9th International Conference on MANAGING PAVEMENT ASSETS (ICMPA9)

Recovering from the 2010 Nashville Flood

Pavement Management as a Tool in Long Term Disaster Recovery

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AASHTO THE VOICE OF TRANSPORTATION

VirginiaTech Transportation Institute

TRB

U.S. Department of Transportation Federal Highway Administration

WORLD ROAD ASSOCIATION MONDIALE DE LA ROUTE 1909-2009

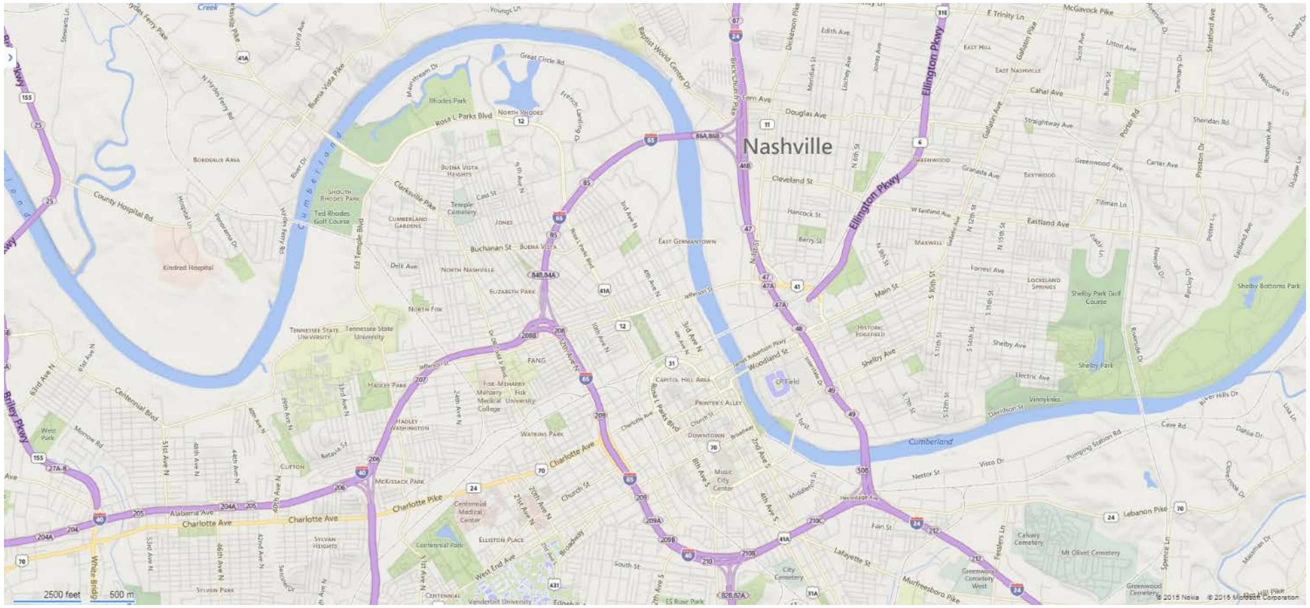
VDOT Virginia Department of Transportation

ARA

Metro Nashville PUBLIC WORKS

What Happened?

- **1,000 Year Flood of the Cumberland River**
- **Over 13 inches of rain in one storm**



From Bing Maps

What Happened?

What Happened?

What Happened?

What Happened?

What Happened?

The Aftermath

The Aftermath

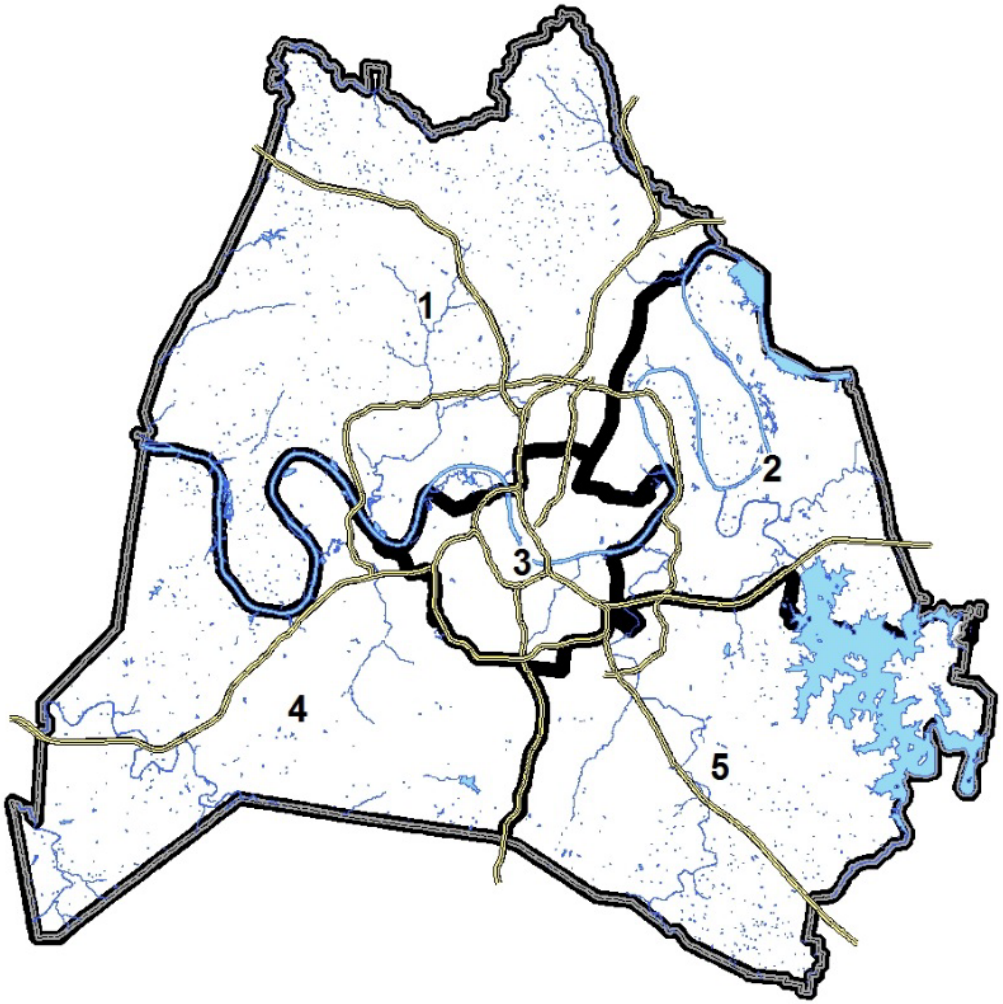
The Aftermath

Road Closures

115 Metro Roads were closed to traffic on May 3

Metro's Water Resources

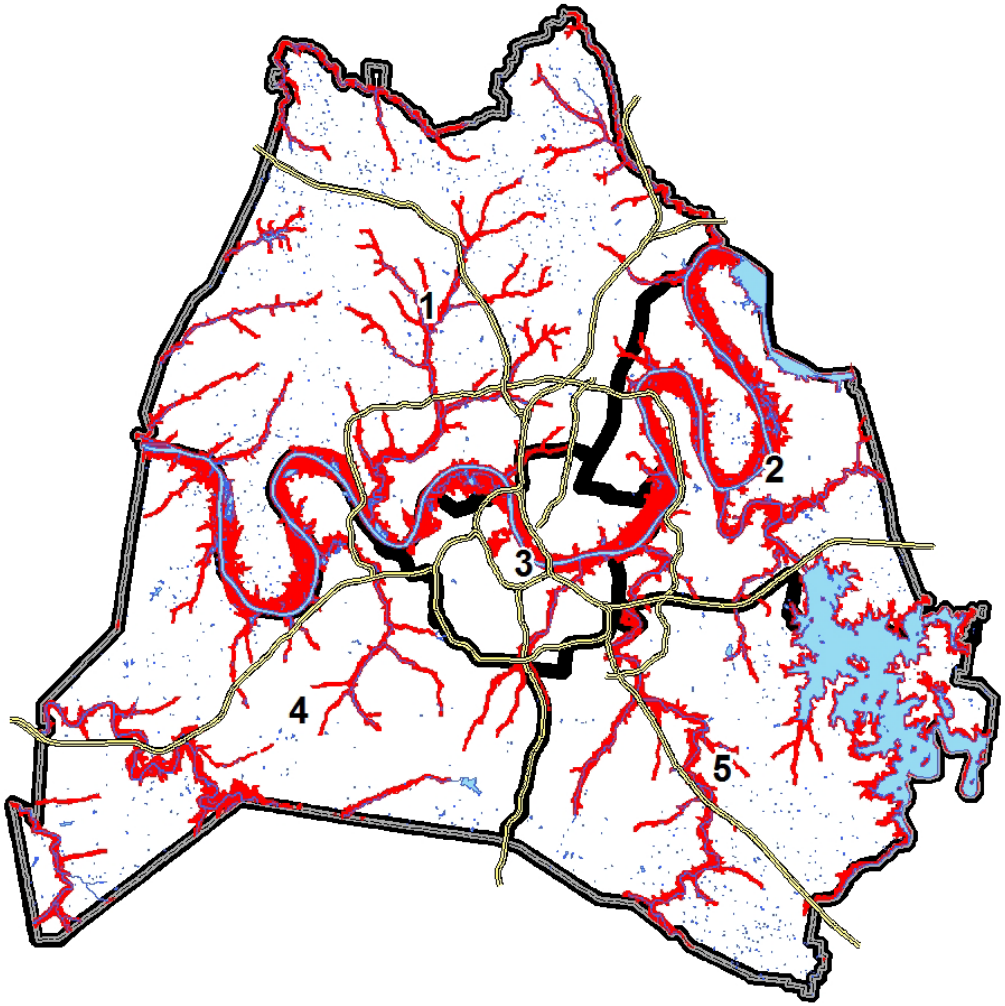
Numbers Indicate
Paving Groups



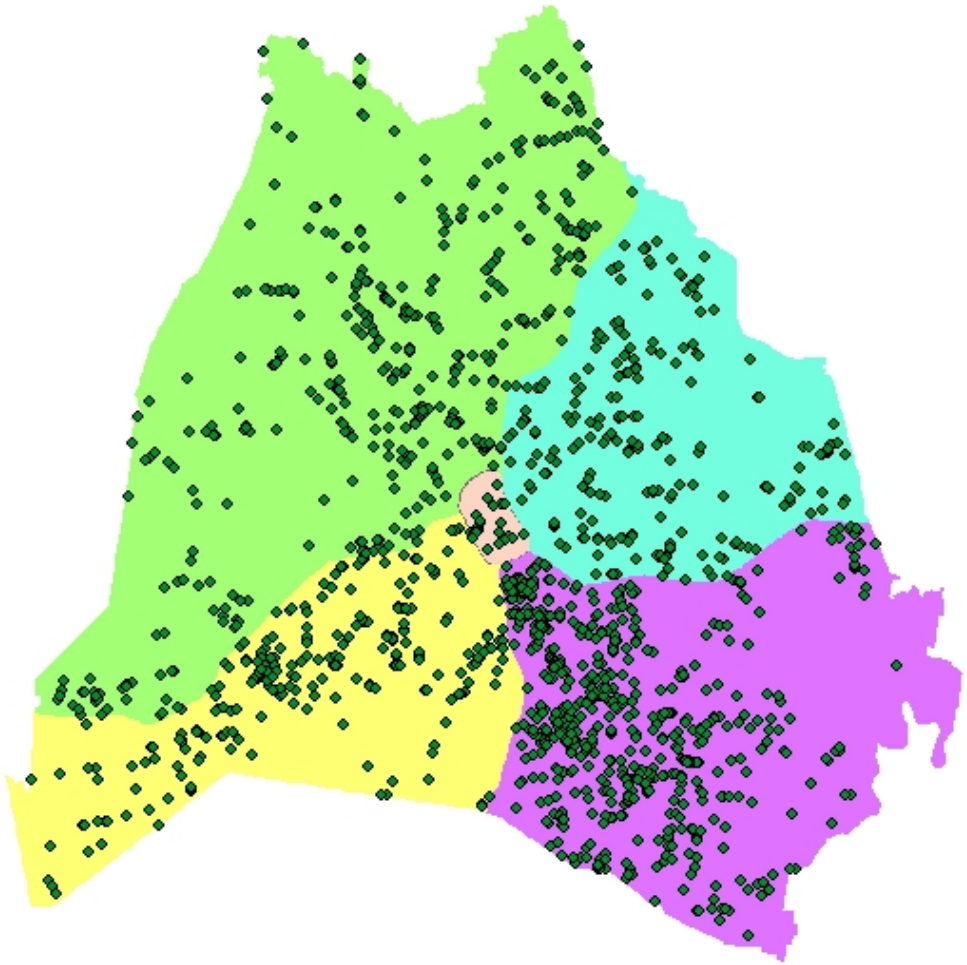
Before Flooding

Metro’s Water Resources

Flooded Areas



Damage Locations



Stages of Response

Emergency Response

Restore Service

Long-Term Response

Evaluating Condition

- Each segment has three measurements:

ASTM D6433, detailed distress data is stored

ASTM E1926

Based on Mean Texture Depth, but only for pavements > 5 years old

Evaluating Condition

- Used a digital survey vehicle from ARA
- Evaluate ½ of network every year
- Collect imagery, location, and laser-based data

Evaluating Condition

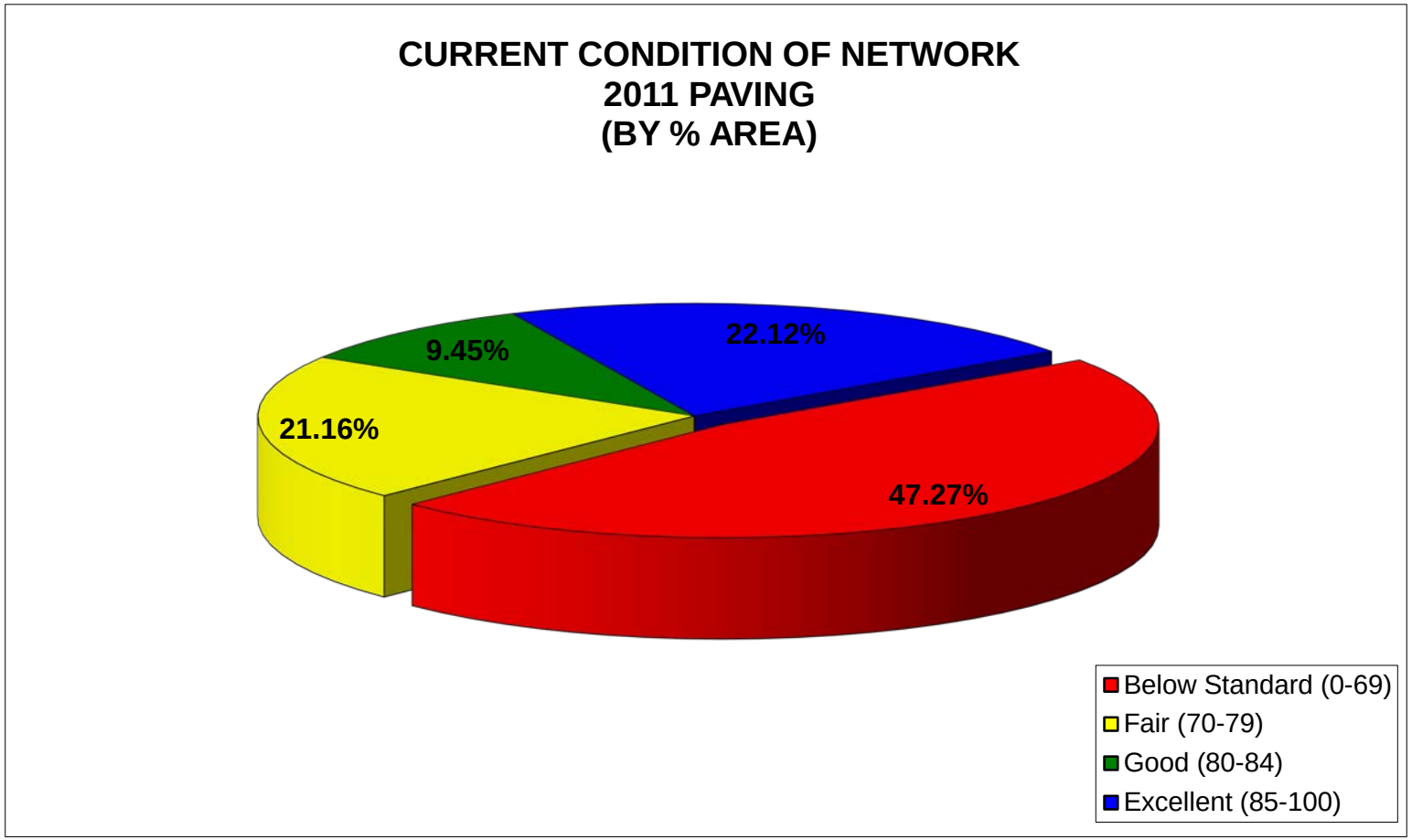
- An Overall Condition Index (OCI) is calculated for each segment based on a weighted average:

Measurement	Percentage
PCI	75
IRI	10
Weathering	15

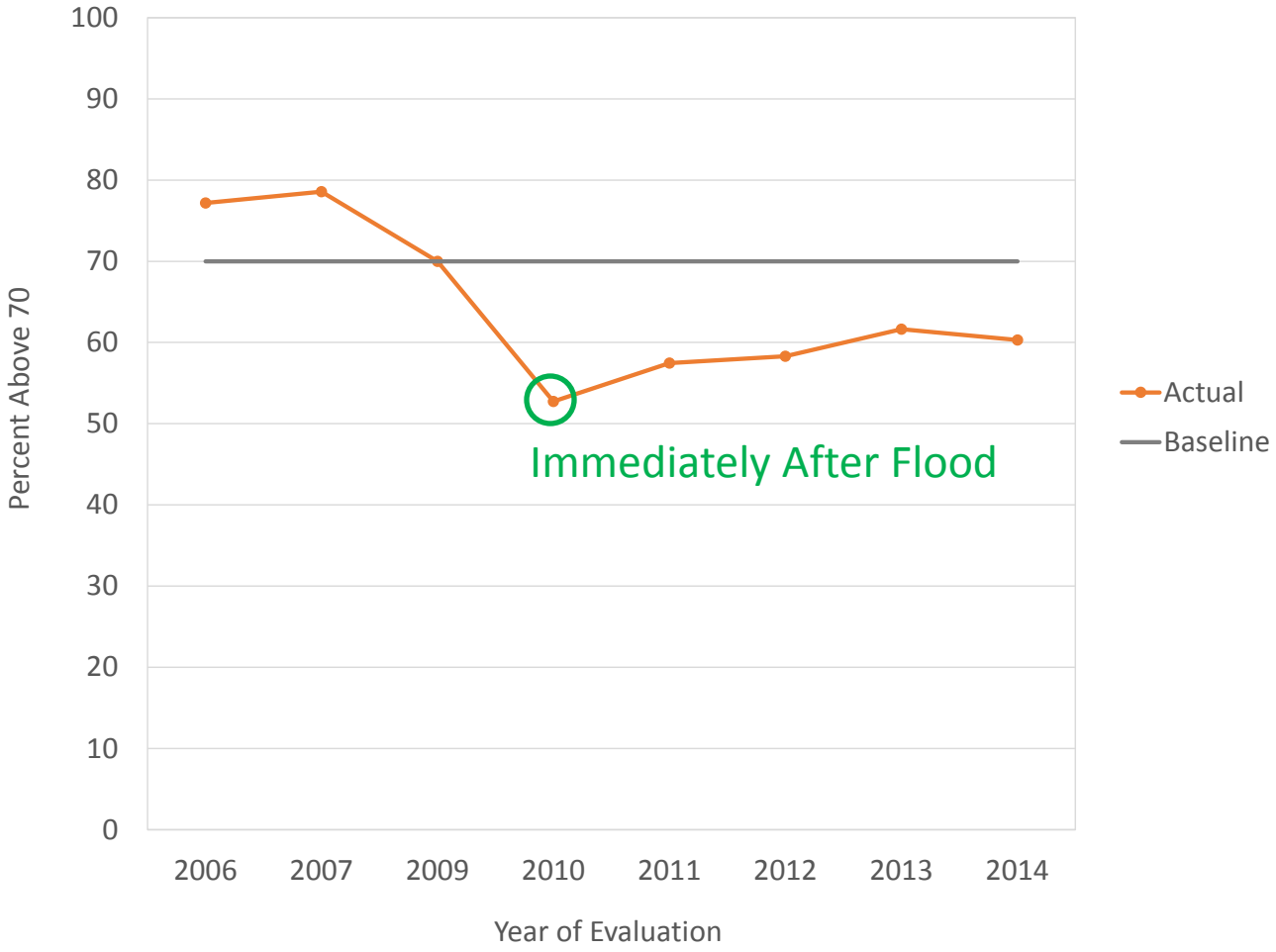
Network Health

- A segment is deficient if its OCI < 70
- Metro's goal is no more than 30% of the network deficient
- "70 above 70"

Network Health after Flood



Network Health Before & After



Evaluating the Problem

- We looked at data directly from the pavement management database
- Here is what we found about the number of potholes in Metro:

Year	High	Moderate	Low	Total
2008	715	769	872	2271
2011	823	1790	1907	4520

Data from Paving Groups 1, 3, and 4 (1/2 of network)

Evaluating the Problem

- We also examined imagery

2008

2011

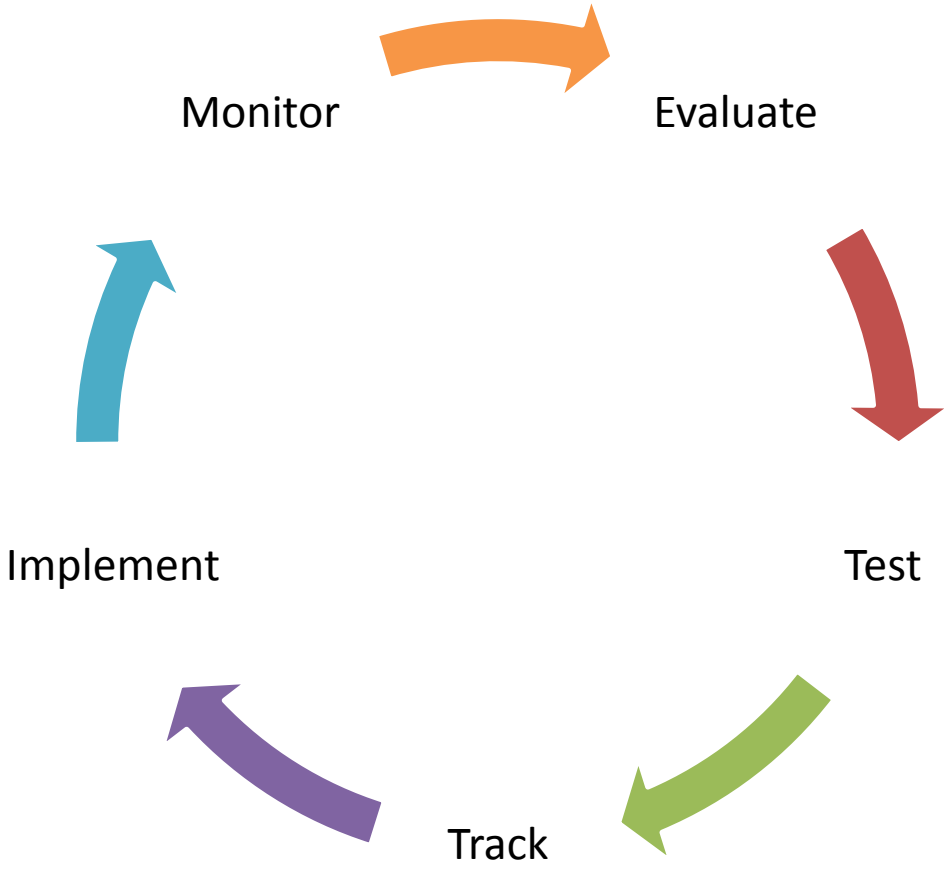
Repair Approach

- Base Failures – Full Depth Reconstruction
- Potholes – Infrared Patching

Construction Approach

- Most potholes were the result of delamination between base and surface asphalt
- New specifications required a new trackless tack product to increase shear strength between asphalt layers

Monitoring Effectiveness



Network Rollout

- Acquire capability (a single contractor or visiting vendor is not enough)
- Train personnel
- Track work and results
- Add to management process

Funding

- Provide simple reports and graphs to show current progress
- Show the effect of decisions (present & future)
- Let the decision makers choose

Metro Council Chamber

Conclusions

1. Pavement management is a key element in disaster response – especially the long-term damage mitigation
2. Without a pavement management system you cannot provide an overall analysis of past, current, or future conditions

Conclusions

3. A properly implemented system will provide:
    1. Data to support evaluating the specific problem(s)
    2. A mechanism to immediately address problems with existing methods
    3. A way to integrate new methods that effectively mitigate new issues and/or use new technology