MUSCATINE PAVEMENT MANAGEMENT USING DTIMS AND GIS

Presenters

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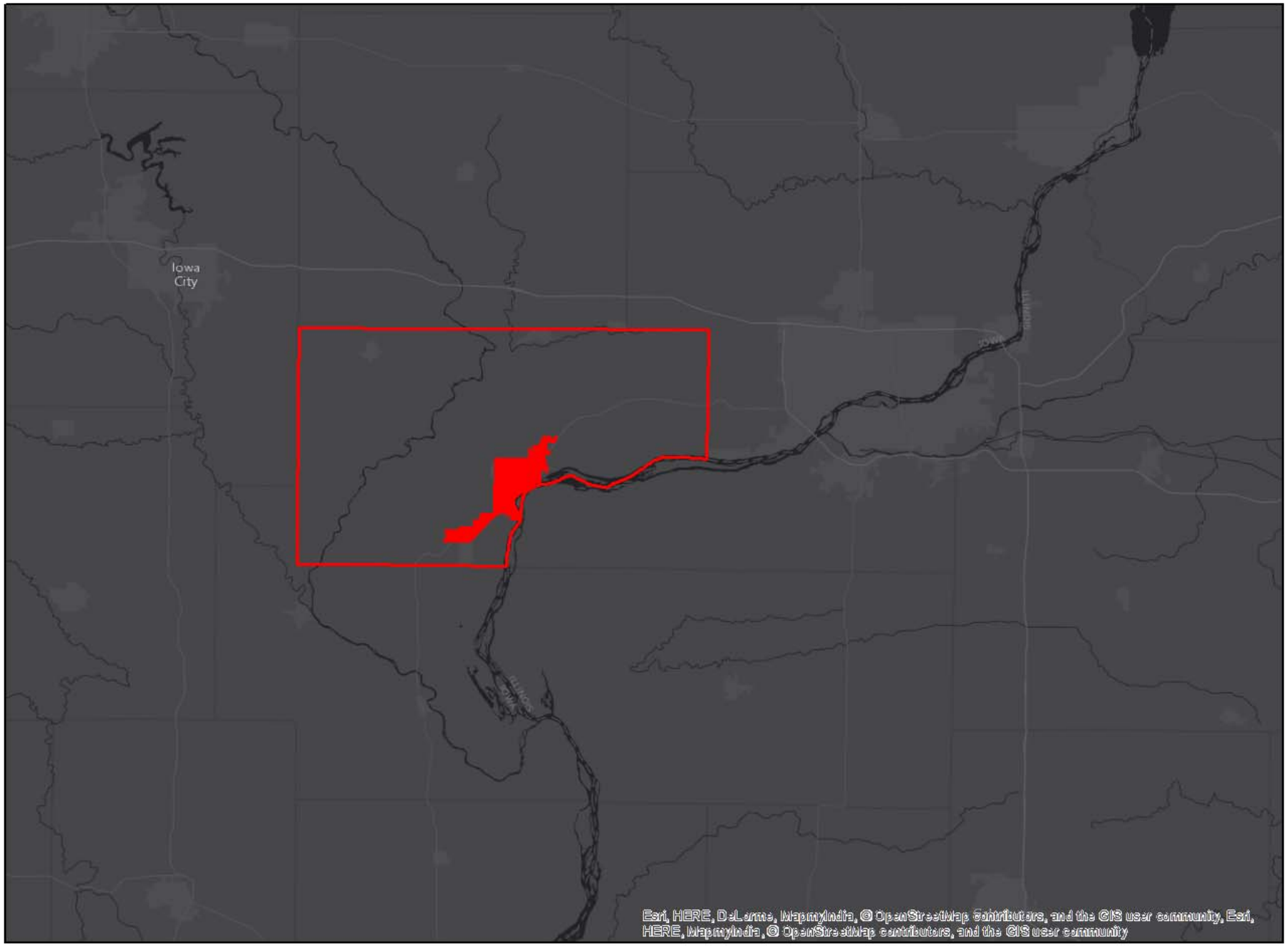
Iowa City
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MUSCATINE

- Population – 23,034 (US Census 2013 est.)
- Total Area – 18.35 square miles
- Pavement Managed – 120 miles
- Street Maintenance Crew – 15 crew members

Once known as the

Pearl Button Capital of the World

1905 Muscatine Produced 1.5 billion pearl buttons annually

HISTORY OF DATA MANAGEMENT

- In 2002 Public Works staff reviewed historical road construction plans/projects and attached pavement information to the road segments.
- In 2003 CTRE (Center for Transportation Research & Education) at Iowa State used Roadware's Automated Road Analyzer to review the streets.
- In 2004 Muscatine received their first delivery of Pavement Condition Information.
- Initial findings showed an overall average **Pavement Condition Index (PCI) of 47**

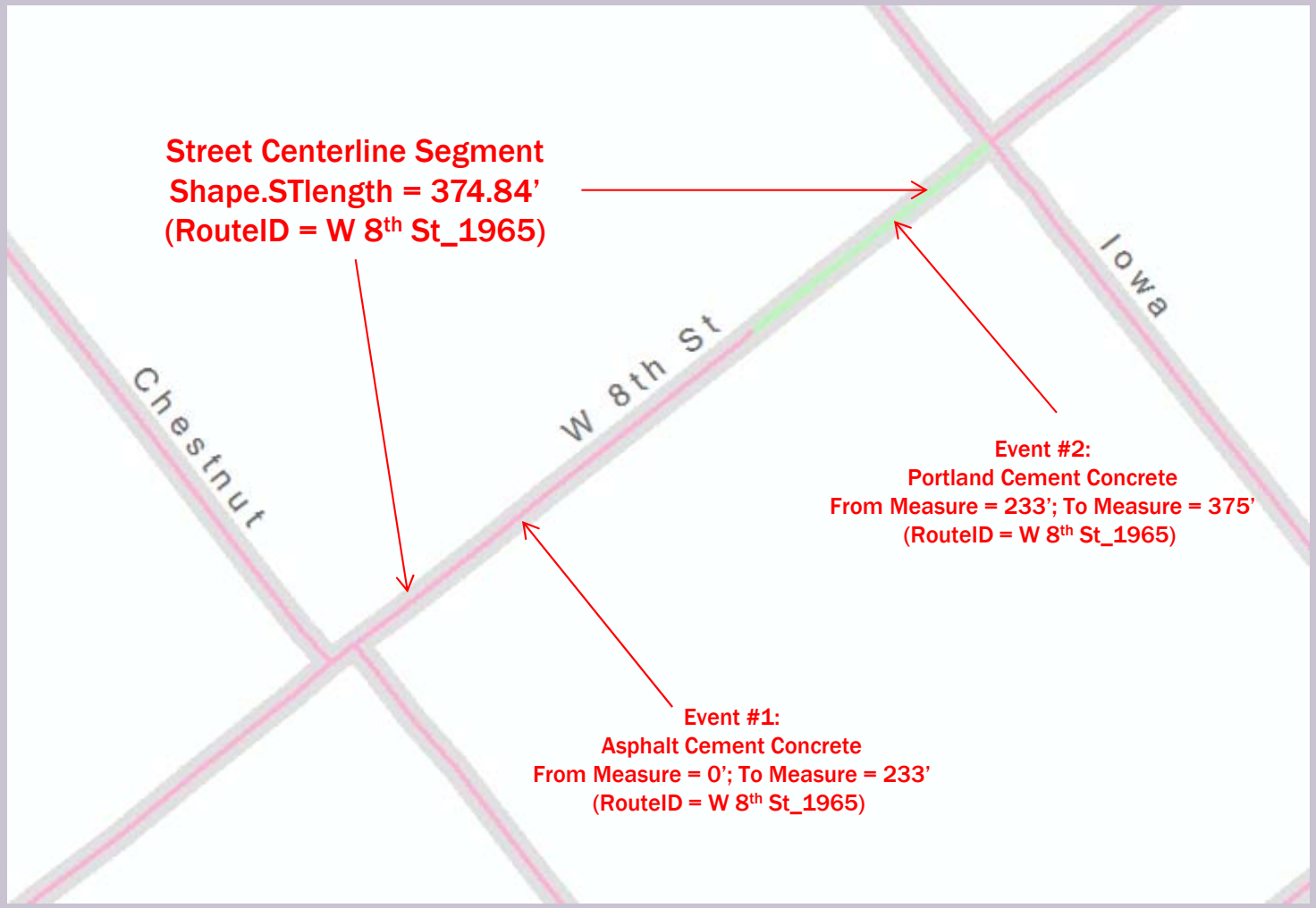
PROBLEMS WITH ORIGINAL APPROACH

- 2004 to 2009 continued receiving Pavement Condition Information.
- 2009 – 2010 started discussions on creating a new workflow.
- Problems Identified
  - Keeping segments current with new and updated street segment geometry.
  - Keeping Unique IDs in sync between CTRE and the City of Muscatine.
  - Updates were not always sent to CTRE for streets that were improved.
  - Trying to maintain multiple versions of geometry for the same feature was not the best approach locally.

GIS ROLE IN IMPROVING THE ORIGINAL SCOPE

- MAGIC (Muscatine Area Geographic Information Consortium) maintains the master street centerline file in an Enterprise Database which wasn't available until 2009.
- Used master street centerline file to build the Pavement Management features.
- How do we make this work?
  - Use linear referencing
    - Don't have to make a geometric split
    - Added one field to Master Centerline file to keep unique ID
    - Created pavement segment table to store the pavement information needed for dTIMS
    - By using a centralized enterprise database, MAGIC can maintain geometry that cascades locally through organizations.

MULTIPLE EVENTS ALONG A SINGLE GEOMETRIC FEATURE



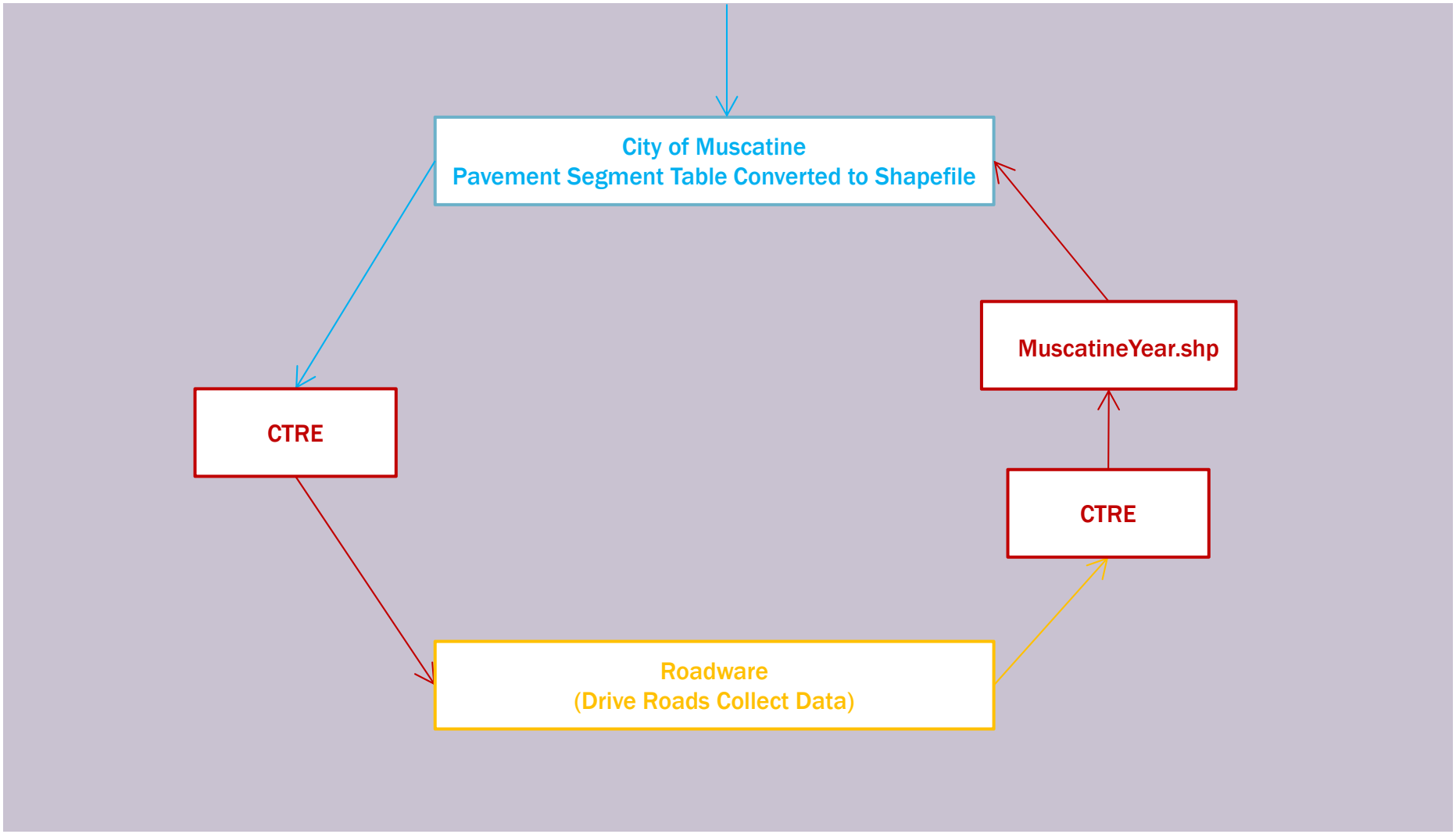
DTIMS
(DEIGHTON TOTAL INFRASTRUCTURE MANAGEMENT SYSTEM)

- Stores inventory of assets and uses models to describe current condition and predict future conditions.
- Key Factors
  - Optimizes for PCI / Weights on Traffic Counts
  - Deterioration curves for Asphalt and Concrete
- We provide different budget scenarios and it creates an maintenance plan for any scenario we choose.

COMMUNICATION

- Worked with CTRE to find out what is needed for the dTIMS program.
- Worked with CTRE to update our dTIMS database and better understand the equations and variables that go into creating an accurate and reliable output.
- Worked out a workflow internally that shows us what needs to be done when we want to collect updated values for our streets.

PATH OF INFORMATION



WORKFLOW TESTED

- In Fall and Spring 2013/14 Roadware provided updated values using their “Automatic Road Analyzer” that fit into Muscatine’s new workflow, with “everything in sync”
  - Captures Surface Information
    - Roughness
    - Rutting
    - Cracking
    - Video Logs & Images
- CTRE calculated the PCI for every street segment from the values that are collected by Roadware.
- Locally we were able to take the updated shapefile and incorporate the updated condition information seamlessly.

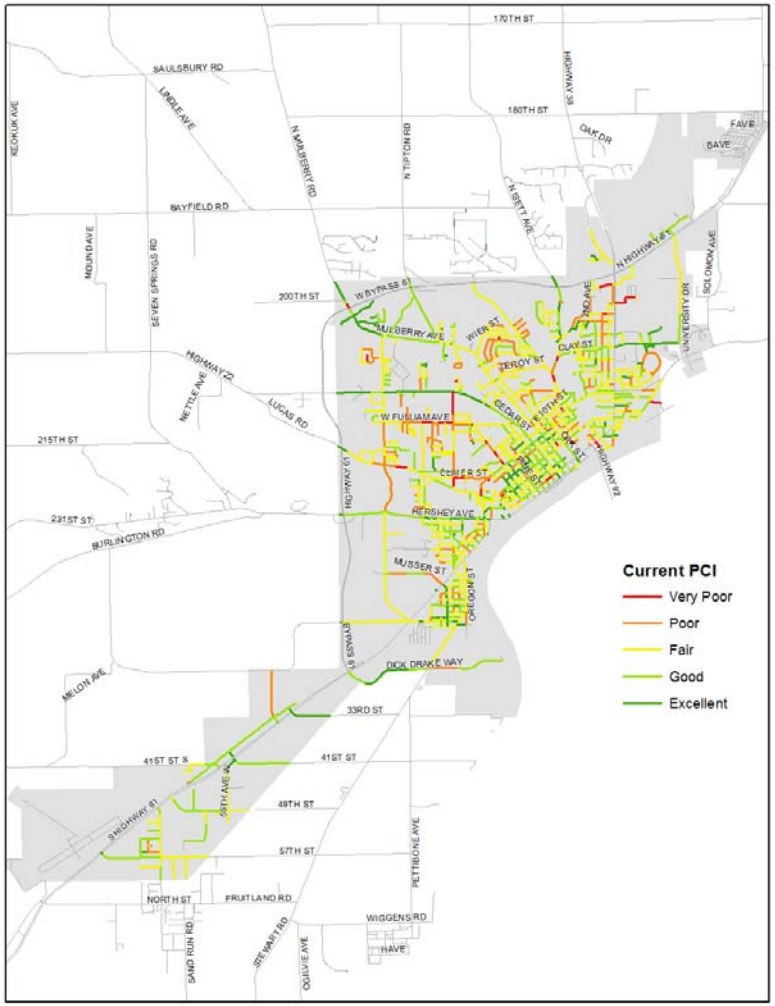
BUDGET DOLLARS AND GOALS

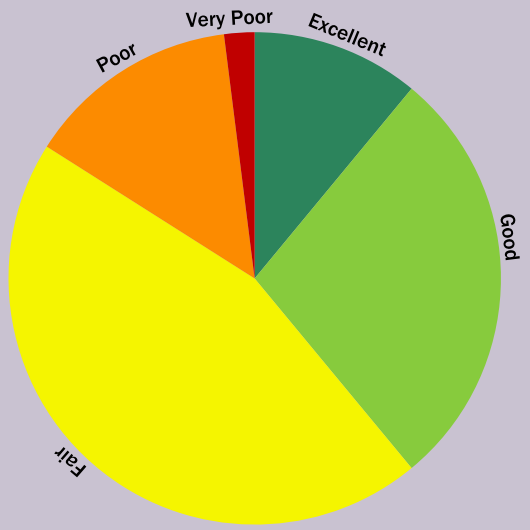
- Made a significant investment in Asphalt Overlay program in the initial years of the project to improve overall condition.
  - Initial Maintenance Investment: $5,000,000 over 3 years (2004 – 2006)
  - Funding mechanism: $0.01 option tax
  - Other sources for pavement improvements
    - Combined Sewer Separation Projects
    - Major street reconstruction
    - Road use tax
- Goal: PCI 60 and maintain at that level
- Held back maintenance dollars for overruns on major reconstruction projects

Actual annual average spending on pavement maintenance only (2009 – 2014)

$418,000

CURRENT CONDITION AS OF SPRING 2014 ROAD ASSESSMENT



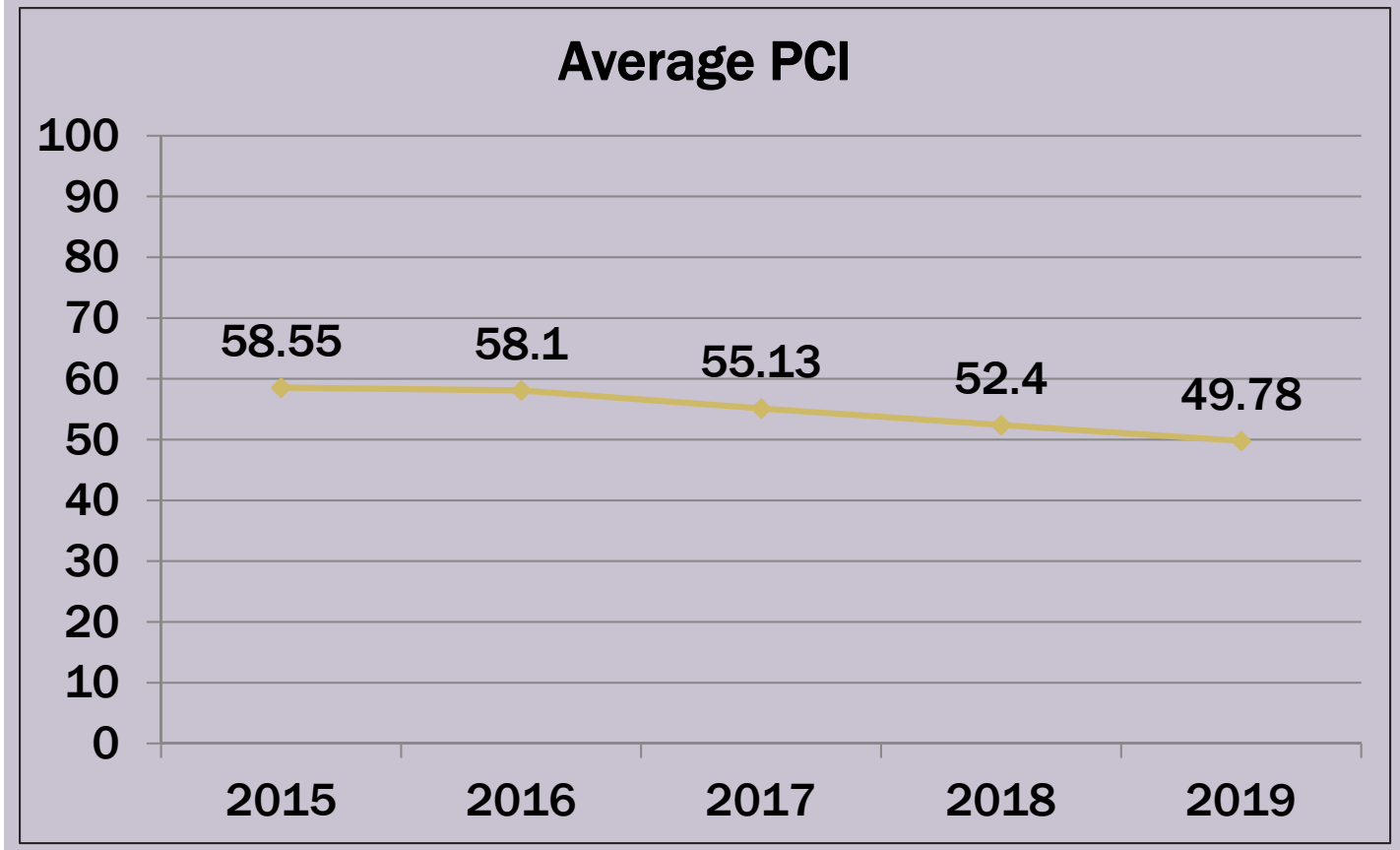


16%

of roads have a poor or very poor condition rating

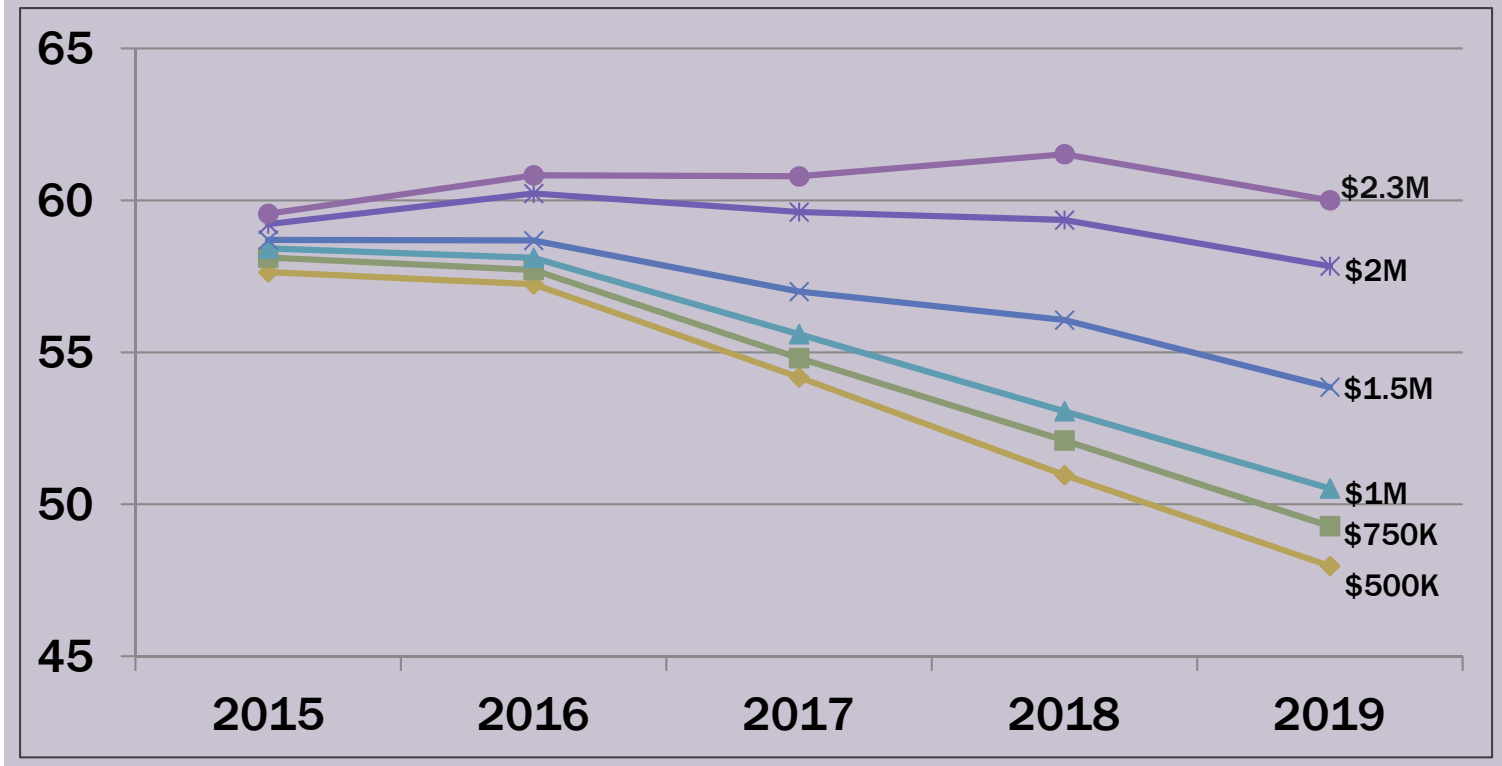
Current overall average Pavement Condition Index for Muscatine **57**

BUDGET AFTER GAS TAX INCREASE



$750,000

HOW MUCH IS ENOUGH??



$2.3M

needed annually to maintain PCI at 60 or above

FUTURE GOALS

- GIS/Data Management Goals
  - Maintain historical PCI in GIS for analysis of deterioration factors in dTIMS.
  - Continue to refine dTIMS variables for a more accurate and reliable plan
  - Review ways to incorporate “Crack Sealing” into dTIMS

MUSCATINE