TRAFCC (Transportation Resource Advisory Forum for Carson City)

July 28, 2016

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Overview

- Update – actions and projects
- Pavement management systems – Dr. Hajj
- Prioritization of projects
- Other transportation issues

Progress Since Last Meeting- Projects and Actions

- Carson City RTC
  - Awarded Airport Road Reconstruction – US 50 to Woodside
  - Awarded Appion Way Reconstruction – California Street to Bigelow Drive
  - Amended Agreement with NDOT for intersection safety project – Carson/Winnie and Roop/Robinson
  - Submitted applications for bicycle/pedestrian projects – S. Carson Street project and Freeway multiuse project.

Airport Road Reconstruction

Appion Way Reconstruction

Progress Since Last Meeting- Projects and Actions

- Carson City – Board of Supervisors
  - Approved amendment #4 to freeway agreement – impacts S. Carson Street plans
  - Approved ballot language regarding fuel revenue indexing measure – would increase motor vehicle fuel tax
- Carson Area Metropolitan Planning Organization
  - Awarded contract for S. Carson Street Complete Streets corridor Study

Area for Complete Streets Study and Future Project

Progress Since Last Meeting- Projects and Actions

- Wide crack repair contract – completed
- Grant-funded sidewalk project near Empire Elementary – completed
- E. Fifth Street at Riverview – underway
- Downtown project –underway
- Citywide patching project – underway
- Goni and Convair reconstruction – underway
- NDOT
  - Freeway Phase 2B-3 – continued progress
  - I580 improvements near hospital – nearly complete
  - S. Carson Street rehabilitation project - underway

Wide Crack Repair Project

Grant-Funded Sidewalk Project

E. Fifth Street at Riverview Park

Downtown Project

Citywide Patching Project

Goni and Convair Reconstruction Project

Goni

Convair

Freeway Phase 2B-3

South from Koontz

North from Koontz

Elie Y. Hajj, Ph.D.

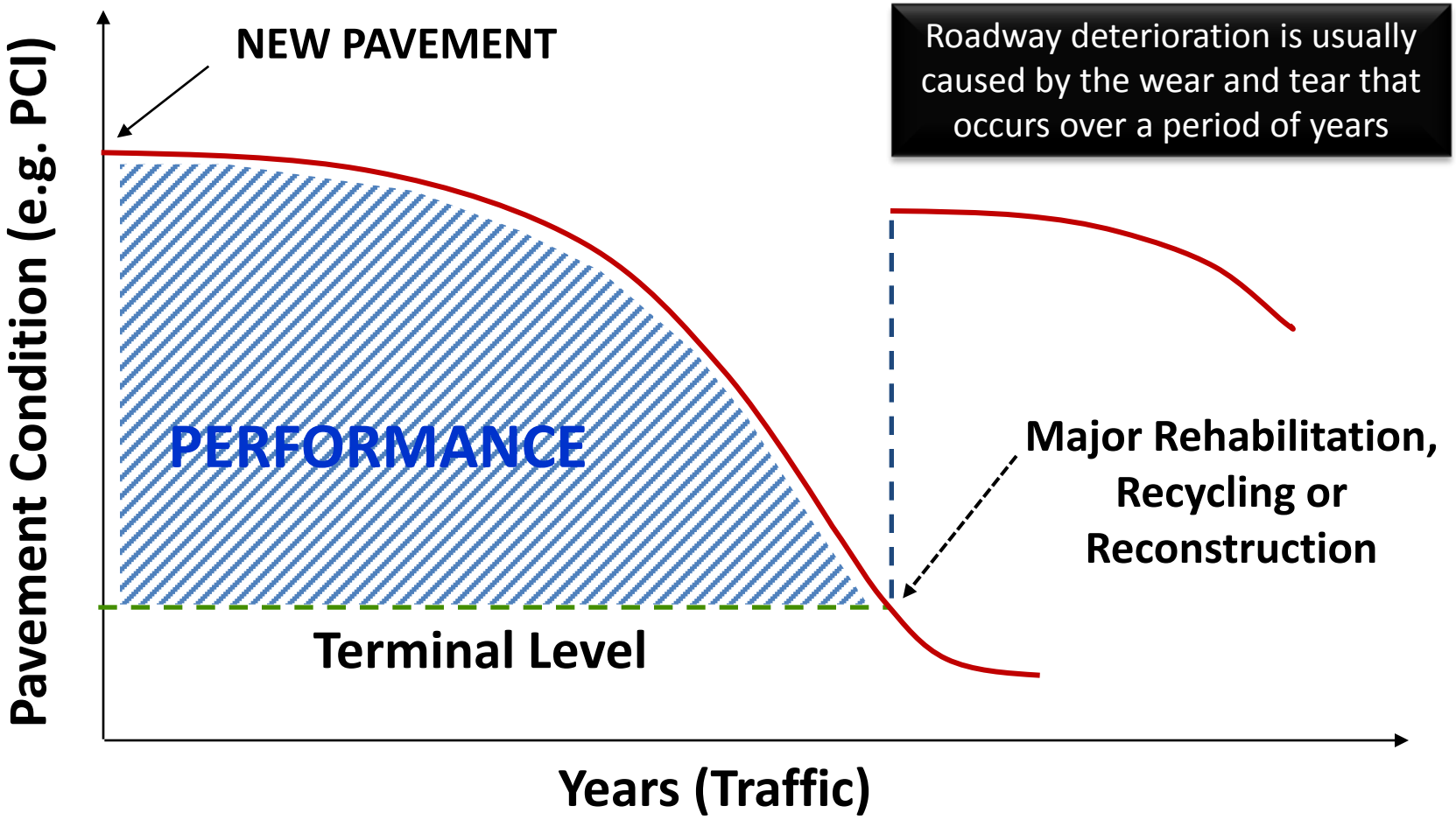
Associate Professor and Associate Director of WRSC

University of Nevada, Reno

PAVEMENT MANAGEMENT SYSTEM FOR CARSON CITY

Pavement Management 101

Pavement Deterioration



Pavement Management 101

Issues with Major Rehabilitation and Reconstruction

- Funds are usually insufficient to adequately repair and rehabilitate every roadway section that deteriorates ($$$).

- Deferring repairs until conditions become unacceptable makes problem complicated.

Pavement Management 101

Why can't we Reconstruct All of our Paved Roads?

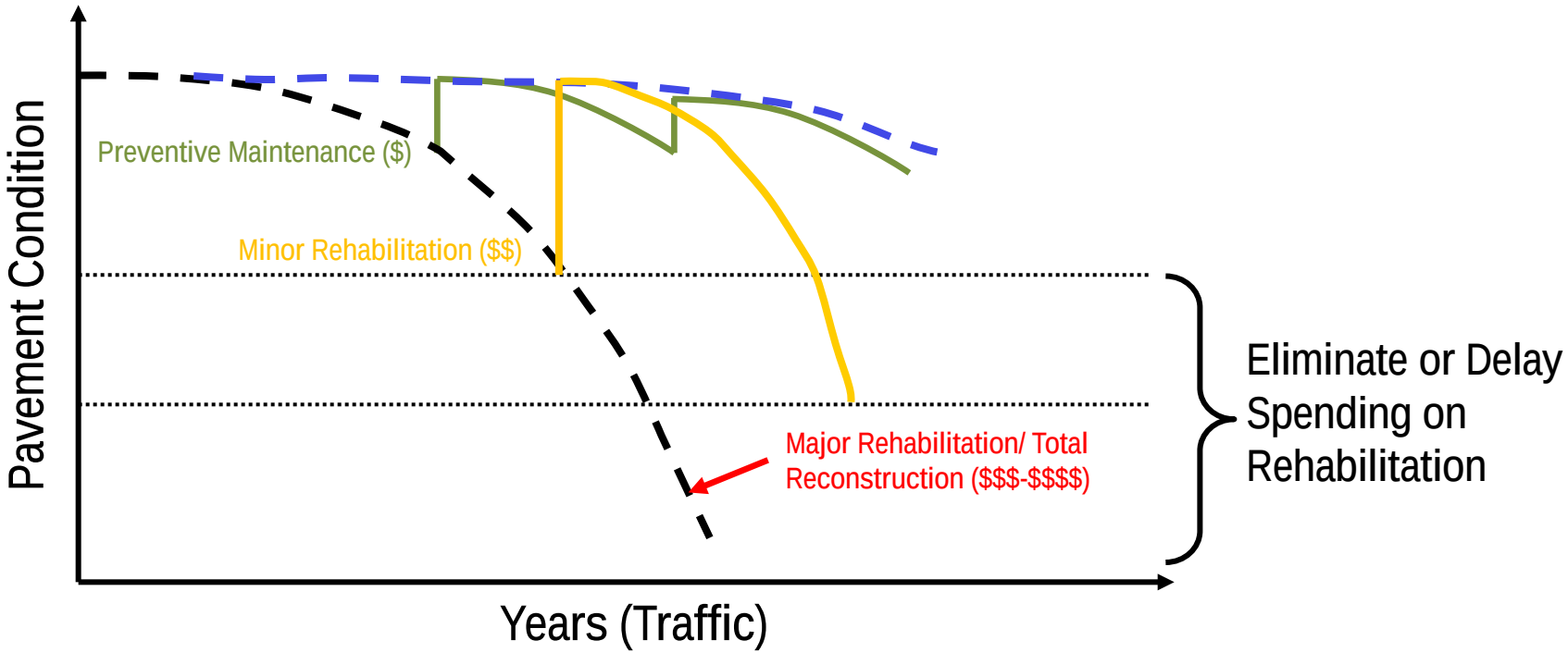
- Carson City County responsible for maintaining
  - 273 miles of paved roadways

Carson City County Paved Roadways		
Miles	Area (ft^2)	Replacement Value to Reconstruct all paved Roads @ \$5.6 per ft^2
273	51 million	!!! \$285.6 million !!!

→ Small improvements can yield big benefits!

Pavement Management 101

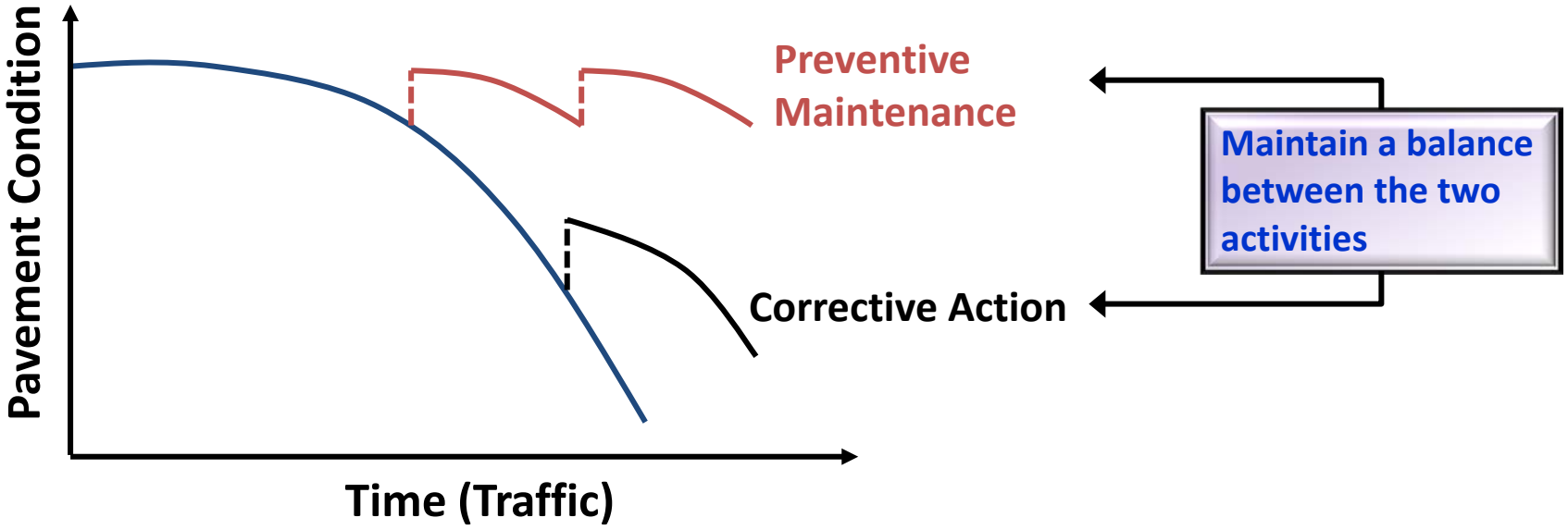
How to Overcome Funding Challenges?



How to Overcome the Funding Challenges?

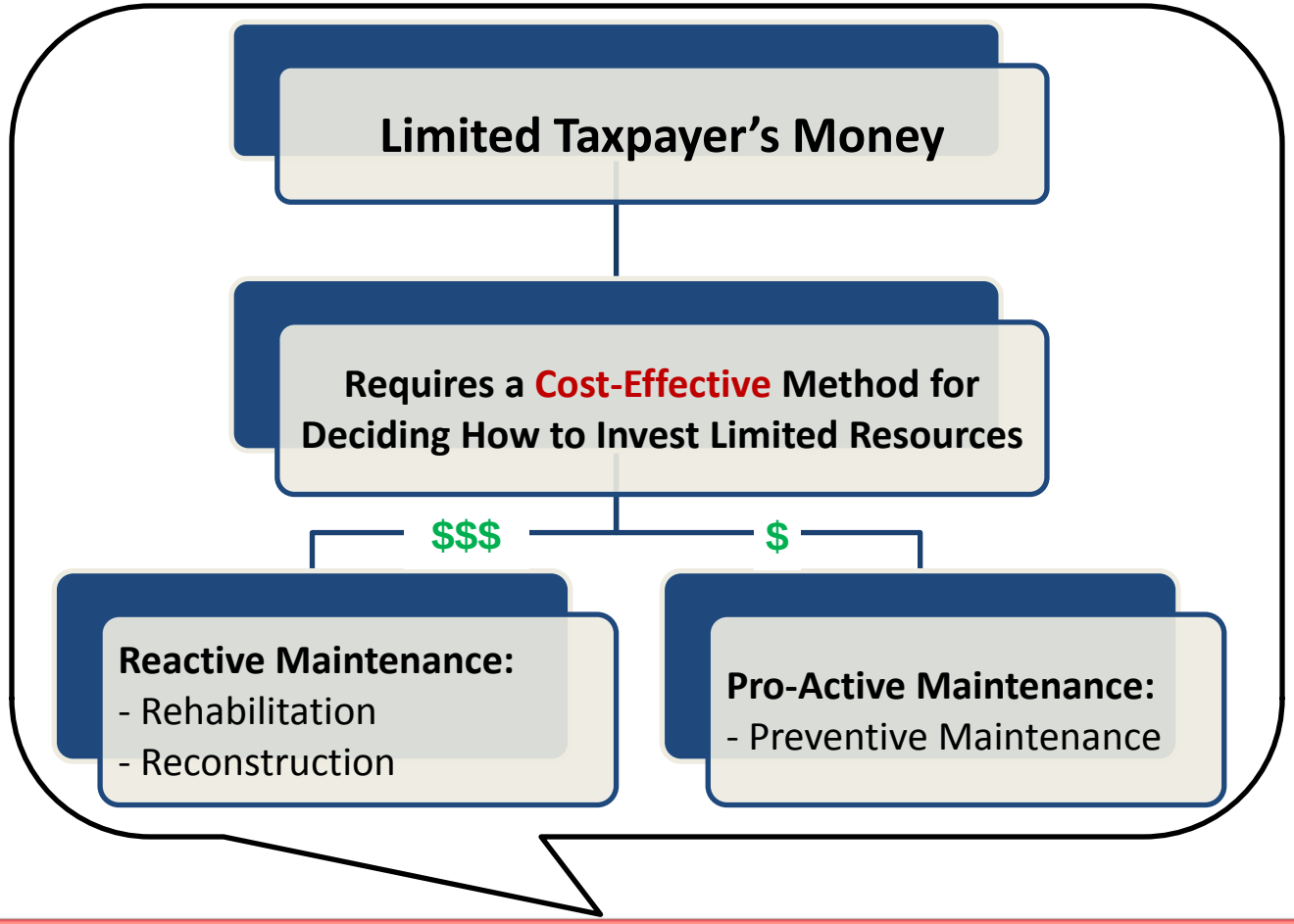
Dilemna is to **balance** the work program between preventive maintenance activities and projects requiring immediate corrective action.

- Traveling public: Unwilling to tolerate extremely rough roads.
- When funds are extremely limited, agencies often respond to the most pressing and severe problems.



Pavement Management 101

How to Approach?



Through the full implementation of a Pavement Management System (PMS)

Pavement Management 101

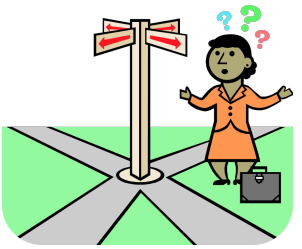
What is a PMS Then?

- Definition:

  PMS is a *decision making process* used to make *cost-effective decisions* about maintenance, rehabilitation, and construction.

  – Allows for project prioritization

  – Allows for planning and budgeting.



- Example pf Pavement Management Software

  – PAVER, StreetSaver, etc.

Pavement Management Process

- Systematic process (simplified)
  - Setup road network
  - Assess present pavement condition
  - Predict future condition
  - Conduct alternative analyses (Planning and Budgeting)

Pavement Management Process: Road Network

Network

- Name: Carson City
- ID: CC

Branches

- Defined as any road, street, lane, drive, avenue, court, way, circle, loop, and boulevard
- Usually large units which do not have consistent characteristics, thus divided into smaller components called “sections”.

Sections

- Section ID; From; to; Original construction date; Length; Width; Rank (Primary, Secondary, Tertiary); Surface type (AC or PCC)

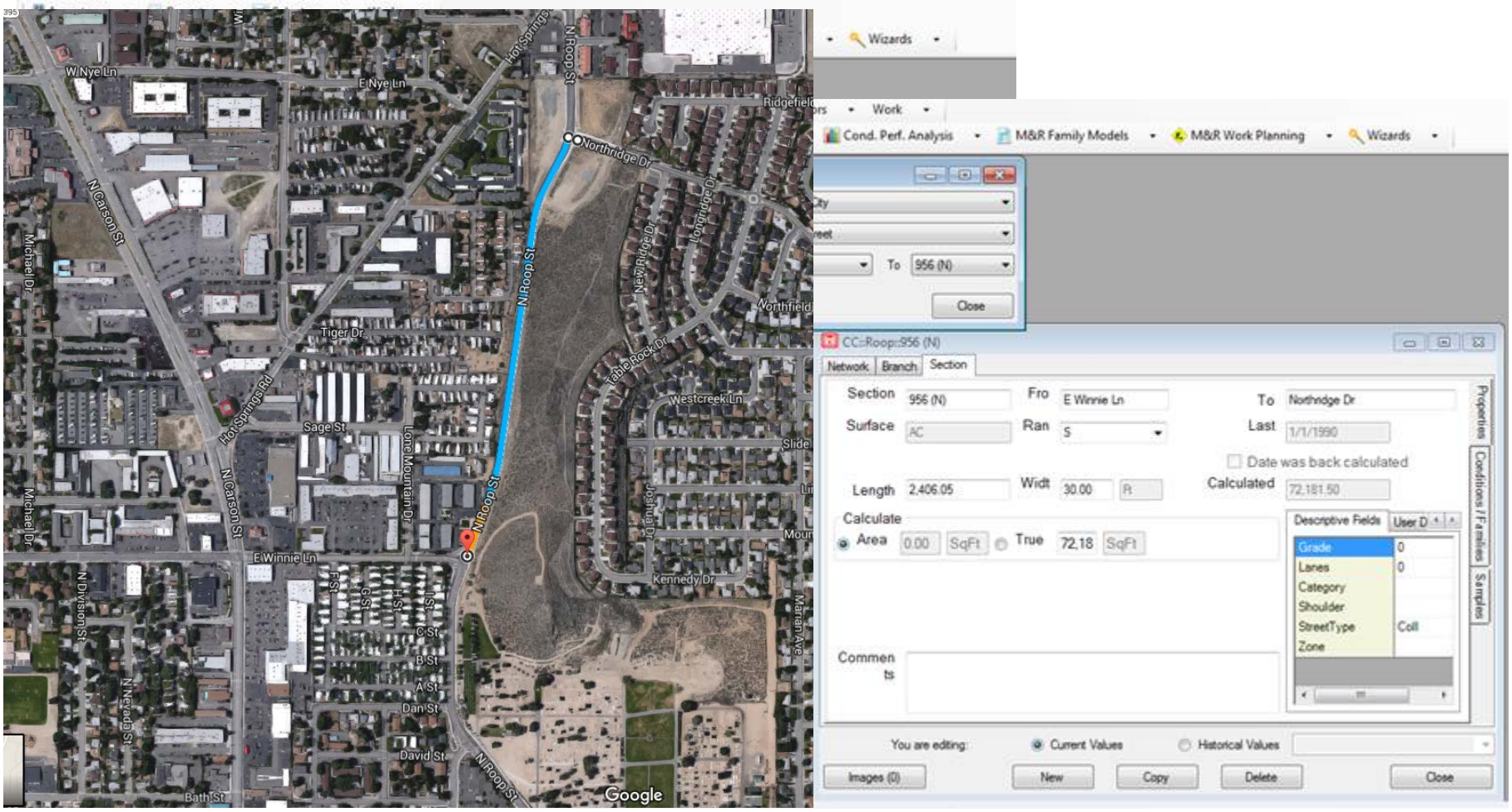
Pavement Management Process: Road Network (Cont'd)

- Carson City Network Characteristics
  - 273 Miles
  - 51 Million ft^2
  - 817 Branches
  - 2,950 Sections
    - 226 Arterial Roads
    - 477 Collector Roads
    - 2239 Local Roads
    - 8 Unpaved Roads

Pavement Management 101

Pavement Management Process: Road Network (Cont'd)

- Example:



Pavement Management Process: Pavement Condition

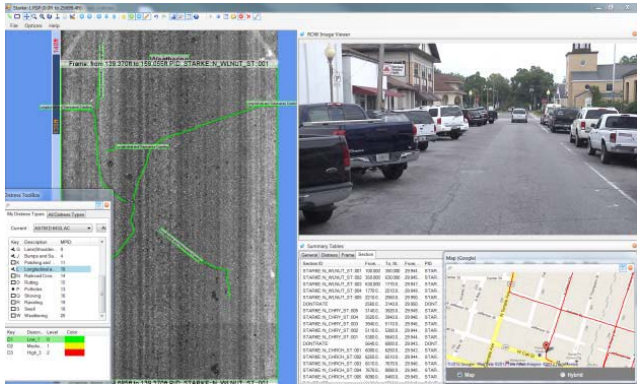
- Pavement Condition determined from a condition survey:
  - Distress Type (WHAT?)
  - Distress Severity (HOW BAD?)
  - Distress Extent (HOW MUCH?)

Pavement Management Process: Pavement Condition

- Condition survey type.
  - Manual Inspection
    - *Surveyed sample units*
  - Automatic Inspection Vehicle
    - *Full road surveyed*

GPS Receiver

Downward Imaging System



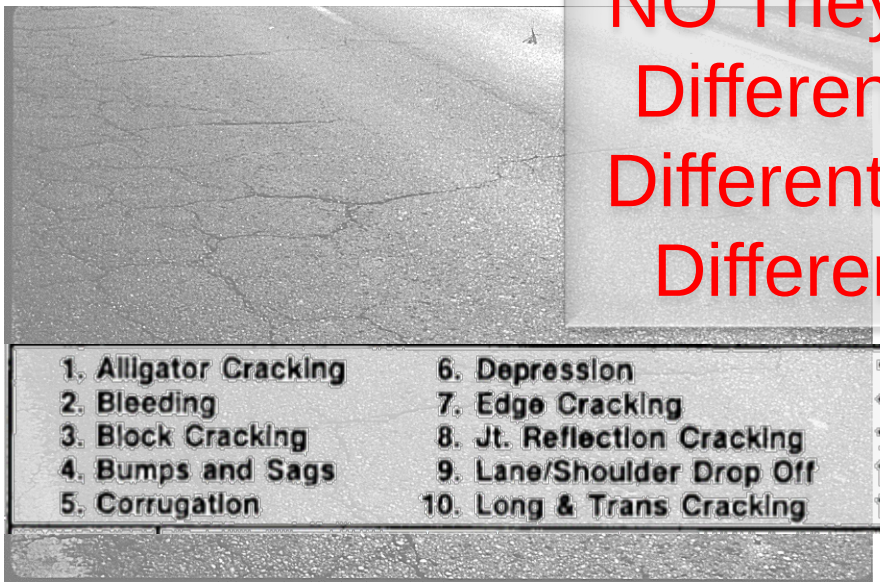
Video images: video tape of road surface at highway speed

Inertial profiler

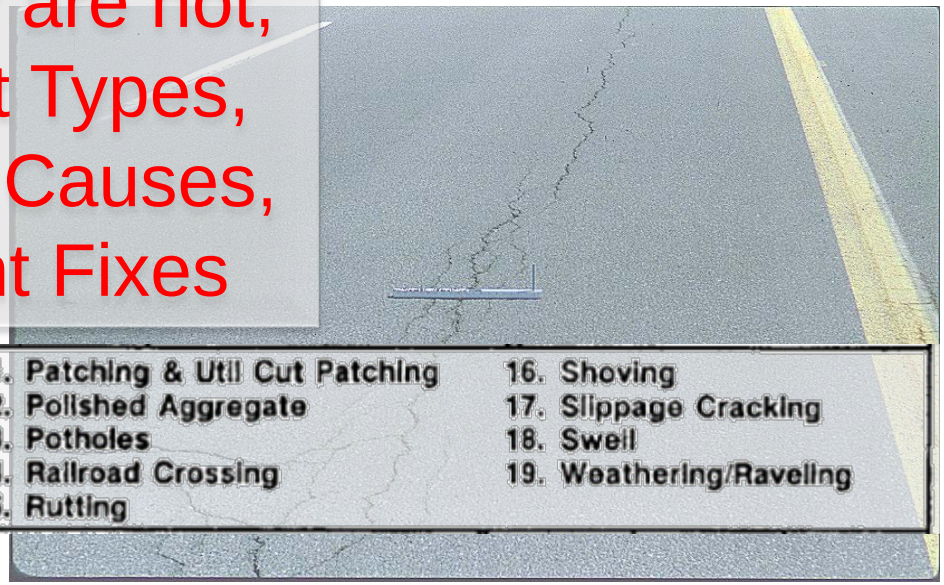
Pavement Management Process: Pavement Condition (Cont'd)

- Are all Cracking the same?

NO They are not,
Different Types,
Different Causes,
Different Fixes



Block Cracking
Thermally-induced cracking

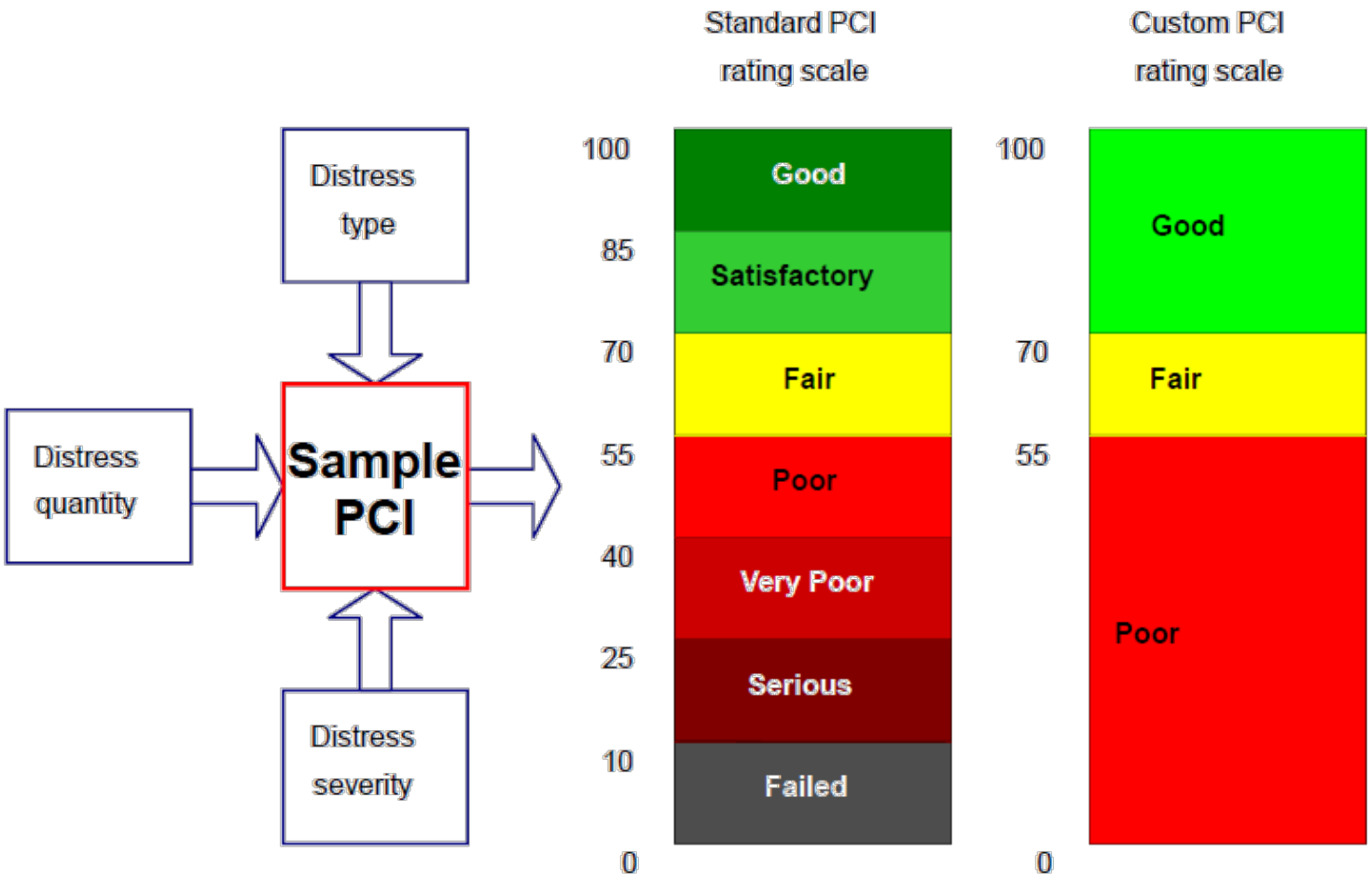


Fatigue Cracking
Load-induced cracking

Pavement Management Process: Pavement Condition (Cont'd)

- Calculate Pavement Condition Index (PCI) based on the results of visual condition survey.
- The PCI provides an index of the pavement's
  - structural integrity and
  - surface operational condition
- Distress information provides insight into the causes of distress
  - Load
  - Climate

Pavement Management Process: Pavement Condition (Cont'd)



Pavement Management Process: Pavement Condition (Cont'd)

PCI = 98
(Good)

PCI = 84
(Satisfactory)

PCI = 78
(Satisfactory)

PCI = 56
(Fair)

PCI = 30
(Very Poor)

PCI < 10
(Failed)

Pavement Management Process: Predict Future Condition

- Develop representative pavement performance models (i.e., PCI versus time curves) to predict pavement deterioration with time.
  - Models are developed based on condition survey data collected over the years.
  - Models have to be regularly revised/updated with recent condition survey data.

- Thus, it becomes *highly critical to maintain the pavement condition survey program*.

Pavement Management Process: Alternative Analyses

- With the proper performance models different *planning and budgeting scenarios* can then be conducted to optimize the most use of the available funds.
  - Multi-year planning analysis,
  - Different allocations of funds for:
    - Localized maintenance (e.g., crack sealing),
    - Preventive maintenance (e.g., slurry seal),
    - Minor rehabilitation (thin asphalt overlay), and
    - Major rehabilitation (e.g., surface replacement) and reconstruction.

Pavement Management Process: Typical Activity Costs

Localized Maintenance	Preventive Maintenance	Minor Rehabilitation	Critical PCI 40	Major Rehabilitation and Reconstruction
Case Specific	90≤PCI≤70	70≤PCI≤40		

Crack Sealing

Cost:
- $0.45 / ft.

Slurry Seal

Cost:
- $0.25 / ft^2
- $37,193 / LM

2” AC Overlay

Cost:
- $2.00 / ft^2
- $297,540 / LM

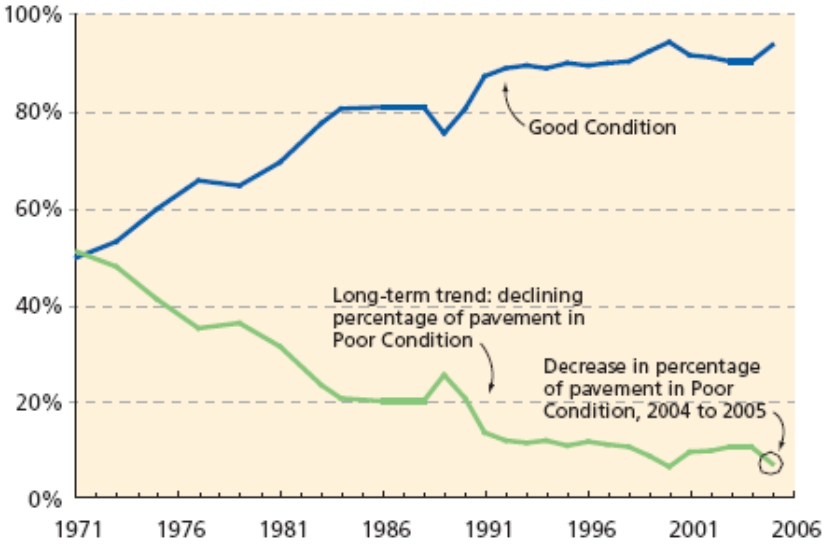
Surface Reconstruction

Cost:
- $4.00 / ft^2
- $595,080 / LM

Pavement Management System: Does it Work?

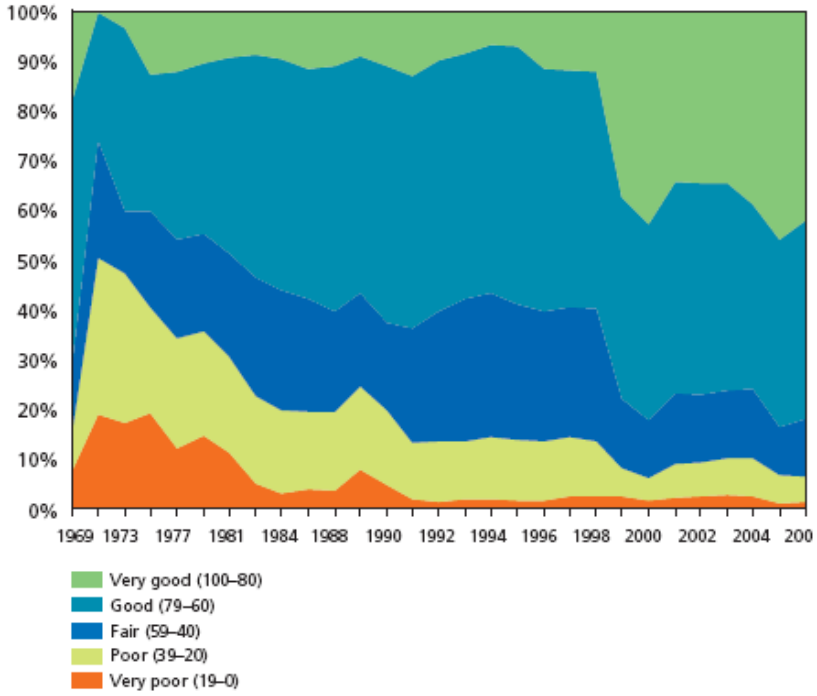
Washington State

Figure 1. Trends in poor and good pavement condition of Washington State highways, 1971–2005, following adoption of a *pavement condition survey in 1969 and a pavement management system in 1982*. Data source: Washington State Department of Transportation Materials Lab.



Washington State

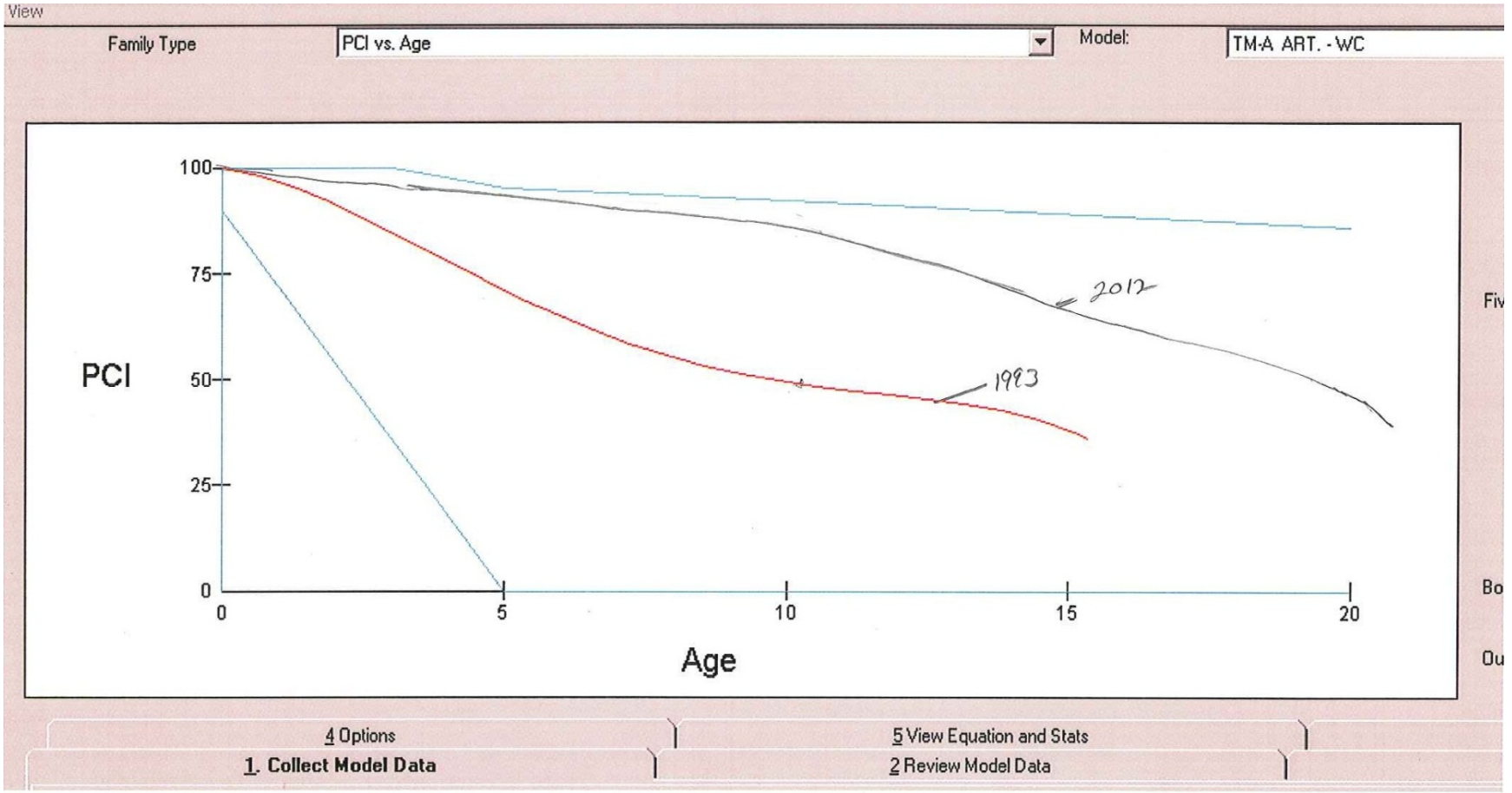
Figure 2. Trends in Washington State pavement structural condition, 1969–2006 (statewide, all pavements). Data source: Washington State Department of Transportation Materials Lab.



Source: https://www.fhwa.dot.gov/asset/if08010/tamcs_pms02.cfm

Pavement Management System: Does it Work?

- **Washoe RTC:** Network Performance Life After Implementing the Preventive Maintenance Program Through PMS (Figure Below Provided by S. Gibson from RTC)



Pavement Management System: Does it Work?

- Additional examples for successful use of PMS can be found….

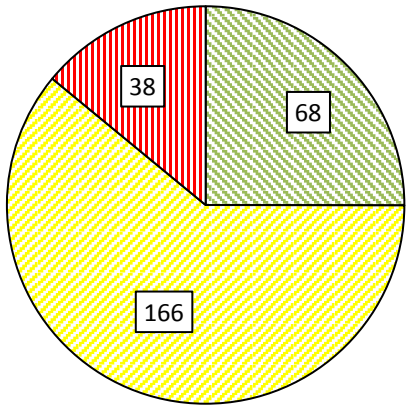
- The key is to properly maintain the database in PMS (including regular measurements of pavement conditions) and, accordingly, keep on updating performance models.

Pavement Management System: Carson City

- A PMS system is implemented and used by Carson City Public Works for planning and budgeting.

- Pavement performance models have been recently updated and will be revised in near future with the new set of pavement condition data.

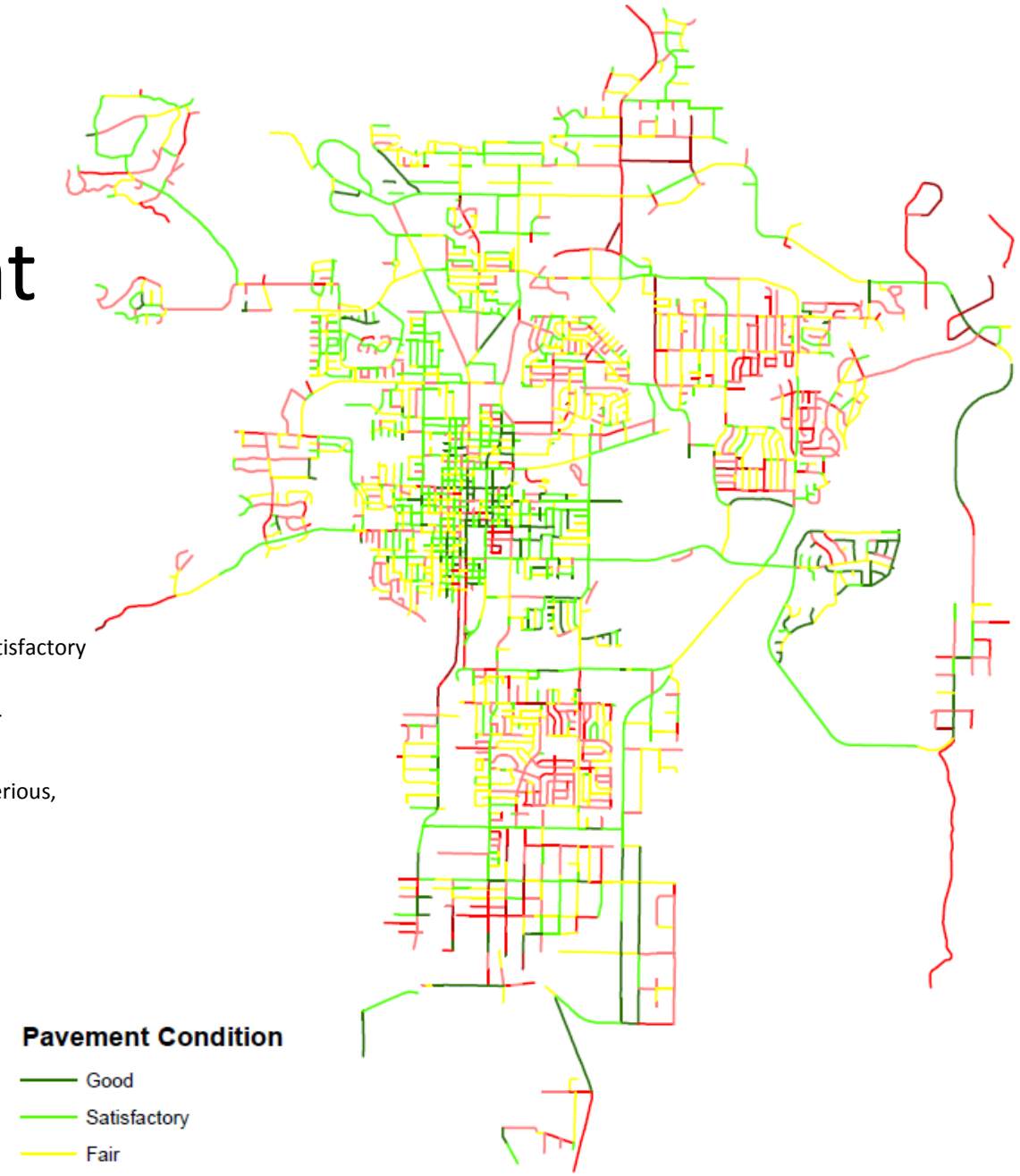
Carson City Streets - Current Conditions



Good and Satisfactory

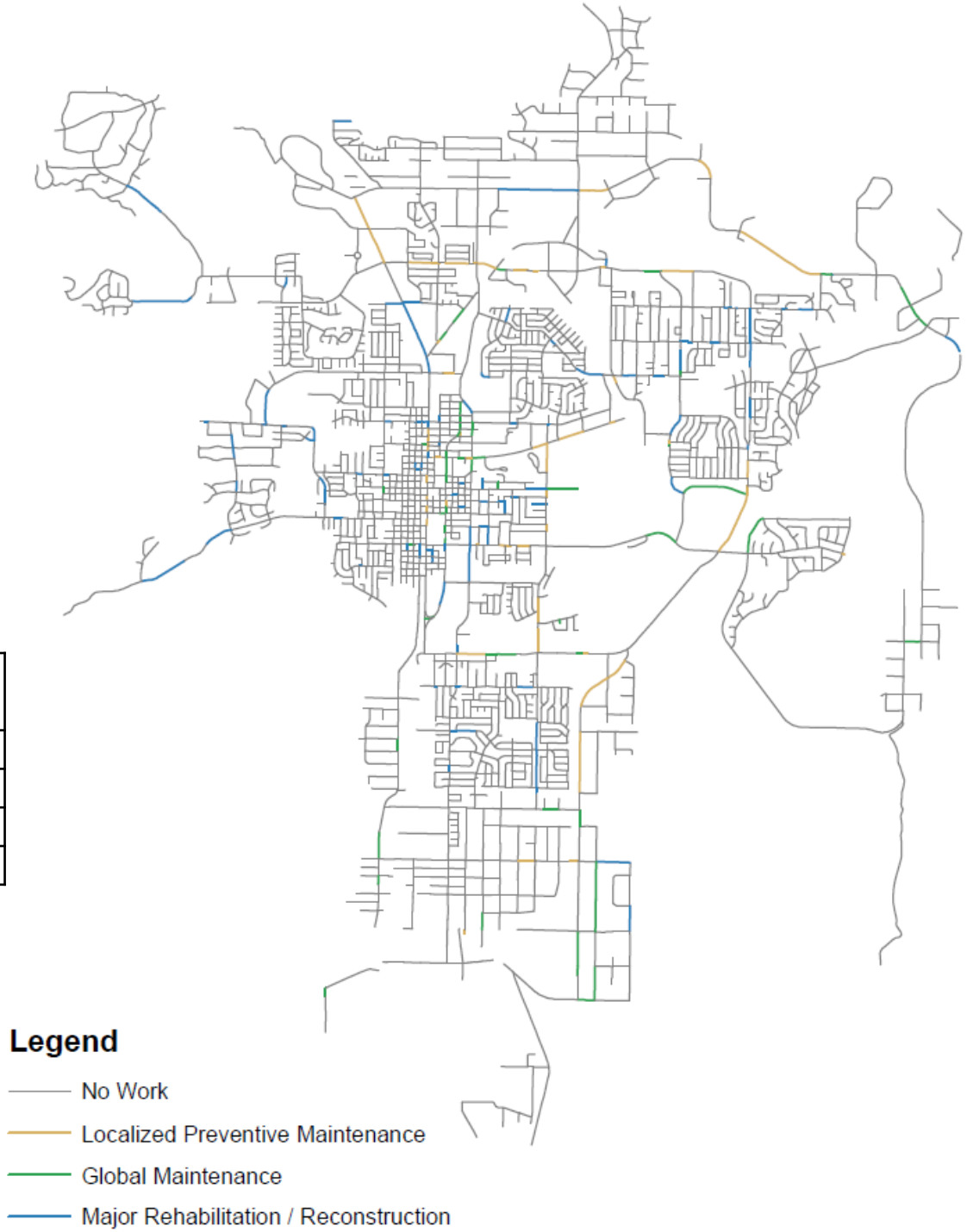
Fair and Poor

Very Poor, Serious, and Failed

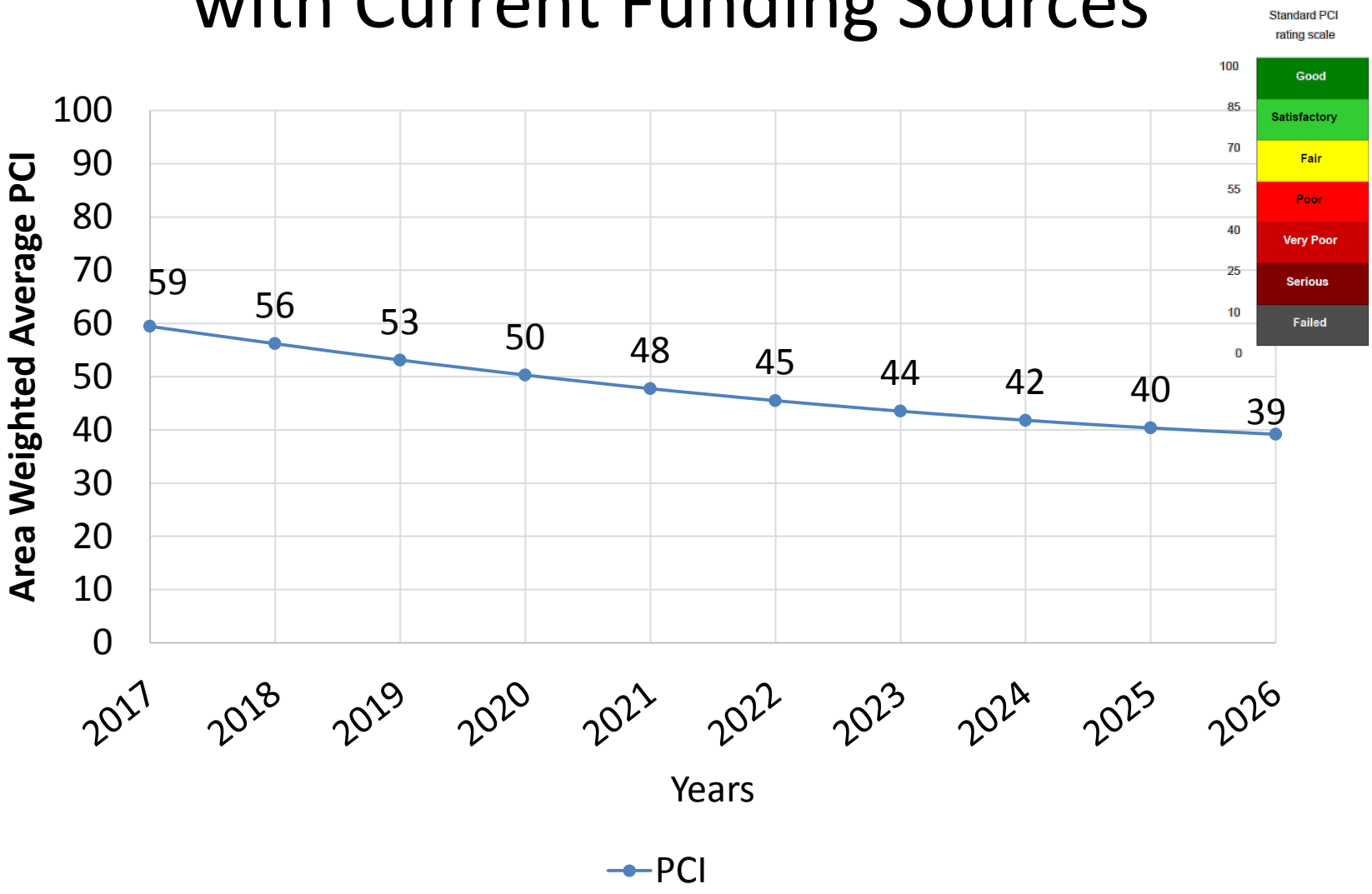


Potential Projects with Current Funding 2017-2026

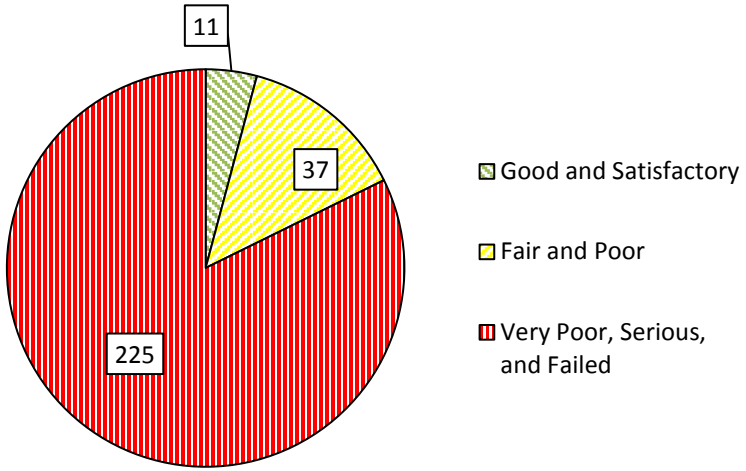
Work Type	Total Addressed Area (2017-2026)	
	Area (ft^2)	Centerline Miles
Major	2,141,942	12
Global	1,217,606	7
Localized	2,985,198	16

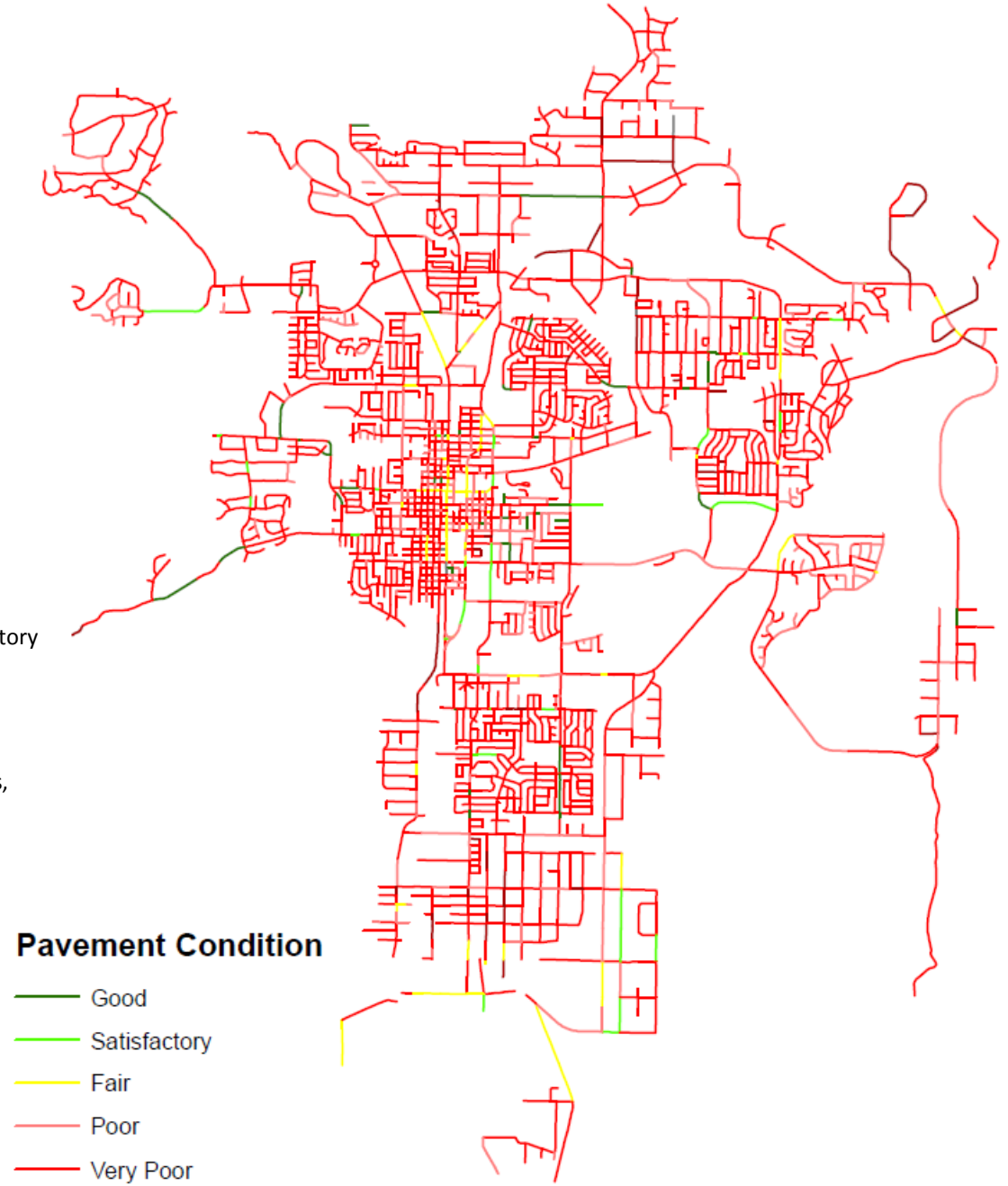


Expected Decline in citywide average PCI with Current Funding Sources



Expected Street Conditions in 2026 with Existing Funding

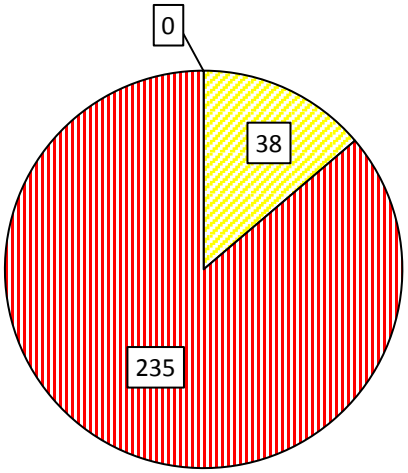




Optional Scenarios for Prioritizing Projects

- PMS can generate alternate scenarios:
  - Funding based on functional classification
  - Funding based on treatment types
  - Alternatives for use of funding such as bonding
- Alternatives considered:
  - "Stopgap" – addresses "worst first."
  - Funding for arterials and collectors vs. locals based on volumes of traffic on each.

Expected Street Conditions in 2026 with Existing Funding – "Stopgap" approach



Good and Satisfactory

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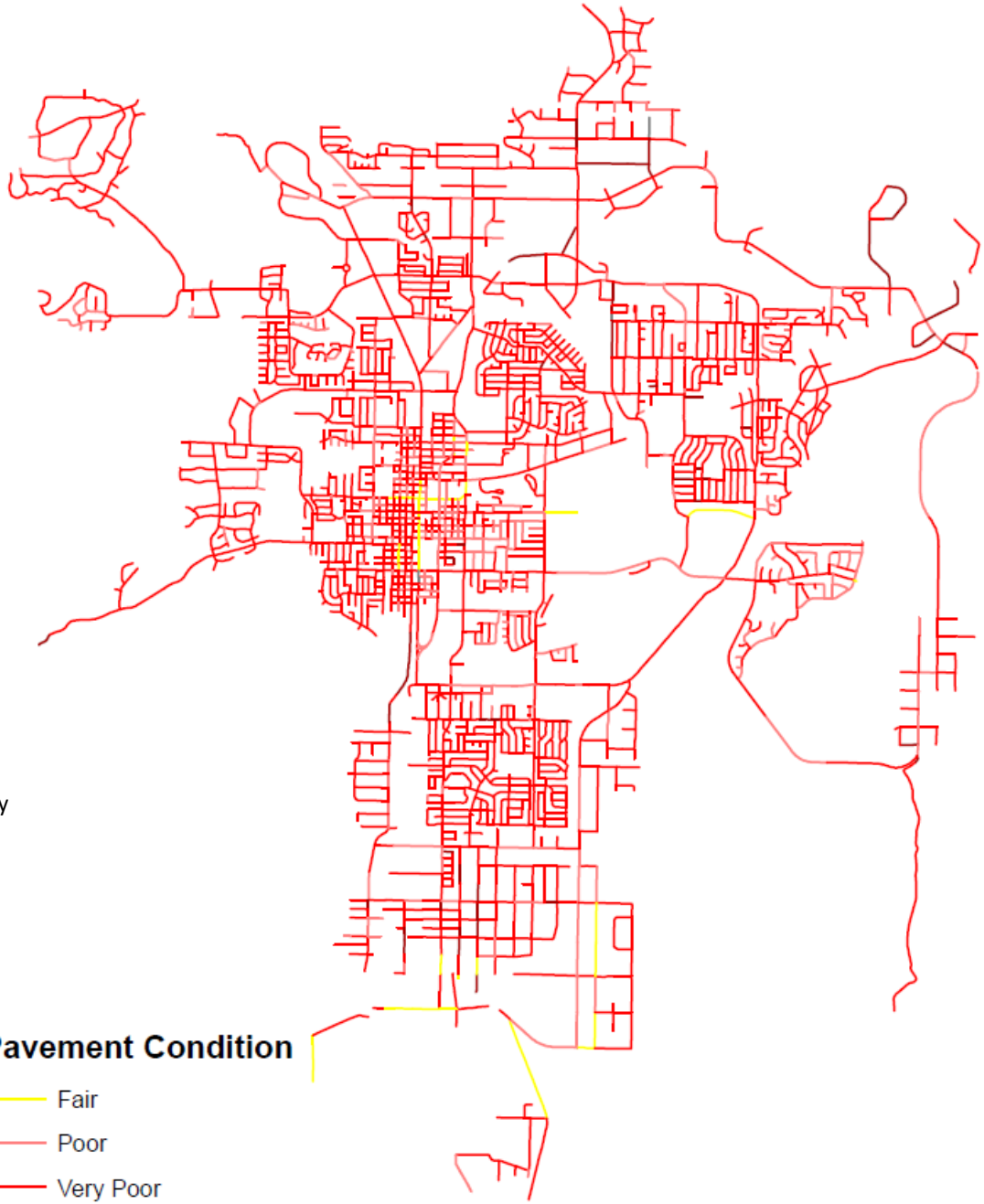
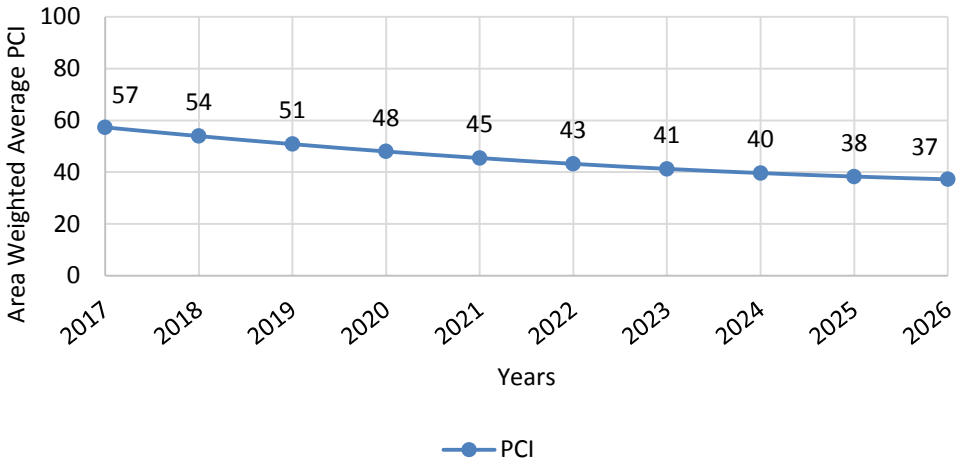
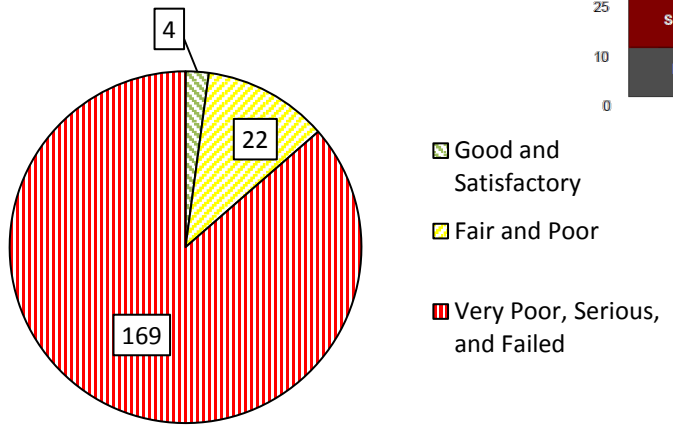
Very Poor, Serious, and Failed



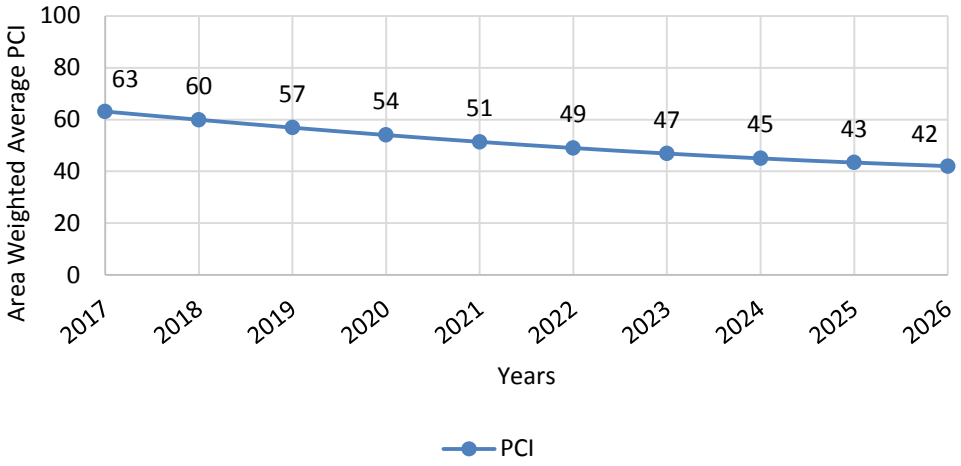
Expected Street Conditions in 2026 with Existing Funding – Funding by Traffic Volume

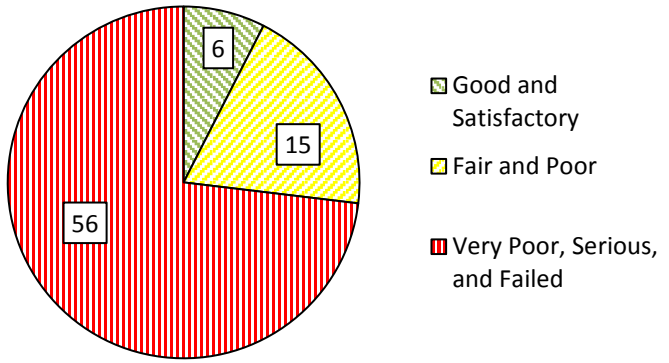
Local Roads
31% of Budget





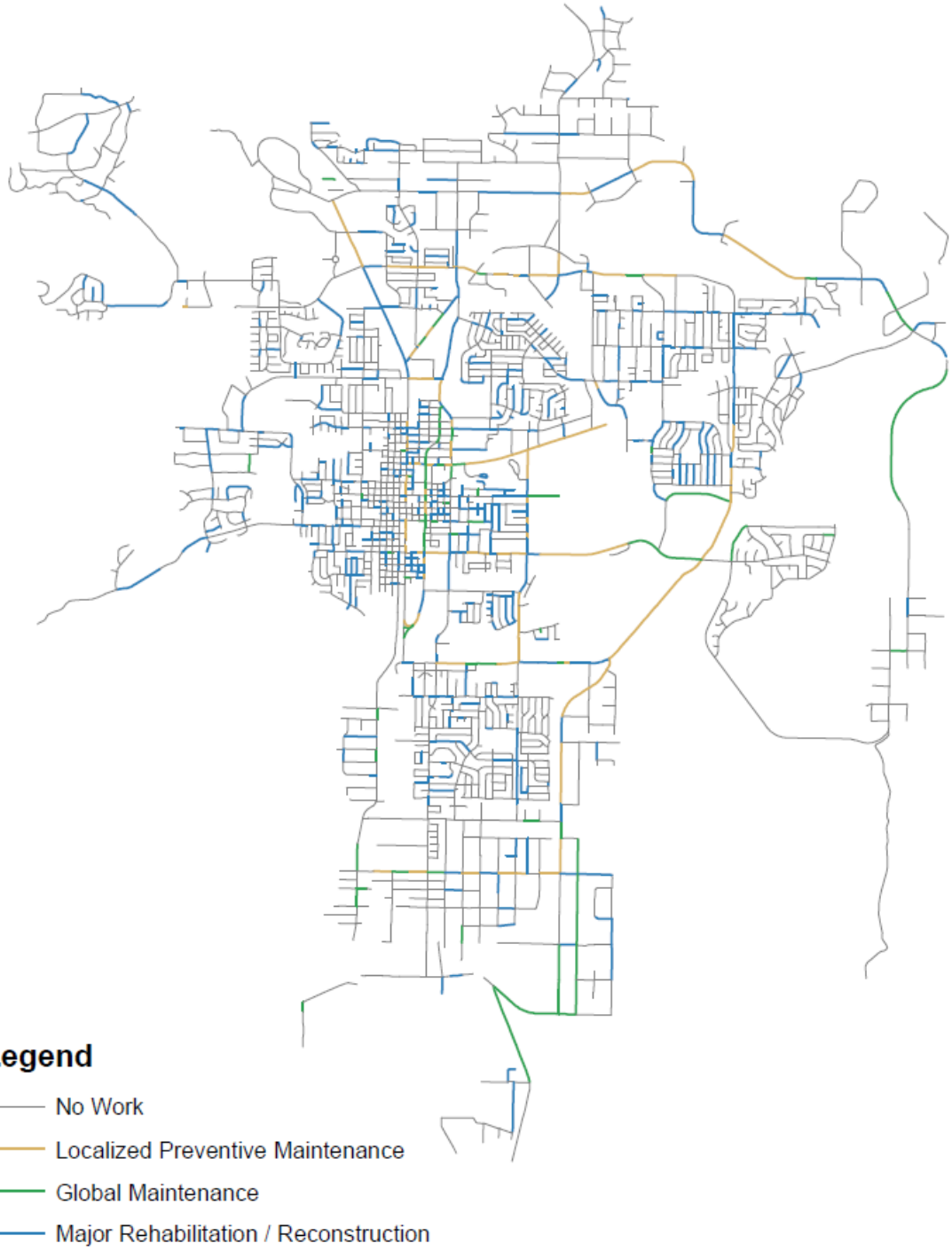
Arterials & Collectors
69% of Budget





Potential Projects if Fuel Revenue Indexing is Available 2017-2026

Work Type	Total Addressed Area (2017-2026)	
	Area (ft^2)	Centerline Miles
Major	9,161,103	49 (+37)
Global	2,762,383	15 (+8)
Localized	6,668,884	36 (+20)



How to Best Use Available Funds Now

- Annual budget with cost estimates
- Typically available funds in spring each year
- This year, available funds in spring – being used now
- Public Works designed FY 2017 projects in Spring 2016, so projects being built now
- Means we already have a good idea about available funds
- GOOD NEWS – bids generally under estimates!
- How do YOU think the City should use available funds?

How to Best Use Available Funds Now

- Road reconstruction?
- Road surfacing?
- Localized repairs – cracks?
- Safety improvements?
  - Pedestrian crossings
  - Lighting
  - Radar speed signs
- Sidewalk replacement?
- Finish incomplete road?

One Need for Available Funds Now- Sidewalk Repairs

Another Need for Available Funds Now- Unfinished Street (California St.)

Other items to Discuss?

Topics for Next Meeting – August 25, 2016

- Prioritization of projects with available funds
- Reporting to RTC and Board of Supervisors

Contact Information

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Thank you!