County and Local Road Infrastructure Needs Assessment and Asset Inventory Toolkit Development

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July 2015
Today’s Presentation:

- History of local road/infrastructure needs studies
- Review of most recent infrastructure study and proposed study improvements
- General methodology for 2015-17 study
- General concepts for advancing legislative initiative for asset inventory toolkit development
• Local Roads Infrastructure Needs Study Process

Assessment of ND County and Local Road Needs, 2013-2015
Upper Great Plains Transportation Institute

- Infrastructure Needs Studies History
  - 2007: NDDOT
  - 2009: NDDOT Level of Service Study
  - 2010: ND Association of Oil and Gas Producing Counties/ND Commerce Department
  - 2011-13: North Dakota Legislature
  - 2013-15: North Dakota Legislature
  - 2015-17: North Dakota Legislature
Data Collected for 2013-15 Study

• Jurisdictional data for 52 counties
• 1,000+ vehicle counts and classifications by NDDOT & UGPTI
• 5,600 miles of pavement video image, pavement distress and ride data.
• 1,500 miles of pavement/subgrade strength and depth surveys
• Gravel costing surveys for all 53 counties
• NBIS data on 2,327 local bridges
Created for the 2013-15 Study

- A statewide CUBE-based truck traffic flow model

- An AASHTO-93 Pavement Deterioration Model to predict pavement needs and remaining life
Created for the 2013-15 Study

• A bridge deterioration and improvement model.
  – A study of bridges located on minimum maintenance roads – approximately 400 bridges excluded from the analysis.
Created for the 2013-15 Study

• An on-line interactive map showing images and data collected for the study so that it was available to the counties.
On-line Interactive Map – Pavement Condition

2013 County Road Information

Zoom in and turn on/off layers below. HELP

- Layers
  - Pavement Condition (PSR)
    - PSR_comb
      - 0.1 - 2.0
      - 2.1 - 3.0
      - 3.1 - 4.0
      - 4.1 - 5.0
  - Strength Testing (Sub E)
    - Subgrade_E
      - Not Tested
      - 0.1 - 6.0
      - 6.1 - 10.0
      - 10.1 - 20.8
  - Bridge (Suf Rating - Projects)
    - Sufficiency Rating (0 to 100)
      - 0.0 - 50.0
      - 50.1 - 70.0
      - 70.1 - 90.0
      - 90.1 - 100.0
  - Bridge (Suf Rating - Non Projects)
    - Sufficiency Rating (0 to 100)
      - 21.5 - 50.0
      - 50.1 - 70.0
      - 70.1 - 90.0
      - 90.1 - 100.0
  - Truck Traffic - Class Counts
    - TOT_TRUCKS
On-line Interactive Map – Pavement Condition
## Outcome of 2013-15 Study

**Table D: Summary of All Road and Bridge Investment and Maintenance Needs for Counties and Townships in North Dakota (Millions of 2014 Dollars)**

<table>
<thead>
<tr>
<th>Period</th>
<th>Statewide</th>
<th>Oil Patch</th>
<th>Rest of State</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015-16</td>
<td>$1,172</td>
<td>$598</td>
<td>$575</td>
</tr>
<tr>
<td>2017-18</td>
<td>$1,026</td>
<td>$466</td>
<td>$561</td>
</tr>
<tr>
<td>2019-20</td>
<td>$981</td>
<td>$498</td>
<td>$483</td>
</tr>
<tr>
<td>2021-22</td>
<td>$954</td>
<td>$509</td>
<td>$444</td>
</tr>
<tr>
<td>2023-24</td>
<td>$796</td>
<td>$373</td>
<td>$422</td>
</tr>
<tr>
<td>2025-34</td>
<td>$4,269</td>
<td>$2,043</td>
<td>$2,226</td>
</tr>
<tr>
<td>2015-34</td>
<td>$9,086</td>
<td>$4,430</td>
<td>$4,657</td>
</tr>
</tbody>
</table>
Positive Feedback from Counties and Legislators on the 2013-15 Study

- Almost all liked the interactive map.
- First time many had any objective pavement ratings available to them.
- Study provided a basis for investing in transportation infrastructure.
Concerns from Counties and Legislators about 2013-15 Study

• Pavement condition scores are not reflecting age of lower layers of pavement
  – Also want more accurate shoulder width and pavement thickness
• Counties not uniformly reporting gravel costs
• No costs for minor structures
• Some counties unaware of data requests
Outlook for the Coming Study

- Legislative expectations for ever-improving data
  - Emphasis on uniformity of gravel costing submissions
  - Additional improvements to county pavement condition data
  - Continued improvement to traffic data and forecasting
  - Updated costing and modeling concepts
  - Capture more accurate history data from counties – asset inventory tool.
Outlook for the 2015-17 Study

- Legislative expectations:
- Continued emphasis on maintaining system – not providing for major upgrades.
Proposed Study Process/Major Steps

• Data Collection
  – Costs and practices surveys – gravel costing and practices
  – Conduct/acquire traffic counts
    • Partner with NDDOT – same as 2013
  – Condition assessment – paved roads
    • Pavement condition with pathway van
  – Non-destructive strength testing
    • Pursue additional 1/3 of remaining paved miles
Proposed Study Process/Major Steps

- Additional pavement data intended to improve pavement modeling
  - Roadway Width, Pavement Thickness, Pavement Age, etc.
  - Request Counties to supply this information via asset inventory tool or survey
- Jurisdiction – ownership and maintenance responsibility - ask for review of past data
- Model Traffic, Road Costs & Assess Needs
  - Review results with Counties through LTAP
- Present Data via on-line map
  - Enhanced version of 2014 version
Cost and Practices Surveys

- Survey of both counties and townships
  - 2013-14 study: 51 county responses, 635 township responses
- Responses reflective of actual improvement and maintenance activities is critical
- Comparison between neighboring counties
  - Cost
  - Overlay frequencies
  - Regional average
Cost and Practices Surveys

- Aggregate (gravel) cost at pit
- Placement cost
- Transportation cost from pit to roads
- Dust suppressant usage/cost
- Stabilization usage/cost
- Intermediate practices
  - Stabilization/armor coat
  - Double chip seal/armor coat
  - For Example – asphalt surface treatment
Traffic Data Collection

• Data collection
  – Joint collection with NDDOT staff and NDSU students
  – Normal NDDOT count schedule covers 2500 counts
  – 500 additional counts will be taken across state.
  – Will supplement with other local counts

• Traffic data processing
  – Use ATR’s from around state to factor the data
  – Use classification data to factor the volume counts
  – Input all traffic data into travel demand model

• Traffic data reporting
  – Specific count location data will be made available with an interactive map on the Web.
Pavement Data Collection

• Condition data collection
  – Collect data with NDDOT Pathway van
  – Approx. 5,000 miles of paved county roads
  – Will not collect short segments
  – Van will provide consistent pavement distress and ride information
  – Collecting data currently to mid August

• Scoring and reporting of data
  – New van has automatic scoring which will need calibration
  – NDSU students will do some manual scoring for validation
  – Data will be referenced to roadways to provide on-line mapping

• Other geometric data
  – Pavement and shoulder width will also need to be collected
Pavement Data Collection

• Non-destructive testing
  – Purpose: Expand the number of sample sections collected
  – Falling weight deflectometer (FWD) and ground penetrating radar (GPR)
  – Western ND – all pavements not recently improved and pavements not collected in last study
  – Eastern ND – additional sample roads not collected in last study
  – FWD will be done first and GPR will be done on the sites (based on GPS) thumped with FWD
Traffic Model

- Objective – update and enhance county and local roads traffic model developed for the 2013-14 Legislative study
- Model calibration – using most recent counts, where applicable
- Non-modeled areas – counts may determine traffic levels in non-modeled areas
Traffic Model

• Modeling
  – The entire modeling process will utilize Cube Base, Voyager and Cargo.
  – Specific models for ag commodities and oil movements
    • PSC grain data movements
    • NDO&G oil well projections
  – Coordination with NDDOT
Pavement Analysis

- Pavement deterioration and recommended improvement process
  - Given starting pavement condition and traffic, remaining pavement life is estimated
    - Verify past assumptions on subgrade strength
    - Apply traffic projections and current PSR
  - Determine recommended improvements and costs based on width, starting condition, and future traffic estimates
Jurisdiction and Maintenance Survey

• UGPTI needs to consult with counties to verify the jurisdictional responsibilities of roadways below the state system

• County major collector – data currently exists with NDDOT
Jurisdiction and Maintenance Survey

UGPTI needs to consult with counties to identify jurisdictional responsibilities for roadways not on the state system

- Township
- Township owned, but maintained by the county
- Minimum maintenance roads
- Private
- IRR – maintained by the tribes
- IRR – maintained by counties
- Municipal
- Forest Service
- Air Force
- Other Federal Roads
- Scenic Routes
- Wildlife/Conservation Routes
Jurisdiction and Maintenance Survey

- UGPTI data collection procedures
  - NDLTAP representatives will meet with county representatives as part of their regular calls on counties
  - UGPTI will create on-line tool for updating data
    - On-line web tool will be used to report data
Study Activities

- Traffic counts - currently underway
- Traffic modeling - currently underway
- Road condition assessment – currently underway
- County cost and practices survey – August
- Township cost and practices survey – August
- County/TWP/other – jurisdiction and maintenance survey – August
- Establish a periodic county briefing newsletter
NDSU-UGPTI Study Team

• Denver Tolliver – UGPTI Director
• Alan Dybing – Associate Research Fellow
  – Traffic Modeling/HERS-ST Modeling
• Tim Horner – Program Director
  – Pavement/Bridge Costing, Project Coordination
• Brad Wentz – Program Director
  – Pavement Condition, Traffic Data, County Scenarios
• Transportation Research Engineer
  – Pavement Non-destructive testing and bridge deterioration
• Pan Lu - Associate Research Fellow
  – Bridge Deterioration Modeling
• Dale Heglund
  – LTAP Program Director
Questions about Infrastructure Needs Study?
Now let’s look at the Local Roads Asset Inventory Toolkit Concepts
Local Roads Asset Inventory Toolkit

• UGPTI Advisory Council Advanced the Concept of Road and Bridge Asset Management Tool Development
• 2015 Legislature Appropriated Funds for an Asset Management Initiative.
  – Intended to focus on providing tools for local governments to preserve and maintain roads and bridges.
Local Roads Asset Inventory Toolkit

• Initial Steps:
  – Establish an Advisory Group of County Representatives.
    • Try to get regional representation
    • Ask NDAoC to participate as well
  – Focus on building data inventory important to county road managers
    • Build so it links to on-line mapping built for past study
Local Roads Asset Inventory Toolkit

• Building Data Inventory Examples:
  – Initial Items to Develop:
    • Web/Map based input system
    • Paved Roadways Data Set
    • Gravel Roads Data Set
    • Bridges
      – Explore Adding Minor Structures (less than 20 ft.)
    • Other critical infrastructure items
Local Roads Asset Inventory Toolkit

- Building Data Inventory Examples:
Local Roads Asset Inventory Toolkit

- Building Data Inventory Examples:
Local Roads Asset Inventory Toolkit

• Future Possible Steps:
  – Pavement Deterioration/Cost Analysis Tools
    • Predict Future Pavement Condition
  – Gravel Cost Tracking Tools
  – Bridge Planning/Costing Tools
  – Jurisdictional Tracking
    • Ownership
    • Maintenance Responsibility
  – Others as suggested by advisory group
Questions about Asset Inventory Initiative?
Questions

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