



**Leveraging Existing Pavement Data to Supplement
Maintenance Condition Assessment Programs**





Outline

- Maintenance Condition Assessment Program overview
- Available Pavement Condition Data
- Case Studies
- Pros and Cons of Leveraging Existing Data



Condition Assessment Program

Condition Assessment Program

- Typically sample-based
- Focus on critical assets; often larger maintenance expenditures
- Utilizes acceptable margin of error for making budgeting decisions at all organization unit levels



Condition Assessment Program

- Key input for Need-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



Condition Assessment Program

- Allows for easy-to-understand performance scorecards

Statewide Condition Ratings						
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				



Pavement Condition Data

- Typically collected statewide; annually
- Can be collected by DOT or outside vendor
- Data used by pavement management system to perform pavement performance forecasting
- Many collected pavement distresses are useful for pavement-based LOS program



Available Pavement Condition Data

7

Available pavement condition data can include:

- Cracking
 - Alligator
 - Fatigue
 - Transverse
 - Longitudinal
 - Wheel path/non-wheel path
- Potholes
- Rutting



Before:

Sample Number		Begin MP		Div/District	/	Route		Direction	
Number of Lanes		End MP		Crew				Date	

ASPHALT PAVEMENT

Features	Measure	Condition
Potholes	Number of potholes ($\geq 6'' \times 6'' \times 1''$)	
Rutting	Lin. ft. of rutting ($\geq 1/2''$)	
Raveling	Surface area distressed (total sq. ft.)	
Alligator Cracking	Surface area distressed (total sq. ft.)	
Linear Cracking	Lin. ft. with unfilled cracks ($\geq 1/8''$ wide)	
Block Cracking	Deficient area ($\geq 1/8''$) (total sq. ft.)	
Shoving	Deficient surface area (total sq. ft.)	

CONCRETE PAVEMENT

Features	Measure	Condition
Spalling	Number of spalls ($\geq 6'' \times 6'' \times 1''$)	
Faulting	Number of faulted slabs ($\geq 1/4''$ high)	
Joint Sealing	Lin. ft. of joints requiring sealing ($\geq 1/4''$ wide)	
Crack Sealing	Lin. ft. of cracking ($\geq 1/4''$ wide)	
Pumping	Number of slabs deficient	
Punchouts	Number of punchouts ($\geq 6'' \times 6''$)	

After:

Sample Number		Begin MP		Div/District	/	Route Type		Direction	
Number of Lanes		End MP		Crew		Route #		Date	

ASPHALT PAVEMENT

Features	Measure	Condition
Potholes	Number of potholes ($\geq 6'' \times 6'' \times 1''$)	
Raveling	Surface area distressed (total sq. ft.)	
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- Eliminated rutting and cracking from field condition assessments
- Saves 3-5 minutes per sample; depending on number of lanes and severity of the deficiency
 - 15-25% efficiency improvement on each sample
- Remaining pavement deficiencies can be measured from edge of pavement
 - Reduces worker exposure



Measuring ruts and cracks is time-consuming!

Asset Group: Asphalt Pavement
Maintenance Feature: Rutting
Definition: Ruts are defined as vertical deformations in the pavement surface along the wheel tracks that can hold water. In severe cases, pavement uplift may occur along the sides of the rut, but in most instances, only a depression is noticeable. Rutting causes water accumulation, which poses an undesirable condition.
Measurement Unit: Inventory: Asphalt lane-miles. Condition: Linear feet of rutting per asphalt lane-mile.
Inspection Procedure: For each sample on asphalt-surfaced pavements, inspect the surface area for rutting. Measure and record the total length of rutting in all lanes that will cause water accumulation, using a straightedge and ½-inch shim to determine if the rut depth is ½-inch or greater and the measuring wheel to determine the length.





- ALDOT performs approximately 11,000 .1-mile samples statewide
- 3-5 minute time savings on each sample equals a statewide savings of 68-114 employee-days for data collection effort



Before:

Condition Indicator	Rating 4	Rating 3	Rating 2	Rating 1	Rating 0
PAVEMENT AND SHOULDERS					
1. Number of uncorrected defects	0	1-2	3-4	5-6	>6
2. Percent of pavement area with ruts more than 1½-inch deep	0-5%	5-10%	10-30%	30-50%	> 50%
3. Percent of pavement area with alligator, block, or other cracking of low severity	0-5%	5-10%	10-30%	30-50%	> 50%
4. Percent of pavement area with alligator, block, or other cracking of moderate severity	0-5%	5-10%	10-30%	30-50%	>50%
5. Percent of pavement area with alligator, block, or other cracking of high severity	0-5%	5-10%	10-30%	30-50%	>50%
6. Number of unsealed transverse cracks ¼ inch or more wide	0-10	10-20	20-40	40-60	>60
7. Percent of rigid pavement joints not functioning over 10% or more of joint length	0-5%	5-10%	10-30%	30-50%	>50%
8. Percent of longitudinal joint length (e.g., between pavement and shoulder) with unsealed longitudinal cracks that are ¼ in or more wide	0-5%	5-10%	10-30%	30-50%	>50%
9. Percent of pavement length in which low severity raveling is present	0-5%	5-10%	10-30%	30-50%	>50%
10. Percent of pavement length in which moderate-to high-severity raveling is present	0-5%	5-10%	10-30%	30-50%	>50%
11. Percent of pavement area in which asphalt surface is oxidized (has whitish appearance)	0-5%	5-10%	10-30%	30-50%	>50%
12. Percent of pavement area in which flushing or bleeding is evident	0-5%	5-10%	10-30%	30-50%	>50%
13. Percent of shoulder with drop-off greater than 1½ inches	0-5%	5-10%	10-30%	30-50%	>50%



After:

MLOS Field Survey Rating Form				
Survey Number:		Route No.:		Reference Point Begin:
Rte.Type (circle): Interstate State Hwy US Hwy		Direction (circle): N S E W		Reference Point End:
Section (circle): 1 2 3 4 5 6 7 9				Area:
No. Lanes:				Survey Personnel:
Date (mm/dd/yyyy):				
Time of Day (00:00 AM or PM):				
Latitude:				Longitude:
Roadway Elements	Asset Deficiency Measure	ASSET Deficiency	ASSET Total	NOTES/CALCS
Shoulder Buildup/Dropoff >2" and <4"	Linear feet of deficient shoulder			
Shoulder Buildup/Dropoff >4"	Linear feet of deficient shoulder			



- Eliminated cracking, potholes, and rutting from field condition assessments
- Saves 3-5 minutes per sample; depending on number of lanes and severity of the deficiency
 - 15-25% efficiency improvement on each sample
- Shoulder drop-off is measured from edge of pavement
 - Reduces worker exposure



- Nevada DOT
 - 2012 assessed pavement surface defects, including potholes, rutting, and cracking
 - Went strictly to Pavement Serviceability Rating (PSI) for pavement in 2014
- Caltrans
 - Pilot project to enhance existing LOS program
 - Focus on 10 priority assets, including potholes
 - Broader implementation will leverage Automated Pavement Condition Survey (APCS) data



Pros and Cons

Pros

- Removes margin of error
 - Full network condition data provided
- Worker exposure is minimized
 - No need to be “on pavement” for condition assessments
- Less time required at each sample site
 - Eliminates counting deficiencies for two time-consuming elements
 - Allows for some samples to be collected from vehicle



Cons

- Can involve revisions to how data is collected or provided from pavement management
 - Average rut depth vs linear feet of rut greater than ½ inch
 - Conversion factors often required to address gap between how data is measured and how work is done
- Timing can be an issue
 - Pavement data is typically collected annually and requires time to process
 - Availability of data may not match the timeline for condition data collected for other assets



Rob Zilay, President
rzilay@dyemanagement.com
(813) 909-3160 • www.dyemanagement.com