# County and Local Road Infrastructure Needs Assessment

## Presented at NDDOT HB 1358 Regional Meetings

June 2013

Upper Great Plains Transportation Institute

NDSU 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.

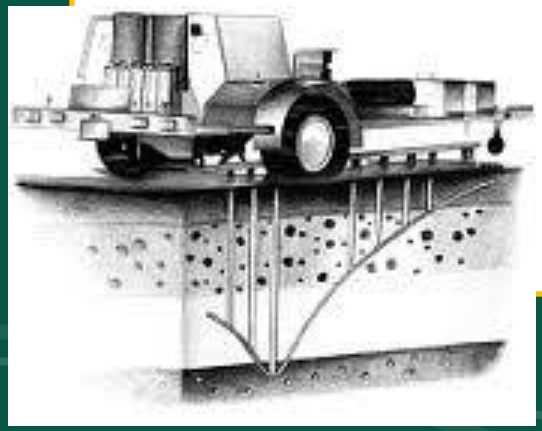
# Pavement Data Collection

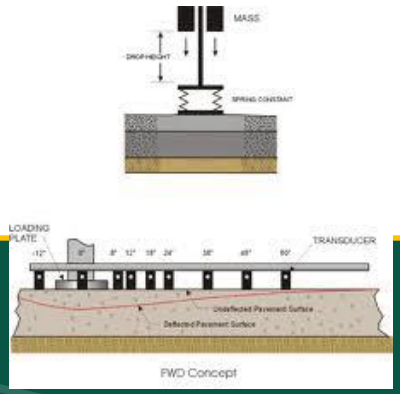
Objective – To collect pavement distress, ride , strength and geometric information on ND paved County roads to determine remaining service life estimates and projected construction costs.


- 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.





FWD Concept

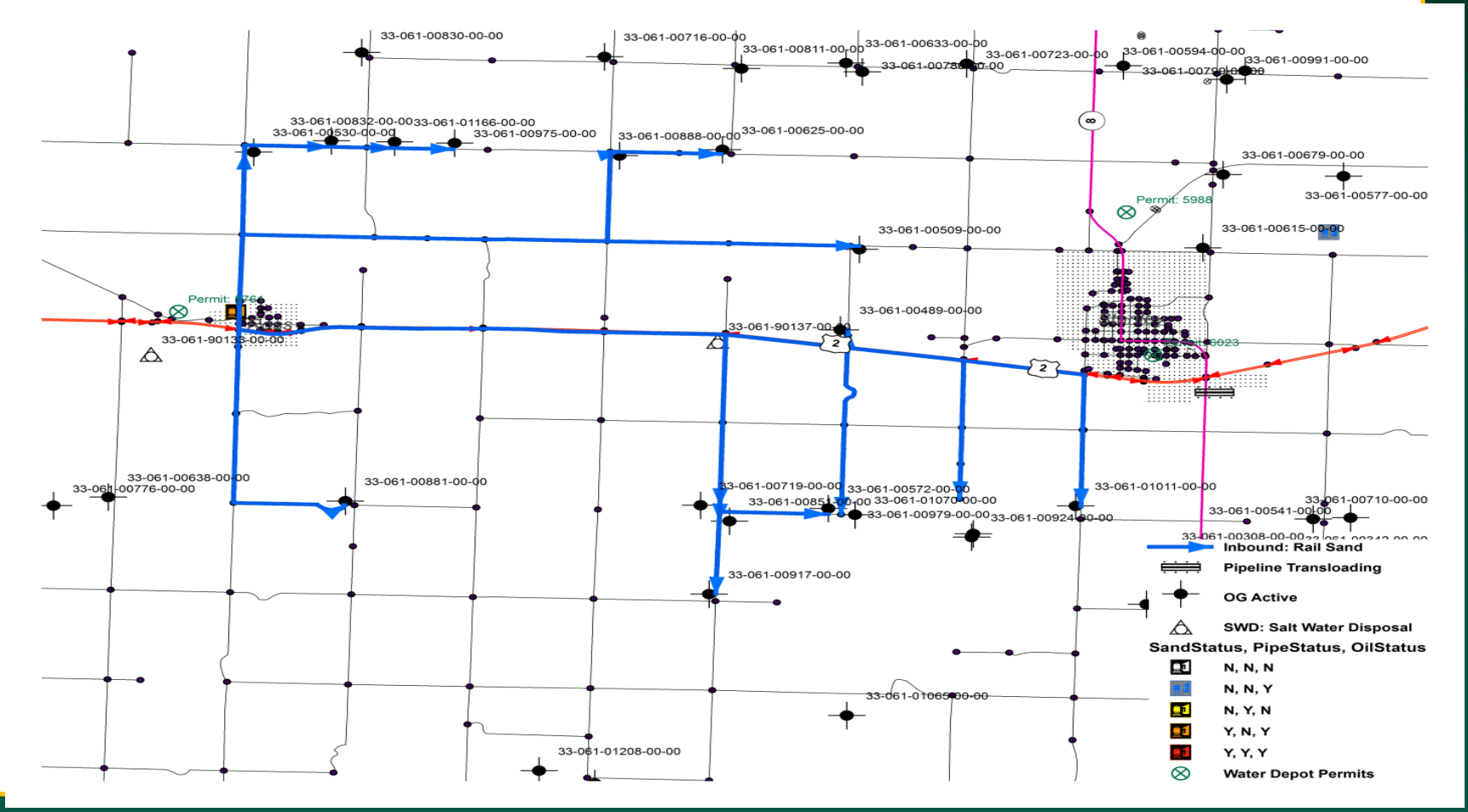
# Traffic Model

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

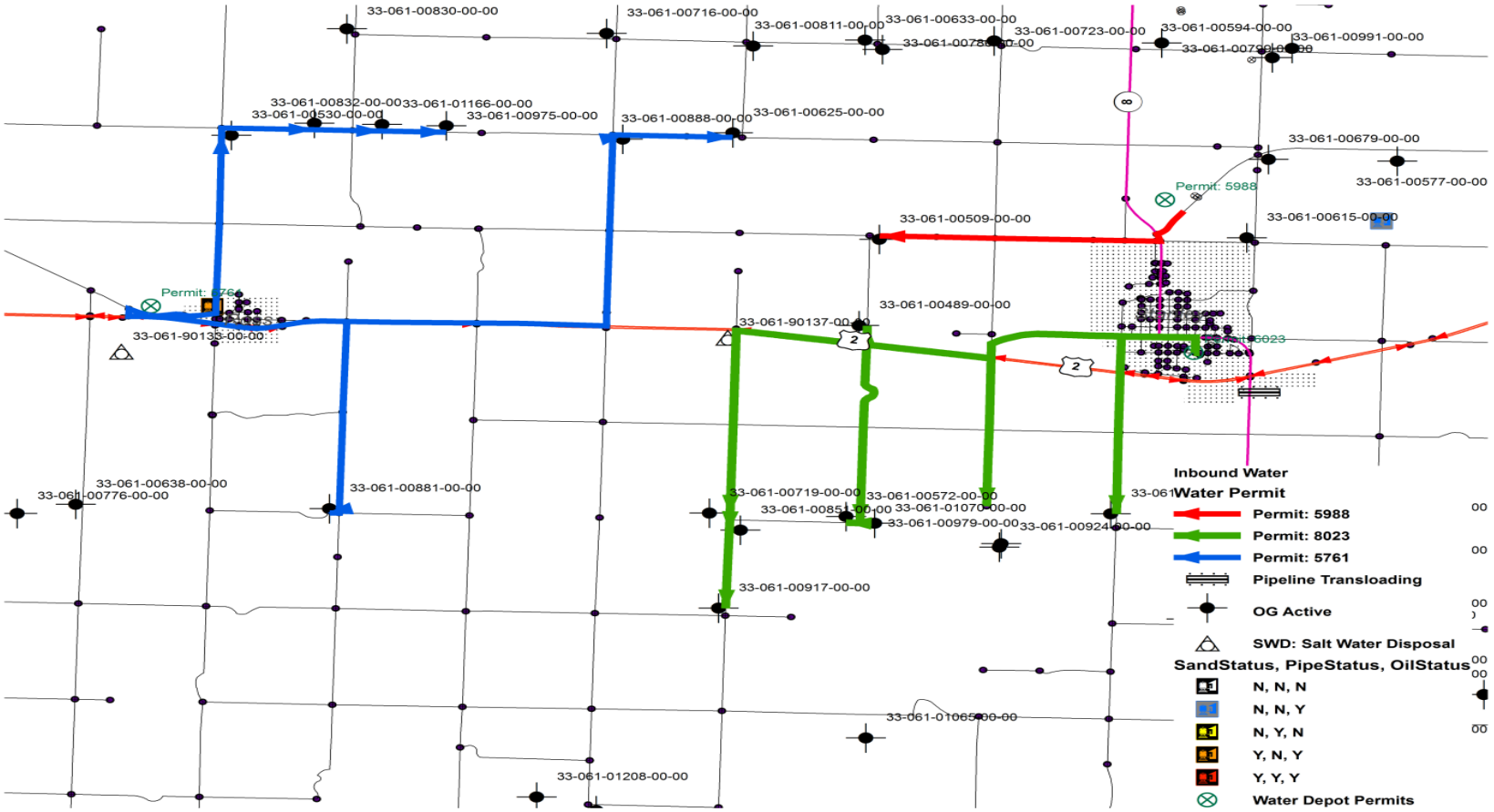
# Traffic Model

- 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.

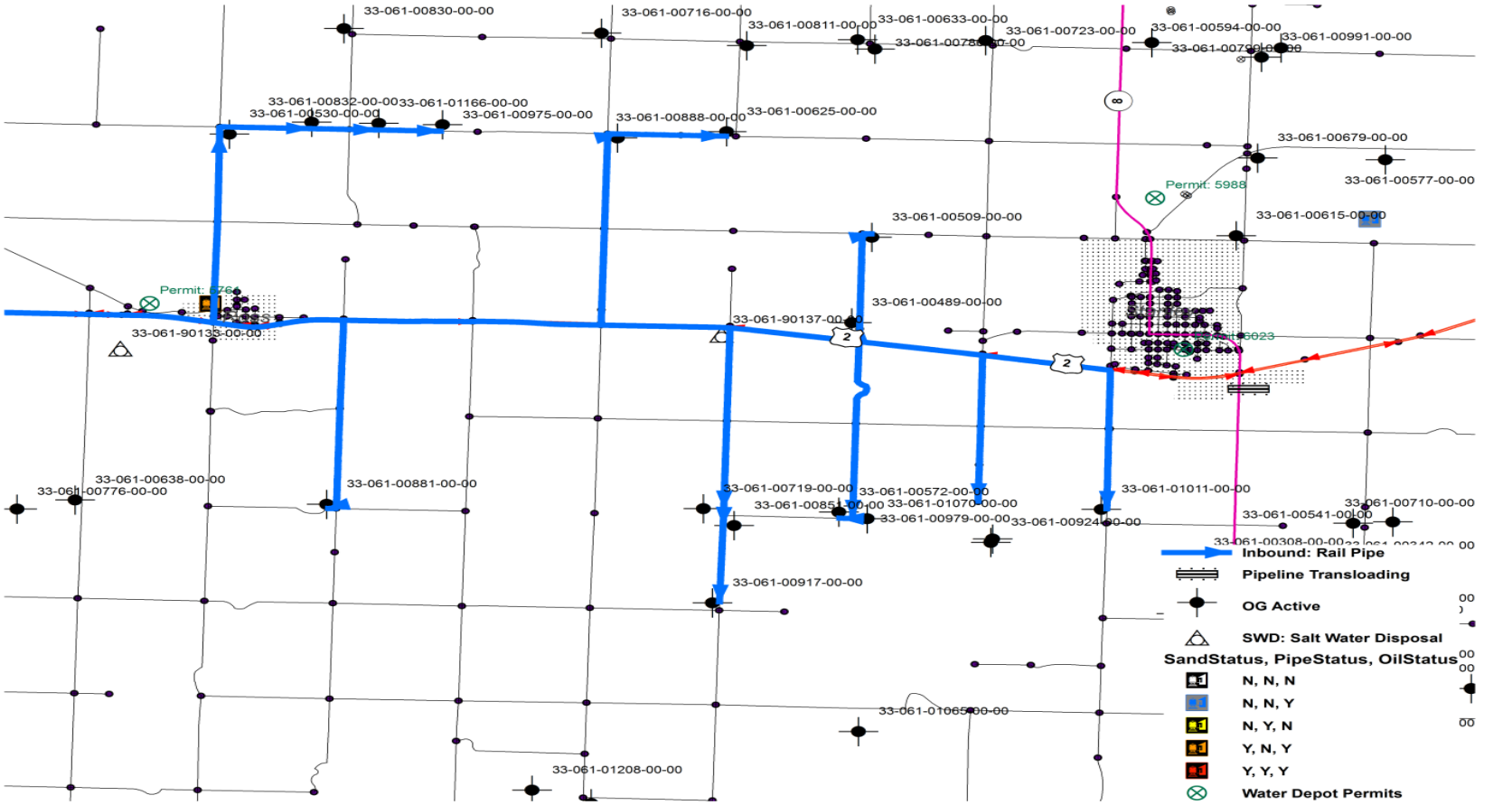
# Inbound Sand



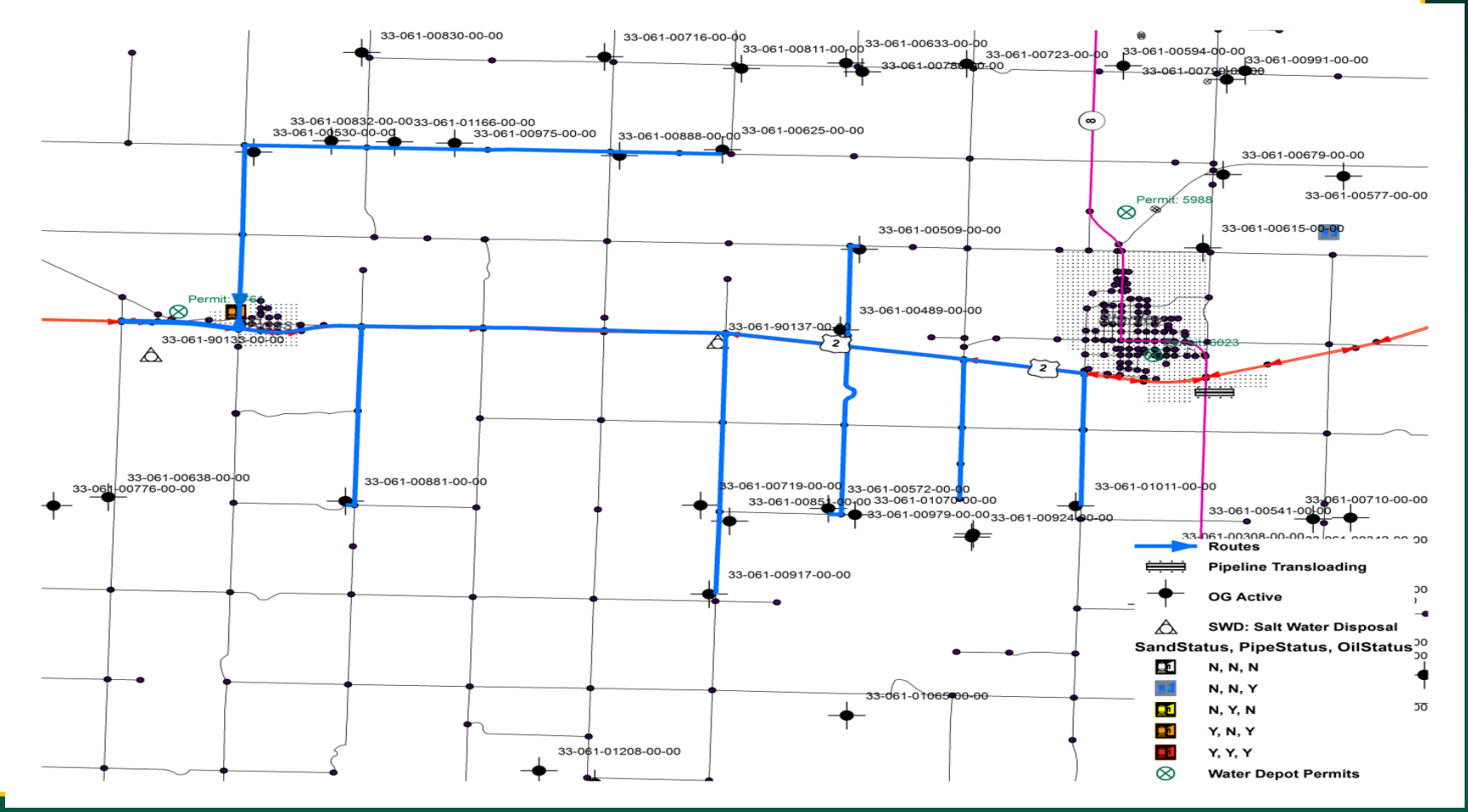
# Inbound Water



# Inbound Pipe



# Outbound Oil - Rail



# Agricultural Analysis

**Known** → Crop Production

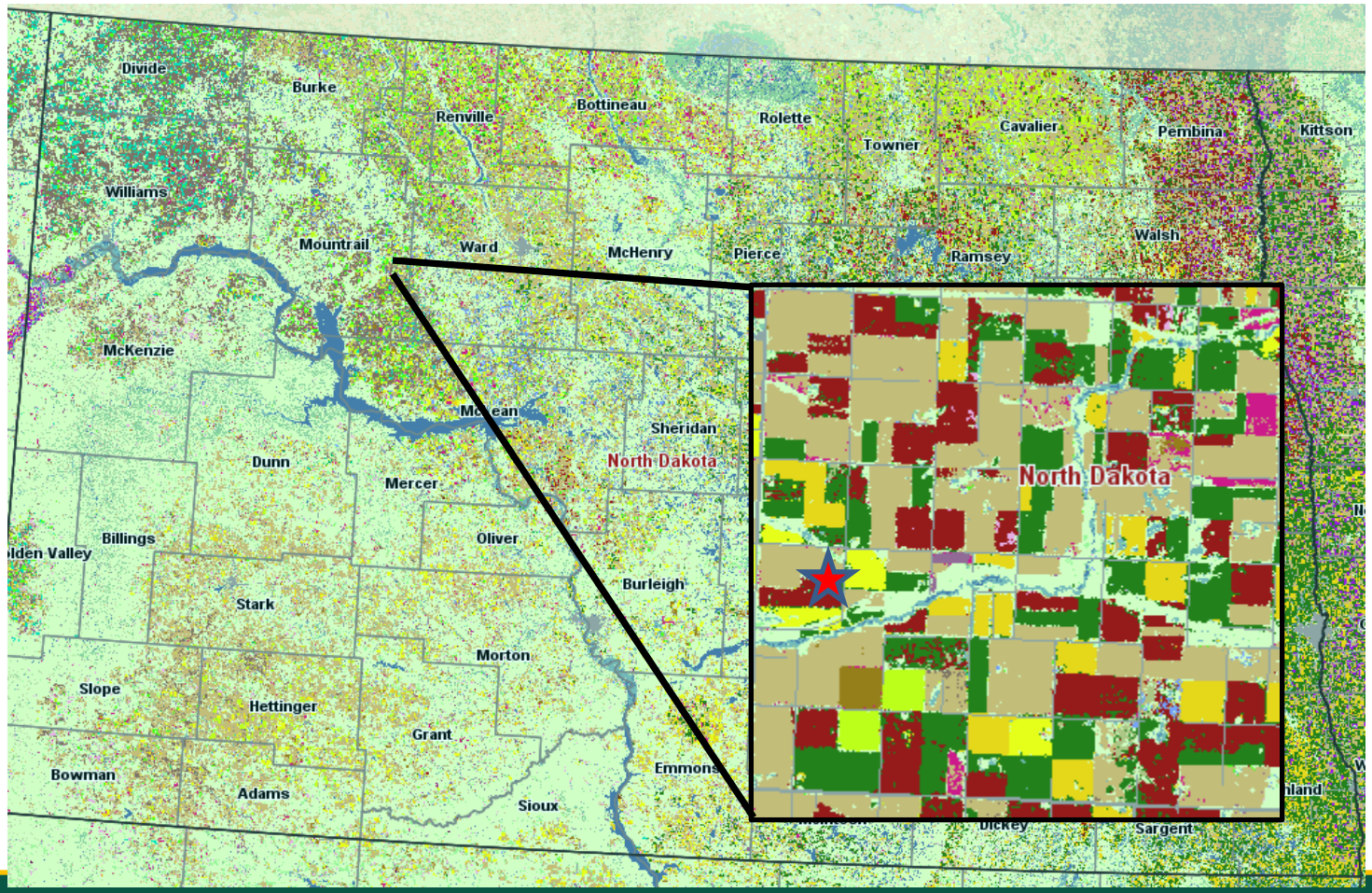
**Predict** → Truck Trips and Routes

**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

# Questions?

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