

# PAVEMENT QUALITY FORECASTING

Technical Analysis Peer Exchange (TAPE)

May 28<sup>th</sup>, 2015

# Introduction

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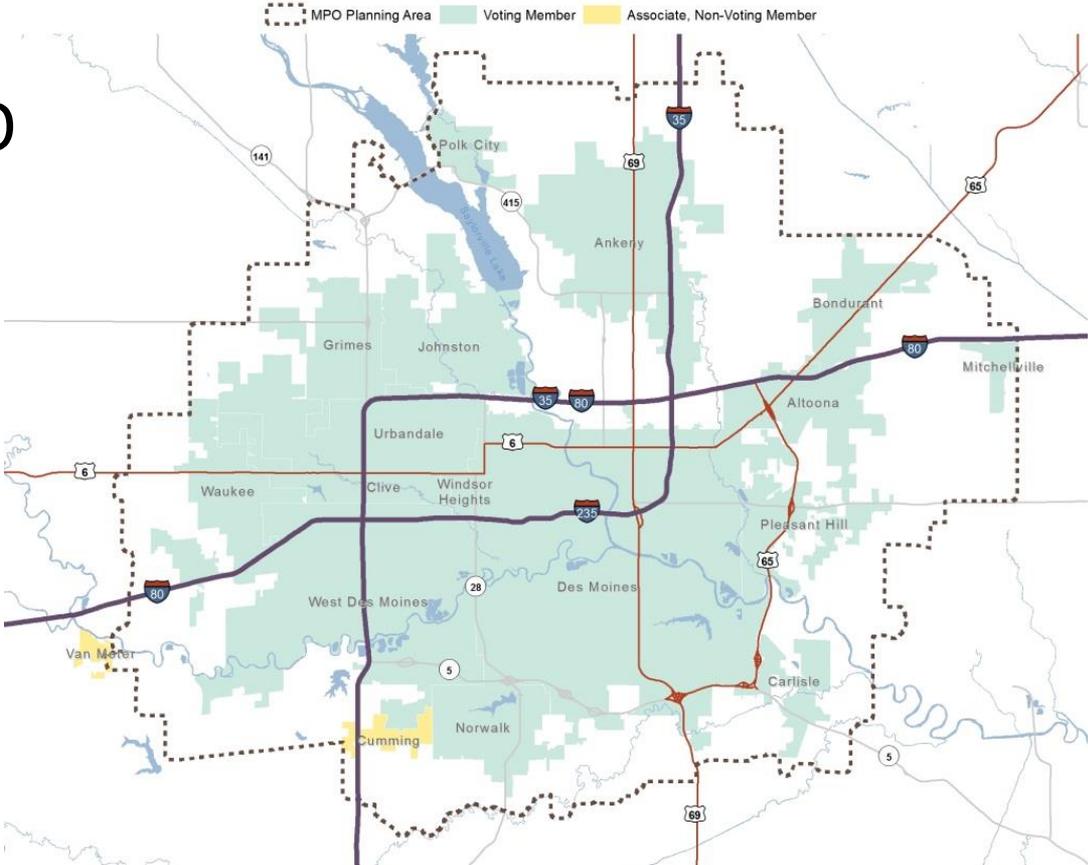
② Methodology

③ Results

④ Post-Report

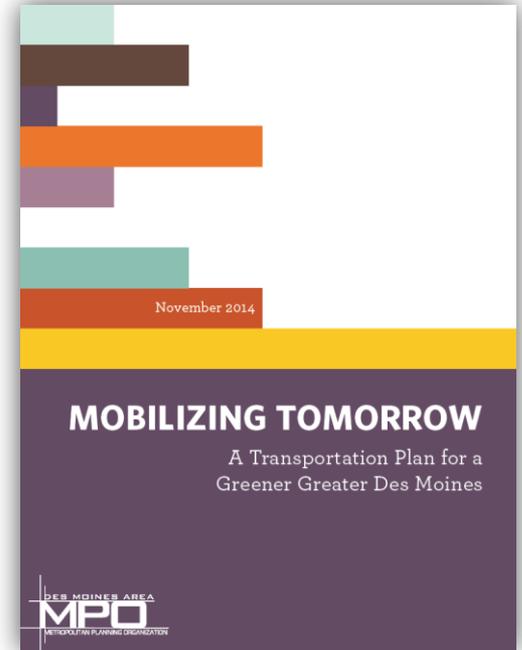
# Des Moines Area MPO

- 16 voting member cities
- 3 voting member counties
- 1 transit agency



# Mobilizing Tomorrow

- A long-range transportation plan for the year 2050
- Four Goals:
  1. Enhance multimodal transportation options
  2. Manage and optimize transportation infrastructure and services
  3. Improve the region's environmental health
  4. Further the health, safety, and well-being of all residents in the region



# Performance-Based Planning

- *Moving Ahead for Progress in the 21<sup>st</sup> Century* (MAP-21)
  - Signed into law in 2012 as the nation's transportation authorization bill
  - Focuses on a fix-it first mentality, encouraging regions to prioritize the protection of prior investments and to improve upon their safety and reliability
  - Most importantly, it requires performance-based planning

# GOAL 2:

Manage and Optimize Transportation Infrastructure and Services

## Performance Measures:

Pavement Conditions

Bridge Conditions

DART's Fleet

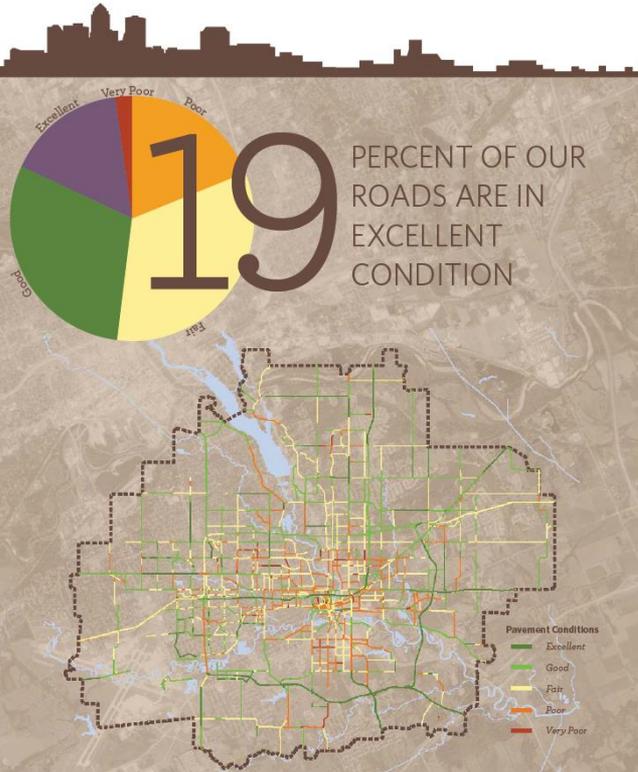
Congestion

Freight Impediments

mobilizing tomorrow

# Setting Regional Targets

## STATE of the Roads



The Iowa Department of Transportation (DOT) and the Institute for Transportation at Iowa State University (InTrans) annually collect pavement condition data for roads across the state. This data includes the Pavement Condition Index (PCI), which tells us the level of quality we can expect when driving on the roadways. PCI scores range from 0 to 100, with 100 being the best possible score.

### IT'S NOT JUST A QUESTION FOR WINTER: HOW ARE THE ROADS?



Using a scoring system of 0 to 100, the average road conditions for Greater Des Moines area communities range widely. The average for the entire region is 60; the state aims to maintain an average rating of 62.5 — good condition — for the entire state-owned network.

Data Sources:  
2012 Iowa Pavement Management Program,  
2012 Iowa DOT GIS Data

## Pavement Condition Index (PCI)

### Current Status:

Average PCI: **60**  
% of roads in poor or worse condition: **18%**

### Target for 2050:

Maintain conditions



# A Need for Forecasting

- Fiscal Capacity
  - Maintenance becomes top priority for federal funding
  - Raises a need to determine whether any funds will be left after maintenance projects are completed
- Two Key Questions:
  1. How is the region performing based on current maintenance budgets?
  2. How much additional funding is needed to maintain the regional target

① Introduction

# Methodology

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③ Results

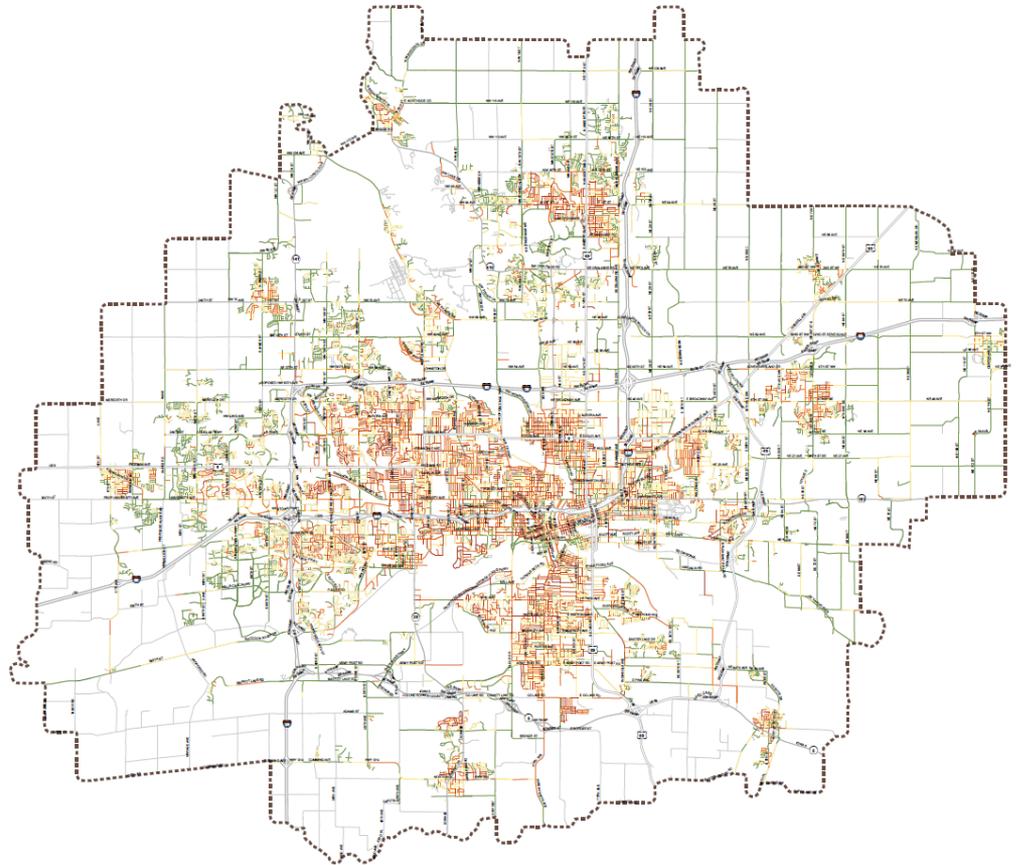
④ Post-Report

# Study Area

MPO Planning Boundary

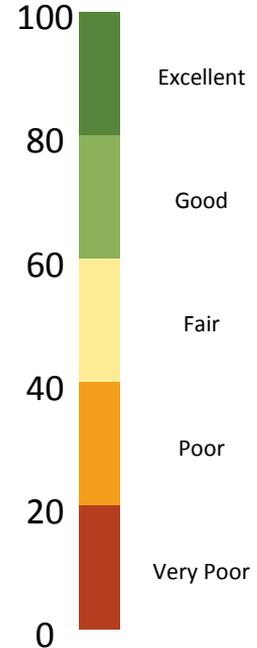
## Data

2013 Local Road Assessment  
2,470 miles of non-DOT roads



# Measuring Pavement Quality

- Pavement Condition Index (PCI)
  - Collected by the Iowa DOT and InTrans
  - PCI gives a user the level of quality they should expect when driving on the roadways
  - Range: 0-100



# Forecasting Software

- Deighton Total Infrastructure Management System (dTIMS®)
  - Purchased from InTrans
  - Pavement forecasting software that uses custom models and budget scenarios to forecast their affect on conditions into the future
  - Applies various treatment types with estimated costs associated with each treatment

# Applying the Right Treatments

- Pavement treatments needed to reflect an entire region
- Worked with the MPO's Planning + Engineering Subcommittees to develop list of treatments:
  - Concrete Pavement Restoration
  - Mill and Overlay for HMA and COM
  - 3" Overlay for HMA and COM
  - Replacement for PCC
  - Crack Sealing

## *Pavement Treatment Types*

COM Composite

HMA Hot Mix Asphalt

PCC Portland Cement Concrete

# Treatment Types

Navigation Analyze & Report

- Analysis Sets
- Budget Scenarios
- Analysis Expressions
- Analysis Variables
- Treatments
- dFRAG Expressions
- dFRAG Objects

Analysis Sets Budget Scenarios **Treatments** Analysis Variables

C CPR

M M20A

O OL\_3

R R\_PC

S SEAL

Treatment	Cost/Mile (2-Lane)
Reconstruction	\$2,300,000
Concrete Restoration	\$175,000
HMA Overlay	\$350,000
Mill + Overlay	\$415,000
PCC Joint/Crack Seal	\$35,000

Properties

Common

(Name) CPR

ReadAccess (Everyone)

WriteAccess (Everyone)

Description Concrete Pavement Rest

Modified By ByPass

Modified On 6/30/2014 4:41 PM

Definition

ChartColor 255, 255, 0

Specific

(Type) Major

ApplyAfterInitial False

BudgetCategory Capital Budget

CanInitiateStrategy True

IntervalYear 0

OverrideBudgetCate: True

Perspective Inventory

TriggerFilter abf\_Trq\_CPR

TriggerTemplate Do Nothing

Treatment Ancillaries

Ancillaries (Collection)

Treatment Costs

Costs (Collection)

Treatment Resets

Resets (Collection)

Treatment Subsequents

Subsequents (Collection)

# Determining Budgets

- Street Financial Reports (IDOT)
  - 6-year average for maintenance spending
  - Region: \$30m/year
  - Des Moines: \$15.5m/year
  - West Des Moines: \$2.3m/year
- Used dTIMS to determine what should be spent on maintenance needs

# Regional + Local Perspectives

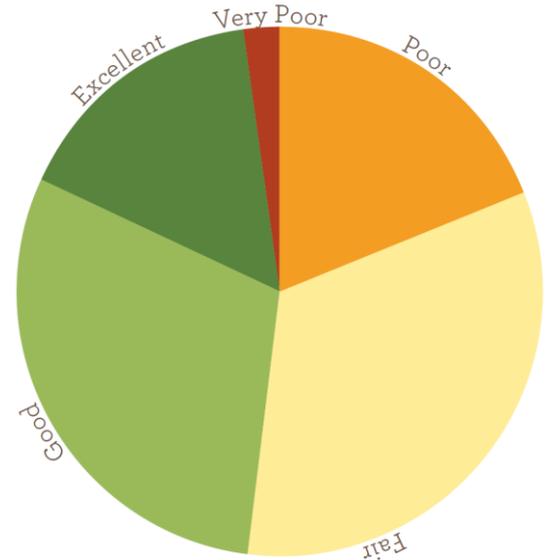
- Step 1 - Regional

- Regional Targets

- 18% of roads in poor or worse condition
    - Average PCI of 60

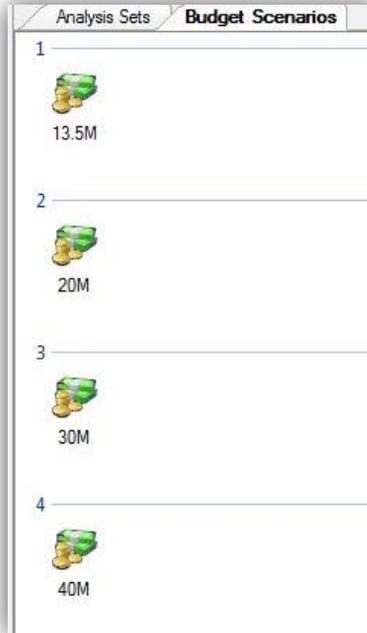
- Two Questions

1. How is the region performing based on current maintenance budgets?
2. How much additional funding is needed to maintain the regional target



# Regional + Local Perspectives

- Step 1 - Regional
  - Applied four budget scenarios to entire roadway network



Years	Maintenance Budget	Capital Budget
2014	\$0.00	\$40,000,000.00
2015	\$0.00	\$40,000,000.00
2016	\$0.00	\$40,000,000.00
2017	\$0.00	\$40,000,000.00
2018	\$0.00	\$40,000,000.00
2019	\$0.00	\$40,000,000.00
2020	\$0.00	\$40,000,000.00
2021	\$0.00	\$40,000,000.00
2022	\$0.00	\$40,000,000.00
2023	\$0.00	\$40,000,000.00

# Regional + Local Perspectives

- Step 2 – Local
  - Are some cities doing better than others?
  - Budget scenarios
    1. Current annual funding
    2. Annual funding needed to maintain regional goals
  - Detailed reports for each jurisdiction

A



① Introduction

② Methodology

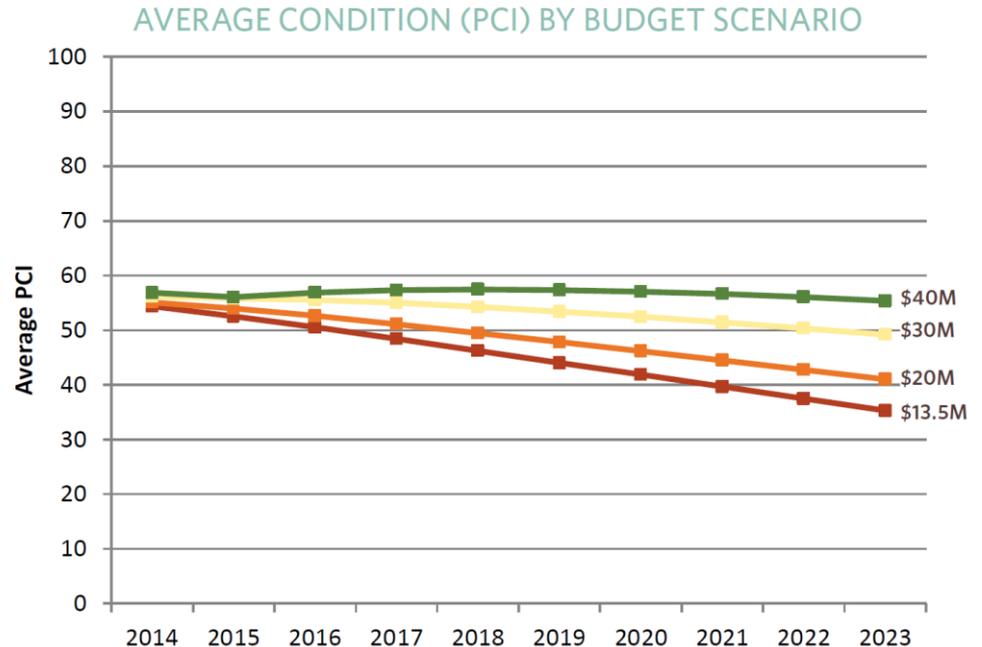
Results

④ Post-Report

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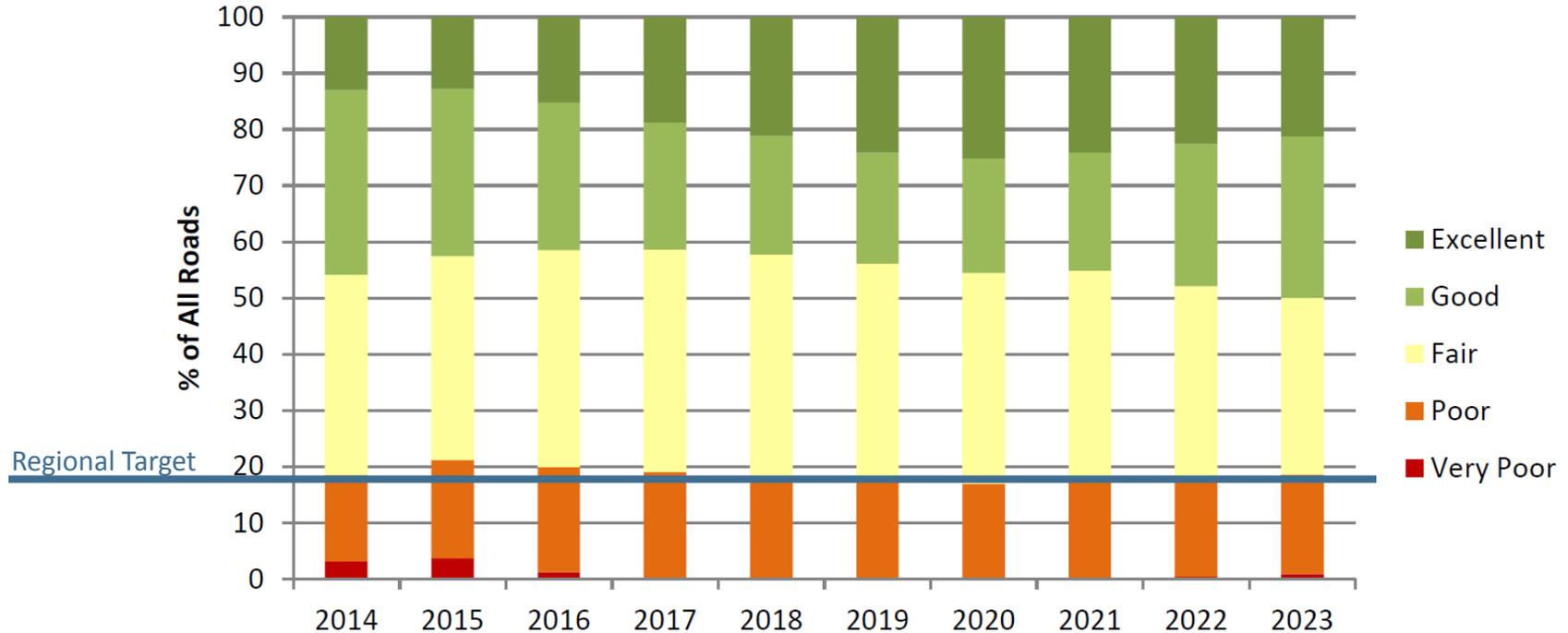
# Regional Pavement Quality

- 4 Budget Scenarios
  - \$13.5 million
  - \$20 million
  - \$30 million
  - \$40 million



\$40 Million  
Annually

## 2050 TARGET: MAINTAIN CURRENT PAVEMENT QUALITY

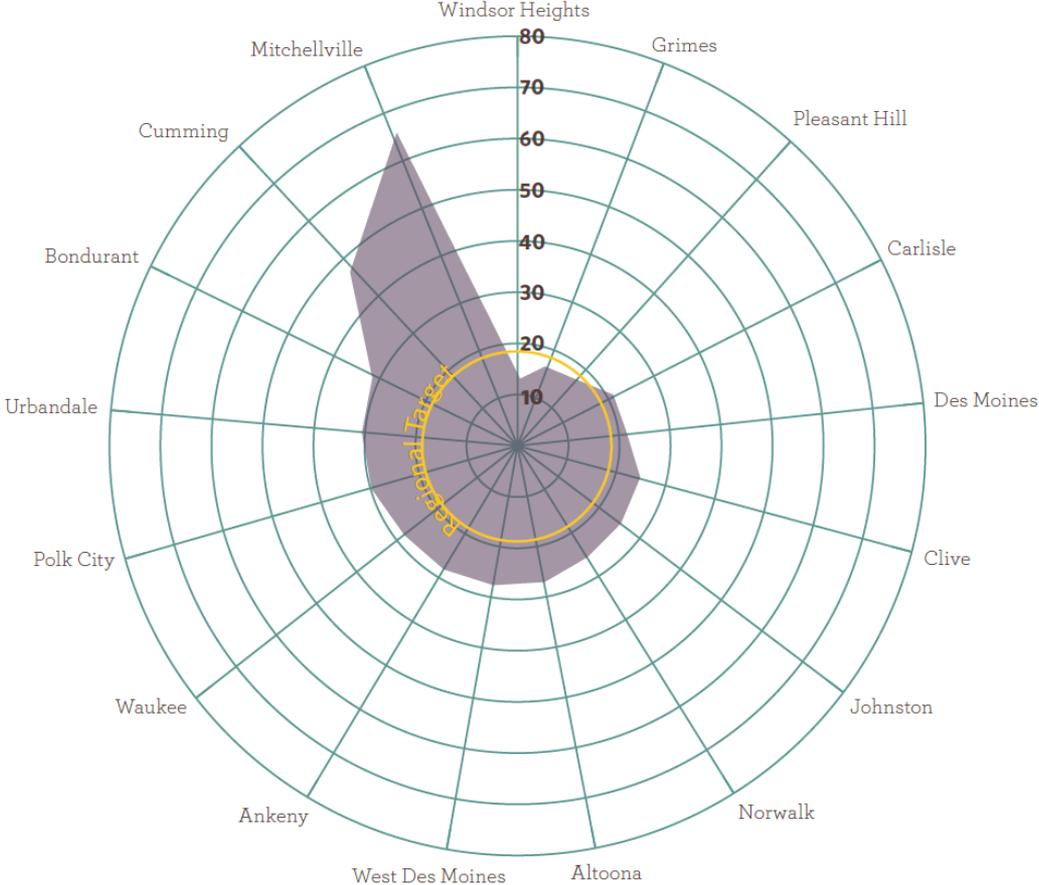


# Local Conditions



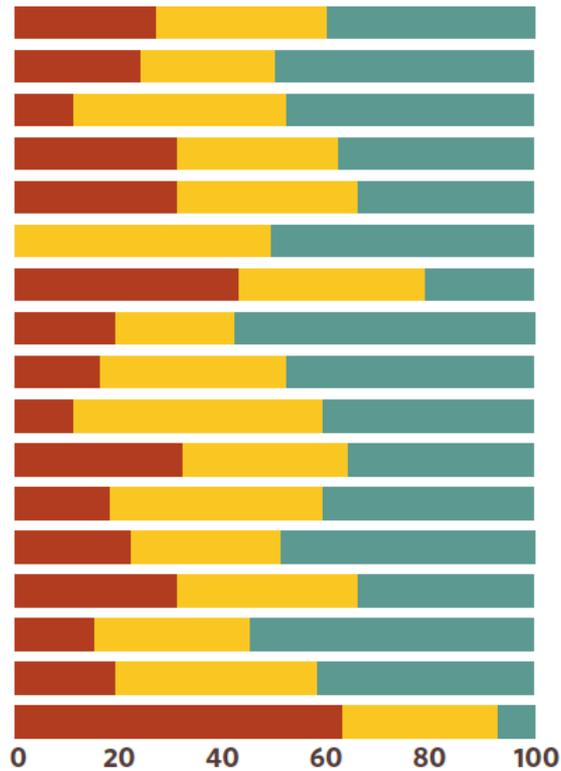
- Individual city forecasts
  - Two Scenarios
    1. Current annual maintenance budgets (*Street Financial Reports*)
    2. Annual budget needed to reach regional target

# PERCENT POOR OR WORSE WITH CURRENT FUNDING LEVELS, 2023

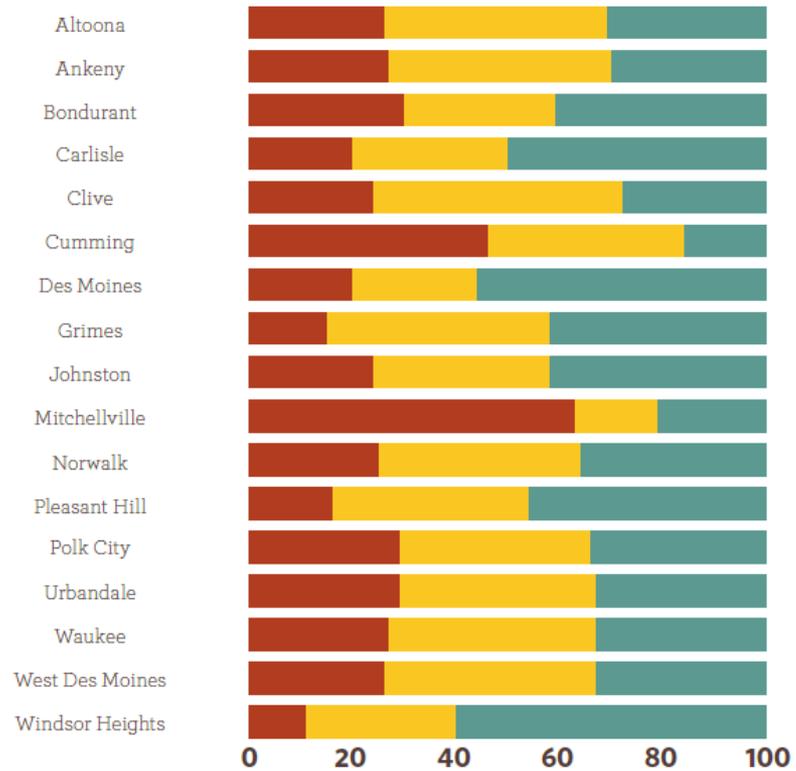


## PCI RATING: PERCENT OF TOTAL MILES

2013 (ACTUAL)



2023 (FORECAST)



Poor or Very Poor Fair Good or Excellent

## 2013 LOCAL ROAD ASSESSMENT

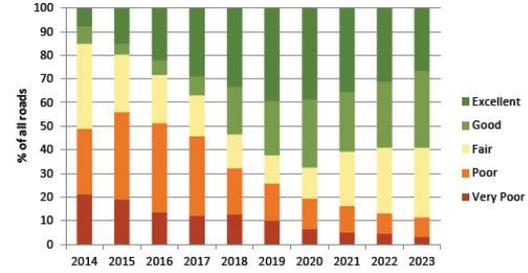


## CITY OF WINDSOR HEIGHTS

Annual Maintenance (6-Year Average): \$498,948

Miles of Road Measured: 22

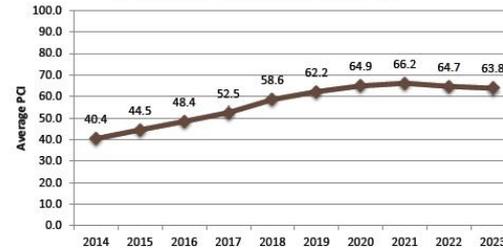
### PAVEMENT QUALITY



### Percent of Roads in Poor or Worse Condition

2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
49.0	55.9	51.3	45.7	32.2	25.8	19.4	16.2	13.2	11.5

### AVERAGE CONDITION (PCI)





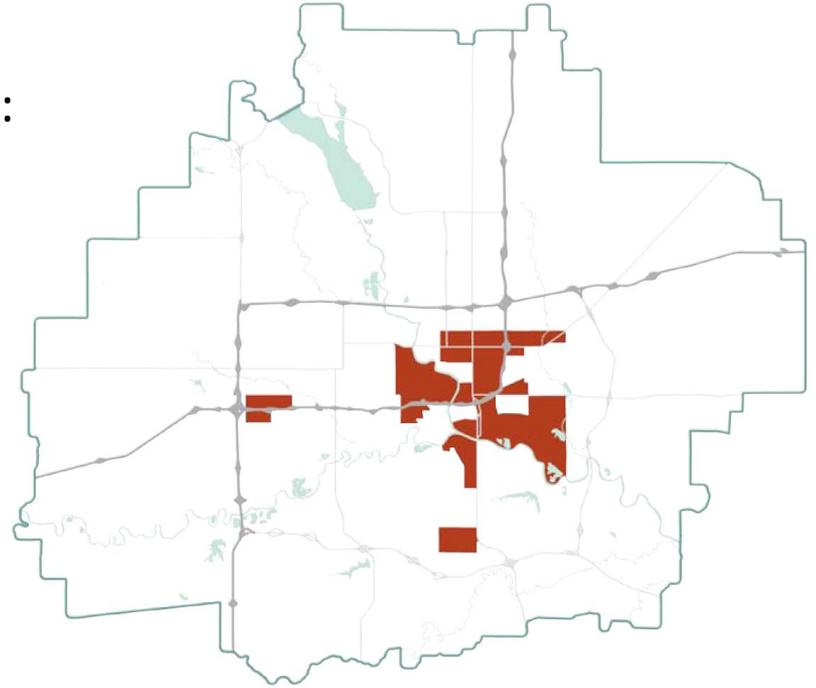
## ANNUAL MAINTENANCE

How much  
funding is  
needed?

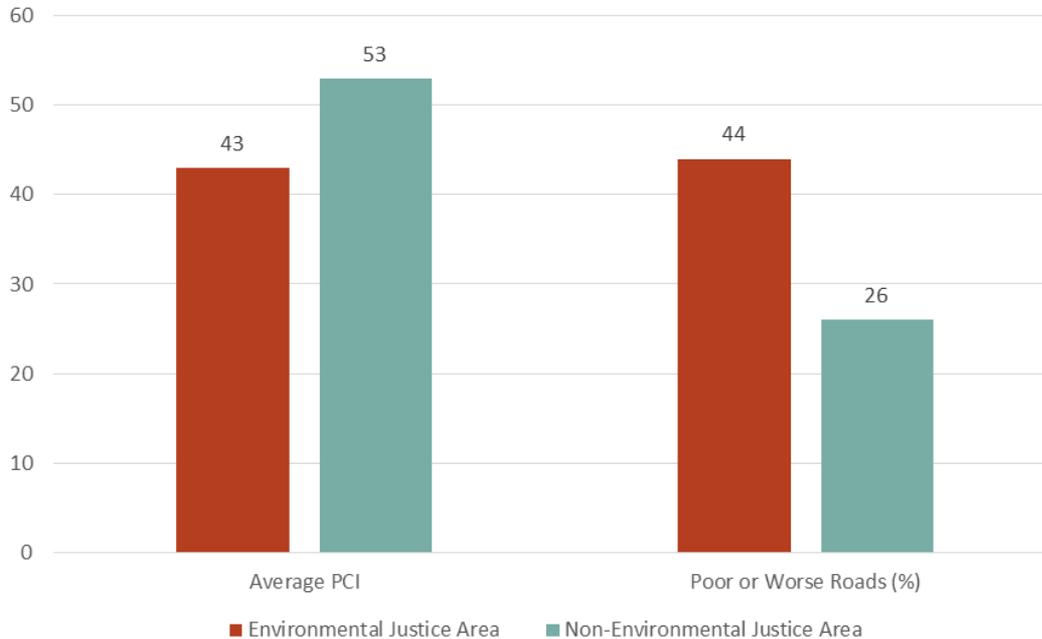
City	Current Annual Funding	Total Annual Funding Needed	Additional Funding Needed
Altoona	\$696,106	\$1,500,000	\$803,894
Ankeny	\$1,544,627	\$5,000,000	\$3,455,373
Bondurant	\$256,328	\$400,000	\$143,672
Carlisle	\$343,530	\$450,000	\$106,470
Clive	\$1,662,341	\$2,500,000	\$837,659
Cumming	\$27,451	\$175,000	\$147,549
Des Moines	\$15,551,818	\$16,500,000	\$948,182
Grimes	\$913,603	-	-
Johnston	\$1,218,221	\$3,000,000	\$1,781,779
Mitchellville	\$58,568	\$275,000	\$216,432
Norwalk	\$679,457	\$1,300,000	\$620,543
Pleasant Hill	\$579,915	-	-
Polk City	\$253,022	\$400,000	\$146,978
Urbandale	\$2,042,375	\$4,000,000	\$1,957,625
Waukee	\$559,356	\$1,500,000	\$940,644
West Des Moines	\$2,237,219	\$4,000,000	\$1,762,781
Windsor Heights	\$498,948	-	-
<b>Total</b>	<b>\$29,122,885</b>	<b>\$41,000,000</b>	<b>\$11,877,115</b>

# Environmental Justice Areas

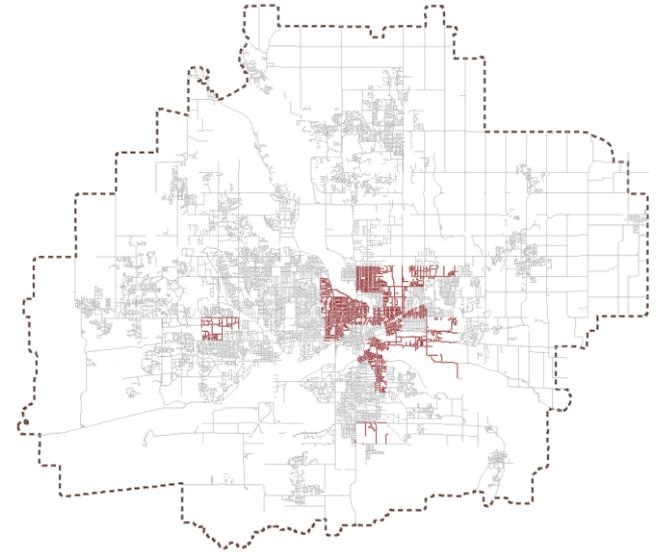
- Concentrated area of traditionally underserved populations. Defined using:
  - Limited English Proficiency (LEP)
  - Non-White Population
  - Persons in Poverty
  - Carless Households
  - Single Heads of Households with Children
  - Persons Over 65
  - Persons with a Disability



# Environmental Justice Areas



About **14%** of local roads in the region lie within EJ areas.



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Post-Report

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# In the news...

**Business Record**

## MPO: Area needs 33 percent increase in road spending to stay even

Tuesday, February 03, 2015 12:07 AM

Des Moines-area local governments will have to come up with at least another \$10 million a year — a 33 percent increase — just to keep overall road conditions steady, an analysis by the Des Moines Area Metropolitan Planning Organization found.

That most likely means looking to a gas tax increase, property taxes or state aid to fill the gap, said MPO Executive Director Todd Ashby.

Currently, the area spends \$30 million a year to maintain roads. That level of spending has left the communities with 18 percent of the roads in poor or very poor condition, and 82 percent in fair, good or excellent shape, MPO reported.

"This report puts a much-needed price tag on a known issue," Tom Hockersmith, Polk County supervisor and MPO chairman said in a statement.

It's a \$40 million a year price tag.

Area governments have set a goal of keeping the current mix of road conditions in the future, Ashby said. The report breaks down the conditions city-by-city, suggesting that Mitchellville and Cumming will face some of the most serious road challenges if current funding levels remain. Des Moines and Windsor Heights are among cities whose average road condition would improve significantly under the current spending levels.

A separate analysis of roads, excluding those overseen by the Iowa Department of Transportation, found the road conditions are worse in underserved areas, generally those with high populations of elderly residents, persons with disabilities, racial minorities, single-parent families, those without vehicles, and residents with limited English skills.

In those areas, 44 percent of the roads are in poor or very poor condition, the MPO found in study led by Aaron Banting, assistant transportation planner. Read more [www.damapo.org](http://www.damapo.org)

- 2015 Early Under 40 class announcement
- Early interests has plans for Apple Valley
- 70-year development could change the scenery in downtown Des Moines
- Kum & Go, Hy-Vee make offers in Dierks bankruptcy
- 2015 Top 25 Most Influential Business Leaders announced

**The Des Moines Register**  
A GANNETT COMPANY

## Report: Metro roads need more maintenance funding

12:47 a.m. CST February 3, 2015

Joel Aschbrenner, [jaschbre@mreg.com](mailto:jaschbre@mreg.com)

40 CONNECT 7 TWEET 7 LINKEDIN 4 COMMENT EMAIL SHARE

(Photo: The Register)

Potholes and pavement cracks will only get worse during the next decade if metro-area cities don't increase road maintenance spending, according to a report released Tuesday by the Des Moines Area Metropolitan Planning Organization.

Cities will need to spend \$10 million more per year to just to maintain the existing pavement, the report found.

While it doesn't specifically address state funding, the report's release coincides with a legislative push to raise Iowa's gas tax. Lawmakers have proposed a 10-cent-per-gallon increase in the tax. Part of that money would go to cities and counties for road projects.

"There is a lot of anecdotal belief that we need to spend more on road maintenance, and this provides the data to support that," said Todd Ashby, executive director of the MPO, a transportation planning agency made up of central Iowa cities and counties.

The Pavement Quality Forecasting Report, which The Des Moines Register examined prior to its release, found that 18 percent of Des Moines-area roads in 2013 had poor or very poor pavement quality, based on the Iowa Department of Transportation's Pavement Condition Index or PCI. The average PCI for the region was 60 out of 100.

To maintain current road conditions, local cities and counties need to increase annual road maintenance spending by a third from \$29.1 million to \$41 million, the report said. That doesn't include spending on new roads or public transit. The spending projections are based on cities' average road maintenance budgets during the previous six years.

**This is a place you'll always remember.**  
#THISISIOWA

travel IOWA ROLL OVER FOR TRADITIONAL IDEAS

# City Attention

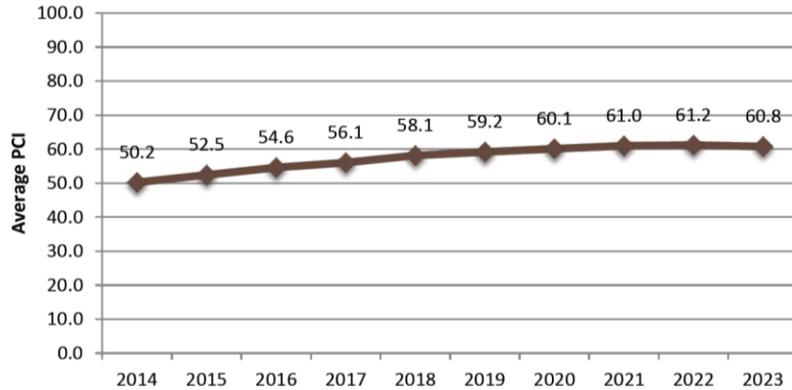


- Following release of the report, City of Des Moines staff took a closer look at their maintenance budgets
- Requested to re-run forecasts based on adjusted budget scenarios
  - \$4 million (actual)
  - \$6.5 million (increased RUT)

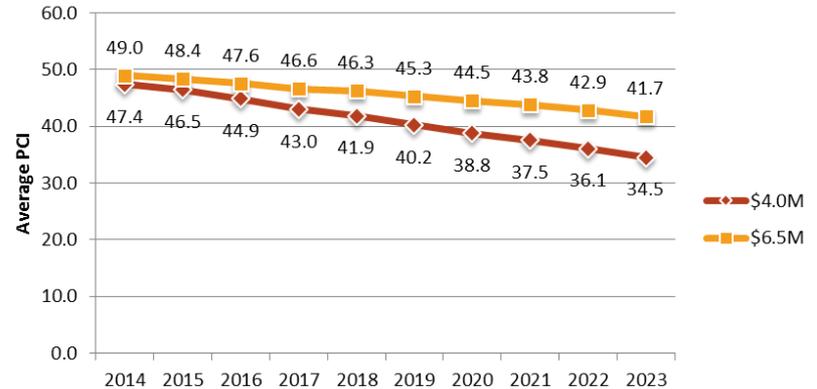
# City of Des Moines Adjustments

## Average Condition (PCI)

### Budget Used in Report (\$15.5M)



### Adjusted Budgets



# Metro Comparisons

## 2013 Local Road Assessment (Non-DOT Roadways)

Jurisdiction	Average PCI	% Poor or Worse
Corridor MPO (Cedar Rapids Region)	50.2	31%
MPO of Johnson County (Iowa City Region)	51.0	29%
Dubuque Metropolitan Area Transportation Study	58.7	21%
Des Moines Area MPO	52.0	28%

# Gas Tax Increase

Additional 10¢ per gallon starting March 1<sup>st</sup>, 2015

City	Current Annual Maintenance	Total Funding Needed	Addition Funding Needed	Increased Funding with 10cpg Increase
Altoona	\$696,106	\$1,500,000	\$803,894	\$261,738
Ankeny	\$1,544,627	\$5,000,000	\$3,455,373	\$820,476
Bondurant	\$256,328	\$400,000	\$143,672	\$69,480
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Source: Iowa DOT



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515-334-0075

Report available at: [dmampo.org/reports](https://dmampo.org/reports)

A white silhouette of a city skyline is positioned at the bottom of the slide, spanning the width of the page. It features various building shapes of different heights and widths, creating a jagged horizon line.

Altoona • Ankeny • Bondurant • Carlisle • Clive • Dallas County • Des Moines • DART • Grimes • Johnston • Mitchellville  
Norwalk • Pleasant Hill • Polk City • Polk County • Urbandale • Warren County • Waukee • West Des Moines • Windsor Heights