

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

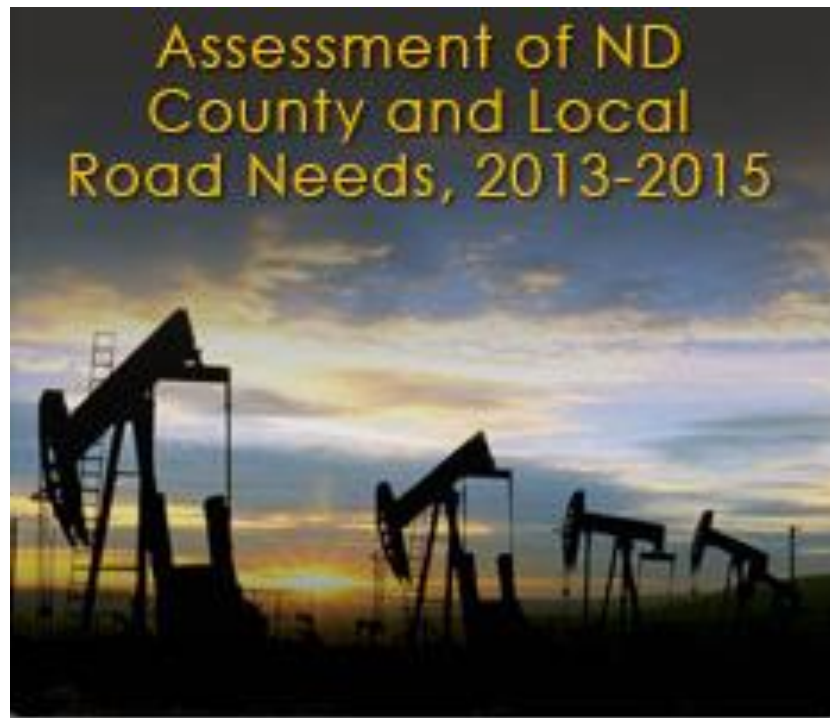
Dickinson, Stanley, Mandan, Fargo,
Devils Lake

Tim Horner and Dale Heglund
Upper Great Plains Transportation Institute

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



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

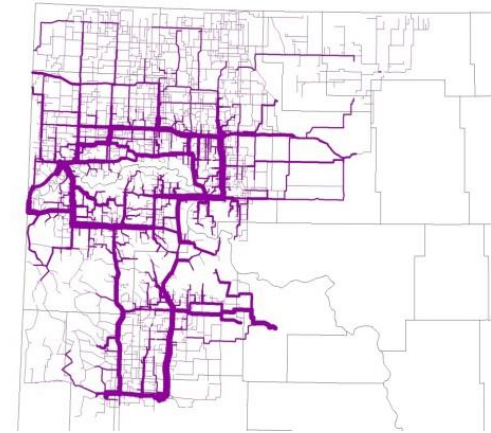


Data Collected for 2013-15 Study

- 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

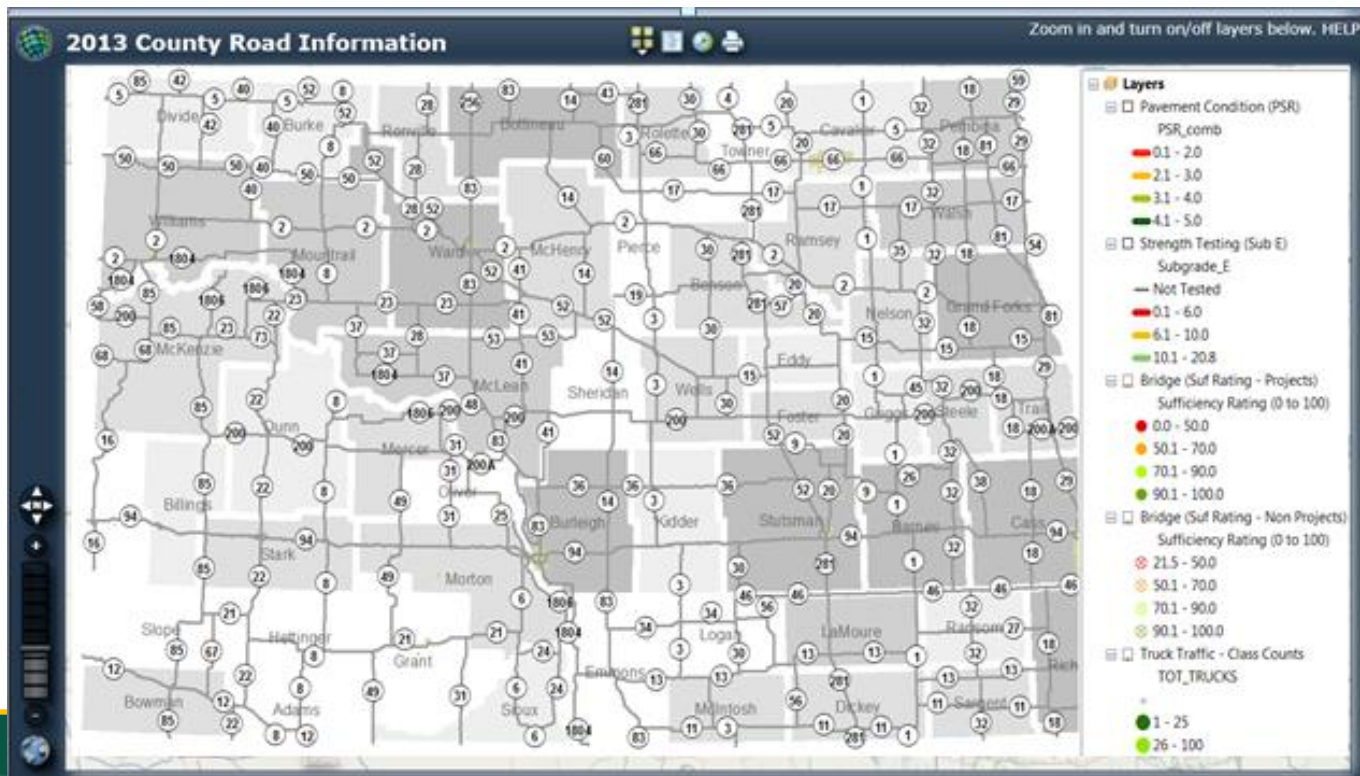
Created for the 2013-15 Study

- A bridge deterioration and improvement model.
 - A study of bridges located on minimum maintenance roads – approximately 400 bridges excluded from the analysis.

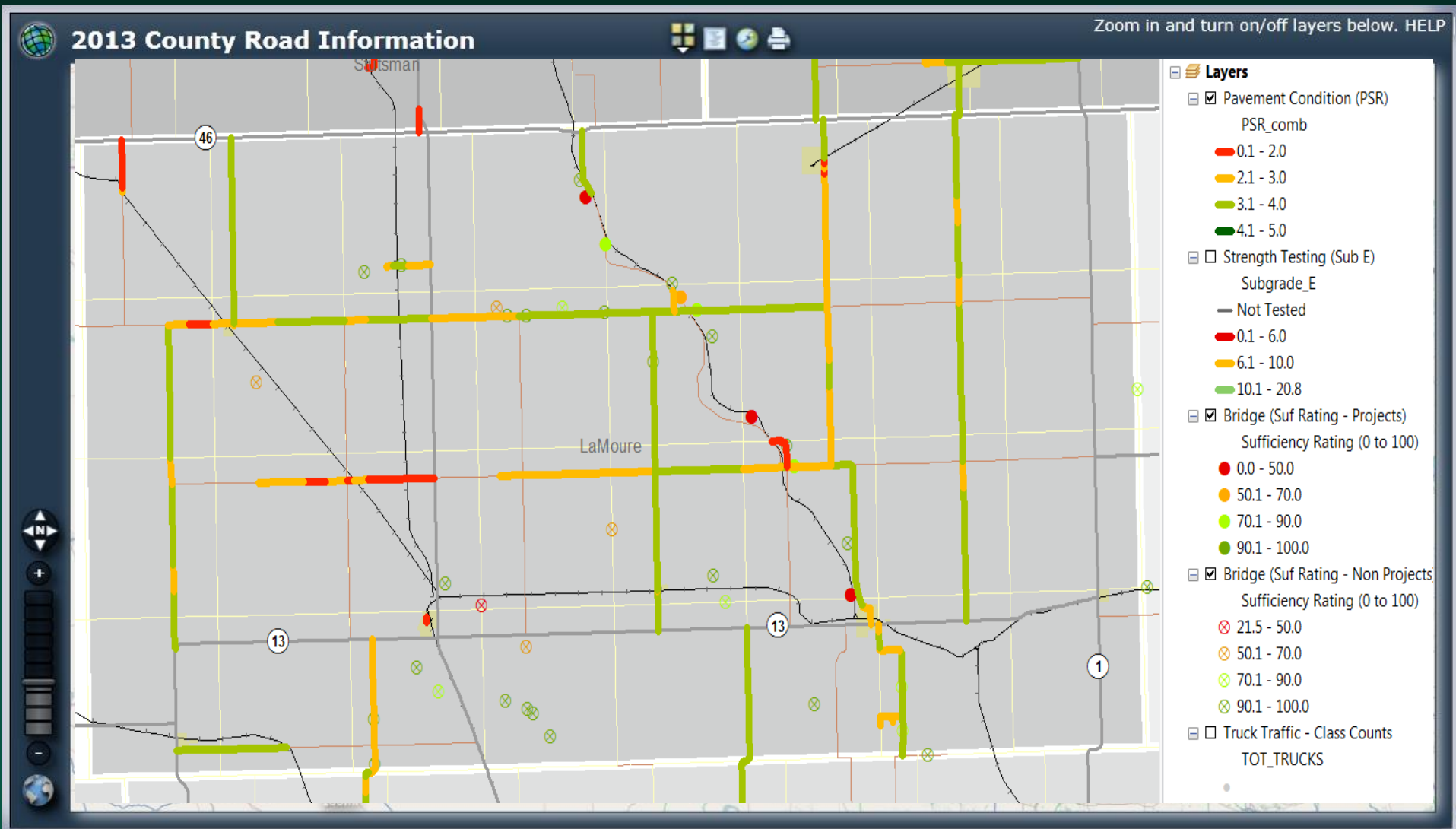


Created for the 2013-15 Study

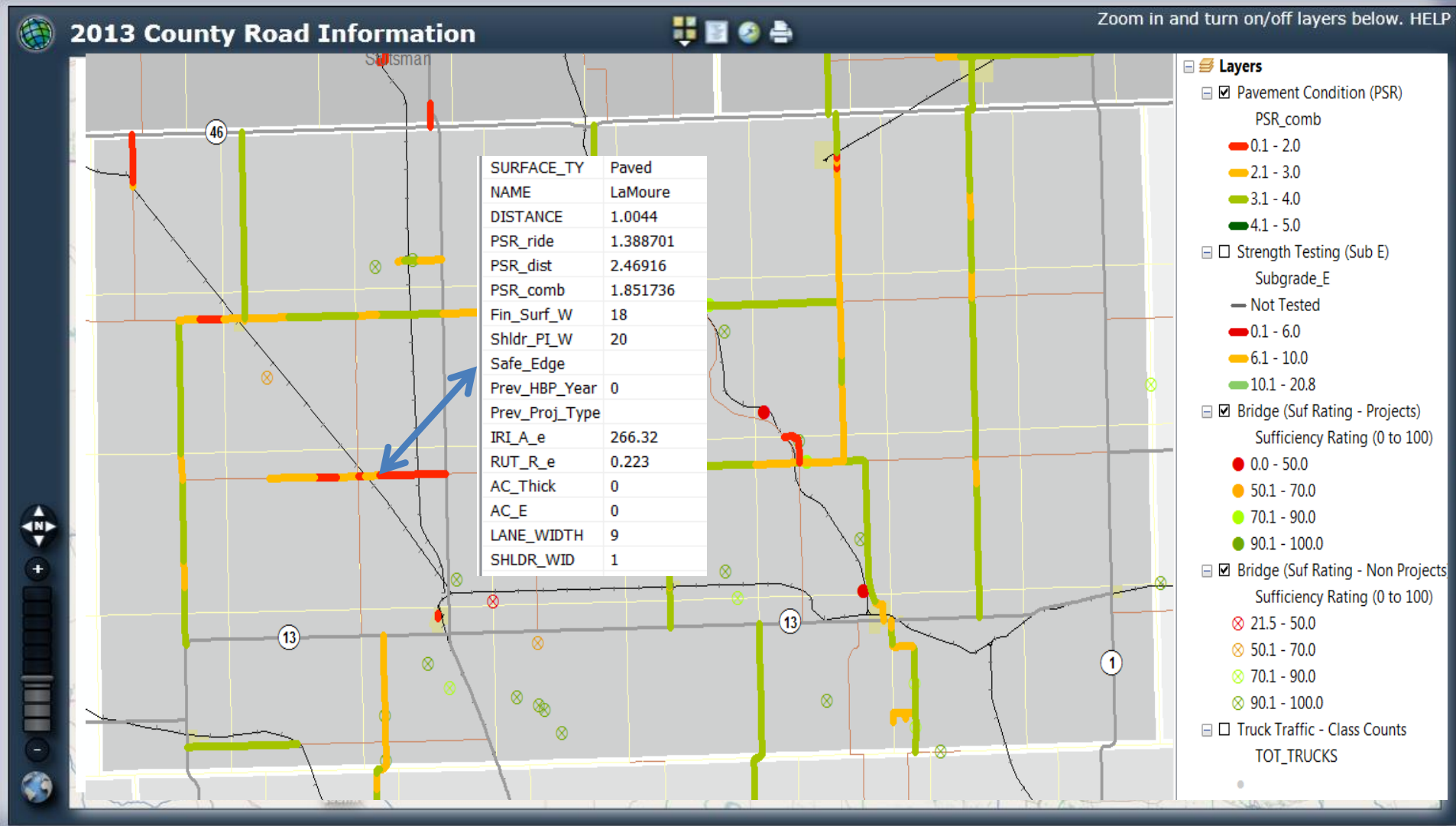
- An on-line interactive map showing images and data collected for the study so that it was available to the counties.



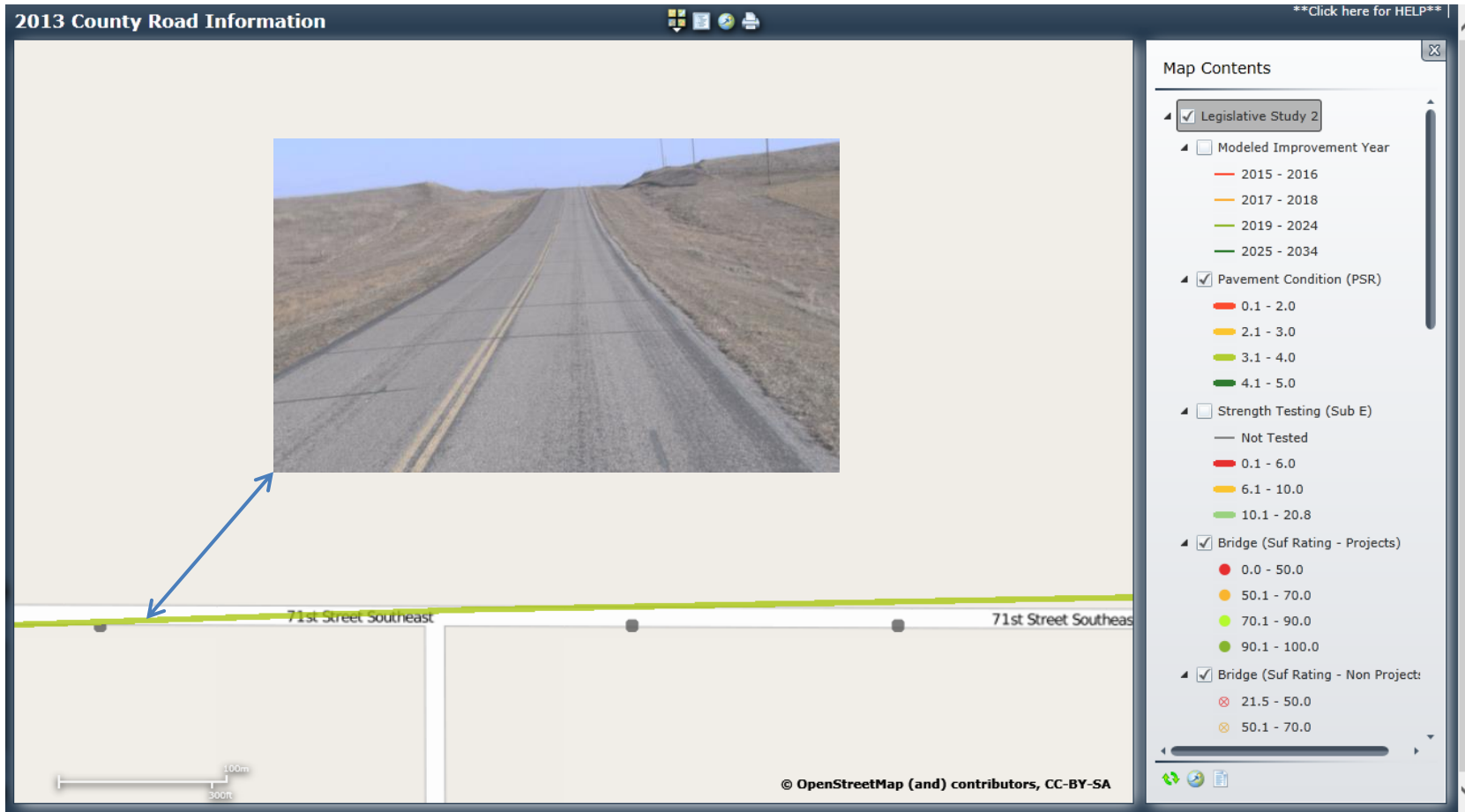
On-line Interactive Map – Pavement Condition



On-line Interactive Map – Pavement Condition



On-Line Interactive Map



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)

Period	Statewide	Oil Patch	Rest of State
2015-16	\$1,172	\$598	\$575
2017-18	\$1,026	\$466	\$561
2019-20	\$981	\$498	\$483
2021-22	\$954	\$509	\$444
2023-24	\$796	\$373	\$422
2025-34	\$4,269	\$2,043	\$2,226
2015-34	\$9,086	\$4,430	\$4,657

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.



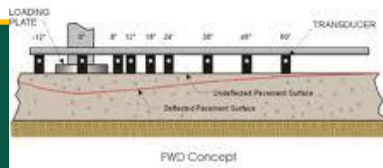
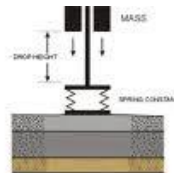
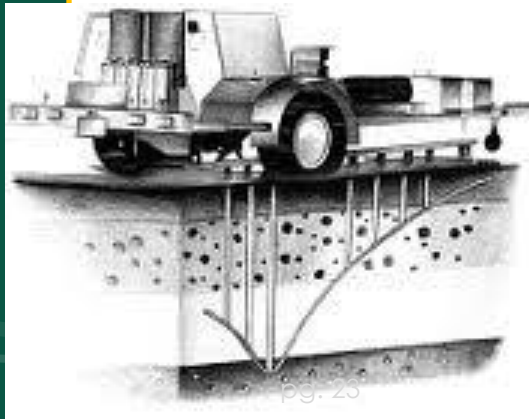
Pavement Data Collection

- 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

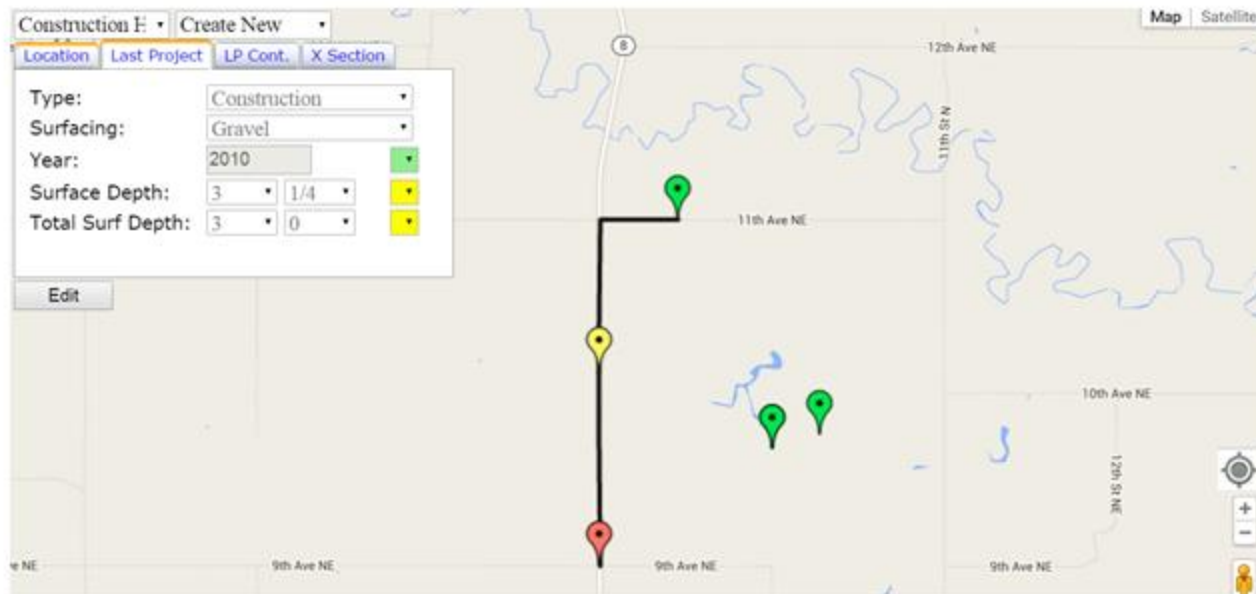
- Initial Steps:
 - Establish an Advisory Group of County Representatives.
 - Try to get regional representation
 - Ask NDAoC to participate as well
 - Focus on building data inventory important to county road managers
 - Build so it links to on-line mapping built for past study

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

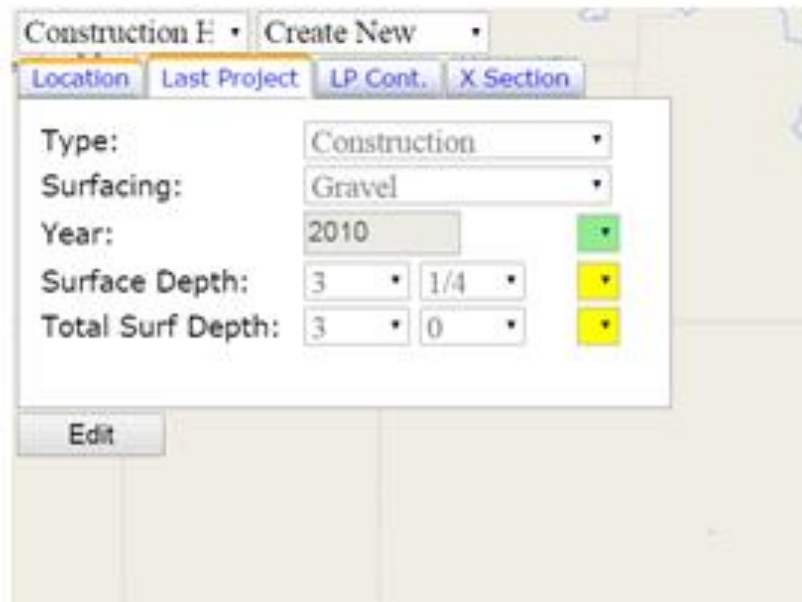
Local Roads Asset Inventory Toolkit

- Building Data Inventory Examples:



Local Roads Asset Inventory Toolkit

- Building Data Inventory Examples:



The screenshot shows a web-based data entry form for the Local Roads Asset Inventory Toolkit. The form is titled "Construction E" and has a "Create New" button. Below the title are four tabs: "Location", "Last Project", "LP Cont.", and "X Section". The "Location" tab is selected. The form contains the following fields:

- Type: Construction (dropdown menu)
- Surfacing: Gravel (dropdown menu)
- Year: 2010 (text input)
- Surface Depth: 3 (text input) and 1/4 (dropdown menu)
- Total Surf Depth: 3 (text input) and 0 (dropdown menu)

Each of the last three fields has a small green or yellow dropdown arrow to its right. An "Edit" button is located at the bottom left of the form.

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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