Pavement Management Fundamentals

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U.S. Department of Transportation
Federal Highway Administration

Federal Highway Administration
RES URCE CENTER

NATIONAL PAVEMENT PRESERVATION CONFERENCE
npc23
IMPACTS AND BENEFITS FROM PAVEMENT PRESERVATION

ncpp
National Center for Pavement Preservation

MICHIGAN STATE
UNIVERSITY

AASHTO
TSP2
PAVEMENT
PRESERVATION

ROCKY MOUNTAIN WEST
PAVEMENT PRESERVATION PARTNERSHIP

SOUTHEAST
PAVEMENT PRESERVATION PARTNERSHIP

MIDWESTERN
PAVEMENT PRESERVATION PARTNERSHIP

NORTHEAST
PAVEMENT PRESERVATION PARTNERSHIP

Importance of Pavements

- Pavement's deterioration and rising costs
- Budgets have not kept pace
- Good roads cost less. Bad roads cost more
  - ✓ If maintained at a reasonable level of service
  - ✓ If responsive to preventive maintenance
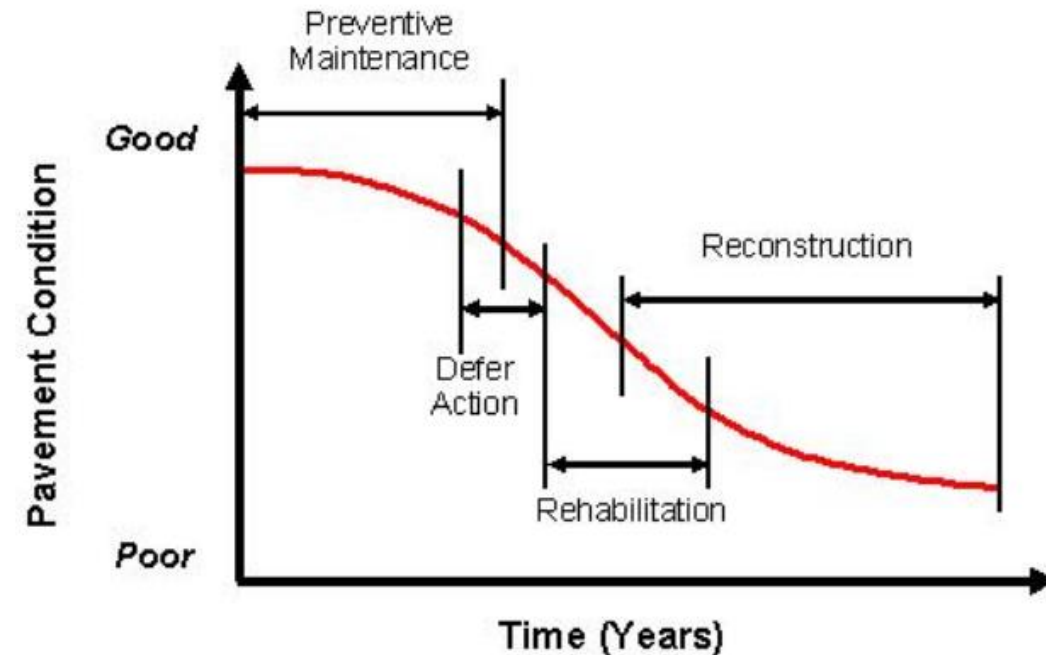
Historical Perspective

- Early PMS (WA, AZ, UT, SD, US Army Corps of Engineers)
- 1985 AASHTO Guidelines
  - ✓ Introduced and defined PMS
  - ✓ Supported development and implementation of PMS
- 1989 FHWA PMS Policy
  - ✓ Required all states to have PMS to manage their Federal Aid Highway (Interstate, Principal)
  - ✓ Condition of funding
- 1990 AASHTO Guidelines for PMS
- ISTEA of 1991 (Rescinded in 1995)
- SAFTY-LU 2005
  - ✓ Requires PMS

1990 AASHTO Guidelines for PMS

▸ "A Pavement Management System (PMS) is designed to provide objective information and useful data for analysis so that road managers can make more consistent, cost-effective, and defensible decisions related to the preservation of a pavement network."

▸ While PMS cannot make final decisions, it can provide the basis for an informed understanding of the possible consequences of alternative decisions.

▸ **A PMS does NOT make decisions, Managers DO!**

What is Pavement Management?

"Pavement Management is a set of tools or methods that assist decision-makers in finding optimum strategies for providing, evaluating, and maintaining pavements in a serviceable condition over a period of time (AASHTO, 1993)
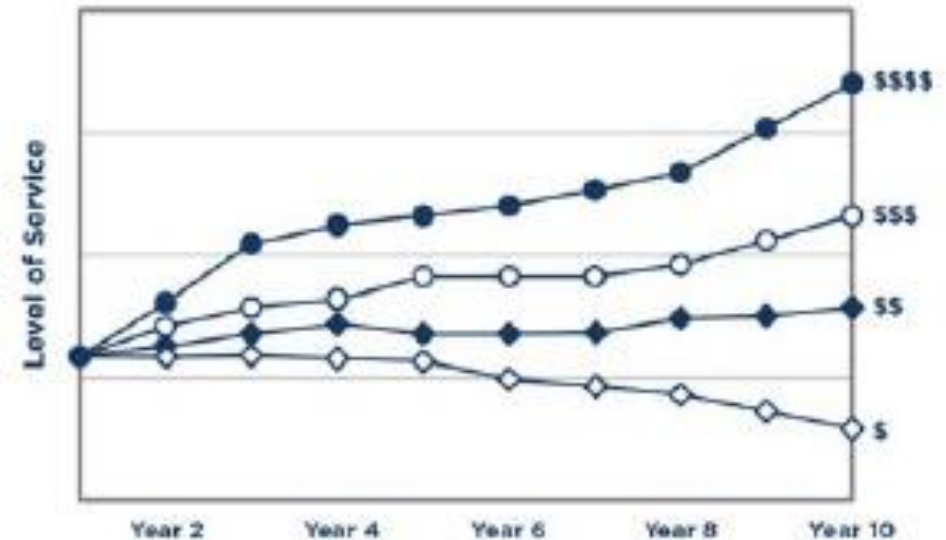
PMS Levels

<u>Strategic</u>
- Policy makers making decisions that influence long-term strategic efforts.

<u>Network</u>
- Current and future network conditions are used to make tactical decisions over a typical 5-year timeframe.
  - ✓ Overall agency pavement condition summary
  - ✓ Budget estimate
  - ✓ Performance prediction

<u>Project</u>
- Decisions are focused over a short timeframe.
  - ✓ Preventive maintenance
  - ✓ Resurfacing or reconstruction
  - ✓ Treatments options along the project

What are the Benefits and Costs Associated with Pavement Management?

- Providing a centralized location for pavement inventory *(location, pavement type, area, mileage, and functional classification);* condition information; construction, maintenance, and rehabilitation records.
- Providing a method to analyze the consequences of various funding levels on pavement conditions.
- Improving scheduling of pavement works to reduce excessive rehabilitation costs.
- Assisting as a decision-making tool in optimizing rehabilitation, maintenance, and trade-off options.

What are the Benefits and Costs Associated with Pavement Management? (cont.)

- Providing the information needed to analyze the cost–effectiveness of different treatment repairs.
- Allowing an agency to answer "what–if" type questions regarding pavement repair programs and funding levels.
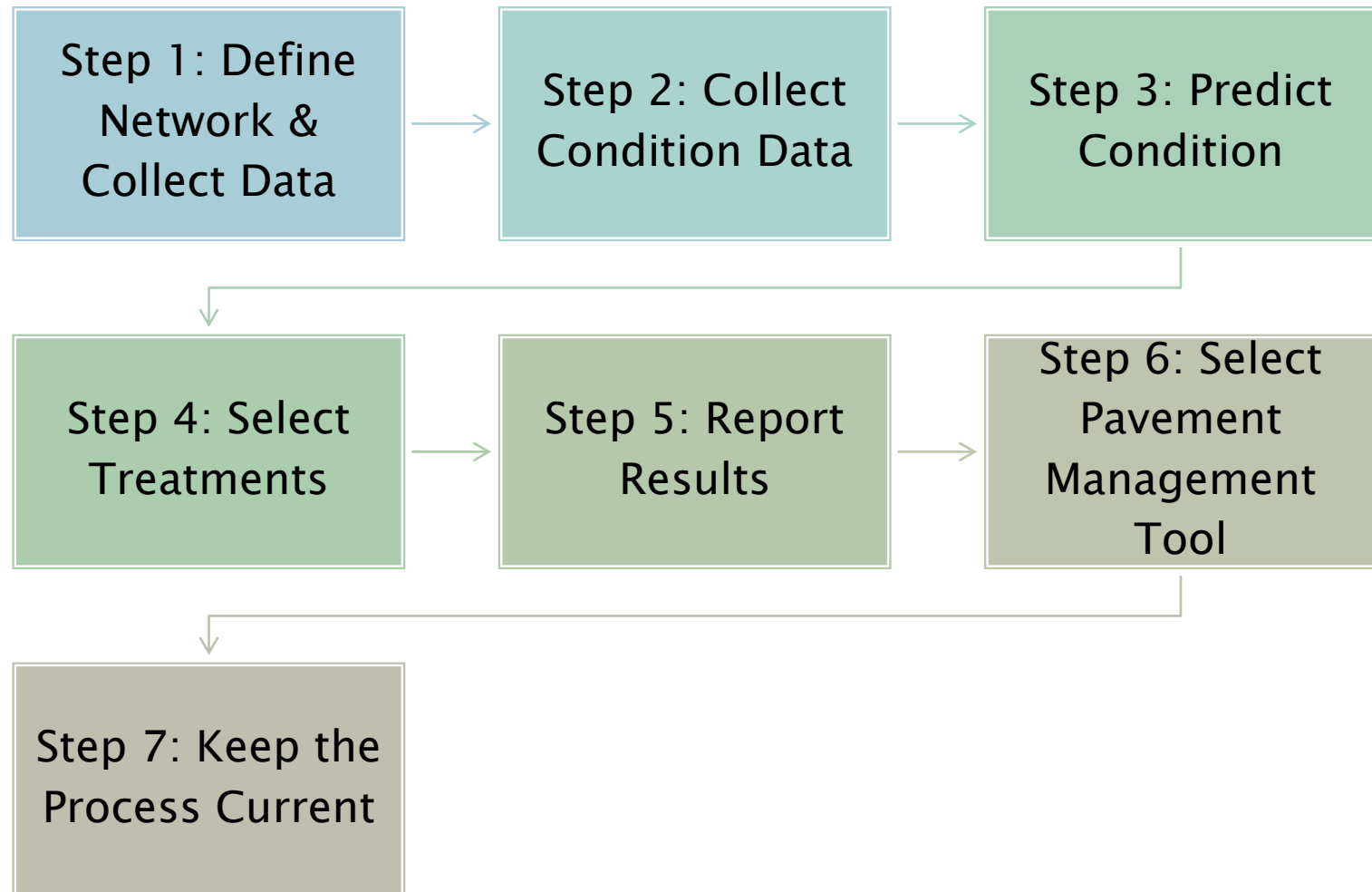- Justifying budget needs to elected officials and other stakeholders

Costs associated with Pavement Management Include:

- Software acquisition and installation.
- Personnel training.
- Data collection.
- Database building.
- System maintenance and updates

Why Invest in Pavement Management Include?

- A rational and objective method to identify resource allocation.
- Optimal use of available funds.
- Reduction in pavement rehabilitation costs over time.
- Identification of accurate treatment for the pavement segments through roadway assessment.
- Estimates of pavement life extensions correlated to treatment timing of treatment applications.
- Increased credibility with stakeholders.

Designing a Pavement Management Process

Step 1: Define Network & Collect Data → Step 2: Collect Condition Data → Step 3: Predict Condition

Step 4: Select Treatments → Step 5: Report Results → Step 6: Select Pavement Management Tool

Step 7: Keep the Process Current

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Step 1: Define Network & Collect Data

▸ Pavement surface type (e.g., hot-mix asphalt or portland cement concrete).

▸ Pavement structure (e.g., pavement materials or thickness).

▸ Construction history (e.g., different construction periods, different contractors, or different materials and techniques).

▸ Roadway geometry (e.g., number of traffic lanes).

▸ Traffic (e.g., volume or patterns).

▸ Pavement condition (e.g., significant variation in condition that is not simply an isolated area).

▸ Geographic boundaries (e.g., intersections, bridges, waterways, jurisdiction limits, railroad crossings).

Collect Data

▸ Roadway Name – A written description of the roadway name and any corresponding numeric references.

▸ Pavement Location – Physical reference to the location, including "beginning location" and "ending location" designations.

▸ Pavement Dimensions – Values including length, width, and/or area.

▸ Pavement Type – The material that comprises, at a minimum, the pavement surface.

▸ Construction History – Details of the latest maintenance and rehabilitation treatments and construction date, and, if possible, original construction dates and additional maintenance and rehabilitation records.

Ways to Store Inventory Information

- Paper records
- Electronic spreadsheets
- Databases (e.g., either stand-alone database or a database as part of pavement management software)
- Maps (e.g., GIS-based maps)

Step 2: Collect Condition Data

- Data quantity – Data quantity refers to what and how much information is collected. Both have time and cost implications since the greater the volume of data collected or the more detailed the collected data, the higher the cost of data collection.

- Data quality – Although the associated cost of the data increases, more detailed data for analysis can result in better analysis decisions. For most agencies, the goals for network-level surveys are to develop appropriate budgetary needs and to evaluate the performance of previously implemented strategies.

What techniques are used to assess pavement condition?

- Visual distress surveys
- Roughness surveys
- Friction surveys
- Drainage evaluation
- Shoulder surveys
- Deflection testing

Pavement Condition Inspection (various methods)

Description
Type of Distress (Cracking, Patching, Rutting)
Severity (Crack Width, Condition Assessment)
Extent (Percentage of the Pavement Length)

Data Collection
Continuous – Windshield survey
(Computer Rater keyboard, and Video)
Some surveys determine load–bearing characteristics
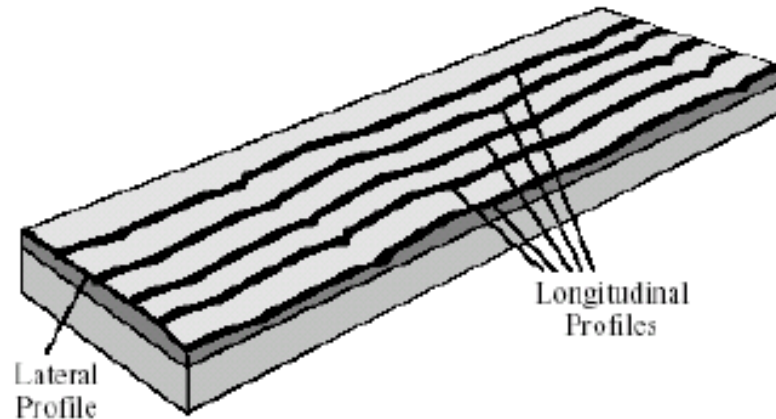

Source: FHWA

Pavement Condition Evaluation
Road Roughness

"Road roughness is the irregularities in the pavement surface affecting user comfort and safety"

Due to variations in horizontal, vertical, and transverse profiles

Ride Quality – User perception of pavement roughness

Longitudinal Profiles

Lateral Profile

Pavement Condition Survey Equipment

Profiler
Roughness, distress, rutting, noise, pavement cracking

Skid Trailer
Pavement friction

FWD
Structural Capacity

GPR
Layer Thickness

Surveys Based on Measured Distresses

- Pavement Surface Evaluation and Rating (PASER) – Scale 1–10
- Condition Rating Survey (CRS) – Scale 1.0–9.0 tenth point increments
- Pavement Condition Index (PCI) – Scale 0–100

Rating		Range
Good		86-100
Satisfactory		71-85
Fair		56-70
Poor		41-55
Very Poor		26-40
Serious		11-25
Failed		0-10

Step 3: Predict Condition

Pavement conditions can be predicted by using either average deterioration rates or prediction models using statistical modeling.

- ◦ Identifying the appropriate timing for pavement maintenance and rehabilitation for each segment.
- ◦ Identifying the most cost-effective treatment strategy for pavement segments in the network.
- ◦ Estimating pavement needs and associated budgets required to address agency-specified goals, objectives, and constraints.
- ◦ Demonstrating the consequences of different pavement investment strategies.

Step 4: Select Treatments

Treatments are selected using cyclical placements or trigger rules. The recommended treatments are then prioritized using ranking or benefit/cost analysis.

a) Cyclical Placements – (e.g., chip seal section of pavements on a 7-year cycle
b) Trigger Rules - Developed into a matrix or a decision tree
c) Ranking – Project priorities
d) Benefit/Cost Analysis – Preferred approach

Effect of Treatment Timing On Costs

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Source: Sui Tan with Metropolitan Transportation Commission

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		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	$1.75	3		
		✏	Surface Treatment	CAPE SEAL	$5.00		7	
		✏	Restoration Treatment	MILL AND THIN OVERLAY	$12.00			2
			Condition Category II - Good, Non-Load Related					
		✏		CAPE SEAL	$6.00		7	
			Condition Category III - Good, Load Related					
		✏		MILL AND THIN OVERLAY	$13.50			
			Condition Category IV - Poor					
		✏		THICK AC OVERLAY(2.5 INCHES)	$40.00			
			Condition Category V - Very Poor					
		✏		RECONSTRUCT SURFACE (AC)	$85.00			
	▶	AC/AC						
	▶	AC/PCC						
	▶	PCC						
	▶	ST						

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Source: Sui Tan with Metropolitan Transportation Commission

Complete Treatment Matrix

Representative RWD Deflection, mils

PCI Value	PCI Rating	< 35 / < 45 / Good	35 - 50 / 45 - 75 / Fair	> 50 / > 75 / Poor	High Traffic / Low Traffic / Structural Rating
100	Excellent	Defer Maintenance			
90	Very Good	Crack sealing (maximum 1 time)			
80	Good	Chip seal, Microsurfacing (maximum 2 times)	Defer Improvements		
65	Fair	2-in AC Mill and Overlay	2-in AC Mill and Overlay	4-in AC Mill and Overlay	
40	Poor	4-in AC Mill and Overlay	4-in AC Mill and Overlay	Reconstruction	
0					

Source: Champaign County Treatment Matrix (ARA FHWA 2009)
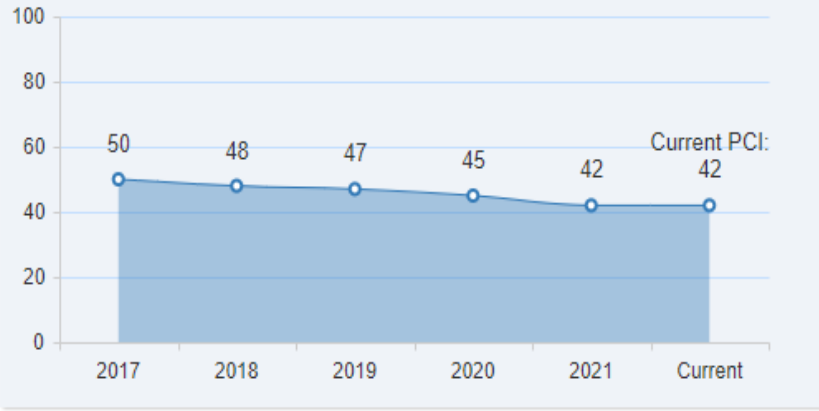
Step 3: Predict Condition

Analysis results can be shared with users of the information using standard or customized reports.
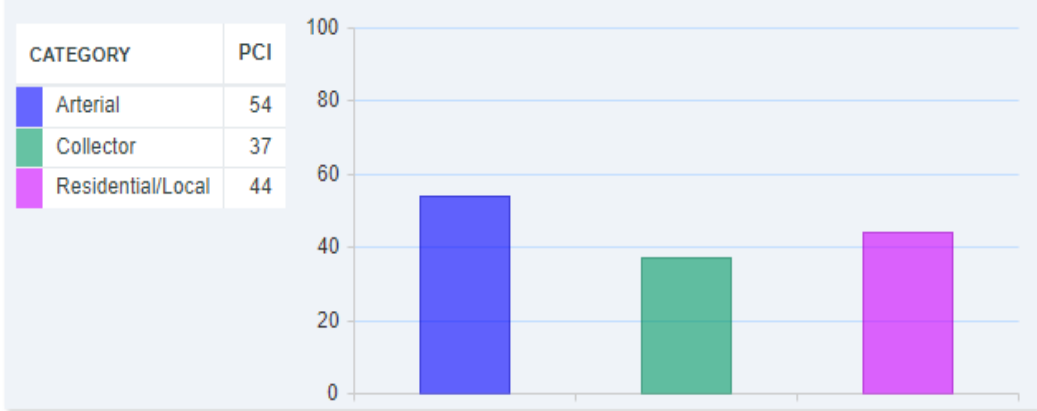
Visual Aid	When to Use	Examples
Tables	• Incorporate into a report or document for detailed oriented user (engineers, planners, etc.) • Display extensive amount of detailed information • Support detailed analysis and provide technical Information	• Inventory listing (e.g., segment location and name, surface type, age, traffic) • Condition listing (e.g., segment name, condition indices) • Maintenance listing (e.g., segment name, year of maintenance activity, maintenance type and cost) • Budget listing (e.g., money proposed for repairs for each segment or for various functional classifications)
Charts	• Present information to nontechnical audiences, such as elected officials and the public • Emphasize points to be made (easy method to convey simple summaries)	• Pie chart (shows size of each part as a percentage of the whole) • Column chart (show how items change with time or compare to one another) • Line chart (shows how items change over time and can compare "what if" budget scenarios)
Maps	• Display single type of information on a geographical basis • Present information to nontechnical audiences, such as elected officials and the public	• Segment surface type • Color-coded current condition • Color-coded projects by year • Future condition for a funding scenario • Deferred projects

Executive Dashboard

| Pavement Area (square miles): **0.09** | Centerline Miles: **16.41** | Lane Miles: **32.81** | Sections: **135** |

Historical Pavement Condition Trends

Values: 50, 48, 47, 45, 42

Current PCI: 42

2017 2018 2019 2020 2021 Current

Current PCI by: Functional Class

CATEGORY	PCI
Arterial	54
Collector	37
Residential/Local	44

*Current PCI

0

From 12/31/2021

PCI 42

2/15/2022
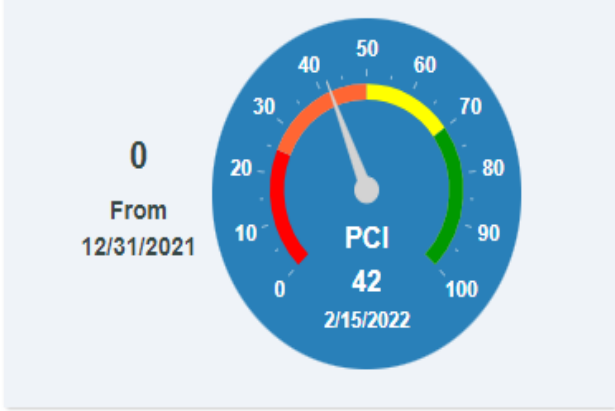
Percent of Area by: Surface Type

Show Legend

AC
AC/PCC
PCC
AC/AC
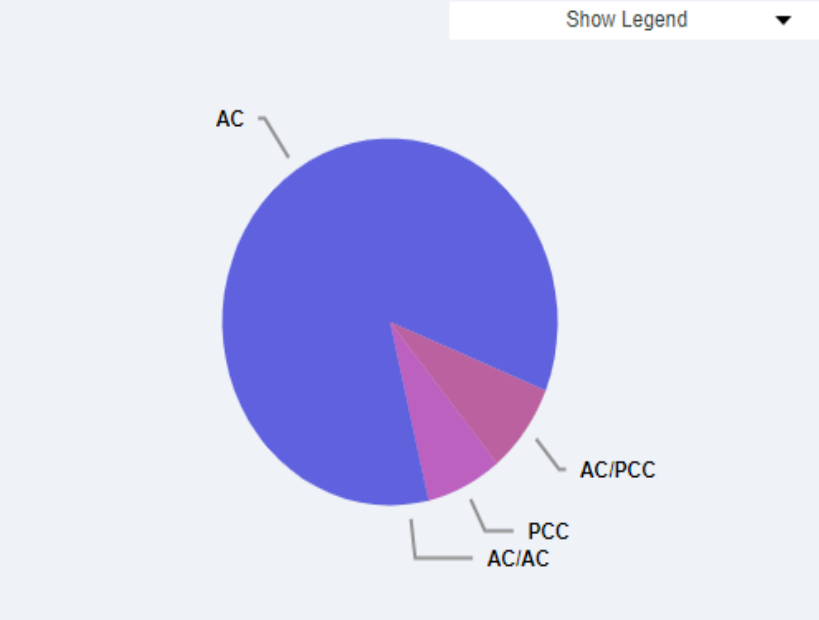
Historical Network Condition Trends

As of 12/31/2021

Very Good 11%	▼	-2
Good 19%	▲	1
Poor 16%		0
Very Poor 54%	▲	1

02/15/2022 ▲

% in Category

2017 2018 2019 2020 2021 2022
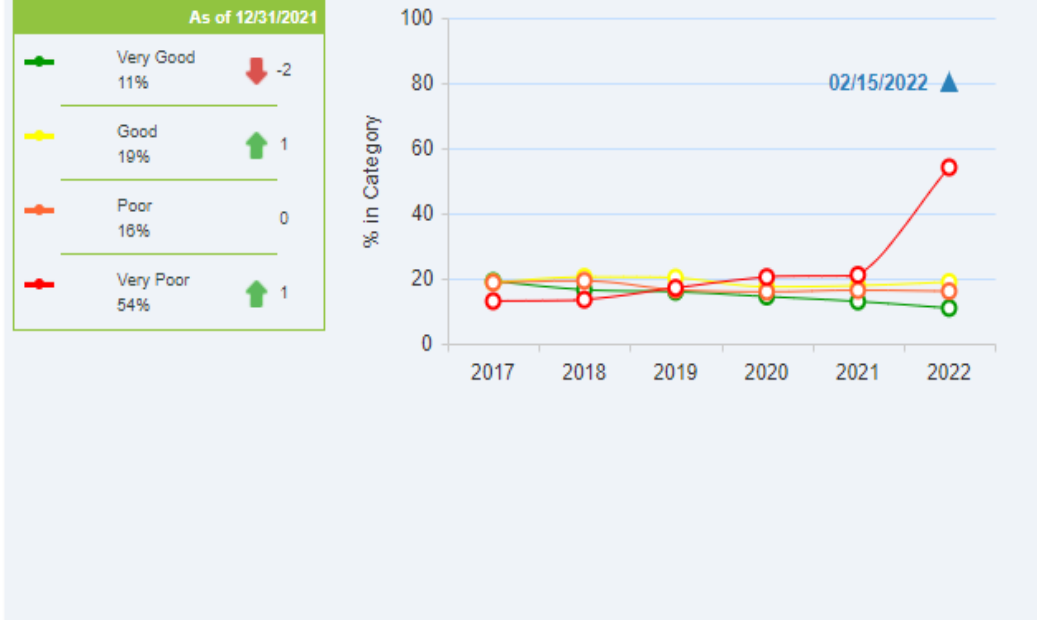
Remaining Service Life (years)

0.0

From 12/31/2021

RSL 6.17

29
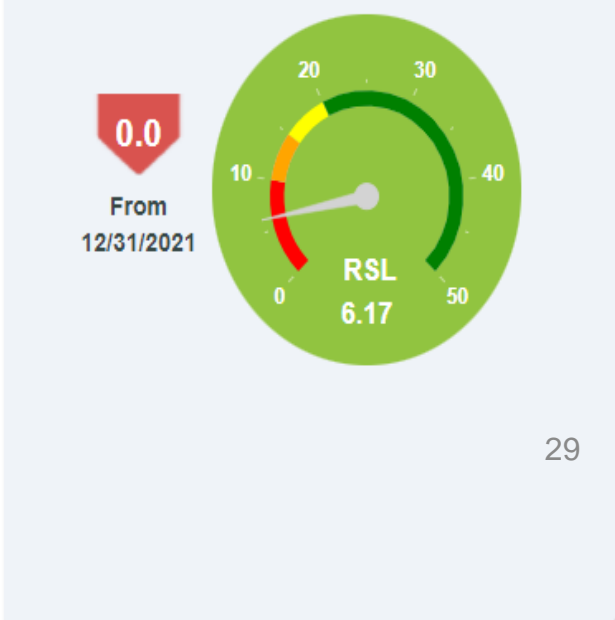
Database Reports

- Pavement Condition Deficiency Reports

- Pavement Condition Performance Histories

- MR&R Actions

- Pavement Inventory and Ranking

City
of
Anywhere

Street ID	Section ID	Road Name	From	To	Length	Width	Area	Functional Class	Surface Type	Historical PCI	Remaining Life
MONEY	20	MONEY LANE	250 N OF LAKE	687 N OF LAKE	437	21	9,177	R - Residential/Local	A - AC	79	25.63
MONEY	30A	MONEY LANE	687 N OF LAKE	ROAD NARROWS	337	35	11,795	R - Residential/Local	A - AC	72	21.04
MONEY	30B	MONEY LANE	ROAD NARROWS	MICHAEL WAY	367	17	6,239	R - Residential/Local	A - AC	0	0.00
MONEY	40	MONEY LANE	MICHAEL WAY	165' N/O MICHAEL WAY	165	20	3,300	R - Residential/Local	A - AC	78	27.66
MORAAV	10	MORA AVE	GRANT ST.	1030' NORTH OF GRANT ST.	1,030	25	25,750	R - Residential/Local	A - AC	0	0.00
MORAAV	20	MORA AVE	1030' NORTH OF GRANT ST.	2090' NORTH OF GRANT ST.	1,060	25	26,500	R - Residential/Local	A - AC	1	0.00
MORAAV	30	MORA AVE	2090' NORTH OF GRANT ST.	LINCOLN AVE	1,120	25	28,000	R - Residential/Local	A - AC	7	0.00
MYRTLE	10	MYRTLE STREET	PINE ST.	LINCOLN AVE	510	30	15,300	R - Residential/Local	P - PCC	38	7.74
MYRTLE	15	MYRTLE STREET	LINCOLN AVE	SPRING ST.	581	30	17,430	R - Residential/Local	P - PCC	56	22.14
MYRTLE	20	MYRTLE STREET	SPRING ST.	SILVER ST.	840	30	25,200	R - Residential/Local	P - PCC	51	17.98
MYRTLE	30	MYRTLE STREET	SILVER ST.	GOLD STREET	380	29	11,020	R - Residential/Local	A - AC	65	15.79
MYRTLE	35	MYRTLE STREET	GOLD STREET	SOUTH OAK	430	33	14,190	R - Residential/Local	A - AC	60	13.67
MYRTLE	40	MYRTLE STREET	S OAK ST.	LILLIE ST.	367	32	11,744	R - Residential/Local	A - AC	41	5.58
MYRTLE	56	MYRTLE STREET	LILLIE STREET	WILLOW STREET	411	32	13,152	R - Residential/Local	A - AC	48	8.52
MYRTLE	60	MYRTLE STREET	WILLOW ST.	DEAD END	454	33	14,982	R - Residential/Local	A - AC	53	11.16
MYRTDL	10	MYRTLEDALE ROAD	GREENWOOD AVE	CITY LIMITS/ NAPA RIVER	1,413	23	32,499	C - Collector	A - AC	0	0.00
NOAKST	10	NORTH OAK STREET	WASHINGTON ST.	FAIR WAY	695	36	25,020	C - Collector	A - AC	41	3.22
NOAKST	20	NORTH OAK STREET	FAIR WAY	GRANT ST.	900	34	30,600	C - Collector	A - AC	56	7.03
NOAKST	30	NORTH OAK STREET	GRANT ST.	AURORA DR.	1,230	26	31,980	C - Collector	A - AC	70	11.66
OATHIL	10	OAT HILL COURT	TABLE ROCK CT.	DEAD END	544	32	17,408	R - Residential/Local	A - AC	65	17.92
PARKST	10	PARK STREET	FAIR WAY	DEAD END	400	24	9,600	R - Residential/Local	A - AC	39	5.12
PETFOR	11	PETRIFIED FOREST ROAD	FOOTHILL BLVD	CITY LIMITS	1,535	26	39,910	A - Arterial	A - AC	70	15.83
PINEST	10	PINE STREET	FOOTHILL BLVD	CEDAR ST.	608	27	16,416	R - Residential/Local	P - PCC	35	6.19
PINEST	20	PINE STREET	CEDAR ST.	DEAD END	350	26	9,100	R - Residential/Local	A - AC	76	23.85
REDWD	10	REDWOOD AVENUE (EB)	GRANT ST.	DEAD END	259	12	3,108	R - Residential/Local	A - AC	33	2.89

Source: Sui Tan with Metropolitan Transportation Commission

MTC StreetSaver

M & R History - PCI Before and After Treatment

Printed: 2/15/2022

Street ID	Section ID	Road Name	Begin Location	End Location	Area
EMERLD	10	EMERALD DRIVE	MONEY LN.	DEAD END	14,880

		Maintenance Date Treatment	PCI Before Treatment	PCI After Treatment	Cost of Maintenance	Remaining Life
		06/01/2003 CAPE SEAL	52	65	$0	17.05
		11/10/2015 CAPE SEAL W/20% DIG OUTS	58	69	$0	19.78

Street ID	Section ID	Road Name	Begin Location	End Location	Area
FAIRVI	10	FAIRWAY VISTA COURT	CENTENNIAL CIR	DEAD END	9,603

		Maintenance Date Treatment	PCI Before Treatment	PCI After Treatment	Cost of Maintenance	Remaining Life
		11/10/2015 CAPE SEAL W/20% DIG OUTS	64	74	$0	22.19

Street ID	Section ID	Road Name	Begin Location	End Location	Area
FAIRWY	30	FAIR WAY	LAKE ST.	N. OAK ST.	20,550

		Maintenance Date Treatment	PCI Before Treatment	PCI After Treatment	Cost of Maintenance	Remaining Life
		03/17/2008 RECONSTRUCT STRUCTURE (AC)	14	100	$140,000	30.05

Street ID	Section ID	Road Name	Begin Location	End Location	Area
FALERI	10	FALLERI STREET	LAKE ST.	URBANI PL.	8,755

		Maintenance Date Treatment	PCI Before Treatment	PCI After Treatment	Cost of Maintenance	Remaining Life
		06/01/2003 SLURRY SEAL	83	90	$0	27.12
		11/10/2015 CAPE SEAL W/20% DIG OUTS	58	69	$0	19.50

Street ID	Section ID	Road Name	Begin Location	End Location	Area
FOURTH	10	FOURTH STREET	WASHINGTON ST.	FAIR WAY	17,280

		Maintenance Date Treatment	PCI Before Treatment	PCI After Treatment	Cost of Maintenance	Remaining Life
		04/01/2019 1.5" OVERLAY WITH FABRIC	7	100	$276,571	38.51

Street ID	Section ID	Road Name	Begin Location	End Location	Area
GOLD	20	GOLD STREET	CEDAR ST.	DEAD END NORTH OF CEDAR	4,368

		Maintenance Date Treatment	PCI Before Treatment	PCI After Treatment	Cost of Maintenance	Remaining Life
		04/27/2017 RECONSTRUCT STRUCTURE (AC)	41	100	$111,253	34.14

Street ID	Section ID	Road Name	Begin Location	End Location	Area
GRANT	20	GRANT STREET	HIGH SCHOOL PROP (COP)	LAKE ST.	28,480

		Maintenance Date Treatment	PCI Before Treatment	PCI After Treatment	Cost of Maintenance	Remaining Life
		05/16/2006 RECONSTRUCT STRUCTURE (AC)	13	100	$235,000	24.26

Criteria:

Source: Sui Tan with Metropolitan Transportation Commission

MTC StreetSaver

CITY OF ANYWHERE - Demo
1232 Washington Street
Anywhere, CA 55555
(555) 555-5555

Scenarios - Sections Selected for Treatment

Interest: 3.00%   Inflation: 3.00%   Printed: 2/15/2022

Scenario: Current Budget $250K

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2022	$250,000	10%	2024	$250,000	10%	2026	$250,000	10%
2023	$250,000	10%	2025	$250,000	10%			

Year: 2022

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	PCI Before	PCI After	Cost	Rating	Treatment
GRANT STREET	WAPOO AVE.	HIGH SCHOOL PROP (COP)	GRANT	10	398	34	13,532	C	AC		64	64	74	$9,022	15,642	CAPE SEAL
HIGHLAND COURT	FOOTHILL BLVD	END	HIGHLD	10	531	32	16,992	R	AC		63	64	74	$11,328	18,542	CAPE SEAL
MYRTLE STREET	SILVER ST.	GOLD STREET	MYRTLE	30	380	29	11,020	R	AC		64	65	74	$7,347	15,897	CAPE SEAL
MYRTLE STREET	GOLD STREET	SOUTH OAK	MYRTLE	35	430	33	14,190	R	AC		60	60	71	$9,460	15,347	CAPE SEAL
STEVENSON STREET	LINCOLN AVE	GRANT ST.	STEVEN	10	675	38	25,650	A	AC		60	60	71	$17,100	23,636	CAPE SEAL
WAPOO AVENUE	GRANT ST.	LINCOLN AVE (NORTH)	WAPOO	20	392	26	10,388	R	AC		69	69	78	$6,926	17,583	CAPE SEAL
WASHINGTON STREET	FIRST ST.	THIRD ST.	WASHNG	35	630	35	22,050	C	AC/PCC		70	70	79	$14,700	22,817	CAPE SEAL
											Treatment Total			$75,883		
MYRTLE STREET	S OAK ST.	LILLIE ST.	MYRTLE	40	367	32	11,744	R	AC		40	41	100	$39,147	15,272	2.5" OVERLAY WITH FABRIC
VIEW ROAD	ARCH WAY	LAKE ST.	VIEW	10	1,300	25	32,500	R	AC		43	43	100	$108,334	15,084	2.5" OVERLAY WITH FABRIC
											Treatment Total			$147,481		

Year 2022 Area Total   158,066   Year 2022 Total $223,364

Year: 2023

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	PCI Before	PCI After	Cost	Rating	Treatment
AMBER WAY	MAGGIE ST.	DEAD END	AMBER	10	106	36	3,816	R	AC		64	62	73	$2,621	16,257	CAPE SEAL
CENTENNIAL CIRCLE	GRANT ST.	FAIRWAY VISTA CT.	CENTCR	10	1,187	33	39,171	R	AC		65	63	73	$26,898	16,378	CAPE SEAL
DEBBIE WAY	DENISE DR.	DEAD END	DEBBIE	10	560	38	21,280	R	AC		70	68	78	$14,613	16,998	CAPE SEAL
FILMORE STREET	FISCHER ST	FAIRWAY	FILLMR	15	435	26	11,310	R	AC		71	70	79	$7,767	17,130	CAPE SEAL
GRANT STREET	LAKE ST.	N. OAK ST.	GRANT	30	710	23	16,330	C	AC		71	69	78	$11,214	18,585	CAPE SEAL
MITZI DRIVE	DENA WY	DEAD END	MITZI	20	860	38	32,680	R	AC		68	66	76	$22,441	16,768	CAPE SEAL
MONEY LANE	LAKE ST.	250 N OF LAKE	MONEY	10	250	25	6,250	R	AC		68	66	76	$4,292	16,767	CAPE SEAL

** - Treatment from Project Selection

MTC StreetSaver

Source: Sui Tan with Metropolitan Transportation Commission

Source: Sui Tan with Metropolitan
Transportation Commission

Step 6: Select Pavement Management Tool

<u>Public Domain Software</u>

- MicroPAVER by the U.S. Army Corps of Engineers.

- RoadSoft GIS by Center for Technology and Training at Michigan Technological University.

- StreetSaver by the Metropolitan Transportation Commission in the San Francisco Bay Area, California.

- Utah Local Assistance Program – Transportation Asset Management System (Utah LTAP-TAMS).

Step 6: Select Pavement Management Tool (contd)

Proprietary Software

- PAVEMENTview by Cartegraph.

- PavePro Manager by Infrastructure Management Services (IMS).

- PubWorks by Tracker Software Corporation.
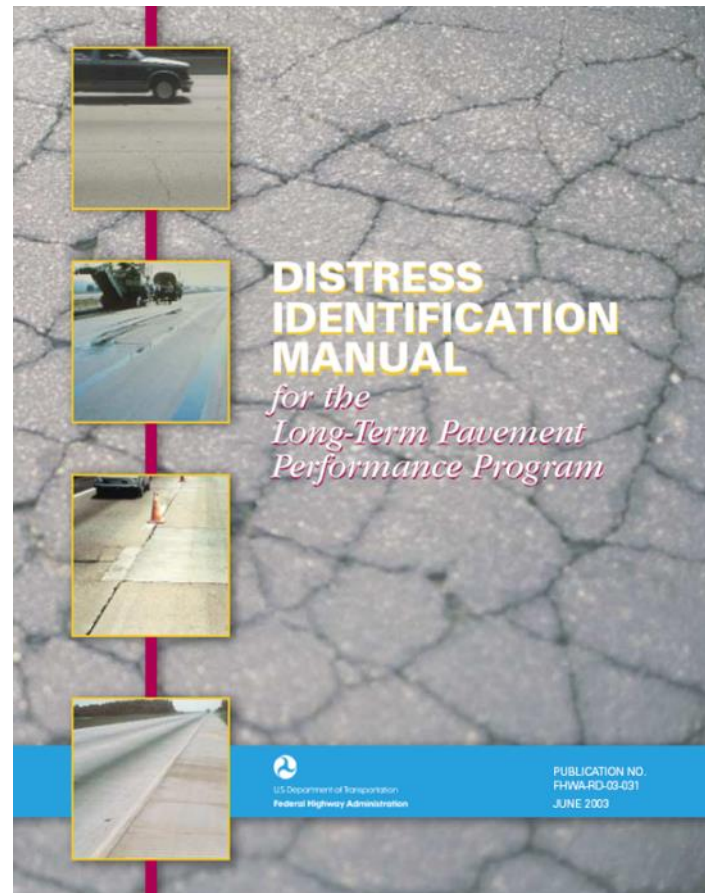
- RoadCare by Applied Research Associates, Inc.

Step 7: Keep the Process Current

The required updates needed to keep the overall pavement management process current:

1. Define Network and Collect Data – Inventory to pavement segments are keep constant components of the database.

2. Collect Condition Data – Recommend that condition information be collected and updated in the pavement management spreadsheet or software on a minimum 3-year cycle on pavement segments.

3. Predict Condition – If prediction models are utilized, consider updating them every 3 years when initially developed and then on a 5-year cycle after they are established.

4. Select Treatments – Rules and priorities should be updated to ensure process continues to improve in the future.

5. Report Results – Will be used by an agency with each new pavement management plan, which ideally should be conducted each year or on a maximum 3-year cycle to correspond with the 3-year data collection cycle.

Distress Identification Manual

https://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/reports/03031/03031.pdf

Why Pavement Management?

- Assess: current/future pavement conditions

- Justify: funding needs to achieve target condition

- Identify: potential treatments while optimizing funding

- Estimate consequences of investments and treatments
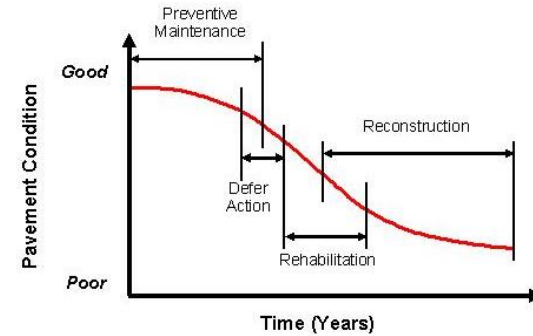
Source: FHWA

Short and Long-term

Web-based Training

Pavement Management Fundamentals WBT

FHWA-NHI-131116

Image Source: Stocker | ShutterStock.com

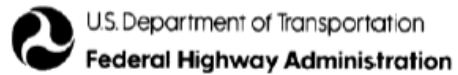# Helpful Links

- FHWA Pavement Management & Performance
  https://www.fhwa.dot.gov/pavement/mana.cfm
- American Association of State Highway and Transportation Officials, Pavement Management Guide, 2012.
- American Association of State Highway and Transportation Officials, Strategic Highway Research Program 2 Guidelines for Preservation of High-Traffic-Volume Roadways, 2016.
- 23 CFR 517.17 – TAMP requirements for Pavement & Bridge Management

For more information:

U.S. Department of Transportation
Federal Highway Administration

Federal Highway Administration
RESOURCE CENTER

The Office of Technical Services
• FHWA Resource Center
• National Highway Institute
• Technology Partnership Programs

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