AASHTO
THE VOICE OF TRANSPORTATION
SUBCOMMITTEE ON MAINTENANCE

Communicating Maintenance Needs: A Performance-Based Budgeting Model

DYE MANAGEMENT GROUP, INC.

Outline

- Maintenance and Transportation Asset Management (TAM)
- Performance-Based Budget Model
- Communicating Needs

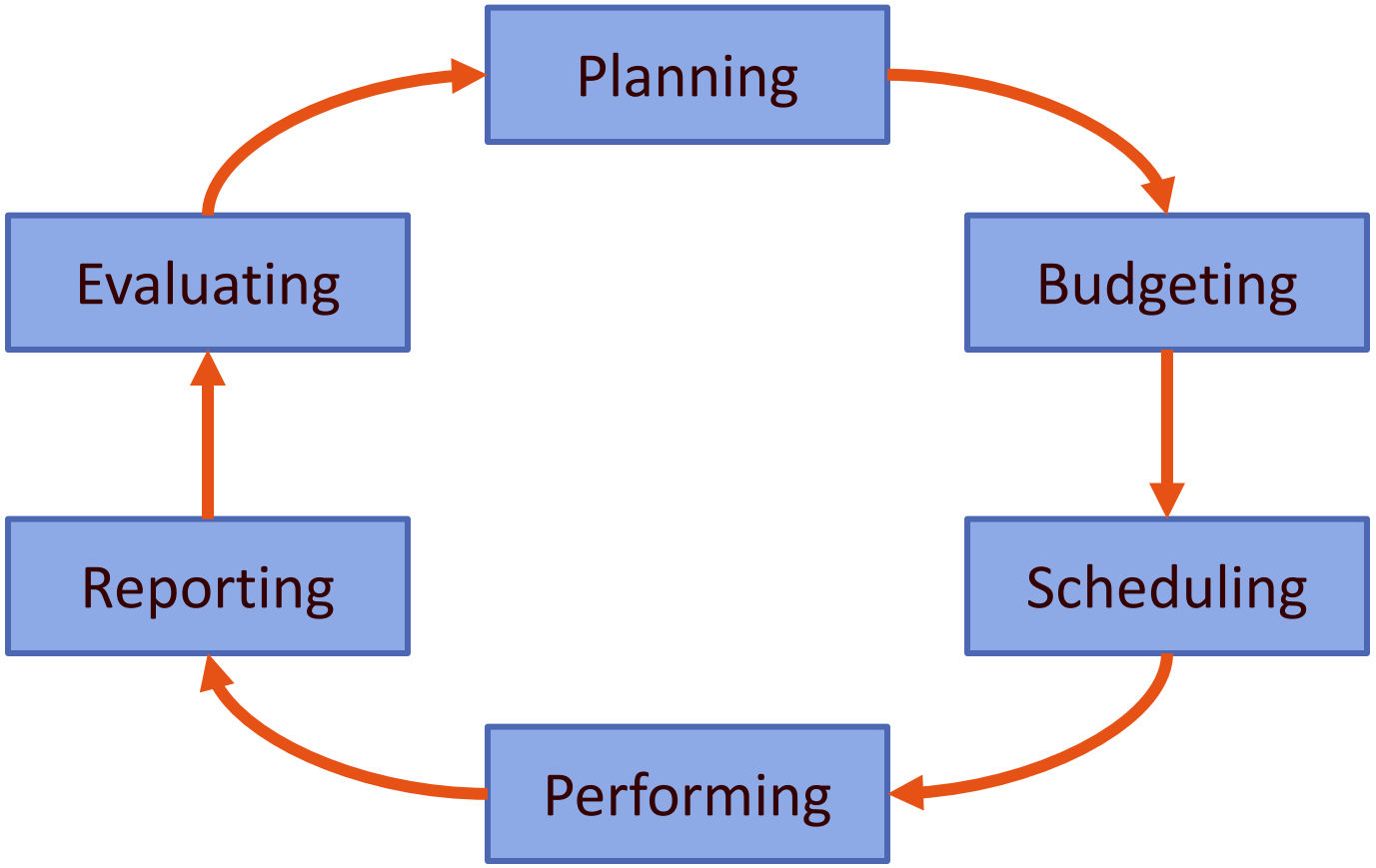
Maintenance and TAM

MAP-21

- Each state must develop a transportation asset management plan (TAMP)
- Performance and risk-based
- Pavements and bridges
- Development performance targets
- Determine funding level necessary to achieve targets

Maintenance and TAM

Maintenance is essential to asset management



Maintenance and TAM

Performance-Based Budgeting

- A systematic way to allocate funds
- Addresses gap between available resources and maintenance needs
- Quantifies and prioritizes work backlog
- Provides compelling budget information
- Effectively communicates impact of doing nothing
- An approach for achieving near- and long-term asset performance goals

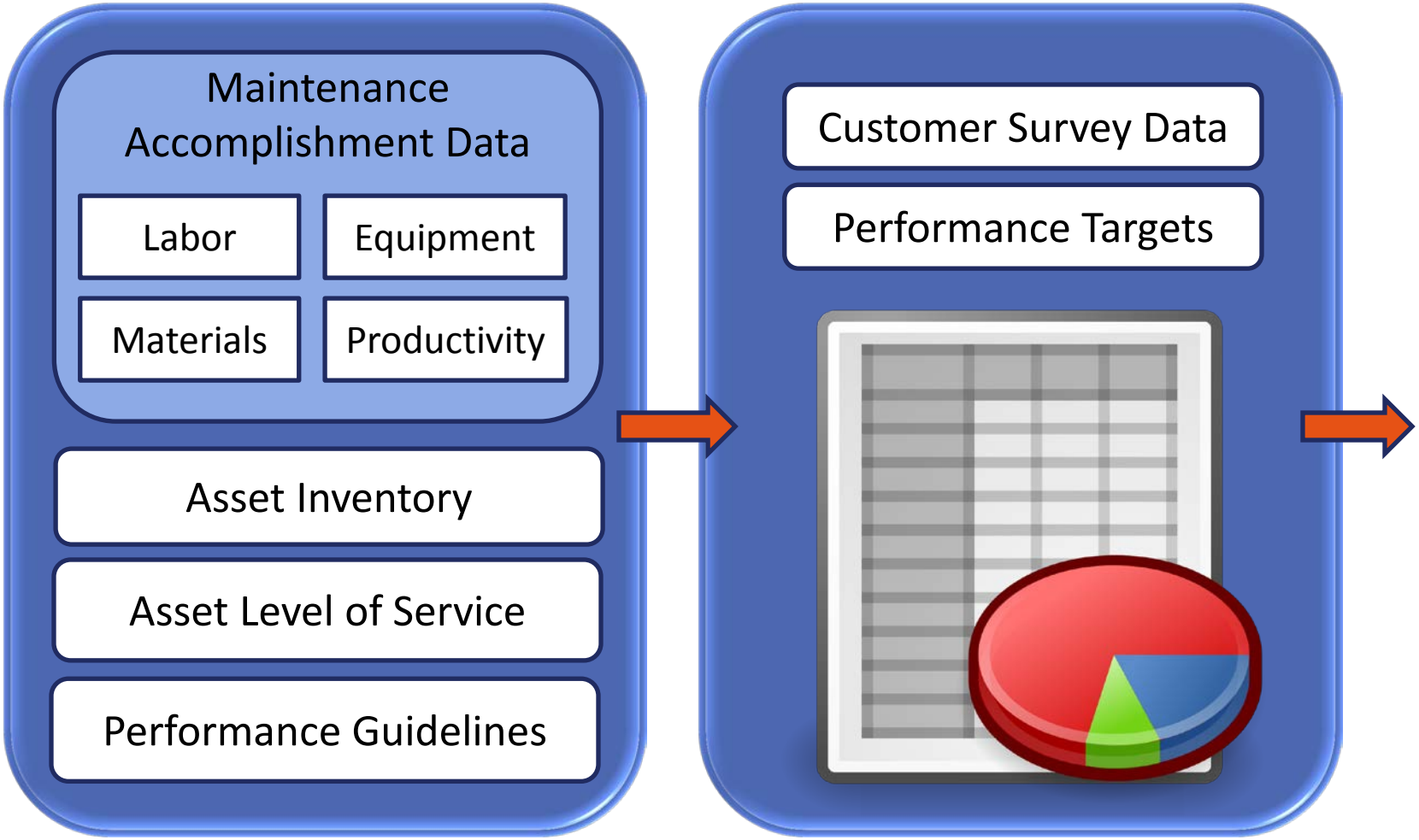
Performance-Based Budget Model

DMG Performance-Based Budget Model

- Aligns with MAP-21 performance-based requirements; merges with asset management plan
- Spreadsheet-based budget modeling tool
- Optimizes resources; demonstrates impact of delayed action
- “What-if” analysis
- Data-driven; transparent; accountable
- Based on inventory, needs, and performance goals

Performance-Based Budget Model

Budgeting Process



Performance-Based Budget Model

Budget Model Output

2015	Statewide	LOS-BASED WORK PROGRAM AND BUDGET - MAINTENANCE												Annual Budget (For LOS-Rated Assets Only)				
Group	Feature	Current LOS	Target LOS	Target FY	Yrs to Target	Activity	Description	LOE Qty	Units	%Distrib.	Factor	Annual Work Quantity	Units	Labor	Equipment	Materials	Expenditure	Total
Roadside	Fence	B+	B+	2016	1	1505	ROUTINE FENCE MAINTENANCE	1,697,986	LIN FT	79.33	1.00	1,375,084	LIN FT	$ 1,652,159	$ 472,779	$ 292,821	$ 2,688	$ 2,420,448
						1510	ACCIDENT-CHAIN LINK FENCE REPAIR	1,697,986	LIN FT	2.58	1.00	31,610	LIN FT	$ 118,999	$ 48,185	$ 57,775	$ 477	$ 225,436
						1511	ACCIDENT BARBED WIRE FENCE REPAIR	1,697,986	LIN FT	4.37	1.00	53,557	LIN FT	$ 90,520	$ 26,482	$ 14,373	$ 75	$ 131,450
						9154	CONTRACT FENCE INSPECTION & MINOR REP	1,697,986	LIN FT	0.13	1.00	2,324	LIN FT	$ -	$ -	$ -	$ 23,237	$ 23,237
						9156	CONTRACT NEW FENCE INSTALLATION	1,697,986	LIN FT	13.58	1.00	235,412	LIN FT	$ 2,878	$ 446	$ -	$ 975,297	$ 978,621
										100.00				**$ 1,864,556**	**$ 547,892**	**$ 364,969**	**$ 1,001,774**	**$ 3,779,191**
	Guardrail	B-	A	2016	1	1503	ACCIDENT GUARDRAIL REPAIR	1,130,026	LIN FT	10.90	1.00	58,504	LIN FT	$ 701,987	$ 340,740	$ 729,172	$ 1,532	$ 1,773,431
						1512	ROUTINE GUARDRAIL REPAIR	1,130,026	LIN FT	85.33	1.00	1,026,129	LIN FT	$ 354,242	$ 100,945	$ 128,903	$ 161	$ 584,251
						9153	CONTR GR INSTAL & REPAIR-ADOT FURN MAT	1,130,026	LIN FT	2.59	1.00	31,172	LIN FT	$ -	$ -	$ 336,198	$ 682,493	$ 1,018,691
						9155	CONTR GR INSTAL/RPR-CONTRACT FURN MAT	1,130,026	LIN FT	1.18	1.00	14,221	LIN FT	$ 253	$ 112	$ -	$ 1,273,714	$ 1,274,079
										100.00				**$ 1,056,482**	**$ 441,797**	**$ 1,194,273**	**$ 1,957,900**	**$ 4,650,452**
	Impact Attenuators	A+	A	2016	1	1520	CRASH ATTENR. (GUARDR.) REPAIR-ACCIDEN	8,842	LIN FT	96.82	1.00	8,719	LIN FT	$ 64,475	$ 23,007	$ 548,972	$ 7,651	$ 644,105
						1590	OTHER ROADSIDE MAINTENANCE	8,842	LIN FT	3.18	2.00	247	LBR HRS	$ 4,124	$ 2,290	$ 317	$ 1,621	$ 8,352
										100.00				**$ 68,599**	**$ 25,297**	**$ 549,289**	**$ 9,272**	**$ 652,457**
	Sweeping	C+	A	2016	1	1507	MECHANICAL SWEEPING	11,145	12-FT LM	48.84	1.00	5,444	12-FT LM	$ 325,994	$ 380,458	$ 1,933	$ 817	$ 709,203
						9157	CONTRACT MECHANICAL SWEEPING	11,145	12-FT LM	51.16	1.00	5,701	12-FT LM	$ -	$ -	$ -	$ 190,790	$ 190,790
										100.00				**$ 325,994**	**$ 380,458**	**$ 1,933**	**$ 191,607**	**$ 899,992**
	Litter	B-	A	2016	1	1501	FULL-WIDTH LITTER PICK-UP	40,895	ACRES	16.01	1.00	6,548	ACRES	$ 86,295	$ 22,335	$ 10,836	$ 754	$ 120,220
						1502	SPOT LITTER & DEBRIS PICK-UP	40,895	ACRES	71.77	3.00	88,045	LBR HRS	$ 2,073,061	$ 670,001	$ 9,754	$ 51,166	$ 2,803,982
						1535	REMOVAL OF DEAD ANIMALS FROM RDWY{NE	40,895	ACRES	12.22	1.00	4,998	LBR HRS	$ 137,766	$ 35,716	$ 1,284	$ 11,412	$ 186,178
										100.00				**$ 2,297,122**	**$ 728,052**	**$ 21,874**	**$ 63,332**	**$ 3,110,380**
	Shoulders	B	B+	2016	1	131	BLADE UNPAVED SHOULDERS	17,101	12-FT LM	93.67	1.45	23,299	-	$ 77,356	$ 92,029	$ 7,432	$ -	$ 176,818
						132	REPAIR / REMOVE SHOULDERS	17,101	12-FT LM	6.33	49.00	53,056	-	$ 468,873	$ 604,934	$ 113,317	$ -	$ 1,187,123
										100.00				**$ 546,229**	**$ 696,963**	**$ 120,749**	**$ -**	**$ 1,363,941**
Drainage	Unpaved Ditches	C+	B+	2016	1	1603	CLEAN CUTS/CHANNELS/DIKES/EMBANK CUR	2,473,952	LIN FT	84.32	1.00	2,085,997	LIN FT	$ 837,056	$ 928,530	$ 120,221	$ 6	$ 1,885,813
						1604	MINOR SLIDE REMOVAL	2,473,952	LIN FT	3.79	20.00	1,876,362	SQ FT	$ 2,839,478	$ 2,412,901	$ -	$ -	$ 5,252,379
						1690	OTHER DRAINAGE MAINTENANCE & REPAIR	2,473,952	LIN FT	11.89	0.02	5,883	LBR HRS	$ 147,770	$ 163,346	$ 31,488	$ 648	$ 343,251
										100.00				**$ 3,824,303**	**$ 3,504,777**	**$ 151,709**	**$ 654**	**$ 7,481,443**
	Channels	C+	B+	2016	1	1603	CLEAN CUTS/CHANNELS/DIKES/EMBANK CUR	1,972,667	LIN FT	100.00	1	1,972,667	LIN FT	$ 791,579	$ 878,084	$ 113,690	$ 5	$ 1,783,358
										100.00				**$ 791,579**	**$ 878,084**	**$ 113,690**	**$ 5**	**$ 1,783,358**
	Pipes & Culverts	B-	B-	2020	1	1601	ROUTINE DRAINAGE MAINTENANCE	96,181	EACH	18.22	1	17,522	EACH	$ 556,619	$ 432,233	$ 55,496	$ 2,609	$ 1,046,957
						1602	EMERGENCY DRAINAGE MAINTENANCE	96,181	EACH	1.43	1	1,368	EACH	$ 105,068	$ 113,332	$ 9,300	$ -	$ 227,700
						1690	OTHER DRAINAGE MAINTENANCE & REPAIR	96,181	EACH	0.28	2	535	LBR HRS	$ 13,433	$ 14,849	$ 2,862	$ 59	$ 31,204
						9114	CONTRACT HYDRO VACUUM-ST PROV TRF CN	96,181	EACH	80.08	1	77,024	EACH	$ 14,551	$ 21,734	$ 13	$ 117,749	$ 154,047
										100.00				**$ 689,671**	**$ 582,148**	**$ 67,671**	**$ 120,417**	**$ 1,459,908**

Communicating Needs

We have the data. Now what?

Communicating Needs

Know your audience

- Senior DOT management
- Transportation commission
- Budget director and staff
- Strategic planning and staff
- Governor's office and staff
- Budget committees
- Legislature

Communicating Needs

Speak their language

- It's not what it is, it's what it means to them!
- Early buy-in
- Focus on hot buttons
  - Business-minded: ROI
  - Attorneys: Risk
  - Legislators: Customer satisfaction
  - Key issues unique to districts/divisions/regions
  - High-profile assets

Communicating Needs

- Establish credibility
  - Good data
  - Transparent, formula-driven process
  - More analysis, less reliance on judgment
- Maintain trust
  - Data
  - Graphics
  - Simulations

Communicating Needs

Data

Maintenance Feature Name:	Guardrail

UOM	LOS	A		B		C		D		F	Conv. Factor
% Deficient	Range:	0	1.9	1.9	7.8	7.8	14.2	14.2	19.0	>19	1.000
	Midpoint:	0.95		4.85		11.00		16.60		19	Units
Converted UOM	Range:	0.00	1.90	1.90	7.80	7.80	14.20	14.20	19.00	>19	
% Deficient	Midpoint:	0.95		4.85		11.00		16.60		19.00	

Average Annual Work Quantity:

Activity	UOM	Avg. Quantity	% Applicable	Applic. Quantity	Conv. Factor	Conv. Quantity	Conv. Units	Distr.(%)
1503	LIN FT	61	100	61	1.0000	61	LIN FT	0.8
1512	LIN FT	7,615	100	7,615	1.0000	7,615	LIN FT	99.2
9153	LIN FT	0	100	0	1.0000	0	LIN FT	0.0
9155	LIN FT	0	100	0	1.0000	0	LIN FT	0.0
					Total =	7,676	LIN FT	100.0
Inventory:	Guardrail Miles	187			5,280	987,360	LIN FT	

	LOS	Converted
Current LOS =	10.000	10.000

Work Program Adjust. Needed:	LOE A	LOE B	LOE C	LOE D	LOE F	Target C
Current Program	7,676	7,676	7,676	7,676	7,676	7,676
Difference	89,356	50,849	-9,874	-65,166	-88,862	-9,874
Total Program	97,032	58,525	0	0	0	0
LOE Factor	**12.64**	**7.62**	**0.00**	**0.00**	**0.00**	**0.00**
LOE (Work Units / Inventory Unit)	**0.098**	**0.059**	**0.000**	**0.000**	**0.000**	**0.000**

Communicating Needs

Graphics: Visual representation of LOS

LOS A: This pavement is in very good to perfect condition.

LOS B: This pavement is in good condition with good ride quality.

LOS C: This pavement is in fair condition with fair ride quality.

LOS D: This pavement is in poor condition with poor ride quality.

LOS F: This pavement is impassable.

Communicating Needs

Graphics: LOS scorecard is easily understood

Average Condition Ratings - 2014						
Asset		A	B	C	D	F
Roadside	Fence			**C+**		
Roadside	Guardrail		**B**			
Roadside	Impact Attenuators		**B**			
Roadside	Length Requiring Sweeping (CL Miles)			**C+**		
Roadside	Length Requiring Litter Patrol (CL Miles)			**C-**		
Drainage	Ditch	**A**				
Drainage	Lined Channels (Miles)		**B-**			
Drainage	Pipes & Culverts (Each)		**B-**			
Paved Surfaces	Alligator Cracks (Maintenance Lane Miles)		**B-**			
Paved Surfaces	Bleeding (Maintenance Lane Miles)	**A**				
Paved Surfaces	Cracks > 1/4" (Maintenance Lane Miles)		**B**			
Paved Surfaces	Potholes (Count)			**C-**		
Paved Surfaces	Raveling (Maintenance Lane Miles)	**A-**				
Paved Surfaces	Cracks < 1/4" (Maintenance Lane Miles)	**A**				

Communicating Needs

Graphics: LOS Trend Visualization

Statewide - All Routes - 2010 Condition Ratings						
Asset		A	B	C	D	F
Asphalt	Potholes		B			
	Stripping (Raveling)		B+			
	Shoving				D+	
Concrete	Spalling			C-		
	Faulting			C-		
	Joint Sealing	A+				
	Punchouts				D	
	Pumping		B-			
Paved Shoulder	Potholes		B			
	Edge Raveling		B			
	Sweeping					F
Unpaved Shoulder	Dropoff					F
	High Shoulder				D-	

Statewide - All Routes - 2011 Condition Ratings						
Asset		A	B	C	D	F
Asphalt	Potholes		B+			
	Stripping (Raveling)		B			
	Shoving				D+	
Concrete	Spalling				D-	
	Faulting					F
	Joint Sealing			C-		
	Punchouts					F
	Pumping				D+	
Paved Shoulder	Potholes			C+		
	Edge Raveling		B-			
	Sweeping				D	
Unpaved Shoulder	Dropoff				D+	
	High Shoulder			C-		

Communicating Needs

Graphics: LOS Trend Visualization

2004	Targets	Northwest	North Central	Olympic	Southwest	South Central	Eastern
4B1 Movable & Floating Bridges	B	B+		B+		D	
6B1 Signal Systems	C	D	B	C+	A	C+	D
5B1 Snow & Ice	C+	C	A-	B-	B	A-	B-
4B2 Keller Ferry	B						B
4B3 Urban Tunnels	B-	B					
4A2 Structrual Bridge	C	F+	A-	C+	A-	A-	C
6A4 Regulatory Signs	C	A-	C	D	B	B-	C
2A5 Slope Repair	C+	A	B	A	B+	B+	C+
6B3 ITS	C	C	B	F	A+	C+	A-
2A3 Catch Basins	C+	B-	A-	B+	B+	B-	B+
1A1 Pavement Patching & Repair	B-	B+	B+	A	A	A	C+
4A1 Bridge Decks	C-	B	A	A	A	B	B-
6A7 Guardrail	B+	B+	A	A	A	A	A
6A1 Striping	B-	C	B	B+	A-	B	C
6A2 Raised/Recessed Markers	C	C	A	B	C	B-	B
3A4 Veg Obstructions	C	C-	B	C	B+	A-	C+
1A2 Crack Sealing	C-	B	D+	B	B	C+	C-
7B1 Rest Areas	B	B-	B	B	B+	B+	B
1A4 Sweeping	B	A	A+	B+	A	A+	A+
2A1 Ditches	C	C+	A	A-	A	B+	B
6B2 Hwy Lighting	B	A	A-	A	B+	A	A
6A6 Guide Posts	D+	D+	C	C	C-	C-	C
1B1 Safety Patrol	C	A	C-	D	C	B	B-
2A2 Culverts	D+	B-	C+	C	C+	C+	C-
6B4 Permits	B	B	B	B	C	B	B
6A3 Pavement Marking	D+	C	B	C	C+	C+	C-
3A2 Noxious Weeds	B	A	A	A	A	C+	A-
1A3 Shoulder Maint	C+	B	B	B+	C+	B	B-
6A5 Guide Signs	B-	A	B+	D+	B+	A-	B-
2A4 Detention Basins	C	C	C	C	C	C	C
4A3 Bridge Cleaning	C	B+	A-	B	B+	A-	B+
3A3 Nuisance Weeds	B-	A-	A	A-	B+	B-	B+
3A5 Landscape	C-	C-		C	C+	C	C-
3A1 Litter	D+	F+	C	D	C	D	C-

State Targets Missed – 1 Region Targets Missed - 19

2008	Targets	Northwest	North Central	Olympic	Southwest	South Central	Eastern
4B1 Movable & Floating Bridges	B+	A+		A		A+	
6B1 Signal Systems	C+	B-	C	F+	D+	C-	C-
5B1 Snow & Ice	A-	A	B+	A	A	A	B+
4B2 Keller Ferry	B						B
4B3 Urban Tunnels	B	B					
4A2 Structrual Bridge	C	D	A+	D+	F+	F	F+
6A4 Regulatory Signs	C+	D	C+	B+	C+	D	D-
2A5 Slope Repair	B	A-	A	A	A+	A	A
6B3 ITS	B-	A	A-	A	D	A-	C+
2A3 Catch Basins	B	D+	C	C	C	C+	F+
1A1 Pavement Repair & Crack Seal	B	B-	C	A-	B+	C	C+
4A1 Bridge Decks	B-	C-	A-	C	B	C-	D
6A7 Guardrail	A	B	B	A	B	A+	B+
6A1 Striping	C+	C-	C-	C	C-	C-	C
6A2 Raised/Recessed Markers	B	C-	A+	C+	F	F+	C
3A4 Veg Obstructions	B-	F-	A	D	B	A+	C-
7B1 Rest Areas	B	B-	B-	B	B	B	B
1A4 Sweeping	B+	A+	A+	A	A-	A	A
2A1 Ditches	B	B-	B+	A	B	A+	B+
6B2 Hwy Lighting	B+	D	D+	B	D	B	A
6A6 Guide Posts	C-	D+	D+	C	D	F	D
1B1 Safety Patrol	C+	B	C-	C	C	C-	C
2A2 Culverts	C	F+	F+	C	D	D	F
6B4 Permits							
6A3 Pavement Marking	C-	C-	D+	D	C	C	C
3A2 Noxious Weeds	B	A	A	A+	A+	D+	D+
1A3 Shoulder Maint	B-	A	A	B+	A	C-	B-
6A5 Guide Signs	B-	C	A-	A	B	C+	B
2A4 Detention Basins	C						
4A3 Bridge Cleaning	C	B	B	B+	C	B-	B
3A3 Nuisance Weeds	B-	A+	B+	B	A+	D+	A-
3A5 Landscape	C-	D		C-	D	D+	C-
3A1 Litter	C-	D	D+	D	D	D	B

State Targets Missed – 16 Region Targets Missed - 85

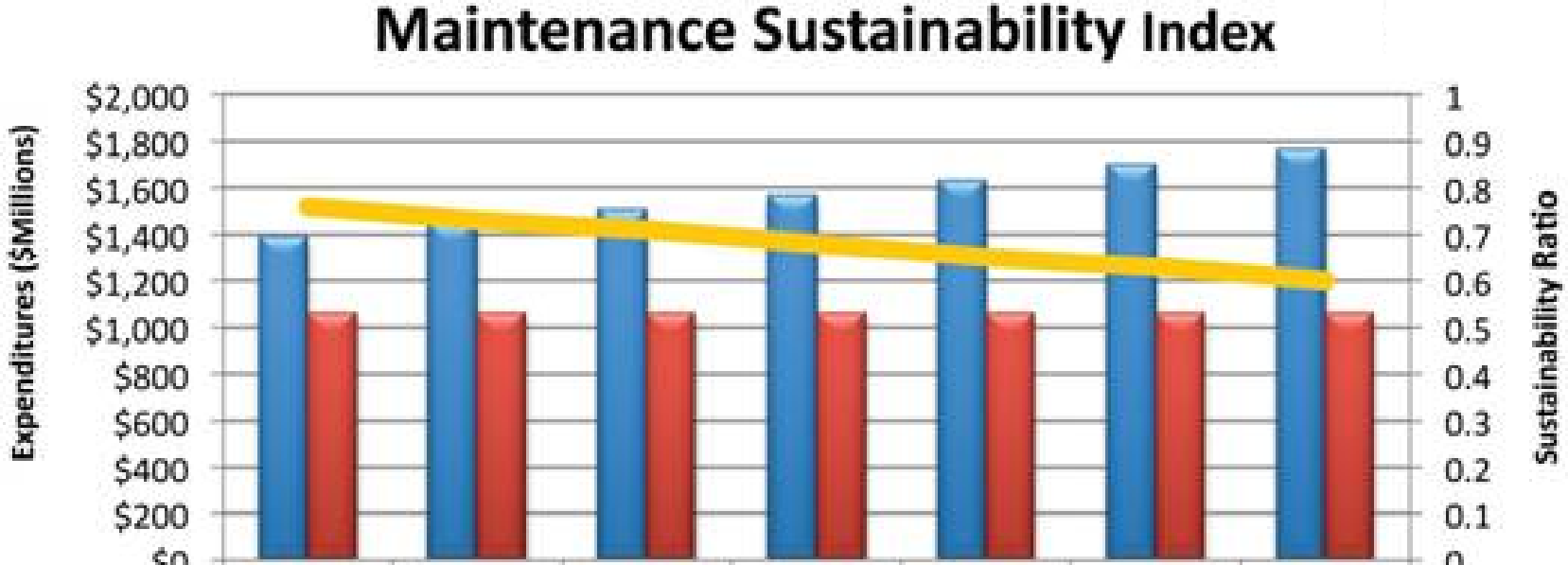
Key:

Missed State Target

Missed Region Target

Communicating Needs

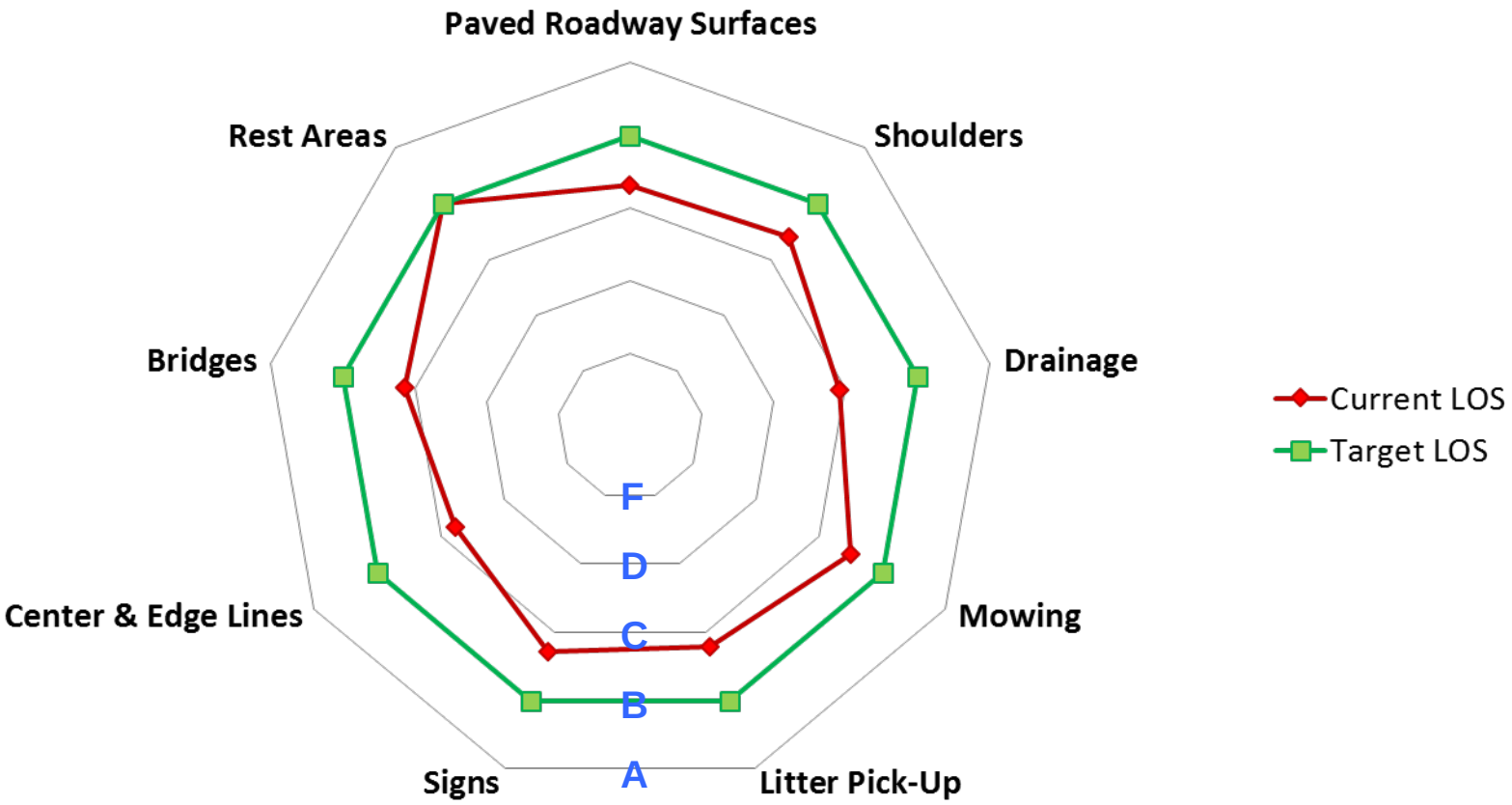
Graphics: Performance Trend Visualization



	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Maintenance Needs	$1,393	$1,448	$1,507	$1,568	$1,632	$1,699	$1,769
Budget	$1,063	$1,063	$1,063	$1,063	$1,063	$1,063	$1,063
Sustainability Index	0.76	0.73	0.71	0.68	0.65	0.63	0.6

Communicating Needs

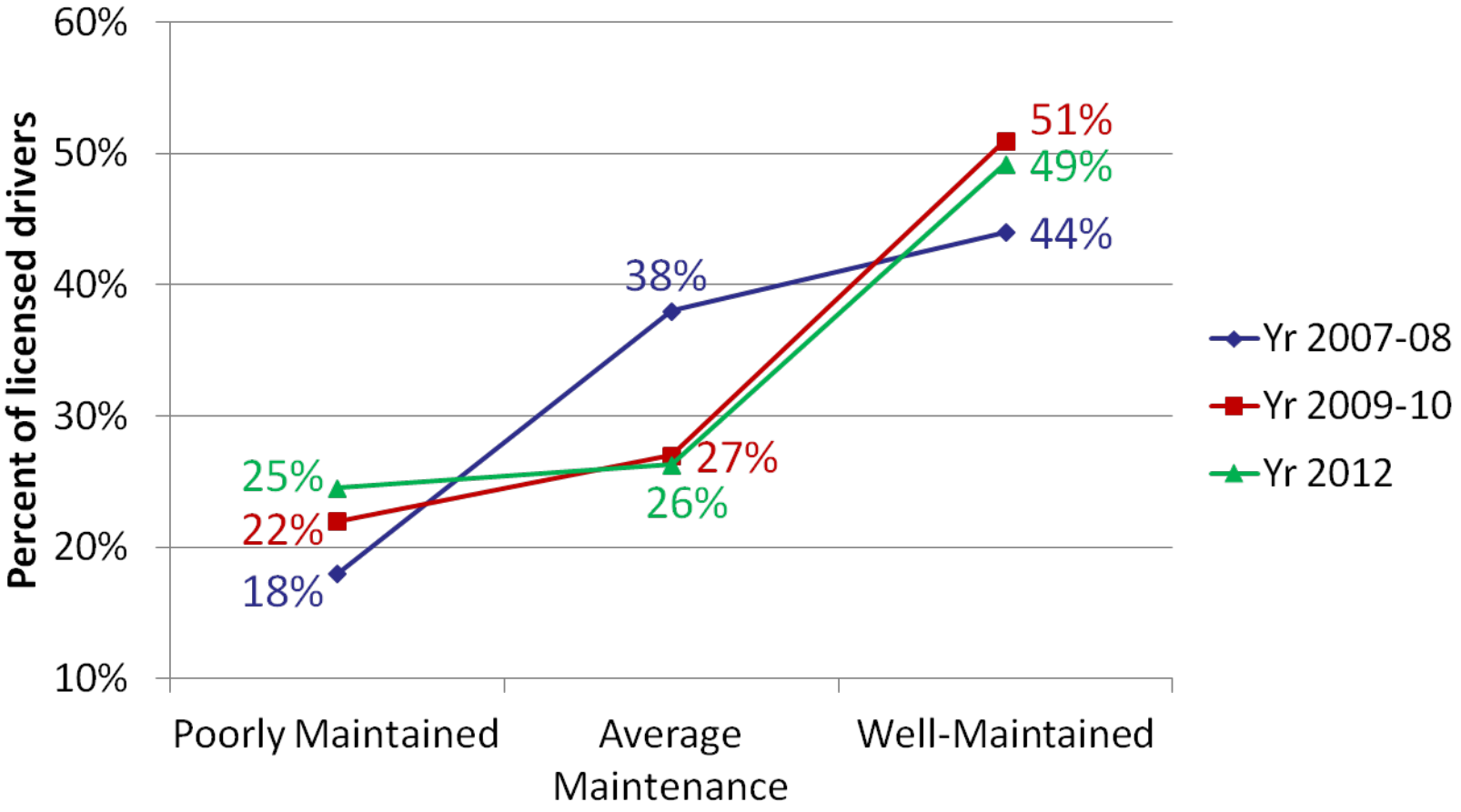
LOS Scorecard - RADAR Chart



Communicating Needs

Customer Perceived LOS - Paved Roadway Surfaces

Multi-Year Trend



Communicating Needs

Simulations

- Budget model “what if” analyses
- May include decision makers in a budget workshop
- Can be used to demonstrate impact of funding levels
- Set expectations for actual budgeted funds

Communicating Needs

Group	Feature	Current Data		1-Yr Goal		3-Yr Goal		5-Yr Goal	
		Current LOS	Current Budget	Target LOS	Target Budget	Target LOS	Target Budget	Target LOS	Target Budget
	Total Budget		**$ 143,649,000**		**$ 166,631,622**		**$ 151,756,026**		**$ 149,181,892**
	Unallocated Funds		**$ 17,000,000**		**$ 19,500,000**		**$ 19,500,000**		**$ 19,500,000**
	Non-LOS Spending		**$ 72,465,373**		**$ 72,465,373**		**$ 72,465,373**		**$ 72,465,373**
	LOS Spending		**$ 54,183,627**		**$ 74,666,249**		**$ 59,790,653**		**$ 57,216,519**
Roadside	Fence	B+	$ 2,774,508	B+	$ 3,779,191	B+	$ 3,109,402	B+	$ 2,975,445
	Guardrail	B-	$ 3,058,079	A	$ 4,650,452	A	$ 3,588,870	A	$ 3,376,554
	Impact Attenuators	A+	$ 663,467	A	$ 652,457	A	$ 659,797	A	$ 661,265
	Length Requiring Sweeping	C+	$ 689,602	A	$ 900,206	A	$ 759,803	A	$ 731,723
	Length Requiring Litter Patrol (Phx)	B-	$ 312,928	A	$ 449,614	A	$ 358,489	A	$ 340,264
	Length Requiring Litter Patrol (non-Phx)	A+	$ 1,377,521	C-	$ -	C-	$ 290,180	C-	$ 725,117
	Shoulders	A	$ 1,351,232	B+	$ 1,308,816	B+	$ 1,337,093	B+	$ 1,342,749
Drainage	Ditch	C+	$ 338,893	B	$ 5,187,493	B	$ 1,955,093	B	$ 1,308,613
	Lined Channels	C+	$ 1,623,039	B+	$ 1,783,358	B+	$ 1,676,479	B+	$ 1,655,103
	Pipes & Culverts	B-	$ 1,455,676	B-	$ 1,459,908	B-	$ 1,457,087	B-	$ 1,456,522
Paved Surfaces	Alligator Cracks	B-	$ 702,743	B-	$ 1,478,879	B-	$ 961,455	B-	$ 857,970
	Bleeding	B+	$ 463,416	B+	$ 15,854,291	B+	$ 5,593,708	B+	$ 3,541,591
	Cracks > 1/4"	C	$ 6,603,889	C	$ 3,814,785	C	$ 5,674,188	C	$ 6,046,068
	Cracks < 1/4"	D+	$ 2,177,664	C-	$ 3,400,808	C-	$ 2,585,379	C-	$ 2,422,293
	Potholes	B+	$ 1,335,915	A+	$ 1,631,882	A+	$ 1,434,571	A+	$ 1,395,109
	Raveling	B	$ 5,812,465	B	$ 4,126,374	B	$ 4,706,340	B	$ 4,822,333

Communicating Needs

Accountability

- Evaluation phase
- Planned vs. actual analysis
- Did we achieve our targets based on budget?
  - If not, why?
- Use results to improve next year's process

Questions?

Rob Zilay, Dye Management Group, Inc.
813-909-3160
rzilay@dyemanagement.com