>	<p>Plowing and abrasives or chemicals applications are performed on limited basis, and some traffic delays are anticipated on all roads (refer to accompanying tables). Snow drifts and localized ice patches are treated after mainline roads are cleared. Limited avalanche control is performed. Chain station operation may be scaled back.</p>
<p>Living Snow Fence</p> 	<p><b>F</b></p>	<p>Plowing and abrasives or chemicals applications are performed on very limited basis, impairing mobility on all roads (refer to accompanying tables). Snow drifts and localized ice patches may not be treated for some time. No preventive avalanche control is performed. Chain station operations are scaled back or suspended.</p>

## Maintenance Program Area: **Snow and Ice**

Survey Item: **Snow Removal, Road Condition**

Budgeted Activities: **402**

<b>A</b>	<p>Levels of service for snow removal and application of chemicals and abrasives for traction are based upon highway category, considering functional classification and daily traffic, and weather conditions in a “standard winter.” Refer to Tables 1 and 2 on the following pages. LOS A represents the highest level of service, which ranges from proactive efforts to maintain wet (bare) pavement throughout a storm on higher-standard or highly traveled highways to snow-pack or icy but passable conditions on lower-standard or low-volume roads. Traffic speed is consistent with wet pavement and prevailing weather.</p>
<b>B</b>	<p>Levels of service for snow removal and application of chemicals and abrasives for traction are based upon highway category, considering functional classification and daily traffic, and weather conditions in a “standard winter.” Refer to Tables 1 and 2 on the following pages. LOS B represents a high level of service, which ranges from targets of wet (bare) pavement as much as possible on higher-standard or highly traveled highways to snow-pack or icy conditions on lower-standard or low-volume roads. Traffic moves at reduced speed, with isolated slowdowns or delays.</p>
<b>C</b>	<p>Levels of service for snow removal and application of chemicals and abrasives for traction are based upon highway category, considering functional classification and daily traffic, and weather conditions in a “standard winter.” Refer to Tables 1 and 2 on the following pages. LOS C represents a moderate level of service. On higher-standard or highly traveled highways, LOS C ranges from wet (bare) pavement as much as possible to patches of snow or slush. On lower-standard or low-volume roads LOS C ranges from patches of snow or ice to predominately snow-pack or icy conditions. Traffic moves slowly with isolated to moderate delays.</p>
<b>D</b>	<p>Levels of service for snow removal and application of chemicals and abrasives for traction are based upon highway category, considering functional classification and daily traffic, and weather conditions in a “standard winter.” Refer to Tables 1 and 2 on the following pages. LOS D represents a marginal level of service, which ranges from patches of “oatmeal” snow, packed snow or ice on higher-standard or highly traveled highways to predominately snow-packed or icy conditions on lower-standard or low-volume roads. Traffic moves slowly with delays.</p>
<b>F</b>	<p>Levels of service for snow removal and application of chemicals and abrasives for traction are based upon highway category, considering functional classification and daily traffic, and weather conditions in a “standard winter.” Refer to Tables 1 and 2 on the following pages. LOS F represents a poor level of service. Patches of snow or ice exist even on the highest-standard roads, and these conditions may degenerate to predominately snow-packed or icy conditions throughout, with accompanying slowdowns or delays. On lower-standard or low-volume roads the surface is snow-covered and may be blocked in locations, with substantial traffic delays.</p>

Levels of service for activity 402, snow plowing and sanding, are developed in two steps:

- Step 1 identifies a range of condition levels that define various levels of snow and ice control, and their likely impacts on traffic movement. Condition levels are described in Table 1.
- Step 2 assigns condition levels to the various categories of highways. These assignments define the different levels of service on each highway category. Levels of service are indicated in Table 2.

**TABLE 1. CONDITION LEVELS, ACTIVITY 402**

Condition	Descriptions
1	Maintain wet (bare), tractive surface through proactive anti-icing prior to the storm and de-icing and application of abrasives during and after the storm. Objective is to keep a wet road surface as much as possible during the storm period. Traffic moves smoothly at a speed consistent with wet pavement and as weather conditions allow. (Note: anti-icing and de-icing are used predominantly in non-windy areas.)
2	Maintain wet (bare) surface as much as possible throughout the storm. Anti-icing is applied prior to the storm, and abrasives (with or without deicers) may be applied during the storm, possibly at lesser frequency than for Condition 1. The road may be de-iced after the storm, or only abrasives may be used. Traffic moves relatively smoothly, though at reduced speed.
3	Patches of "oatmeal" snow, slush, or packed snow may exist. Anti-icing, de-icing, and application of abrasives may be done on a limited basis. Traffic may experience isolated slowdowns or delays, but movement is otherwise unimpeded, although at reduced speed.
4	Icy or packed snow conditions prevail. Abrasives may be applied to improve traction. Traffic moves slowly and is delayed.
5	Road is snow-covered and may be blocked in locations. Traffic flow will be impeded at these locations and motorists may encounter substantial delays. On highways designated for seasonal closure (currently Mt. Evans, Independence passes), the snow cover is left untouched until the spring.

**NOTE:** Storms vary widely in their characteristics, and road conditions may deviate temporarily from the descriptions above based upon the timing, intensity, and duration of the storm, temperature and wind conditions, nature of the precipitation, and so forth. While storms may sometimes temporarily overtake snow and ice operations, the conditions above describe the objectives that the crews continue to strive to meet.

TABLE 2. LEVEL OF SERVICE, ACTIVITY 402

Highway Category	A	B	C	D	F
Interstate, > 75,000 AADT	Cond. 1	Cond. 1	Cond. 2	Cond. 3	Cond. 3
NHS, >75,000	Cond. 1	Cond. 1	Cond. 2	Cond. 3	Cond. 3
Interstate, 15K < AADT < 75K	Cond. 1	Cond. 1	Cond. 3	Cond. 3	Cond. 4
NHS, 15K < AADT < 75K	Cond. 1	Cond. 1	Cond. 3	Cond. 3	Cond. 4
Other, >50,000 AADT	Cond. 2	Cond. 3	Cond. 3	Cond. 3	Cond. 4
Interstate, < 15,000 AADT	Cond. 1	Cond. 2	Cond. 3	Cond. 4	Cond. 5
NHS, < 15,000 AADT	Cond. 1	Cond. 2	Cond. 3	Cond. 4	Cond. 5
Other, 5K < AADT < 50K	Cond. 4	Cond. 4	Cond. 4	Cond. 4	Cond. 5
Other, <5,000 AADT	Cond. 4	Cond. 4	Cond. 4	Cond. 5	Cond. 5
Mountain Passes	Cond. 3	Cond. 3	Cond. 4	Cond. 5	Cond. 5
Seasonal Highways	Cond. 5	Cond. 5	Cond. 5	Cond. 5	Cond. 5

**Note:** Level of service definitions may be adjusted based upon importance of the route to one or more of the following travel purposes: commuting; medical and emergency transport; commercial, economic, tourist, and recreational activities, and school bus, mail routes, and defense routes. The level of service may also be adjusted to compensate for the alignment and grade of the highway itself.

For purposes of performance budgeting, the demand for winter maintenance activities is based upon storm conditions in a “standard winter.” A **standard winter** is estimated by taking the most recent five-year averages of plow-mile accomplishment units and of total expenditures for activity 402, and using the composite of these averages to adjust the most recent fiscal year expenditures and conversion factors (ratio of backlog work to inventory quantity) for each winter activity in each maintenance section. Before the five-year expenditures are averaged, however, an adjustment to materials costs is made to reflect the current percentage of materials costs to total costs (for fiscal 1999, this was 35 percent). The reason for this adjustment is to update historical data to reflect current environmental requirements that call for application of CMA in lieu of sand or other abrasives in air quality non-attainment areas.

**Maps Illustrating  
Geographic Distribution of  
Snow and Ice Conditions  
Corresponding to  
LOS A through F,  
Respectively**

## Maintenance Program Area: **Snow and Ice**

Survey Item: **Ice Control, Hand Work**

Budgeted Activities: **403**

<b>A</b>	Ice is removed from all spot locations quickly after its formation, resulting in minimal effect of ice on traffic and maintenance of proper highway and bridge drainage. (Spot locations include bridge drains, bridge wheel guards, and walkways; culvert drains; and susceptible locations such as tunnel walls and road surface areas in protracted shade.)
<b>B</b>	Ice is removed from most spot locations quickly, resulting in minor effect of ice on traffic and maintenance of proper highway and bridge drainage in most if not all locations. (Spot locations include bridge drains, bridge wheel guards, and walkways; culvert drains; and susceptible locations such as tunnel walls and road surface areas in protracted shade.)
<b>C</b>	Ice is removed from many spot locations quickly, but with some delays at others, resulting in moderate effect of ice on traffic and varying levels of highway and bridge drainage among affected locations. (Spot locations include bridge drains, bridge wheel guards, and walkways; culvert drains; and susceptible locations such as tunnel walls and road surface areas in protracted shade.)
<b>D</b>	Ice is removed from spot locations after some delay, resulting in widespread effect of ice on traffic and impeded highway and bridge drainage. (Spot locations include bridge drains, bridge wheel guards, and walkways; culvert drains; and susceptible locations such as tunnel walls and road surface areas in protracted shade.)
<b>F</b>	Ice is removed from spot locations only after significant delay if at all, resulting in a widespread and sustained effect of ice on traffic and impeded highway and bridge drainage. (Spot locations include bridge drains, bridge wheel guards, and walkways; culvert drains; and susceptible locations such as tunnel walls and road surface areas in protracted shade.)

## Maintenance Program Area: **Snow and Ice**

Survey Item: **Snow Fence**

Budgeted Activities: **404**

A	Snow fence is erected and removed on schedule. Damaged areas of snow fence are fully repaired on a timely schedule. Living snow fences are maintained effectively.
B	Snow fence is erected and removed mostly on schedule. Damaged areas of snow fence are repaired at key locations (e.g., high-volume routes, routes subject to major drifting, major intersections). Living snow fences are maintained effectively at key locations.
C	Snow fence is erected and removed on schedule at key locations (e.g., high-volume routes, routes subject to major drifting, major intersections). Instances of major damage in snow fences, including living snow fences, are repaired in timely fashion at key locations, and on a prescribed schedule at other locations.
D	Snow fence is erected and removed on an as-can basis with no governing schedule. Instances of major damage in snow fences, including living snow fences, are repaired as schedule and resources permit.
F	Snow fence maintenance is performed erratically if at all, and receives low priority.



**Maintenance Program Area: Snow and Ice**
**Survey Item: Snow Removal, Closed Roads**
**Budgeted Activities: 406**

<p style="text-align: center; font-size: 2em;"><b>A</b></p>	<p>Roads temporarily closed due to drifting are opened quickly and completely, resulting in minimal delay to traffic. Seasonally closed roads are opened on schedule.</p>
<p style="text-align: center; font-size: 2em;"><b>B</b></p>	<p>Roads temporarily closed due to drifting are opened completely with only minor delay, resulting in delays to traffic only on lower-standard highway categories shown in Table 2. Seasonally closed roads are opened on or close to schedule.</p>
<p style="text-align: center; font-size: 2em;"><b>C</b></p>	<p>Roads temporarily closed due to drifting are opened partially or with moderate delay, resulting in impeded traffic for a considerable time on affected routes. Opening of seasonally closed roads is delayed up to a month later than scheduled.</p>
<p style="text-align: center; font-size: 2em;"><b>D</b></p>	<p>Roads temporarily closed due to drifting are opened partially after significant delay, resulting in closure of affected routes for more than 24 hours. Opening of seasonally closed roads is delayed up to two months later than scheduled.</p>
<p style="text-align: center; font-size: 2em;"><b>F</b></p>	<p>Roads temporarily closed due to drifting are opened partially after significant delay, resulting in closure of affected routes for more than 48 hours. Opening of seasonally closed roads is delayed more than two months beyond schedule.</p>

## Maintenance Program Area: **Snow and Ice**

Survey Item: **Avalanche Paths**






Budgeted Activities: **406.10**

<b>A</b>	Avalanche control is effective to a very high degree, in that 1) there are no traffic delays due to naturally occurring avalanches, and 2) the durations of road closures for avalanche control all meet an activity duration guideline. This guideline duration encompasses all tasks needed for avalanche control, including closure and traffic control, setting off charges, and any snow removal and cleanup.
<b>B</b>	Avalanche control is effective to a high degree, in that 1) traffic delays due to naturally occurring avalanches occur at no more than five percent of identified paths in a section during a winter, 2) snow removal and cleanup at these occurrences are within prescribed time limits, and 3) the traffic delays due to avalanche control all meet an activity duration guideline. This guideline duration encompasses all tasks needed for avalanche control, including road closure, setting off charges, and snow removal and cleanup.
<b>C</b>	Avalanche control is effective to a moderate degree. Traffic delays due to naturally occurring avalanches occur at no more than ten percent of identified paths in a section during a winter, and snow removal and cleanup at these occurrences are within prescribed time limits in most instances. The traffic delays due to avalanche control meet an activity duration guideline in most cases, where this guideline encompasses all tasks needed for avalanche control, including road closure, setting off charges, and snow removal and cleanup.
<b>D</b>	Avalanche control is effective at only a fair to marginal degree. Traffic delays due to naturally occurring avalanches occur at more than ten percent of identified paths in a section during a winter, and snow removal and cleanup at these occurrences do not meet prescribed time limits in many instances. Preventive avalanche control is not practiced fully. Traffic delays due to avalanche control do not meet a guideline activity duration in many cases.
<b>F</b>	Avalanche control is poor to nonexistent. Traffic delays due to naturally occurring avalanches occur at many identified paths in a section during a winter. Snow removal and cleanup at these occurrences do not meet prescribed time limits. Preventive avalanche control is rarely practiced.

Maintenance Program Area: **Snow and Ice**Survey Item: **Chain Stations**Budgeted Activities: **408**

<b>A</b>	Chain stations are fully staffed in all snow emergencies.
<b>B</b>	Most chain stations are staffed at or near full complements for most or all snow emergencies.
<b>C</b>	Many chain stations are staffed near full complements for most snow emergencies.
<b>D</b>	Chain stations are partially or intermittently staffed during snow emergencies.
<b>F</b>	Chain stations are staffed poorly or not at all during snow emergencies.

# MPA: Rest Areas, Equipment & Buildings

Example Buildings, Equipment, Rest Area Items	LOS	Description
<p>Maintenance Building and Equipment</p> 	<p><b>A</b></p>	<p>Rest areas are rated based upon the condition and appearance of the building interior and exterior, interior facilities serving motorists, surrounding grounds, and parking lot and ramps. Most of these items are rated excellent or very good. Maintenance equipment and buildings are in excellent condition.</p>
<p>Rest Area Buildings, Grounds</p> 	<p><b>B</b></p>	<p>Rest areas are rated based upon the condition and appearance of the building, interior facilities serving motorists, surrounding grounds, and parking lot and ramps. Most of these items are rated as good or better, with few or no serious deficiencies. Maintenance equipment and buildings are in very good condition.</p>
<p>Rest Area, Interior</p> 	<p><b>C</b></p>	<p>Rest areas are rated based upon building condition and appearance, interior facilities serving motorists, surrounding grounds, and parking lot and ramps. These items are rated as good or better, with few serious deficiencies, none critical. Maintenance equipment and buildings are good overall, but problems may occur.</p>
<p>Parking Lot, Markings</p> 	<p><b>D</b></p>	<p>Rest areas, equipment, and maintenance buildings are rated no higher than good, with some serious deficiencies, and a limited number of critical problems.</p>
<p>Ramps, Grounds</p> 	<p><b>F</b></p>	<p>Rest areas, equipment, and maintenance buildings are rated no higher than good. Many are in fair or poor condition, with serious or critical deficiencies.</p>

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**Maintenance Program Area: Equipment, Buildings and Grounds****Survey Item: Minor Equipment Maintenance****Budgeted Activities: 458**

<b>A</b>	Minor or routine maintenance of equipment is performed on schedule at the recommended frequency.
<b>B</b>	Minor or routine maintenance of equipment is performed generally at the recommended frequency, with few exceptions subject to time availability.
<b>C</b>	Equipment is maintained as problems arise or as time is available, but not necessarily at the recommended frequency.
<b>D</b>	Minor or routine maintenance of equipment is performed infrequently.
<b>F</b>	Minor or routine maintenance of equipment is not performed.






## Maintenance Program Area: **Equipment, Buildings and Grounds**

Survey Item: **Buildings and Grounds**

Budgeted Activities: **460, 461**

<b>A</b>	Buildings and grounds in rest areas, maintenance sections and patrols, and other departmental locations are in excellent condition. Rating elements include visual assessments of the condition of the building structure, building exterior appearance, appearance of grounds, condition of pavement and pavement markings, building interior cleanliness and appearance, and operation of utilities and fixtures. At LOS A no deficiencies in these items are present.
<b>B</b>	Buildings and grounds in rest areas, maintenance sections and patrols, and other departmental locations are in very good condition. Rating elements include visual assessments of the condition of the building structure, building exterior appearance, appearance of grounds, condition of pavement and pavement markings, building interior cleanliness and appearance, and operation of utilities and fixtures. At LOS B up to three areas of deficiency are present, none of which is serious.
<b>C</b>	Buildings and grounds in rest areas, maintenance sections and patrols, and other departmental locations are in good condition. Rating elements include visual assessments of the condition of the building structure, building exterior appearance, appearance of grounds, condition of pavement and pavement markings, building interior cleanliness and appearance, and operation of utilities and fixtures. At LOS C up to four areas of deficiency are present, one of which may be extensive or require prompt attention.
<b>D</b>	Buildings and grounds in rest areas, maintenance sections and patrols, and other departmental locations are in fair condition. Rating elements include visual assessments of the condition of the building structure, building exterior appearance, appearance of grounds, condition of pavement and pavement markings, building interior cleanliness and appearance, and operation of utilities and fixtures. At LOS D up to six areas of deficiency are present, of which no more than three are extensive or require prompt attention. None of these deficiencies is critical.
<b>F</b>	Buildings and grounds in rest areas, maintenance sections and patrols, and other departmental locations are in poor condition. Rating elements include visual assessments of the condition of the building structure, building exterior appearance, appearance of grounds, condition of pavement and pavement markings, building interior cleanliness and appearance, and operation of utilities and fixtures. At LOS F more than six areas of deficiency are present, or more than three are extensive or require prompt attention, or a critical deficiency may exist.

# MPA: Major Tunnels

Example Major Tunnel Items	LOS	Description
<p>Operations Control</p> 	<p><b>A</b></p>	<p>Condition of the tunnel structure is excellent. Operation of electrical, electronic, and mechanical systems is highly reliable. Inspections and repairs are performed on schedule. Response to incidents is immediate and effective, and frequent, attentive care of the facilities (e.g., washing, clearing of ice and debris) maintains safe and efficient passage.</p>
<p>Lighting &amp; Luminance</p> 	<p><b>B</b></p>	<p>Condition of the tunnel structure is very good. Operation of electrical, electronic, and mechanical systems is reliable. Inspections and repairs are performed on schedule. Response to incidents is virtually immediate, and care of the facilities (e.g., washing, clearing of ice and debris) maintains a high degree of safe, efficient passage.</p>
<p>Electric Power</p> 	<p><b>C</b></p>	<p>Condition of the tunnel structure is good. Operation of electrical, electronic, and mechanical systems is reliable overall, with few nonfunctioning items. Inspections and repairs are performed regularly. Response to incidents is immediate most of the time. Care of the facilities is good overall, although conditions may degrade temporarily.</p>
<p>Mechanical &amp; Ventilation</p> 	<p><b>D</b></p>	<p>Condition of the tunnel structure is fair. Operation of electrical, electronic, and mechanical systems is somewhat degraded, and response time exceeds desirable limit. Inspections, calibrations, and repairs are behind schedule. Response to incidents is immediate much of the time, but delays may occur. Care of the facilities is overdue.</p>
<p>Incident Response</p> 	<p><b>F</b></p>	<p>Condition of the tunnel structure is poor. Operation of electrical, electronic, and mechanical systems is degraded, with response time exceeding desirable limit, and multiple concurrent failures in systems. Inspections, calibrations, and repairs are infrequent. Response to incidents is irregular. Care of the facilities is lacking.</p>

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**Maintenance Program Area: Tunnels**
**Survey Item: Tunnel Operations****Budgeted Activities: 502**

<b>A</b>	Ability to conduct tunnel operations is excellent. Sufficient staff are on shift to provide immediate response at all times to tunnel operational requirements.
<b>B</b>	Ability to conduct tunnel operations is very good. Number of staff on shift is sufficient to provide immediate response to tunnel operational requirements at least 95 percent of the time, with no more than a 5-minute delay otherwise.
<b>C</b>	Ability to conduct tunnel operations is good, with less than 10 percent likelihood of delay. Number of staff on shift is sufficient to provide immediate response to tunnel operational requirements at least 90 percent of the time, with no more than a 10-minute delay otherwise.
<b>D</b>	Ability to conduct tunnel operations is fair. Number of staff on shift is sufficient to provide immediate response to tunnel operational requirements at least 85 percent of the time, with no more than a 15-minute delay otherwise.
<b>F</b>	Ability to conduct tunnel operations is poor. Number of staff on shift is not sufficient to meet LOS D response to tunnel operational requirements.



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**Maintenance Program Area: Tunnels**
**Survey Item: Emergency Operations**
**Budgeted Activities: 502**

<p style="text-align: center; font-size: 2em;"><b>A</b></p>	<p>Ability to conduct tunnel emergency operations is excellent. Sufficient staff are on shift to provide immediate response at all times to tunnel emergency requirements.</p>
<p style="text-align: center; font-size: 2em;"><b>B</b></p>	<p>Ability to conduct tunnel emergency operations is good. Number of staff on shift is sufficient to provide immediate response to tunnel emergency requirements at least 98 percent of the time.</p>
<p style="text-align: center; font-size: 2em;"><b>C</b></p>	<p>Ability to conduct tunnel emergency operations is fair. Number of staff on shift is sufficient to provide immediate response to tunnel emergency requirements at least 95 percent of the time.</p>
<p style="text-align: center; font-size: 2em;"><b>D</b></p>	<p>Ability to conduct tunnel emergency operations is marginal. Number of staff on shift is sufficient to provide immediate response to tunnel emergency requirements at least 90 percent of the time.</p>
<p style="text-align: center; font-size: 2em;"><b>F</b></p>	<p>Ability to conduct tunnel emergency operations is poor. Number of staff on shift is not sufficient to meet LOS D response to tunnel emergency requirements.</p>

**Maintenance Program Area: Tunnels****Survey Item: Snow Removal and Sanding****Budgeted Activities: 502**

<b>A</b>	Tunnel crews are able to meet Condition 1 of the Activity 402 Level-of-Service definitions in clearing snow and ice in and around the tunnel facility.
<b>B</b>	Tunnel crews are able to meet Condition 1 of the Activity 402 Level-of-Service definitions in clearing snow and ice in and around the tunnel facility.
<b>C</b>	Tunnel crews are able to meet Condition 3 of the Activity 402 Level-of-Service definitions in clearing snow and ice in and around the tunnel facility.
<b>D</b>	Tunnel crews are able to meet Condition 3 of the Activity 402 Level-of-Service definitions in clearing snow and ice in and around the tunnel facility.
<b>F</b>	Tunnel crews are able to meet Condition 4 of the Activity 402 Level-of-Service definitions in clearing snow and ice in and around the tunnel facility.

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**Maintenance Program Area: Tunnels**
**Survey Item: Rescue Training**
**Budgeted Activities: 502**

<b>A</b>	Frequency of rescue training is excellent following the initial required period of 40 hours per person. Continuing training is provided in fire-fighting, hazardous materials handling and control, and first aid to the level of at least 40 hours per qualified staff annually.
<b>B</b>	Frequency of rescue training is good following the initial required period of 40 hours per person. Continuing training is provided in fire-fighting, hazardous materials handling and control, and first aid to the level of 30 hours per qualified staff annually.
<b>C</b>	Frequency of rescue training is fair following the initial required period of 40 hours per person. Continuing training is provided in fire-fighting, hazardous materials handling and control, and first aid to the level of 20 hours per qualified staff annually.
<b>D</b>	Frequency of rescue training is deficient following the initial required period of 40 hours per person. Continuing training is provided in fire-fighting, hazardous materials handling and control, and first aid to the level of 10 hours per qualified staff annually.
<b>F</b>	Frequency of rescue training is poor following the initial required period of 40 hours per person. Continuing training is provided in fire-fighting, hazardous materials handling and control, and first aid to the level of less than 10 hours per qualified staff annually.

## Maintenance Program Area: **Tunnels**

Survey Item: **Hazmat Control**

Budgeted Activities: **502**

<p style="text-align: center; font-size: 2em;"><b>A</b></p>	<p>For the safety of the motoring public, hazmat control requires the closure of the Eisenhower Tunnel in both directions to allow the controlled passage of hazardous materials through the tunnel. The total processing time (i.e., the time interval between arrival of the vehicle carrying the hazmat and the time it is allowed through the tunnel) is a function of traffic volume, which varies by time of day and seasonally. LOS A corresponds to the ability of the tunnel crew to exercise this judgment, close the tunnel at the appropriate time, and escort the material through the tunnel.</p>
<p style="text-align: center; font-size: 2em;"><b>B</b></p>	<p>See LOS A. It is recommended that Eisenhower Tunnel crews maintain a log of hazmat control events so that statistics can be developed on number of occurrences, time of day and year, traffic volume, and processing time.</p>
<p style="text-align: center; font-size: 2em;"><b>C</b></p>	<p>See LOS A. It is recommended that Eisenhower Tunnel crews maintain a log of hazmat control events so that statistics can be developed on number of occurrences, time of day and year, traffic volume, and processing time.</p>
<p style="text-align: center; font-size: 2em;"><b>D</b></p>	<p>See LOS A. It is recommended that Eisenhower Tunnel crews maintain a log of hazmat control events so that statistics can be developed on number of occurrences, time of day and year, traffic volume, and processing time.</p>
<p style="text-align: center; font-size: 2em;"><b>F</b></p>	<p>For the safety of the motoring public, hazmat control requires the closure of the Eisenhower Tunnel in both directions to allow the controlled passage of hazardous materials through the tunnel. The total processing time (i.e., the time interval between arrival of the vehicle carrying the hazmat and the time it is allowed through the tunnel) is a function of traffic volume, which varies by time of day and seasonally. LOS F corresponds to the inability, for whatever reasons, to perform this function.</p>

**Maintenance Program Area: Tunnels****Survey Item: Tunnel Washing****Budgeted Activities: 504**

<b>A</b>	Frequent washing and rinsing maintain good luminance in the tunnel throughout the year.
<b>B</b>	Regular washing and rinsing, with only occasional seasonal interruption, maintain good luminance in the tunnel throughout the year.
<b>C</b>	Periodic washing and rinsing, less frequently than in LOS A or B, allow luminance to degrade between wash cycles.
<b>D</b>	Very few cleaning cycles are performed throughout the year, leading to a sustained reduction of luminance inside the tunnel.
<b>F</b>	No more than one washing per year is performed.

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**Maintenance Program Area: Tunnels**
**Survey Item: Electronic Traffic Ctrl. Sys.**
**Budgeted Activities: 506**

<b>A</b>	The electronic traffic control system comprises the lane-use signals, loop detection system, and telecommunications within the tunnel. System availability is excellent, with no more than one component failure at a time in the past year, and a response time of 30 minutes or less.
<b>B</b>	The electronic traffic control system comprises the lane-use signals, loop detection system, and telecommunications within the tunnel. System availability is very good, with no more than three concurrent failures in the past year, and response time within one hour in all cases.
<b>C</b>	The electronic traffic control system comprises the lane-use signals, loop detection system, and telecommunications within the tunnel. System availability is good, with no more than five concurrent failures in the past year, and no response time exceeding two hours.
<b>D</b>	The electronic traffic control system comprises the lane-use signals, loop detection system, and telecommunications within the tunnel. System availability is fair, with no more than seven concurrent failures in the past year, and no response time exceeding four hours.
<b>F</b>	The electronic traffic control system comprises the lane-use signals, loop detection system, and telecommunications within the tunnel. System availability is poor, with concurrent failures and response times in the past year exceeding the levels in LOS D.

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**Maintenance Program Area: Tunnels**
**Survey Item: Tunnel Traffic Control**
**Budgeted Activities: 506**

A	Tunnel traffic control encompasses the variable matrix signs and video systems and monitors within the tunnel and at its entrances. System availability is excellent, with no more than one component failure at a time in the past year, and a response time of 30 minutes or less.
B	Tunnel traffic control encompasses the variable matrix signs and video systems and monitors within the tunnel and at its entrances. System availability is very good, with no more than three concurrent failures in the past year, and response time within one hour in all cases.
C	Tunnel traffic control encompasses the variable matrix signs and video systems and monitors within the tunnel and at its entrances. System availability is good, with no more than five concurrent failures in the past year, and no response time exceeding two hours.
D	Tunnel traffic control encompasses the variable matrix signs and video systems and monitors within the tunnel and at its entrances. System availability is fair, with no more than seven concurrent failures in the past year, and no response time exceeding four hours.
F	Tunnel traffic control encompasses the variable matrix signs and video systems and monitors within the tunnel and at its entrances. System availability is poor, with concurrent failures and response times in the past year exceeding the levels in LOS D.

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**Maintenance Program Area: Tunnels**
**Survey Item: CO Monitoring Sensors**
**Budgeted Activities: 506**

A	This item concerns the calibration of electronic sensors for monitoring carbon monoxide in the tunnel. All monitors are calibrated, and none is tagged (i.e., does not conform to standard).
B	This item concerns the calibration of electronic sensors for monitoring carbon monoxide in the tunnel. Monitors are calibrated; at most one monitor is tagged for a duration that does not exceed three days.
C	This item concerns the calibration of electronic sensors for monitoring carbon monoxide in the tunnel. Monitors are calibrated; at most three monitors are tagged for a duration that does not exceed three days.
D	This item concerns the calibration of electronic sensors for monitoring carbon monoxide in the tunnel. Monitors are calibrated; at most three monitors are tagged for a duration that does not exceed five days.
F	This item concerns the calibration of electronic sensors for monitoring carbon monoxide in the tunnel. Monitors are calibrated, with results that cannot meet the requirements of LOS D.



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**Maintenance Program Area: Tunnels**
**Survey Item: Tunnel Fiber Optic System**
**Budgeted Activities: 506**

<b>A</b>	Fiber optic cables are used for the cameras, CO sensing, and communications systems in the tunnel. System reliability is excellent, with no more than one failure at a time in the past year, and response time within one-half hour.
<b>B</b>	Fiber optic cables are used for the cameras, CO sensing, and communications systems in the tunnel. System reliability is good, with no more than two concurrent failures in the past year, and a response time in no case exceeding one hour.
<b>C</b>	Fiber optic cables are used for the cameras, CO sensing, and communications systems in the tunnel. System reliability is fair, with no more than two concurrent failures in the past year, and a response time in no case exceeding two hours.
<b>D</b>	Fiber optic cables are used for the cameras, CO sensing, and communications systems in the tunnel. System reliability is marginal, with no more than three concurrent failures in the past year, and a response time in no case exceeding four hours.
<b>F</b>	Fiber optic cables are used for the cameras, CO sensing, and communications systems in the tunnel. System reliability is poor, and is unable to meet the requirements of LOS D.

**Maintenance Program Area: Tunnels**Survey Item: **Tunnel Gen'l Electrical Sys.**Budgeted Activities: **508**

<b>A</b>	Reliability of the general electrical power system is excellent. System availability in the past year is 98 to 100 percent, excluding downtime due to preventive maintenance or general power outages.
<b>B</b>	Reliability of the general electrical power system is good. System availability in the past year is 95 to 98 percent, excluding downtime due to preventive maintenance or general power outages.
<b>C</b>	Reliability of the general electrical power system is fair. System availability in the past year is 90 to 95 percent, excluding downtime due to preventive maintenance or general power outages.
<b>D</b>	Reliability of the general electrical power system is borderline. System availability in the past year is 80 to 90 percent, excluding downtime due to preventive maintenance or general power outages.
<b>F</b>	Reliability of the general electrical power system is poor. System availability in the past year cannot meet the requirements of LOS D.

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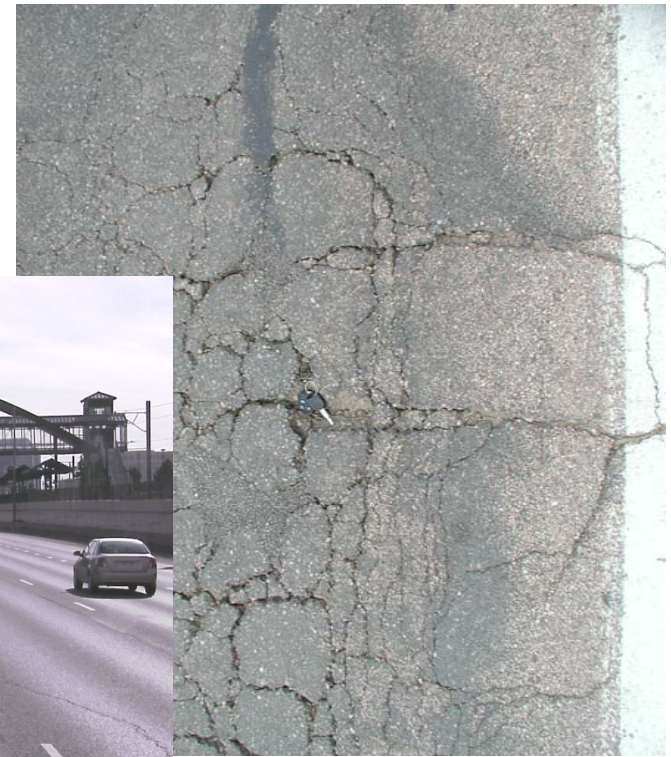
**Maintenance Program Area: Tunnels**
**Survey Item: Tun'l Mechanical, Ventilation**
**Budgeted Activities: 510**

<b>A</b>	Reliability of the tunnel mechanical and ventilation systems is excellent. System availability in the past year is 98 to 100 percent, excluding downtime due to preventive maintenance or general power outages.
<b>B</b>	Reliability of the tunnel mechanical and ventilation systems is good. System availability in the past year is 95 to 98 percent, excluding downtime due to preventive maintenance or general power outages.
<b>C</b>	Reliability of the tunnel mechanical and ventilation systems is fair. System availability in the past year is 90 to 95 percent, excluding downtime due to preventive maintenance or general power outages.
<b>D</b>	Reliability of the tunnel mechanical and ventilation systems is borderline. System availability in the past year is 80 to 90 percent, excluding downtime due to preventive maintenance or general power outages.
<b>F</b>	Reliability of the tunnel mechanical and ventilation system is poor. System availability in the past year cannot meet the requirements of LOS D.

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**Maintenance Program Area: Tunnels**
**Survey Item: Tunnel Structure**
**Budgeted Activities: 512**

<b>A</b>	The tunnel structural condition is excellent, with no observed defects (cracking, spalling, or popouts of the lining; leakage of groundwater; corrosion of reinforcement or steel structural members; etc.).
<b>B</b>	The tunnel structural condition is very good, with few observed defects (cracking, spalling, or popouts of the lining; leakage of groundwater; corrosion of reinforcement or steel structural members; etc.), and none affecting structural integrity of the tunnel tube or roadway or ceiling supports.
<b>C</b>	The tunnel structural condition is generally good, but with several observed defects (cracking, spalling, or popouts of the lining; leakage of groundwater; corrosion of reinforcement or steel structural members; etc.). None affects the structural integrity of the tunnel tube or roadway or ceiling supports.
<b>D</b>	The tunnel structural condition is fair, with several observed defects (e.g., cracking, spalling, or popouts of the lining; leakage of groundwater; corrosion of reinforcement or steel structural members; etc.) that require attention before progressing to a worse state.
<b>F</b>	The tunnel structural condition is poor. Observed defects (e.g., cracking, spalling, or popouts of the lining; leakage of groundwater; corrosion of reinforcement or steel structural members; etc.) are sufficiently extensive or serious enough locally to require structural analysis of the most appropriate repair.



# 2010 SURFACE TREATMENT REPORT FOR THE STAC

Presented by: **Stephen Henry**  
**Pavement Management Program**  
**November 2010**

# TOPICS

- Present the current condition of
  - Entire CDOT network
  - Interstate highways
  - National Highway System
  - Other highways
- Present long-term network condition predictions at current budget levels
- Present necessary budget to achieve Transportation Commission objectives and goals



# Pavement Management Process

## Required Inputs

Contracted

Data Collection



Traffic Data  
from DTD

Regional  
Inventory Data

Select	Proj Name	Region	Description	SPW	Proj. Mile	Est. Mile	Length	Region	Work Type	Plan Type	Depth	Units	Prime Cont
	0.00000												
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	0.00200		SECA	1	2	1	2	New	Concrete	ASPHALT	3	44	
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Project Costs & Treatments

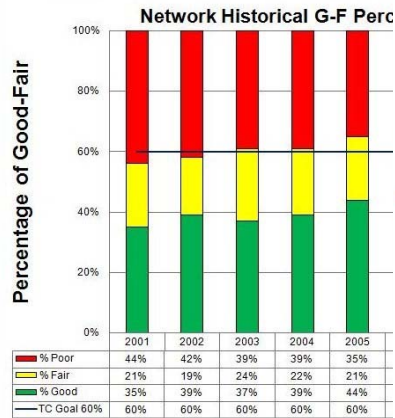
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Pavement  
Management  
Model

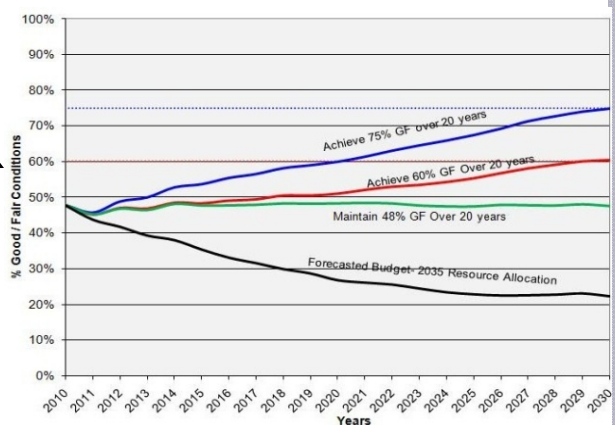


Project Recommendations

Good/Fair/Poor  
Percentages & Maps



20-Year G/F/P Projections



Resulting  
Outputs

## CURRENT CONDITION OF THE CDOT NETWORK

	TC Goal	2009 Condition	2010 Condition
	% G-F	% G-F	% G-F
Network	60	50	48
Interstate	85	65	62
NHS non-Interstate	70	64	63
Other	55	37	35







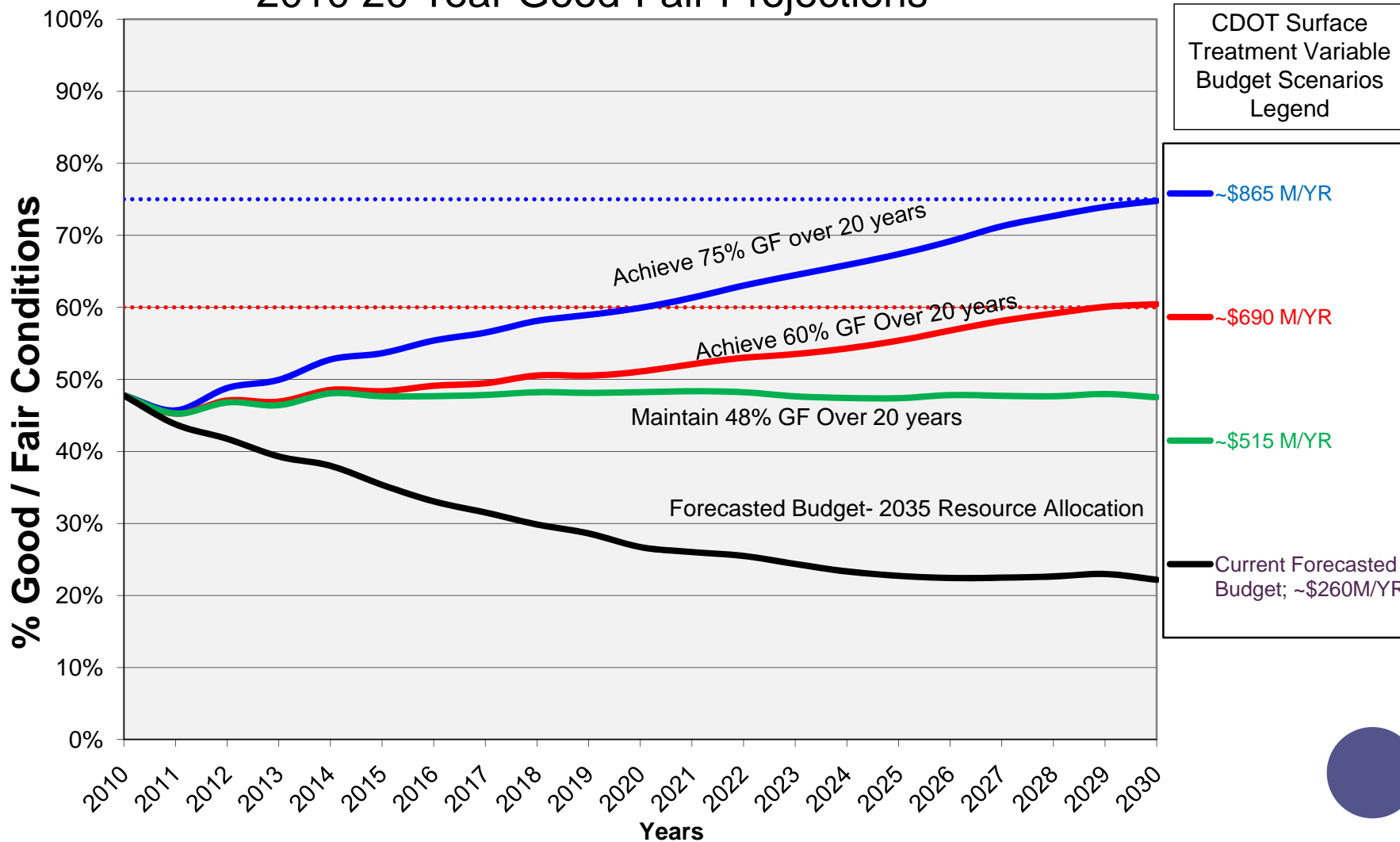






# LONG-TERM CONDITION PROJECTIONS AND BUDGET ANALYSIS

## 2010 20 Year Good-Fair Projections



# TRANSPORTATION COMMISSION GOALS

	TC Goal	2010 Condition	2011 Condition (Predicted)	2012 Condition (Predicted)
	% G-F	% G-F	% G-F	% G-F
Network	60	48	44	42
Interstate	85	62	57	50
NHS (Non-Interstate)	70	63	59	56
Other	55	35	31	31

- To achieve the *vision* of 75% Good-Fair requires \$865M/YR
- To *repair* the system to 60% Good-Fair requires \$690M/YR
- To *maintain* the current 48% Good-Fair requires \$515M/YR



Questions?



# MLOS

STAC meeting  
November 12, 2010



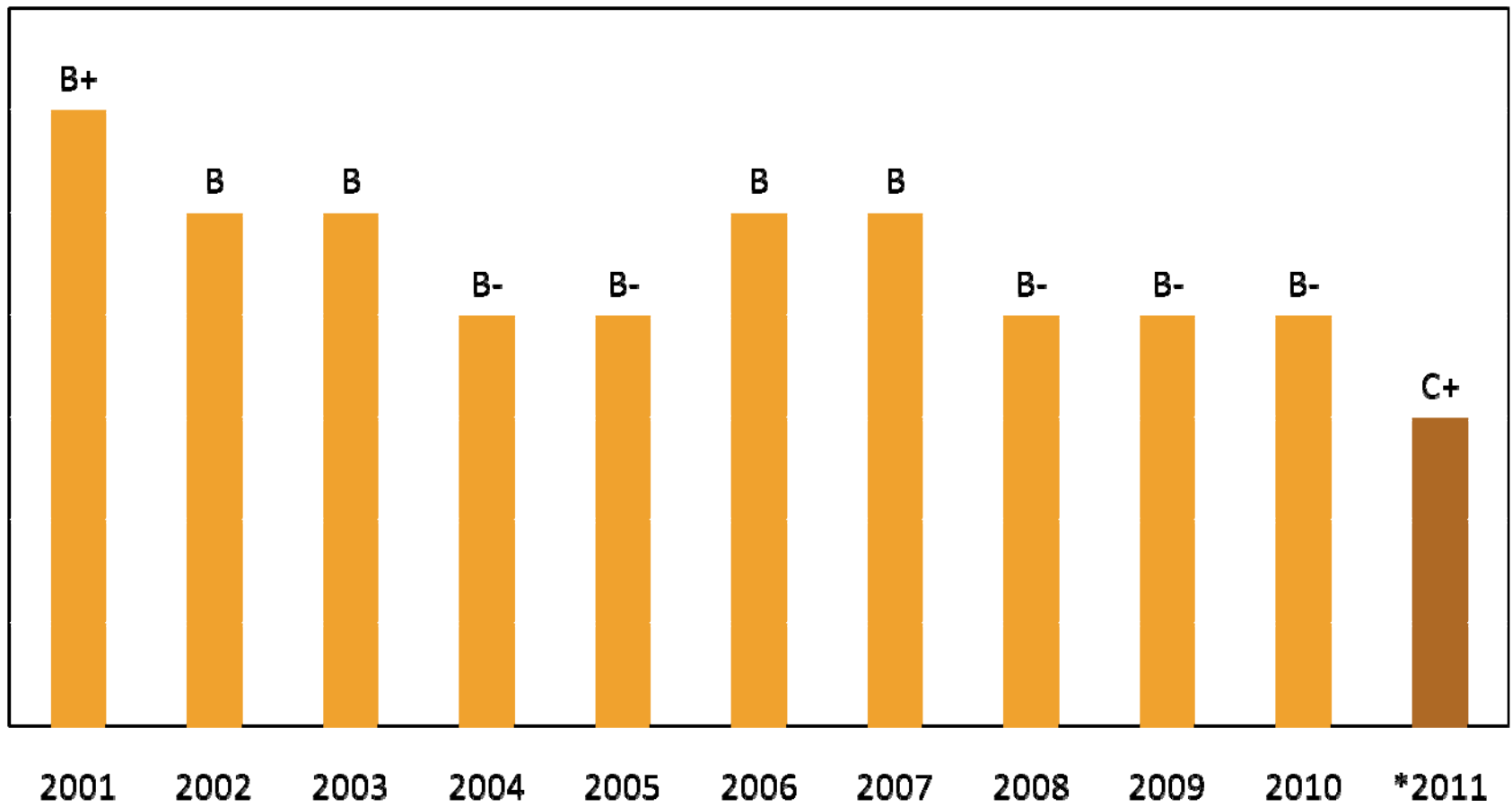


# MLOS

- ▶ Presented three options ranging from \$242 million to \$249 million to the Transportation Commission
  - Meet the dollar amount proposed by OFMB
  - Hold the FY 11 Level of Service target constant
  - Add 3.5% (inflation) to the FY 11 target expenditure
- ▶ The Commission asked for a more direct comparison between Maintenance Program Areas (MPAs)



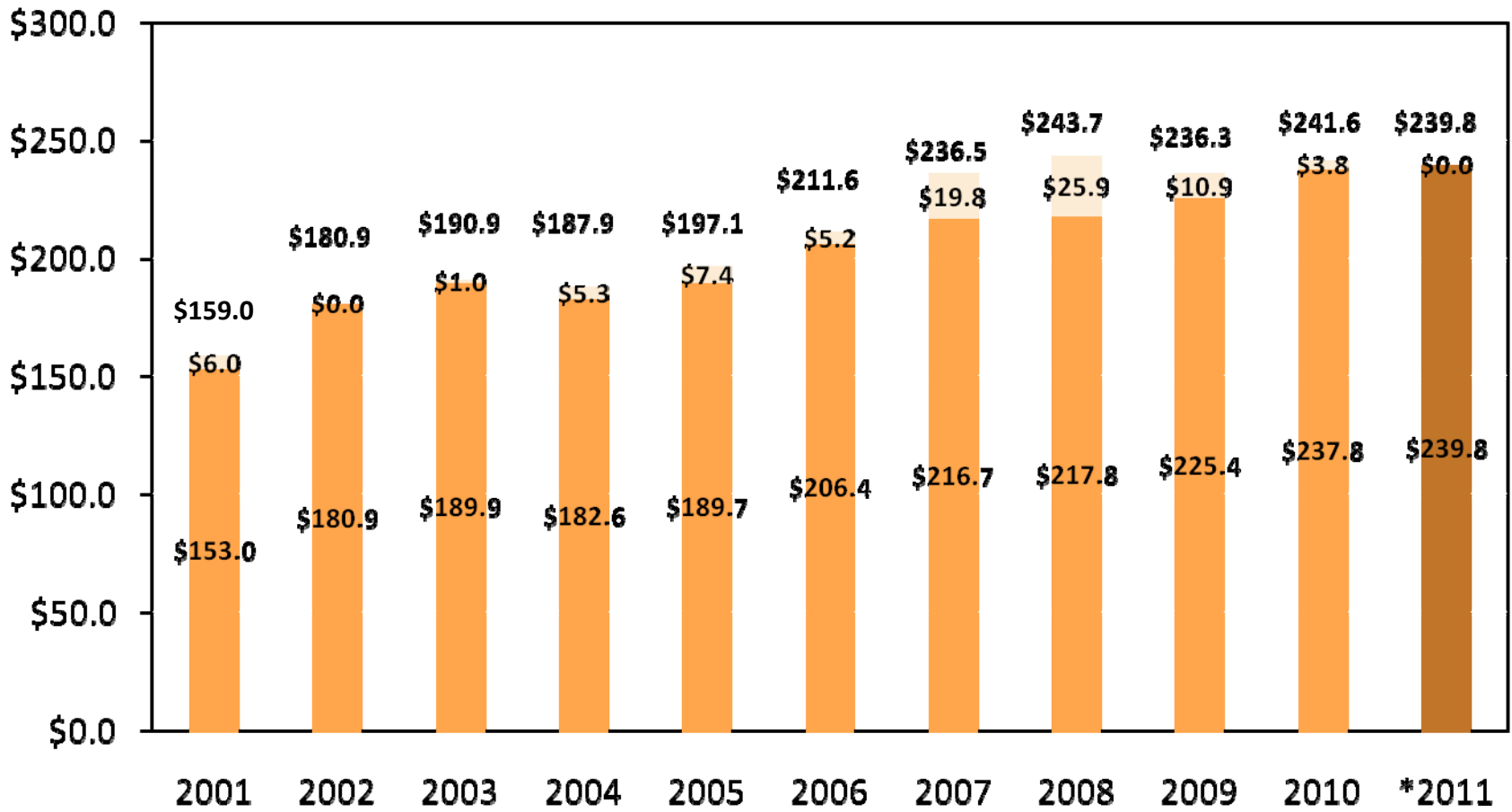
# Achieved LOS Ratings



\*Target



# MLOS Budget Trends

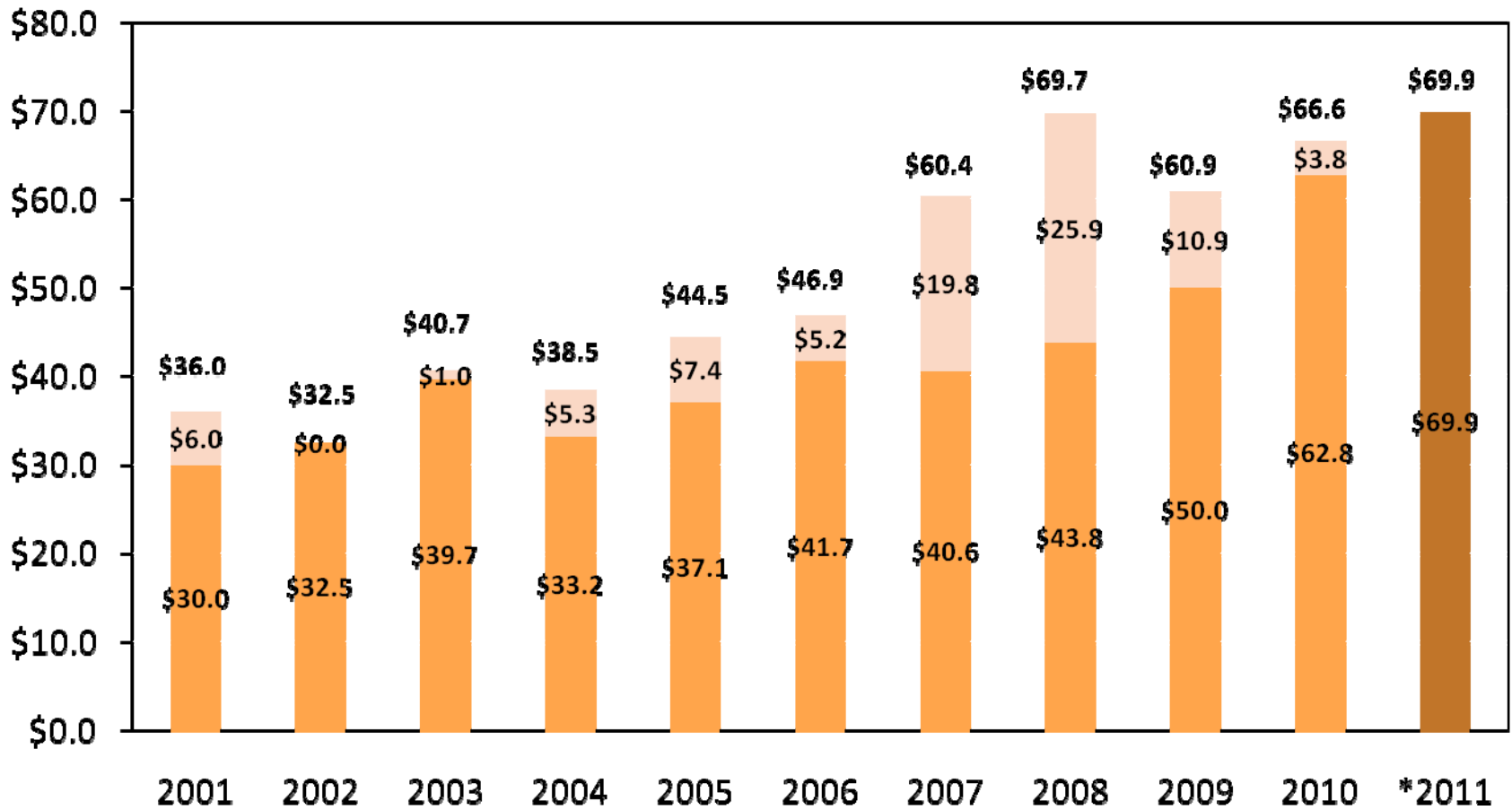


\*Target



# Snow and Ice History

## Starting Budgets and Contingency Usage



\*Target



# Projected Expenditure D to A+

MPA	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
Planning, Training & Scheduling	\$10.21	\$10.95	\$11.74	<b>\$12.59</b>	\$13.51	\$14.49	\$15.54	\$16.66	\$17.87	\$19.17	\$20.56
Roadway Surface	\$33.97	\$35.72	\$37.55	\$39.47	<b>\$42.82</b>	\$52.43	\$67.14	\$97.69	\$137.00	\$206.05	\$232.26
Roadside Facilities	\$14.34	\$15.07	\$15.82	<b>\$16.62</b>	\$17.88	\$18.79	\$19.98	\$21.61	\$23.39	\$25.55	\$27.43
Roadside Appearance	\$6.40	\$6.72	\$7.06	<b>\$7.41</b>	\$7.81	\$8.23	\$8.70	\$9.18	\$9.74	\$10.41	\$11.08
Traffic Services	\$48.39	\$51.48	\$54.84	<b>\$58.54</b>	\$62.46	\$66.27	\$70.17	\$77.78	\$89.55	\$101.34	\$109.08
Structure Maintenance	\$7.57	\$8.50	\$9.46	\$10.55	<b>\$12.56</b>	\$17.71	\$26.92	\$39.10	\$51.91	\$65.18	\$78.47
Snow and Ice Control	\$48.51	\$51.00	\$53.63	\$56.41	\$59.58	\$62.73	<b>\$66.05</b>	\$69.53	\$73.17	\$77.00	\$78.98
Rest Areas, Buildings and Grounds	\$11.48	\$12.31	\$13.21	<b>\$14.16</b>	\$15.19	\$16.29	\$17.47	\$18.74	\$20.10	\$21.56	\$23.12
Tunnel Maintenance	\$4.51	\$4.83	\$5.18	\$5.56	<b>\$6.03</b>	\$6.46	\$6.92	\$7.42	\$7.95	\$8.52	\$9.05
<b>Total</b>	<b>\$176.61 - \$185.39</b>	<b>\$185.50 - \$196.58</b>	<b>\$197.63 - \$208.48</b>	<b>\$209.56 - \$221.31</b>	<b>\$222.41 - \$237.84</b>	<b>\$238.05 - \$263.41</b>	<b>\$263.72 - \$298.90</b>	<b>\$299.39 - \$357.72</b>	<b>\$358.51 - \$430.68</b>	<b>\$444.81 - \$534.77</b>	<b>\$535.68 - \$591.80</b>



# Next Steps

- ▶ We asked for direction as to which of these scenarios to develop more fully
- ▶ The Commission gave us direction and we came up with a new recommendation based on this direction
- ▶ We will then plan to present final MLOS budget at November meeting



# Maintenance Program Area

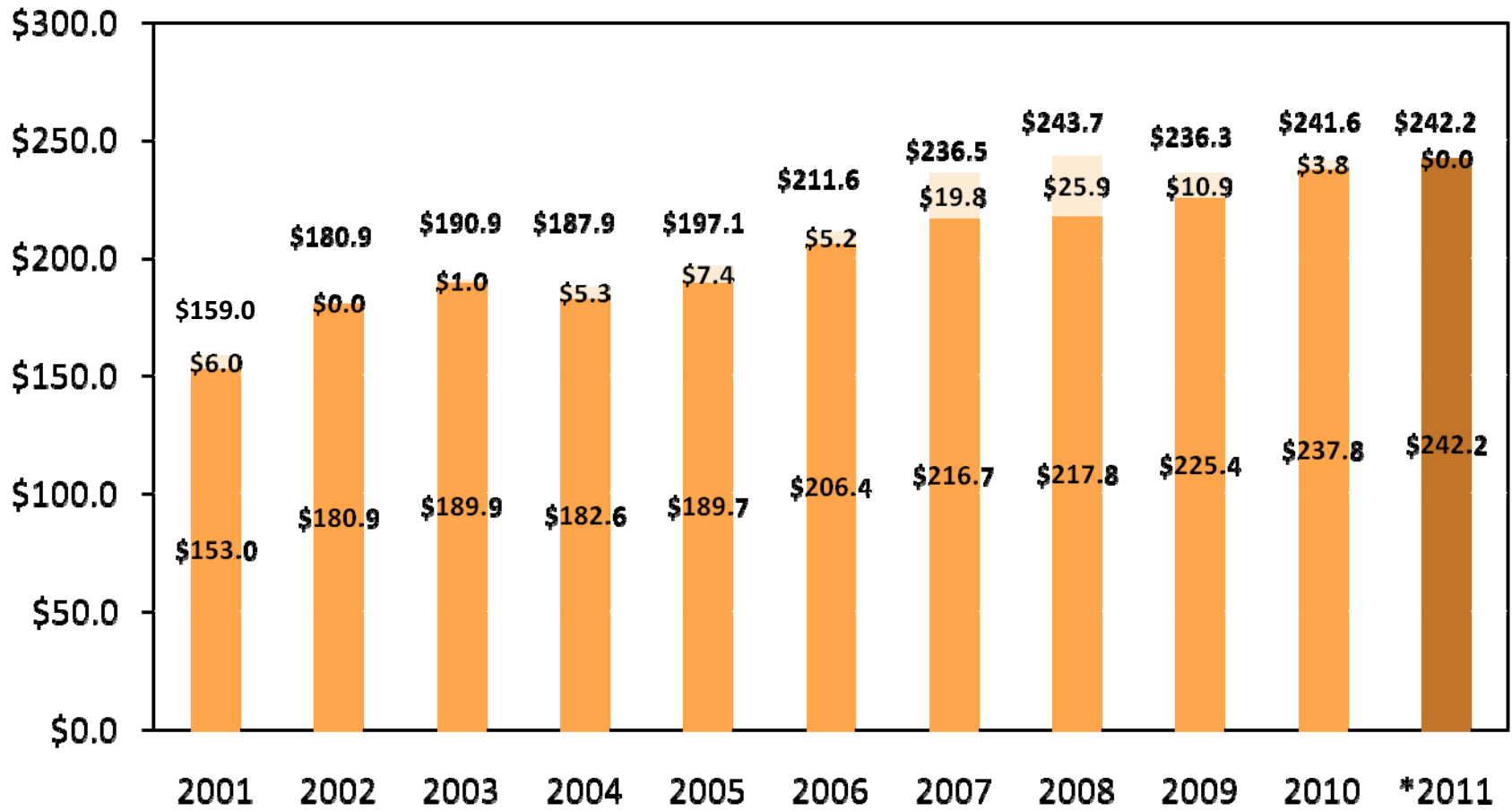
MPA	LOS Grade	Projected Expenditure
100	C	\$12,600,000.00
150	B-	\$52,000,000.00
200	C	\$16,233,252.00
250	C	\$7,000,000.00
300	C	\$58,000,000.00
350	C+	\$12,000,000.00
400	B	\$64,300,000.00
450	C	\$14,000,000.00
500	C+	\$6,100,000.00
<b>State</b>	<b>B-</b>	<b>\$242,233,252.00</b>

# Investment Category

Investment Category	LOS Grade	Projected Expenditure
System Quality	B-	\$93,333,252.00
Mobility	B	\$64,300,000.00
Safety	C	\$58,000,000.00
Program Delivery	C	\$26,600,000.00
<b>State</b>	<b>B-</b>	<b>\$242,233,252.00</b>



# MLOS Budget Trends



\*Target



# Thank you

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Maintenance and Operations Branch Mgr.

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Golden CO 80401

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[david.wieder@dot.state.co.us](mailto:david.wieder@dot.state.co.us)



# Maintenance Program Area

MPA	LOS Grade	Projected Expenditure
100 Planning Scheduling & Training	C	\$12,600,000.00
150 Roadway Surface	B-	\$52,000,000.00
200 Roadside Facilities	C	\$16,233,252.00
250 Roadside Appearance	C	\$7,000,000.00
300 Traffic Services	C	\$58,000,000.00
350 Structure Maintenance	C+	\$12,000,000.00
400 Snow and Ice Control	B	\$64,300,000.00
450 Equipment, Rest Areas, Buildings & Grounds	C	\$14,000,000.00
500 Tunnel Maintenance	C+	\$6,100,000.00
<b>State</b>	<b>B-</b>	<b>\$242,233,252.00</b>



# Colorado Department of Transportation

## Highway Devolution Study

November 2010



# Definition

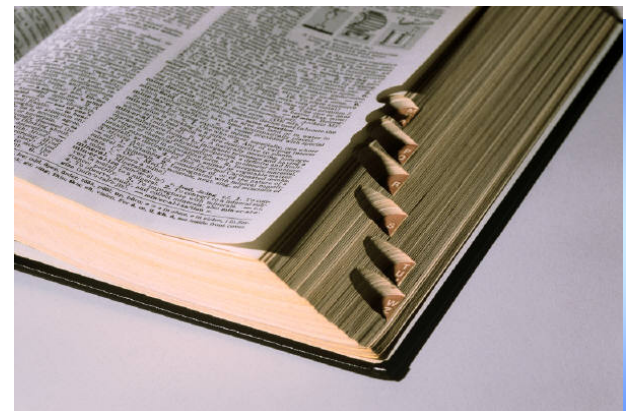
## Devolution:

de·vo·lu·tion

*noun* \ de-və-lü-shən *also* dē-və-\

### Definition of DEVOLUTION

**1** : transference (as of rights, powers, property, or responsibility) to another; *especially* : the surrender of powers to local authorities by a central government\*



\*Source: Merriam Webster Dictionary

# The Evolution of Devolution

- **Conversation on the concept started during the Governor's Transportation Finance and Implementation Panel (2007)**
- **HB 08-1012 (Vaad/Spence)—Would have required the transportation commission to evaluate the state highway system and remove roads from the system if it determines that it is feasible and appropriate to do so.**
- **HB 09-1114 (Vaad)—Would have required the Transportation Commission to determine “commuter highways” within MPO boundaries and remove eligible segments from the state highway system.**
- **HB 10-1088 (Vaad)—Identical to the previous session legislation (HB 09-1114)**





# Background

## HB 10-1405 (Vaad/Spence)

Requires CDOT to work with the Metro Planning Organizations (MPO) to conduct a study to determine which highways within MPO boundaries are “commuter highways\*.”

- Calls for use of easily obtainable data from which the Transportation Commission may make recommendations to remove certain segments of highway from the state system
- Report to the House and Senate Transportation Committees by February 1, 2011

**If the Transportation Commission recommends removal of some eligible segments from the state system, the Commission must:**

- Consult with the impacted MPO or local governments
- Removal must not result in an unfunded mandate
- Suggest modifications to the funding formula used to allocate HUTF to impacted jurisdiction



# Background con't

## HB 10-1405 (Vaad/Spence)

\* “***Commuter Highway***” as defined by the bill is:

- A highway or a portion of highway that:
  - Is part of the state highway system
  - Is located within the territory of an MPO
  - At least 80 percent of trips originate and terminate within that MPO
  - Is not an interstate highway

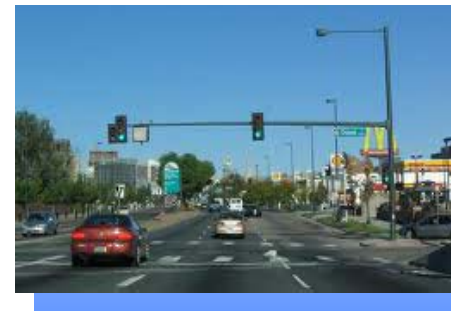




# Methodology

## Identifying Commuter Highways

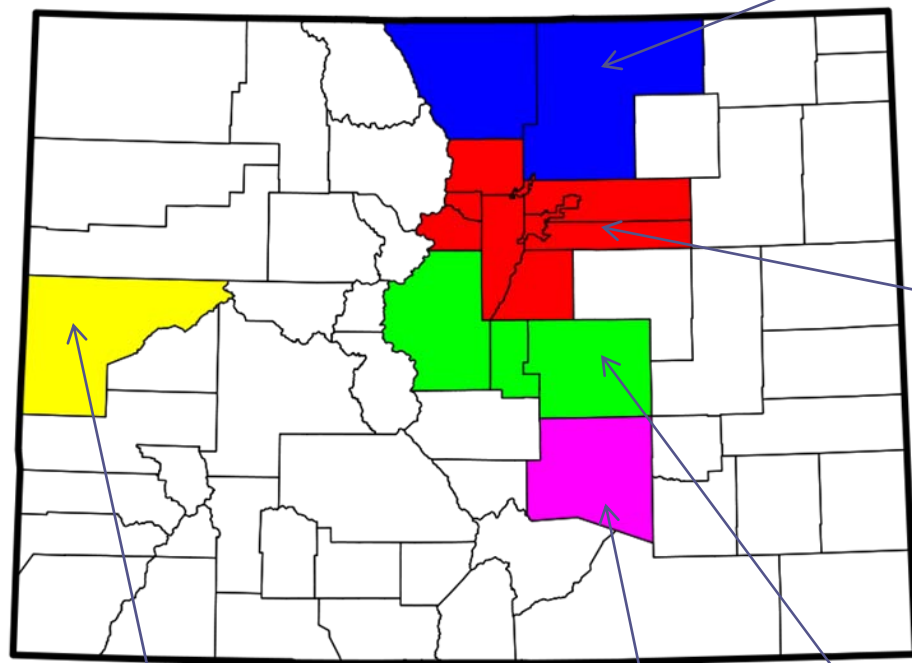
- **Direct Survey is not feasible**
- **Use each MPO's regional travel model**
  - Produces an estimate of traffic volume on all segments of the system
  - Resulting model output identifies internal trips within the MPO boundary





# Study Areas

## Metropolitan Planning Organizations MPO's



• North Front Range Metropolitan Planning Organization (NFRMPO)



• Denver Regional Council of Governments (DRCOG)



• Pikes Peak Area Council of Governments (PPACG)



• Pueblo Council of Governments (PACOG)



• Grand Valley Metropolitan Planning Organization (GVMPO)

### CENTERLINE MILES

CDOT maintains 1,201.76 centerline miles within the 5 MPO boundaries (excluding interstates)

### LANE MILES

CDOT maintains 3,886.85 lane miles within the 5 MPO's (excluding interstates)

### MILES TRAVELED

In 2009 26 million daily vehicle miles were traveled within the 5 MPO boundaries (excluding interstates)

This is 59% of the total daily vehicle miles traveled in CO in 2009 (excluding interstates)



# PPACG

## MPO at a Glance

### CENTERLINE MILES

CDOT maintains 124.9 centerline miles (excluding interstates)

Total "commuter" centerline miles 36.05

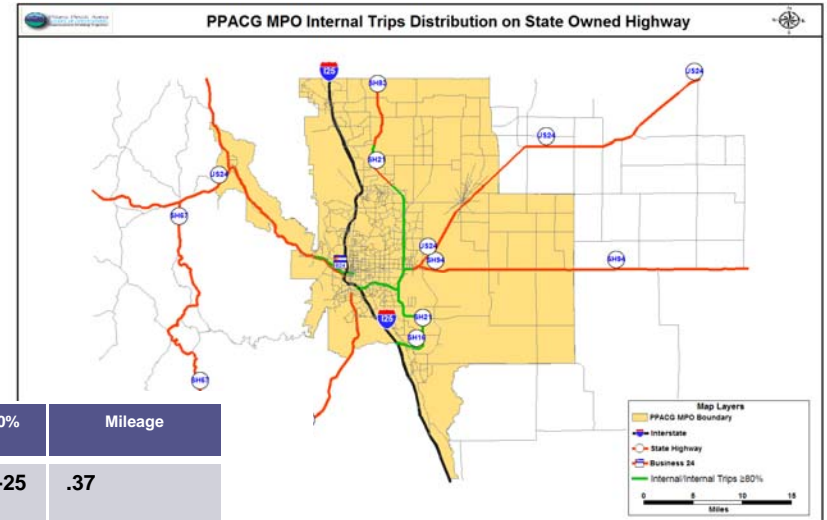
### LANE MILES

Total lane miles (excluding interstates) 413

Total "commuter" lane miles 158.82

### MILES TRAVELED

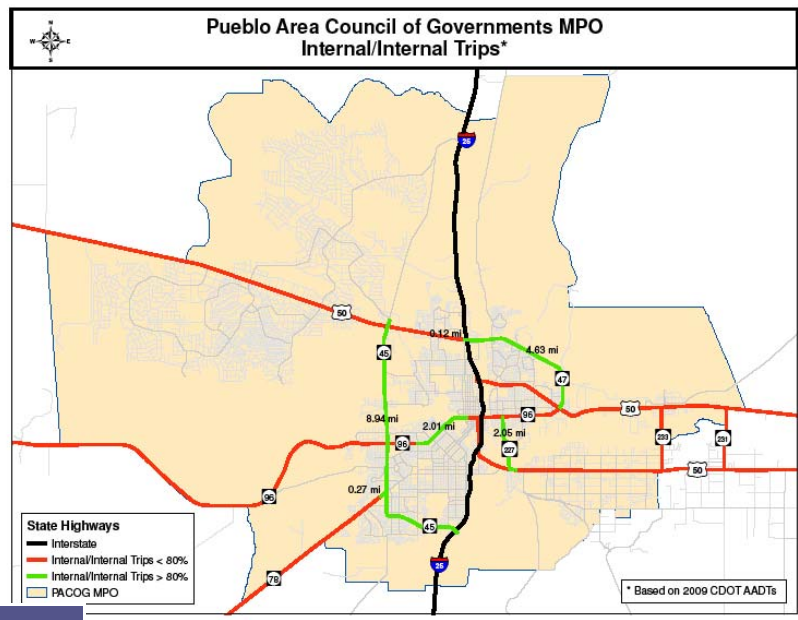
2,283,446 daily vehicle miles were traveled within this MPO in 2009 (excluding interstates)



State Highway in PPACG Region	Internal Trips More than 80%	Mileage
US 24 West	Between 8 <sup>th</sup> St and I-25	.37
US 24 Middle	Between I-25 and Powers Blvd	4.64
US 24 East	Between Powers Blvd and Peters Rd	1.09
Powers Blvd (SH 21)	Between Briargate Pkwy and SH 16	19.67
SH 16	Whole Segment	3.05
SH 105	Whole Segment	9.59
SH 83	Between North Gate Rd and Powers Blvd	2.27
24 Business	Whole Segment	4.96
<b>Total</b>		<b>36.05</b>



# PACOG



State Highway in PACG Region	Internal Trips More than 80%	Mileage
US 50	Between I-25 and SH 47	.12
SH 45	Between I-25 and US 50	8.94
SH 78	At Jct of SH 45	.27
SH 227	Between North US 50 and South US 50	2.05
SH 47	Between US 50 and I-25	4.63
SH 96	Between I-25 and SH 45	2.01
<b>Total</b>		<b>18.02</b>

**MPO at a Glance**

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**CENTERLINE MILES**

CDOT maintains  
 42.3 centerline miles  
 (excluding interstates)

Total "commuter"  
 centerline miles  
 18.02

---

**LANE MILES**

Total lane miles  
 162.66  
 (excluding interstates)

Total "commuter"  
 lane miles  
 68

---

**MILES TRAVELED**

741,922.4 daily vehicle  
 miles were traveled  
 within this MPO in 2009



# GVMPO

## MPO at a Glance

### CENTERLINE MILES

CDOT maintains 55 centerline miles (excluding interstates)

Total "commuter" centerline miles 22.39

### LANE MILES

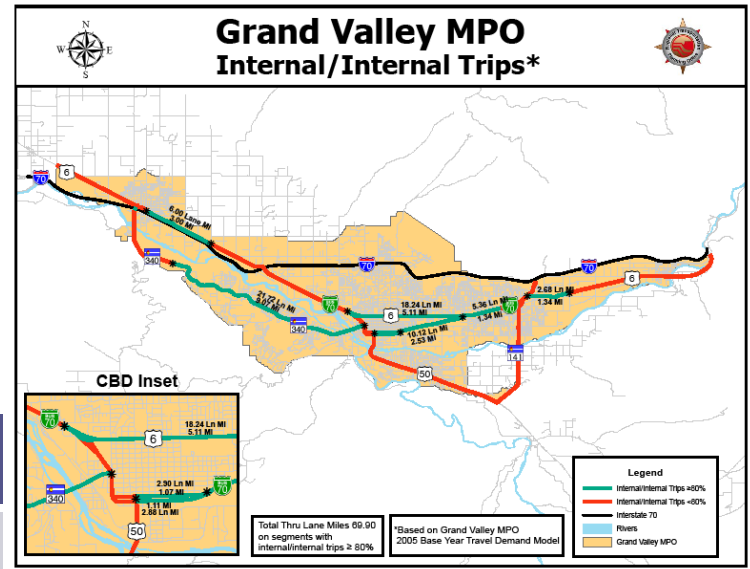
Total lane miles 170 (excluding interstates)

Total "commuter" lane miles 69.90

### MILES TRAVELED

770,986.1 daily vehicle miles were traveled within this MPO in 2009 (excluding interstates)

State Highway in PACG Region	Internal Trips More than 80%	Mileage
US 6	From I-70B to I-70B	5.11
SH 340	From I-70 to I-70B	9.07
US 6	Section of I-70B	2.53
US 6	East of SH 141	1.34
US 6	Section of I-70B	1.34
US 6	Section just east of jct w SH 340	1.34
<b>Total</b>		<b>22.39</b>







# NFRMPO

## MPO at a Glance

### CENTERLINE MILES

CDOT maintains 197.66 centerline miles (excluding interstates)

Total "commuter" centerline miles 56.5

### LANE MILES

Total lane miles 553.69 (excluding interstates)

Total "commuter" lane miles 204.33

### MILES TRAVELED

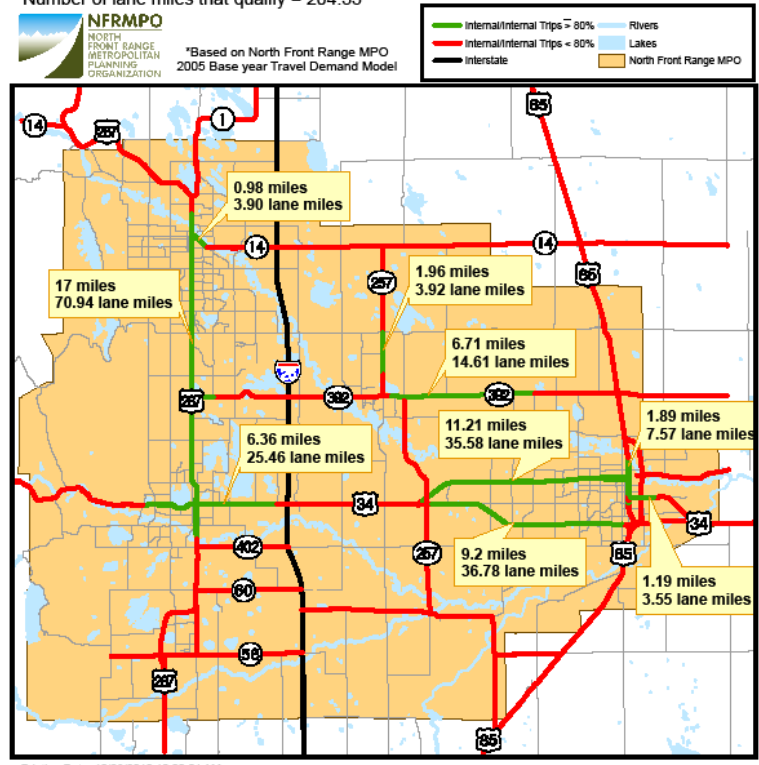
2,695,149.9 daily vehicle miles were traveled within this MPO in 2009 (excluding interstates)

State Highway in PACG Region	Internal Trips More than 80%	Mileage
US 287	From SH 14 to SH 402	17
SH 14	From US 287 to SH 14	.98
US 34	From I-25 to US 287	6.36
SH 392	From SH 257 to US 85	6.71
US 34 north	From SH 257 to US 85	11.21
US 34 South	From SH 257 to US 85	9.2
US 85	from US 34 south to US 34 North	1.89
US 34	From US 85 east to US 34 South	1.19
SH 257	From SH 392 to SH 14	1.96
<b>Total</b>		<b>56.5</b>

## North Front Range MPO Internal/Internal Trips\*

Total number of center line miles within North Front Range MPO (excluding I-25) = 197.66

Total number of lane miles within North Front Range MPO (Excluding I-25) = 553.69  
Number of lane miles that qualify = 204.33



Printing Date: 10/28/2010 10:00:51 AM  
 File: C:\NFR Model\NFR Model\Output\SB1405\SB1405.mxd  
 Prepared By: akirchoff  
 Illustrative purposes only.





# DRCOG

## MPO at a Glance

### CENTERLINE MILES

CDOT maintains 781.9 centerline miles (excluding interstates)

Total "commuter" centerline miles 433.2

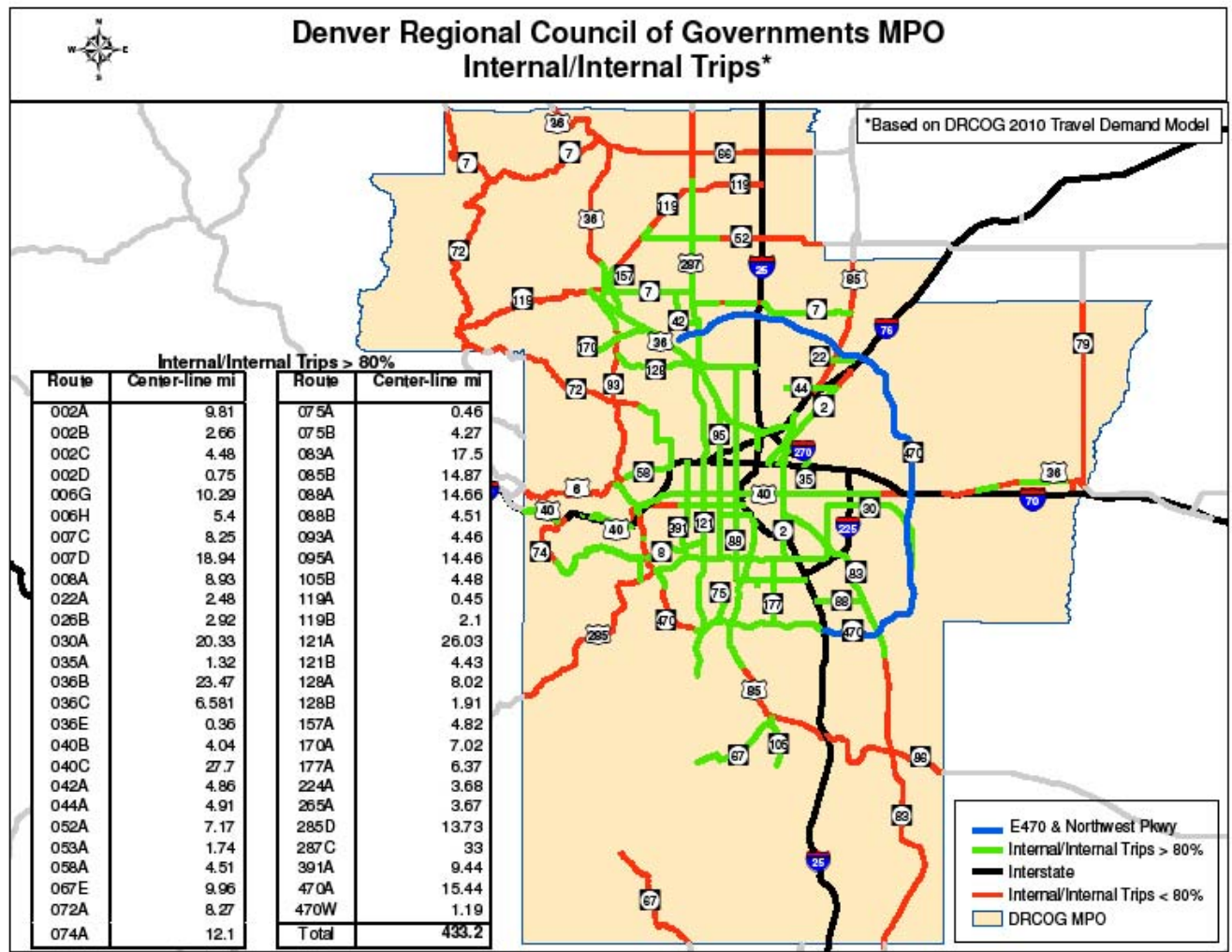
### LANE MILES

Total lane miles 2,587.5 (excluding interstates)

Total "commuter" lane miles 1,653

### MILES TRAVELED

19,133,627.24 daily vehicle miles were traveled within this MPO in 2009 (excluding interstates)





## DRCOG.....

ROUTE #	NAME
002A	Colorado Boulevard
002B	Colorado Boulevard
002C	Hansen Boulevard
002D	Sable Boulevard
006G	6th Avenue
006H	Vasquez Boulevard/Brighton Boulevard
007C	Baseline Road
007D	Baseline Road/W. 168th Avenue/W. 160th Avenue/Bridge Street/E. 160th Avenue
008A	Morrison Road
022A	E. 124th Avenue
026B	Alameda Avenue
030A	Hampden Avenue/Havana Street/E. 6th Avenue
035A	Quebec Street
036B	28th Street/Boulder Turnpike
036C	E. Colfax Avenue
036E	Boulder Spur
040B	I-70 Frontage Road along Clear Creek-Jefferson County Line
040C	Colfax Avenue
042A	N. 95th Street
044A	104th Avenue
052A	Mineral Road
053A	North Broadway
058A	No Name (Freeway)
067E	No Name
072A	Coal Creek Road/Ward Road/W. 64th Avenue
074A	Bear Creek Road
075A	Broadway
075B	Bowles Avenue/Platte Canyon Road
083A	Parker Road/Leetsdale Drive

ROUTE #	NAME
085B	Santa Fe Drive
088A	Federal Boulevard/Belleview Avenue
088B	Arapahoe Road
093A	Broadway Street
095A	Sheridan Boulevard
105B	Perry Park Road
119A	Boulder Canyon Road
119B	Diagonal Highway
121A	Wadsworth Boulevard
121B	Wadsworth Boulevard
128A	120th Avenue/Interlocken Loop
128B	120th Avenue
157A	Foothills Parkway
170A	Eldorado Springs Drive/Marshall Drive
177A	University Boulevard
224A	E. 70th Avenue/E. 74th Avenue
265A	Brighton Boulevard
285D	Hampden Avenue
287C	Federal Boulevard/S. 112th Street/N. 107th Street/Main Street
391A	Kipling Parkway
470A	C-470
470W	C-470 (In Golden)



# Study Results

## CDOT Maintains

### CENTERLINE MILES

- 1,201.76 centerline miles within the MPO boundaries (excluding interstates)
- 566.16 “commuter” centerline in the MPO’s

### LANE MILES

- 3,886.85 lane miles within the MPO boundaries (excluding interstates)
- 2,154.05 “commuter” lane miles in the MPO’s





# Additional Issues

At this time, Staff does not recommend devolution based on:

- Devolution Mechanisms Exist
  - In 2008 Transportation Commission adopted Policy Directive 1003.0 that allows for devolution based on mutual agreement with cities and counties
  - Statutory authority to abandon state highways (CRS 43-2-106)
  - Swap Options (i.e. Powers Boulevard)
- Unfunded Mandate
  - Legislation stipulates that removal cannot create unfunded mandate (C.R.S. 29-1-304.5)
  - What is an unfunded mandate in this case?
  - Providing local governments with additional HUTF funds could leave a disproportionately small budget for CDOT to maintain the remaining state system
- Federal Concern
  - Do NHS routes stay on the federal system?
  - Consideration of other “special rules” including outdoor advertising and the disposal of excess ROW on HTF funded routes
  - Potential reduction in federal funds if routes removed from federal system



# Additional Issues Con't

## *CDOT's Mission*

*To provide the best multi-modal transportation system for Colorado that most effectively and safely moves people, goods, and information*

- Potential Impact to CDOT's Mission
- Freight
  - Truck traffic continuity could not be guaranteed
  - Local entities can restrict truck traffic
  - Permitted routes (over-size, overweight and height) could be impacted
- Technology Infrastructure
  - CDOT would need to establish easements or maintain ownership of fiber in ROW due to use of federal funds
  - Franchise agreements may need to be established with some utilities and the local entity taking over segment
- Haz-Mat Routes
  - Local governments have the authority to prohibit the transport of hazardous materials
  - Continuity with existing rules and routes

# Next Steps

## MPO Presentations

- November and December, 2010

## Transportation Commission Workshop

- November 17<sup>th</sup>, 2010

## Transportation Commission Action \*

- December 16<sup>th</sup>, 2010

## Complete Report

- January 2011

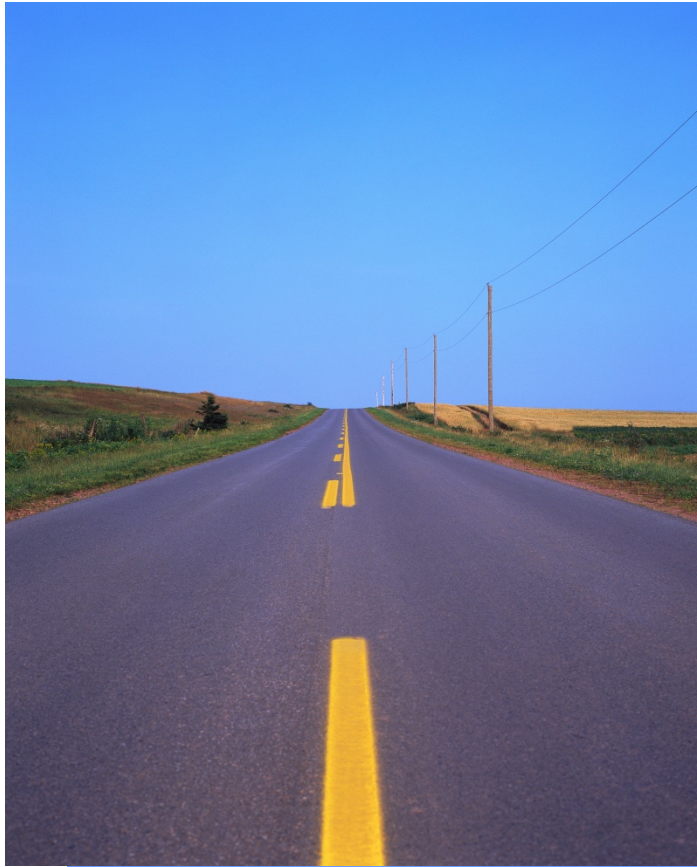
## Report Due to Joint Transportation Committees

- February 1<sup>st</sup>, 2011





# Questions?





# CDOT Owned Bridges in Poor Condition

Prepared by:  
CDOT Bridge Asset Management  
Tuesday May 13, 2008

125 Poor bridges based  
on April 2008 data.

Sufficiency Rating < 50 and SD or FO

