Proactive Performance Management:

Next Generation Key Performance Indicators (KPIs)

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San Francisco Metropolitan Region

POPULATION = 7.5 MILLION

9 COUNTIES

100 CITIES
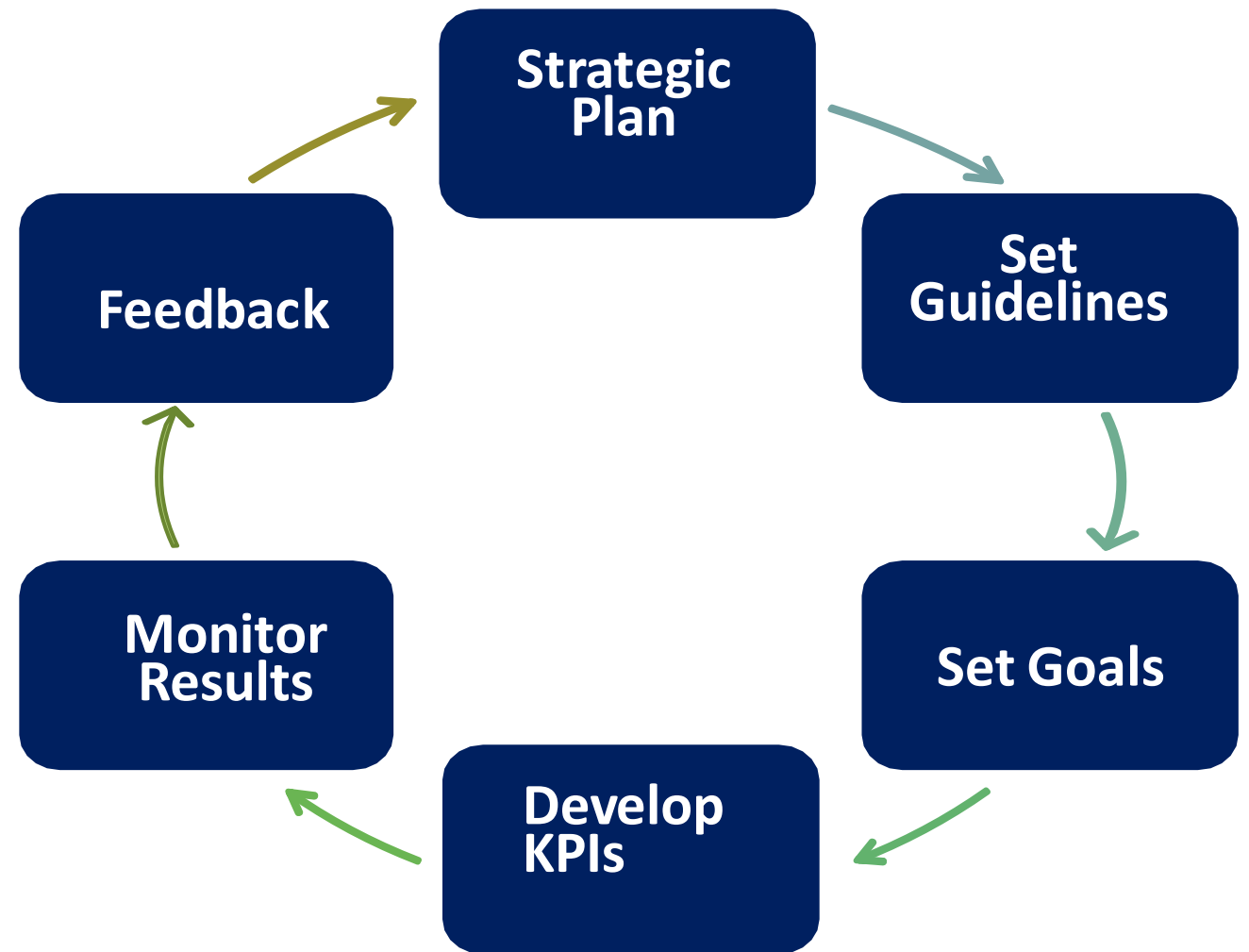
44,000 LANE-MILES OF LOCAL STREETS & ROADS

6,850 LANE-MILES OF STATE HIGHWAY (CALTRANS)

27 TRANSIT AGENCIES

7 TOLL BRIDGES

One MPO - Metropolitan Transportation Commission

What is Performance Management?

Strategic Plan → Set Guidelines → Set Goals → Develop KPIs → Monitor Results → Feedback → Strategic Plan

Why is it Important?

- Federal Requirements
  - MAP-21, FAST Act, BIL $\rightarrow$ Funding
  - Set Performance Targets for Non-State (locally owned) NHS $\rightarrow$ Keeping good roads good
- Yes, but what's in it for me?

Performance Indicators

Qualitative	Quantitative
What is the outcome?	What is the amount?
⬇	⬇
Provides insights and understanding of an issue	Can be computed and measured

Types of Performance Indicator

Leading Indicator	Lagging Indicator
Activities you must undertake to achieve the desired outcome	"Output" oriented, easy to measure but hard to improve

vs

Performance Indicators

Leading Indicator	Lagging Indicator
PCI	IRI
↓	↓
Detect low-severity cracks early	Will only detect cracks when they are visible

Guiding principles

- Measurable

- Objective as possible

- Can be fairly applied

- Utilize data widely available

- Meaningful (e.g. promotes pavement preservation)
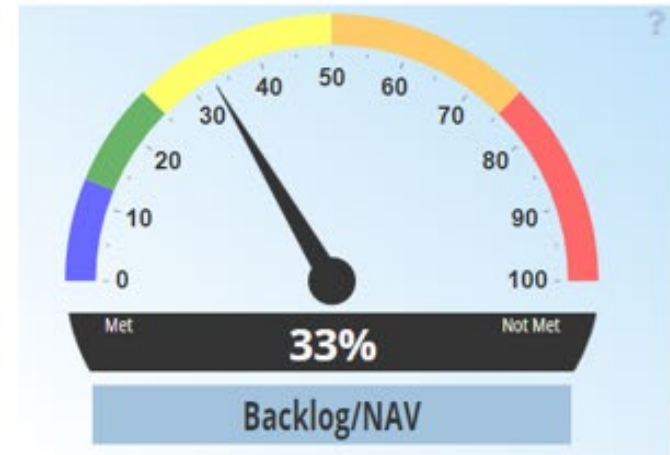
KPIs in StreetSaver

Pavement Preservation Decision Tree

	Edit	PM Category Name	Treatment Name	Cost/Sq Yd, except Seal Cracks in LF	Years Between Crack Seals	Years Between Surface Seals	# of Surface Seals before Overlay
Arterial							
▼ AC							
▼ Condition Category I - Very Good							
	✎	Crack Treatment	SEAL CRACKS	$2.60	3		
	✎	Surface Treatment	SLURRY SEAL	$6.50			
	✎	Restoration Treatment	ULTRA THIN LIFT HMA	$25.00			
▼ Condition Category II - Good, Non-Load Related							
	✎		CAPE SEAL	$20.00			
▶ Condition Category III - Good, Load Related							

Condition Categories

PCI Cap

100

90

70

50

Very Good - I

Non Load - II	Load - III
Good - II/III	

Using Transitional Windows

Pavement Preservation Index (PPI)

$$PPI = \frac{Percentage\ of\ Actual\ Pavement\ Preservation\ Expenditures}{Percentage\ of\ Recommended\ Pavement\ Preservation\ Expenditures}$$

100 Section - KPI

Needs - Projected PCI/Cost Summary

Interest: 0.00%   Inflation: 0.00%   Printed: 5/24/2022

Year	PCI Treated	PCI Untreated	PM Cost	Rehab Cost	Cost
2022	83	43	$30,970	$1,936,170	$1,967,140
2023	81	41	$2,123	$183,051	$185,174
2024	83	39	$1,539	$168,096	$169,635
2025	86	37	$116,980	$303,046	$420,026
2026	85	35	$17,542	$0	$17,542
2027	85	32	$19,972	$227,600	$247,572
2028	89	30	$106,263	$62,004	$168,267
2029	87	28	$12,778	$220,824	$233,602
2030	86	27	$21,902	$0	$21,902
2031	84	25	$37,444	$0	$37,444
		% PM	**PM Total Cost**	**Rehab Total Cost**	**Total Cost**
		10.60%	$367,513	$3,100,791	$3,468,304

Pavement Preservation

Total Budget Needs

Percentage of Recommended
Pavement Preservation Expenditures

$$\frac{\$367,513}{\$3,468,304} \longrightarrow 10.593\ \%$$

Example: Pavement Preservation Index (PPI)

What is the effort towards pavement preservation?

PPI = Actual PM % / Recommended PM %

County	Jurisdiction	Network PCI	$PM/ Lane Mile	Actual PM%	Recom'd PM%	Pavement Preservation Index
	Regional Benchmark	**68**	**$1,336**	**17%**	**16%**	**1.06**
Alameda	ALAMEDA	66	$1,271	13%	15%	0.88
	ALAMEDA COUNTY	71	$ 671	18%	28%	0.67
	ALBANY	58	$1,247	10%	13%	0.78
	BERKELEY	58	$ 263	2%	11%	0.20
	DUBLIN	87	$3,124	50%	79%	0.62
	EMERYVILLE	75	$ 48	100%	35%	2.87
	FREMONT	63	$5,140	43%	16%	2.76

Success Story - MTC
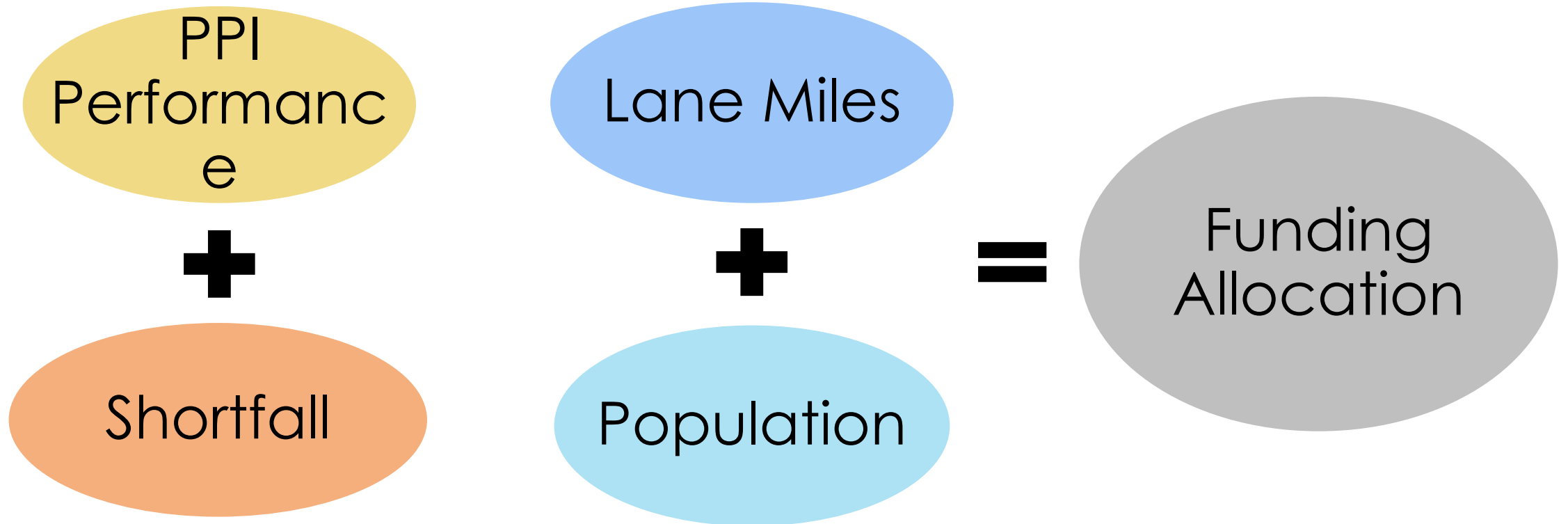
Outcome-Driven Performance Measure

Funding Allocation Formula:
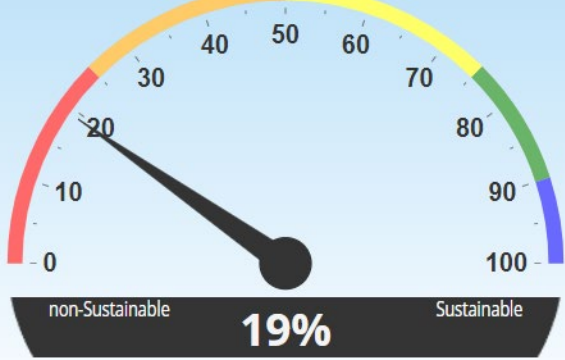
- ❑ No advantage or disadvantage

- ❑ Data from StreetSaver PMS

- ❑ Promotes pavement preservation principles

- ❑ Replaces "Maintenance of Effort"

Behavior Change: Shifts practice from "worst first" to preventive maintenance

Asset Sustainability Index (ASI)

$$ASI = \frac{Average\ of\ Actual\ Pavement\ Total\ Expenditures}{Average\ of\ Recommended\ Pavement\ Total\ Expenditures}$$

100 Section - KPI

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	% PM		PM Total Cost	Rehab Total Cost	Total Cost
	10.60%		$367,513	$3,100,791	$3,468,304

Average of Recommended Total Expenditures $\longrightarrow$ $\dfrac{\$3,468,304}{10}$

Backlog/NAV $= \dfrac{Budget\ Needs\ at\ Year\ 1}{Pavement\ Network\ Net\ Asset\ Value}$

33%

Backlog/NAV

100 Section - KPI

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% PM	PM Total Cost	Rehab Total Cost	Total Cost
10.60%	$367,513	$3,100,791	$3,468,304

First Year Budget Needs

100 Section - KPI

GASB 34 - Cost Summary

Printed: 3/21/2021

** Current Replacement Cost calculated from current Decision Tree unit costs

Effective Date	Price Index	Functional Class	Section Area (SF)	Original Cost	Current Value	Accumulated Depreciation	Current Replacement Cost
03/31/2019	ENR	A - Arterial	250,000	$583,695	$219,607	$364,086	$1,349,155
		C - Collector	250,000	$628,844	$281,094	$347,750	$1,515,380
		O - Other	250,000	$605,316	$270,489	$334,827	$1,515,380
		R - Residential/Local	250,000	$605,316	$270,489	$334,827	$1,515,380
		Totals:	1,000,000	$2,423,169	$1,041,680	$1,381,490	$5,895,295
03/31/2020	ENR	A - Arterial	250,000	$555,653	$197,247	$358,406	$1,349,155
		C - Collector	250,000	$605,316	$224,730	$380,586	$1,515,380
		O - Other	250,000	$605,316	$258,465	$346,851	$1,515,380
		R - Residential/Local	250,000	$605,316	$258,465	$346,851	$1,515,380
		Totals:	1,000,000	$2,371,601	$938,907	$1,432,694	$5,895,295
03/31/2021	ENR	A - Arterial	250,000	$678,638	$336,915	$341,724	$1,349,155
		C - Collector	250,000	$605,316	$214,663	$390,653	$1,515,380
		O - Other	250,000	$605,316	$246,820	$358,496	$1,515,380
		R - Residential/Local	250,000	$605,316	$246,820	$358,496	$1,515,380
		Totals:	1,000,000	$2,494,586	$1,045,217	$1,449,369	$5,895,295

GASB 34 Replacement Cost

National Center for Pavement Preservation

PPC23

16
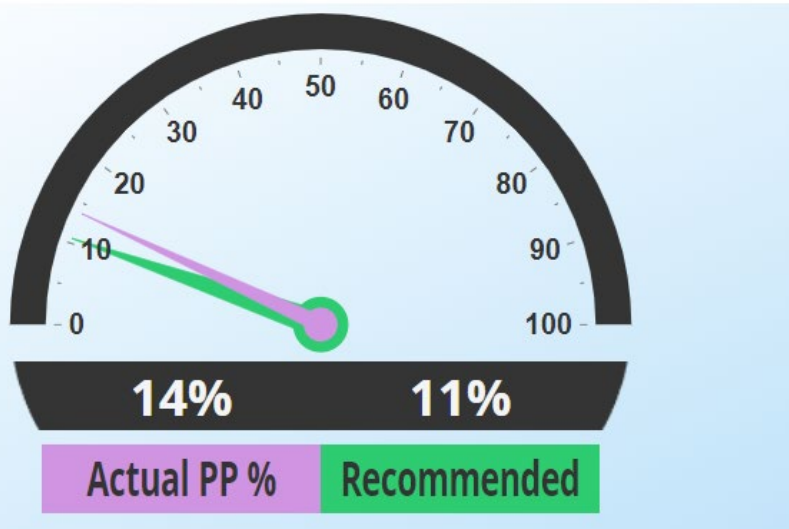
Actual PP % vs. Recommended

Actual: The percentage of the actual total expenditures allocated to pavement preservation.

$$Actual\ PP\% = \frac{Actual\ Pavement\ Preservation\ Expenditures}{Actual\ Total\ Expenditures}$$

Recommended: The percentage of total expenditures recommended for pavement preservation.

$$Recommended\ PP\% = \frac{Recommended\ Pavement\ Preservation\ Expenditures}{Recommended\ Total\ Expenditures}$$

Pavement Preservation Cost per Lane Mile

SGR = State of Good Repair

PP Actual Cost per Lane Mile

From Historical Treatment Costs

$$Actual\ PP\ Cost\ per\ Lane\ Mile = \frac{Average\ of\ Actual\ Pavement\ Preservation\ Expenditures}{Total\ Lane\ Miles}$$

PP SGR Cost per Lane Mile

From Budget Needs

$$SGR\ PP\ Cost\ per\ Lane\ Mile = \frac{Average\ of\ Recommended\ Pavement\ Preservation\ Expenditures}{Total\ Lane\ Miles}$$

M & R Cost per Lane

Actual M&R Cost per Lane Mile

From Historical Treatment Costs

$$Actual\ M\&R\ Cost\ per\ Lane\ Mile = \frac{Average\ of\ Actual\ Pavement\ M\&R\ Expenditures}{Total\ Lane\ Miles}$$

SGR M&R Cost per Lane Mile

From Budget Needs

$$SGR\ M\&R\ Cost\ per\ Lane\ Mile = \frac{Average\ of\ Recommended\ Pavement\ M\&R\ Expenditures}{Total\ Lane\ Miles}$$

KPIs Summary

KPI	Data Sources (Std Reports)
Pavement Preservation Index (PPI)	• Historical M&R Costs (3 Years Prior to Analysis Period). • Needs – Projected PCI/Cost Summary.
Asset Sustainability Index (ASI)	• Historical M&R Costs (3 Years Prior to Analysis Period). • Needs – Projected PCI/Cost Summary.
Backlog/NAV	• Needs – Projected PCI/Cost Summary. • GASB 34 – Cost Summary.
PP Cost per Lane Mile (Actual)	• Historical Pavement Preservation Costs (3 Years Prior to Analysis Period). • Network Summary Statistics
PP Cost per Lane Mile (SGR)	• Needs – Preventive Maintenance Treatment/Cost Summary. • Network Summary Statistics.
M&R Cost per Lane Mile (Actual)	• Historical M&R Costs (3 Years Prior to Analysis Period). • Network Summary Statistics
M&R Cost per Lane Mile (SGR)	• Needs – Projected PCI/Cost Summary • Network Summary Statistics
Actual PP% vs. Recommended	• Historical M&R Costs (3 Years Prior to Analysis Period). • Needs – Projected PCI/Cost Summary

Future Generation KPIs

- Pavement Resiliency – Tracking effort toward achieving pavement resiliency to adapt climate change

- Pavement Sustainability – Tracking effort toward reducing greenhouse gas emissions and transportation related pollution

- Transportation Safety toward Vision Zero – Tracking effort toward reducing traffic fatalities and severe injuries

- Transportation Equity – Tracking effort toward equitable distribution of transportation investments such as underserved populations