County and Local Road Infrastructure Needs Assessment
Presented at NDDOT HB 1358 Regional Meetings
June 2013

Upper Great Plains Transportation Institute
Upper Great Plains Transportation Institute

• UGPTI is under North Dakota State University

• 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
General Outlook for the Coming Study

• Legislative expectations for ever-improving data
  – Better Jurisdictional Data – who owns and operates roads and bridges
  – More/improved county pavement condition data
  – Additional traffic data and forecasting
  – Updated costing and modeling concepts
  – Shorter turn-around
Proposed Study Process/Major Steps

• Data Collection
  – Costs and Practices Surveys
  – Conduct /Acquire Traffic Counts
    • Partner with NDDOT
  – Condition Assessment – Paved Roads
    • Pavement Condition, Non-Destructive Testing
    • Roadway Width, etc.
  – Jurisdiction – ownership and maintenance responsibility
  – Model Traffic, Roadway Costs & Assessment of Needs
Cost and Practices Surveys

• Survey of both Counties and Townships
  • 2011-13 study: 51 County Responses, 230 Township Responses
Cost and Practices Surveys

• Aggregate (Gravel) Cost
• 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
  – Others
Traffic Data Collection

Objective – To collect traffic volume and classification data on ND County and Township roads for the adequate calibration of travel demand models and ESAL calculations.

• Data Collection
  – Joint collection with NDDOT staff and NDSU students
  – Number of counts to be taken - 1000+
  – Number of classification counts – 670
  – Any County Counts being planned?

• 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

Objective – To collect pavement distress, ride, strength and geometric information on ND paved County roads to determine remaining service life estimates and projected construction costs.

• Condition Data Collection
  – Collect Data with NDDOT Pathway Van
  – 5,600 miles of paved County roads
  – Will not collect short segments
  – Van will provide consistent pavement distress and ride information
  – Will begin collection in July and 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: verify assumptions from last study on subgrade strength
  – Falling Weight Deflectometer (FWD) and Ground Penetrating Radar (GPR).
  – Western ND – All Pavements not recently improved.
  – Eastern ND – Selected based on Ag Production Facilities and other major traffic generators
  – FWD will be done first and GPR will be done on the sites (based on GPS) thumped with FWD
  – Some drilling needed to calibrate GPR – will contact road author.
Traffic Model

• Objective – to update and enhance the county and local roads traffic model developed for the 2011-13 Legislative study
Traffic Model

• Modeling
  – The entire modeling process will utilize Cube Base, Voyager and Cargo.
  – Specific models for Ag commodities and Oil movements
  – Inclusion of direct passenger modeling
  – Coordination with NDDOT
    • Network modeling necessarily includes state highways.
Inbound Sand
Inbound Water
Outbound Oil - Rail
Agricultural Analysis

**Known**
- Crop Production

**Predict**
- Truck Trips and Routes

**Known**
- Elevator & Plant Demands

**Estimate**
- Segment Specific Traffic

*Data:* Crop Production (NASS), Elevator Volumes (NDPSC), In-State Processors (Survey), Road Network (NDDOT-GIS Hub), Local Road Data (2008 Survey)
Crop Production and Location
Distribution Model

- Each township connected to nearest 150 elevators
- Elevators connected to each other
- Elevators connected to the plants
- Fastest and shortest route algorithms
- Objective: meet the demands at elevators and in-state processing plants with minimal hauling distances (trucking cost)
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 tie down the jurisdictional responsibilities of roadways below the state system.
Jurisdiction and Maintenance Survey

- County Major Collector – data currently exists with NDDOT
- County – Non-CMC
  - 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

• NDSU Data Collection Procedures
  • NDLTAP representatives will meet with county representatives as part of their regular calls on counties.
  • Unorganized townships will be assumed to be county owned and maintained.

• Data Processing
  • UGPTI GIS staff/students will convert the NDLTAP collected information to GIS shape files.
  • Ultimately we hope to put on the ND GIS Hub
    – Subject to their approval
Current and Upcoming Activities

- Traffic Counts - Currently Underway
- Traffic Modeling - Currently Underway
- Road Condition Assessment to begin early July
- County Cost and Practices Survey – August
- Township Cost and Practices Survey – August
- County/TWP/other – Jurisdiction and Maintenance Survey – Currently Underway
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
- Andrew Bratlien – Transportation Research Engineer
  - Pavement Non-destructive testing and bridge deterioration
- Darcy Rosendahl – NDLTAP Program Director
  - Jurisdictional ownership and maintenance