PAVEMENT QUALITY FORECASTING

Technical Analysis Peer Exchange (TAPE)

May 28th, 2015
Introduction
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 21st 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
Setting Regional Targets

Pavement Condition Index (PCI)

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

Target for 2050:
Maintain conditions
Project Selection Process

• Projects solicited from communities & evaluated
• Balance of community priorities and system need
• Two project lists
  – Constrained = STP eligible
  – Illustrative = non-STP eligible
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
Methodology
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
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Cost/Mile (2-Lane)</th>
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<tbody>
<tr>
<td>Reconstruction</td>
<td>$2,300,000</td>
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<tr>
<td>Concrete Restoration</td>
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<tr>
<td>HMA Overlay</td>
<td>$350,000</td>
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<tr>
<td>Mill + Overlay</td>
<td>$415,000</td>
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<tr>
<td>PCC Joint/Crack Seal</td>
<td>$35,000</td>
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</table>
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
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
Results
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
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

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<thead>
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<td>Value</td>
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<td>16.2</td>
<td>13.2</td>
<td>11.5</td>
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</table>

AVERAGE CONDITION (PCI)
CITY OF URBANDALE

Annual Maintenance (6-Year Average): $2,042,375
Miles of Road Measured: 190

PAVEMENT QUALITY

Percent of Roads in Poor or Worse Condition

AVERAGE CONDITION (PCI)
How much funding is needed?

<table>
<thead>
<tr>
<th>City</th>
<th>Current Annual Funding</th>
<th>Total Annual Funding Needed</th>
<th>Additional Funding Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altoona</td>
<td>$696,106</td>
<td>$1,500,000</td>
<td>$803,894</td>
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<tr>
<td>Ankeny</td>
<td>$1,544,627</td>
<td>$5,000,000</td>
<td>$3,455,373</td>
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<td>Bondurant</td>
<td>$256,328</td>
<td>$400,000</td>
<td>$143,672</td>
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<tr>
<td>Carlisle</td>
<td>$343,530</td>
<td>$450,000</td>
<td>$106,470</td>
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<tr>
<td>Clive</td>
<td>$1,662,341</td>
<td>$2,500,000</td>
<td>$837,659</td>
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<tr>
<td>Cumming</td>
<td>$27,451</td>
<td>$175,000</td>
<td>$147,549</td>
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<tr>
<td>Des Moines</td>
<td>$15,551,818</td>
<td>$16,500,000</td>
<td>$948,182</td>
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<td>Grimes</td>
<td>$913,603</td>
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<tr>
<td>Johnston</td>
<td>$1,218,221</td>
<td>$3,000,000</td>
<td>$1,781,779</td>
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<tr>
<td>Mitchellville</td>
<td>$58,568</td>
<td>$275,000</td>
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<td>Norwalk</td>
<td>$679,457</td>
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<tr>
<td>Pleasant Hill</td>
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<td>$498,948</td>
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<td>-</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$29,122,885</strong></td>
<td><strong>$41,000,000</strong></td>
<td><strong>$11,877,115</strong></td>
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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.
Post-Report
In the news...

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

Omaha-area local governments will have to come up with at least an additional $39 million a year — a 33 percent increase — just to keep current road conditions from deteriorating, an analysis by the Des Moines Area Metropolitan Planning Organization has shown.

That means local governments looking to get the tax rate up, presently 6 cents or state aid and $50 million, said MPO Executive Director Todd Ashley.

Currently, the area spends $28 million a year to maintain roads. That level of spending has left the community with a percent of the roads in poor or very poor conditions, 84 percent in good, or excellent shape, 4 percent in fair, or good condition, 3 percent in fair, or good condition, and 3 percent is in fair, or good condition.

This is not only a breach needed price tag on a bridge bond,
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

post-report
## Metro Comparisons

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

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Average PCI</th>
<th>% Poor or Worse</th>
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<tr>
<td>Corridor MPO (Cedar Rapids Region)</td>
<td>50.2</td>
<td>31%</td>
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<tr>
<td>MPO of Johnson County (Iowa City Region)</td>
<td>51.0</td>
<td>29%</td>
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<td>Dubuque Metropolitan Area Transportation Study</td>
<td>58.7</td>
<td>21%</td>
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<tr>
<td>Des Moines Area MPO</td>
<td>52.0</td>
<td>28%</td>
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Gas Tax Increase

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

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Source: Iowa DOT
Aaron Bartling  
abartling@dmampo.org  
515-334-0075  

Report available at: dmampo.org/reports