Process & Status of Urban Street Needs Study of the 14 Largest Cities

September 16, 2016
3:30 to 4:30 PM CT
North Dakota League of Cities Conference
Bismarck Ramkota Hotel
Bismarck, North Dakota

Upper Great Plains Transportation Institute
North Dakota State University
Tim Horner and Brad Wentz

NDSU UPPER GREAT PLAINS TRANSPORTATION INSTITUTE

Agenda

- Background/History of urban study
- Overview of County/TWP Study
- 2015-16 Partnership of NDDOT & NDLoC
  - Approach for 2016 Urban Study
- Overview of Geographic Roadway Information Tool (GRIT)
- Discussion

Background/History of urban study

- NDDOT initiated an Urban/City needs study in 2013-14 time period
- It was a survey based study – short timeframe
- NDDOT presented results to 2015 Legislature
  - Legislative Comments/Issues with 2014 Study:
    - survey based study – not engineering /objective based study
    - Goal should be to develop and portray city needs in similar vein as county/twp/state system needs studies

Urban Study Process - 2014

- Primarily a survey based study
- Cities with population > 5,000 surveyed differently than those < 5,000
- Cities with < 5000 population generally don't have LRTPs or CIPs
- Covered all streets except state system

Urban Study Process - 2014

- Small cities survey
  - Survey mailed to each city Auditor
  - Data Requests
    - # of miles of street
    - Surface type (gravel, asphalt, concrete)
    - Condition
    - Maintenance Practices
    - Curb & Gutter (Y/N)
  - Response Rate
    - 41%

Urban Study Process - 2014

- Large Cities Process Used:
  - Most recent LRTP
  - Most recent CIP
  - Simple Survey - Expected annual needs based on history
  - Meetings with cities

Overview of Past County/TWP Studies

- Past County/TWP studies were developed under following concepts and steps
  - 20 year study window
  - Estimate the traffic on all county TWP roads through a traffic flow model
  - Counties submit pavement history via Geographic Road Inventory Tool (GRIT) (2016 Study)
  - Estimate pavement, gravel and bridge costing
    - Note: Gravel is approximately 50% of 20 year cost

Overview of Past County/TWP Studies

- UGPTI obtains pavement cost information from NDDOT
- UGPTI obtains gravel costing from each county & responding TWP
- UGPTI obtains pavement depth and strength through GPR survey from legislative funding
- UGPTI obtains pavement distress information from NDDOT
  - NDDOT operates Pathways van on 5000 miles of county road
  - UGPTI provides staff for driving and data analysis
  - NDDOT supplies final pavement ride and distress information

Overview of Past County/TWP Studies

- UGPTI uses AASHTO-93 model to project necessary pavement improvements over 20 years
- UGPTI models needed bridge improvements – 20 years
- UGPTI models gravel needs -20 years
- UGPTI develops report, takes comments and reports to Legislative Budget Section

Data Collected for 2015-16 County/TWP Study

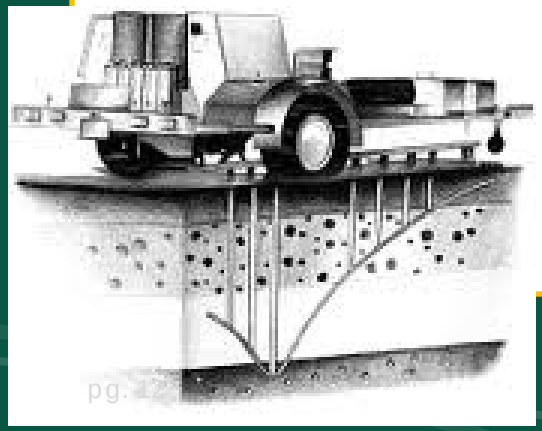
- Jurisdictional data for 52 counties -2014
- 1,000+ vehicle counts and classifications by NDDOT & UGPTI
- 5,600 miles of pavement video image, pavement distress and ride data.
- 1,500 miles of pavement/subgrade strength and depth surveys
- Gravel costing surveys for 53 counties
- NBIS data on 2,327 local bridges

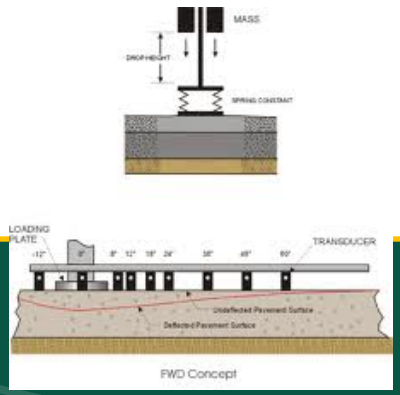
County Pavement Data Collection

- Condition data collection
  - Collected data with NDDOT Pathway van
  - Approx. 5,000 miles of paved county roads
    - Did not collect short segments
  - Van provides consistent pavement distress and ride information
- Scoring and reporting of data
  - Van has automatic pavement distress/ride scoring
  - 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 needed from GRIT (To be discussed in upcoming slides)

Pavement Data Collection – not proposed in Urban Study

- Non-destructive testing
  - 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 2013 study
  - FWD done first and GPR done on the sites (based on GPS) thumped with FWD
  - **More important where many trucks are present**



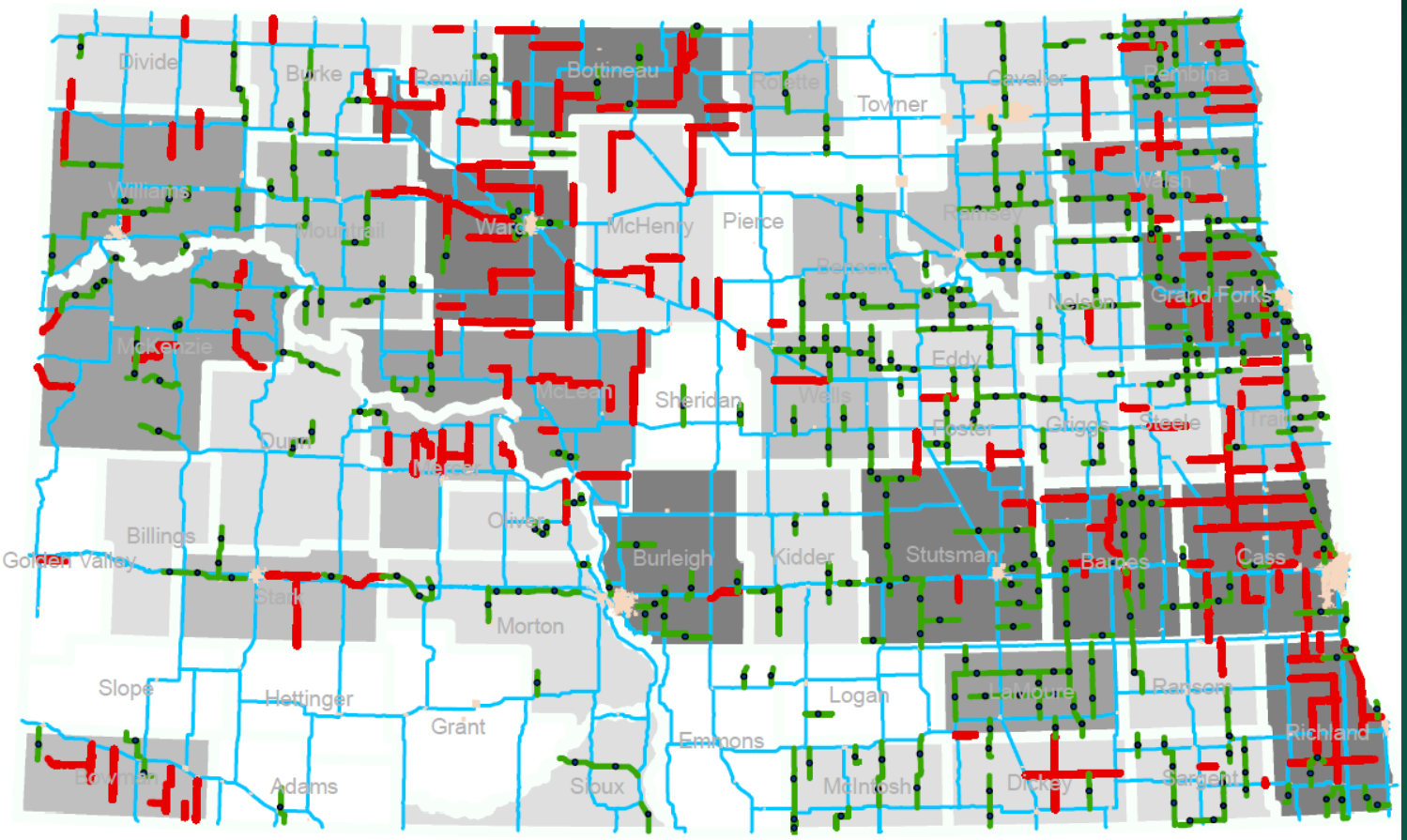


FWD Concept

Non-Destructive Testing Sites

2013

2015



Overview of 2016 County/TWP Study

- In current County/TWP study, counties are supplying pavement history/depth and width data through GRIT (Geographic Road Information Tool) –
- GRIT was a 2015 Legislative Asset Management Initiative

NDDOT & NDLoC Partnership for 2016 Urban Study

- NDLoC began discussions with NDDOT in Summer of 2015
- NDLoC hosted NDDOT/UGPTI/City discussion meetings in September '15 and January '16.
- NDDOT agreed to sponsor UGPTI staff time for a study
- NDLoC and 14 Largest Cities agreed to pay for pavement data collection

2016 Scope of Urban Study as Decided Upon

- 14 cities to be in the study group
  - Corridors limited to non-residential, non-state system routes
    - Basically collectors up to but not including state system
  - Pavements
    - Incorporate storm sewer and traffic operations and lighting into unit costs – not specifically analyzed.
    - Use AASHTO-93 analysis method
    - Collect Pavement Condition with Automated Data Vehicle
  - Volume/Capacity ratios
    - Identify Capacity needs for less than LOS D
    - Corridors, not intersections

2016 Scope of Urban Study as Decided Upon

- Bridges – include in study

- Future growth investment needs based on LRTP
- Participating cities supply pavement depth, width and age data through UGPTI Geographic Inventory Toolkit-GRIT
- Use study as a testbed to decide if urban studies expand to next tier of cities in future

2016 UGPTI Urban Study Activities

- Fine tuned network to be studied in each city
  - Maps to be shown later in presentation
- Researched of available city FHWA-HPMS data
  - Very limited – excludes HERS-ST as an option (used in NDDOT Study)
  - Pushed option to AASHTO-93 pavement deterioration study (used in county/twp study)
- Requested informal quotes for pavement distress and ride surveys
  - Braun Intertec, Fugro, CGI Engineering Consulting Group (ECG), Dynatest

2016 UGPTI Urban Study Activities

- Brainstormed essential data needed from cities – pavement depth and history and lanes/width
- Contacted various cities regarding GIS based pavement history file
  - Existed in Fargo, Grand Forks, Bismarck
    - Different formats and referencing systems
  - Very little pavement depth & history data found in other cities
    - Would have to be obtained on a city by city basis

2016 Urban UGPTI Study Activities

- Surveyed most likely cities for recent automated pavement distress surveys
  - Grand Forks – Completed 2013
  - Fargo – Completed 2012
  - Bismarck – Completed 2012
  - Note:
    - County/TWP survey was conducted 2015
  - No surveys existed that were as current as county/TWP or state system studies

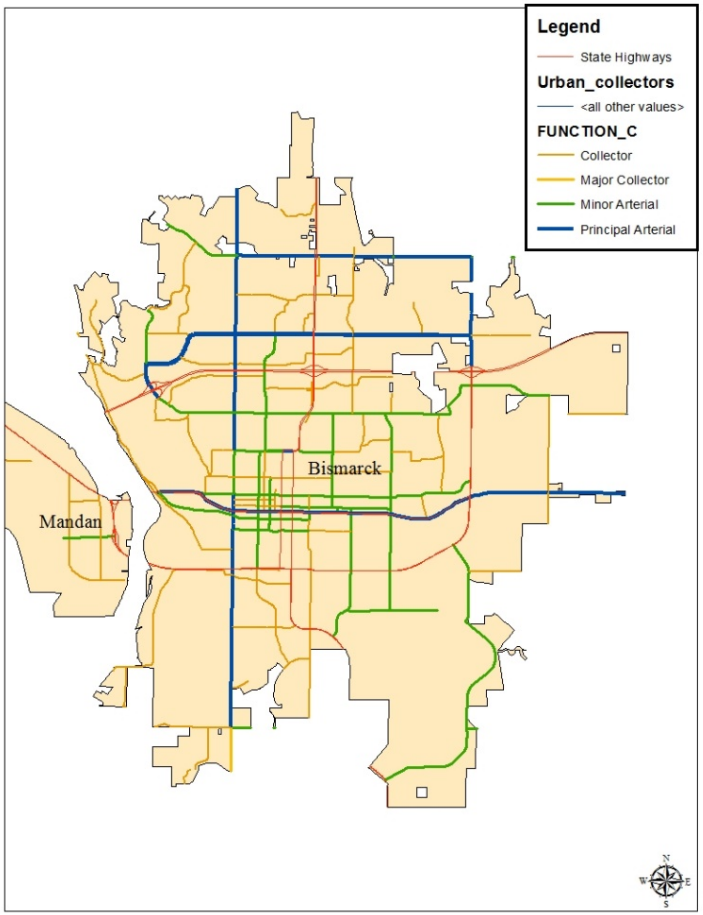
2016 UGPTI Urban Study Activities

- Solicited informal quotes so NDLoC could propose a budget to 14 cities
  - Fugro (Austin, TX) (received last week)
  - Braun Intertec (St. Paul, MN)
  - CGI Engineering Consulting Group (ECG) (Los Angeles, CA)
- Scope of quotes
  - Approx. 525 Miles across 14 cities
  - IRI/PCI, Rutting, Distress, Location
  - Imaging added as option cost

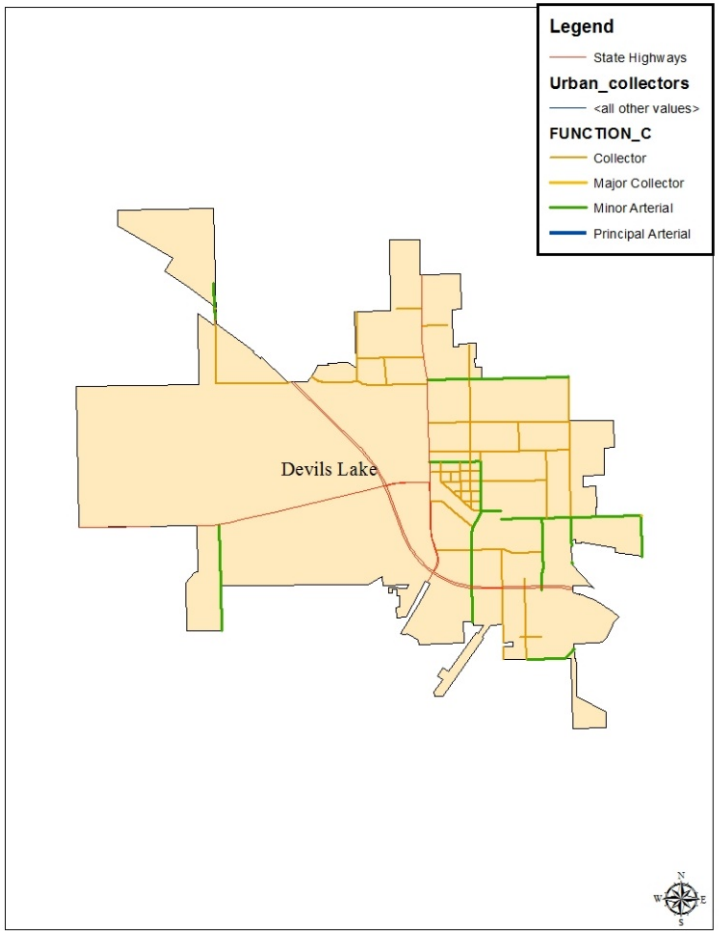
2016 UGPTI Urban Study Activities

- Solicited formal quotes from pavement distress companies – received from:
  - Fugro (Austin, TX)
  - Dynatest Inc. (Florida)
  - CGI Engineering Consulting Group (ECG) (Los Angeles, CA)
- Selected Dynatest
  - Used 2 city reps on selection panel
  - Collection of data completed Aug. 1
  - Received final processed data this week

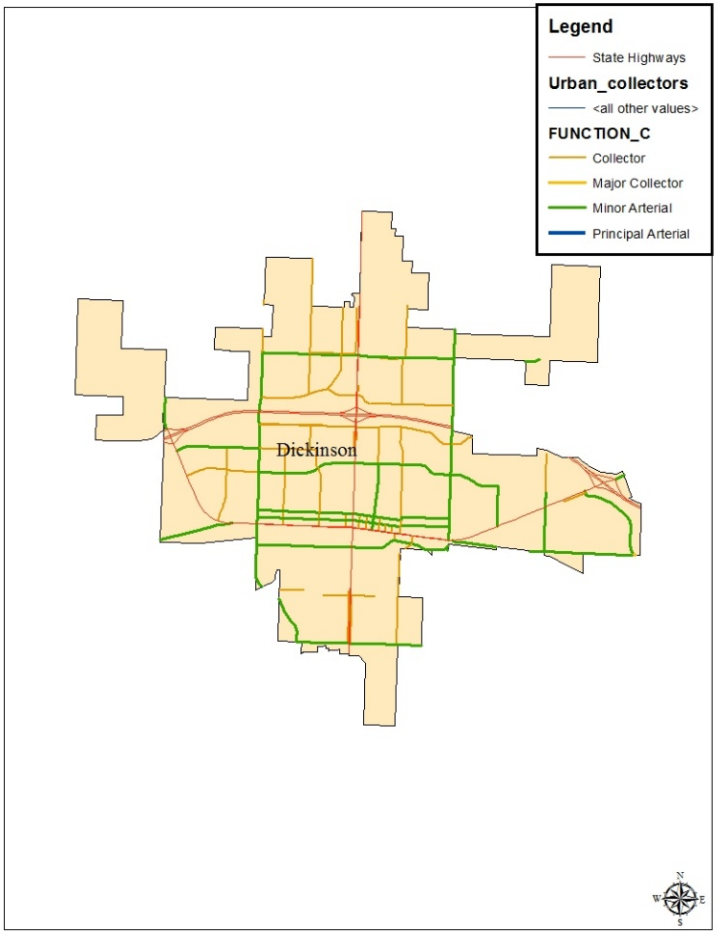
Study Network – Bismarck



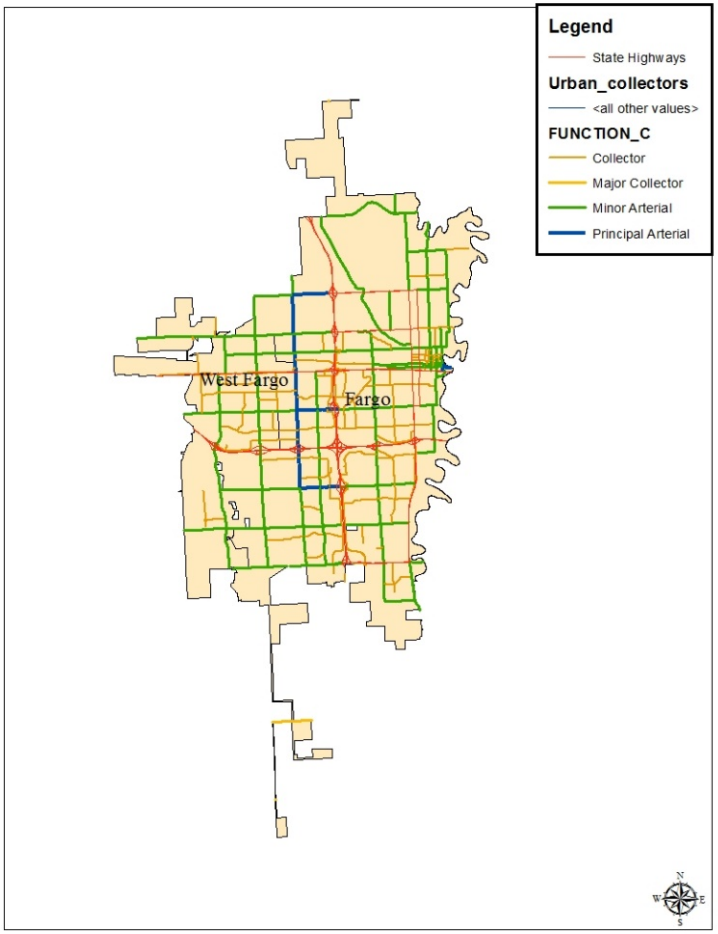
Study Network – Devils Lake



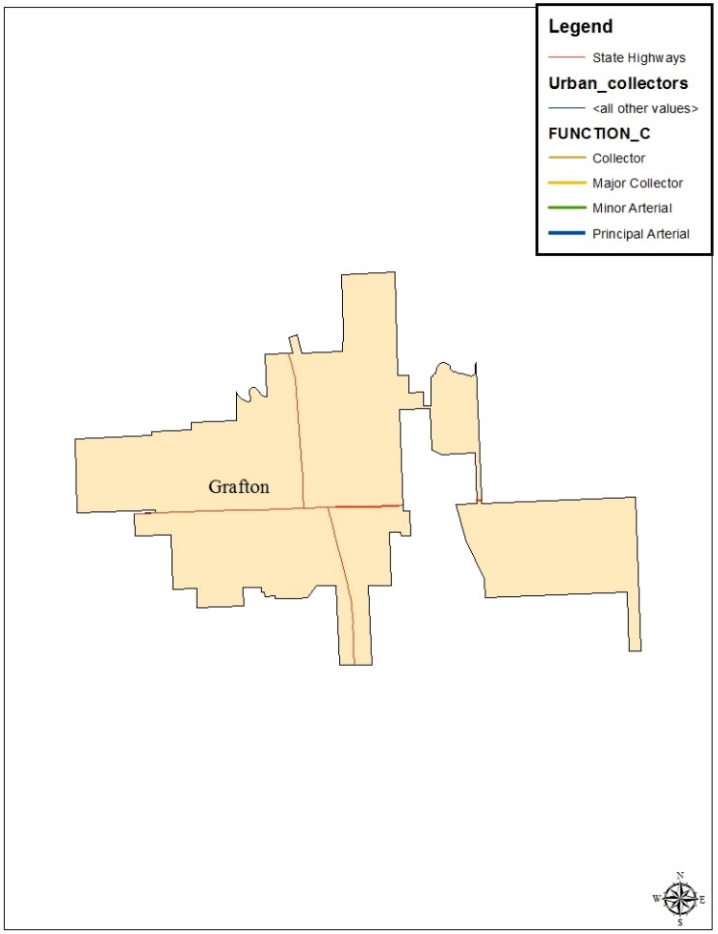
Study Network - Dickinson



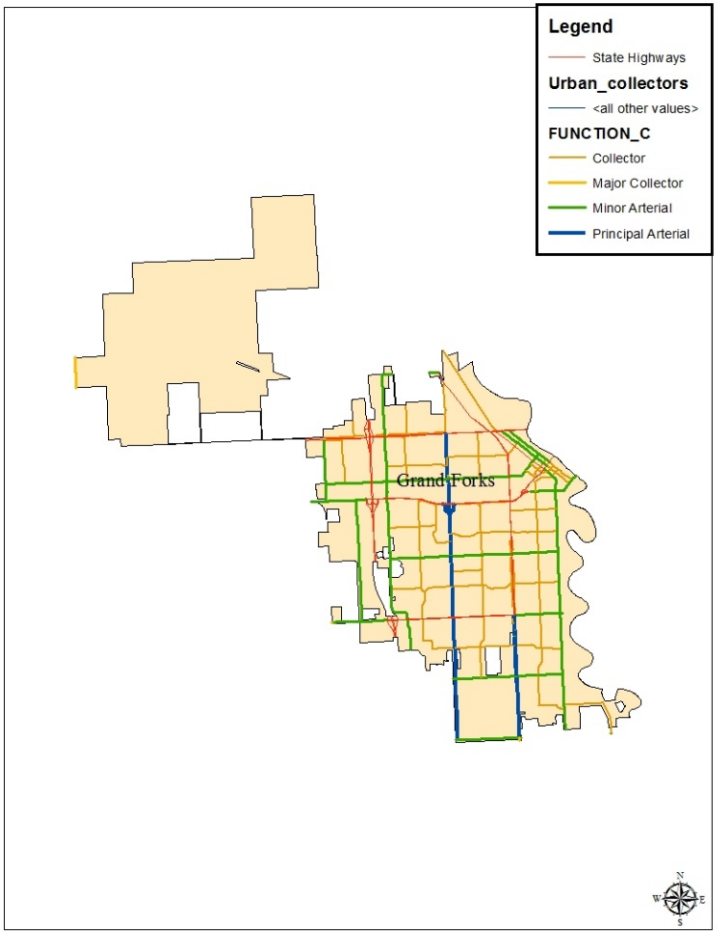
Study Network – Fargo



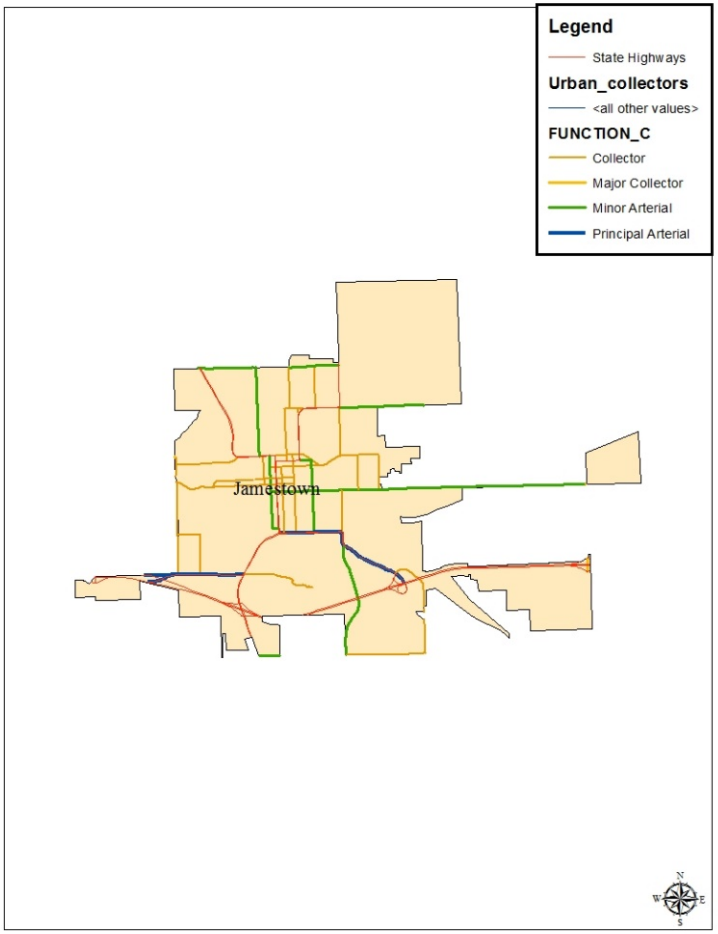
Study Network – Grafton



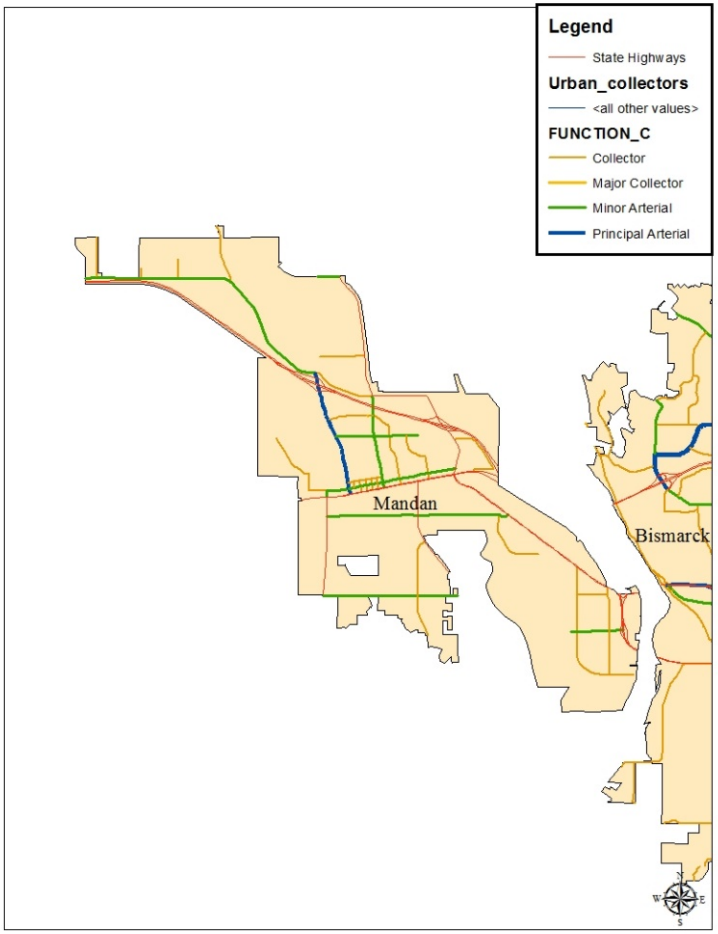
Study Network – Grand Forks



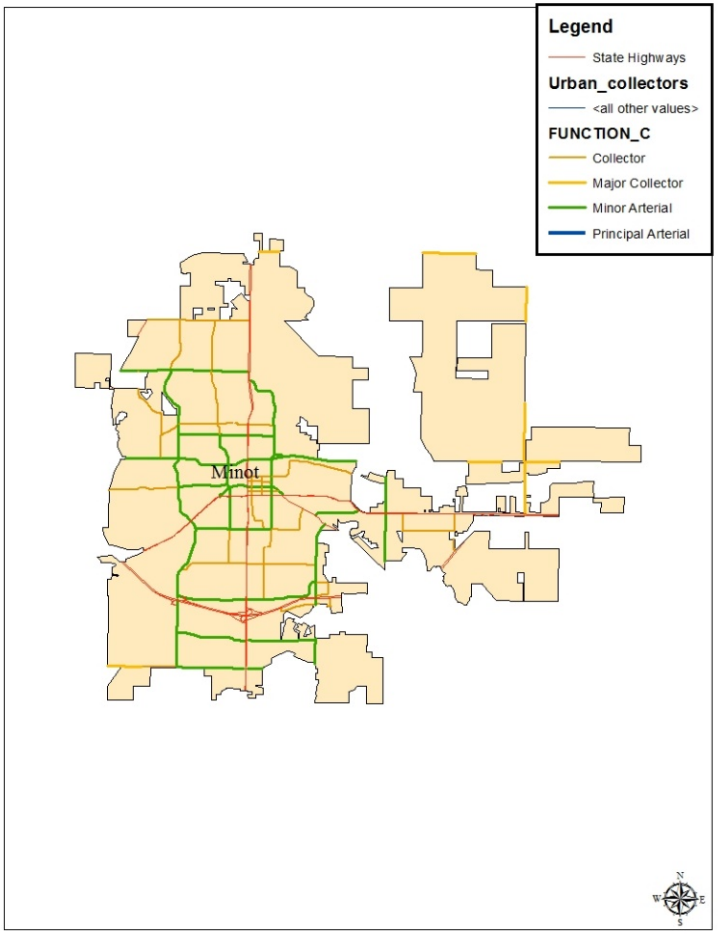
Study Network - Jamestown



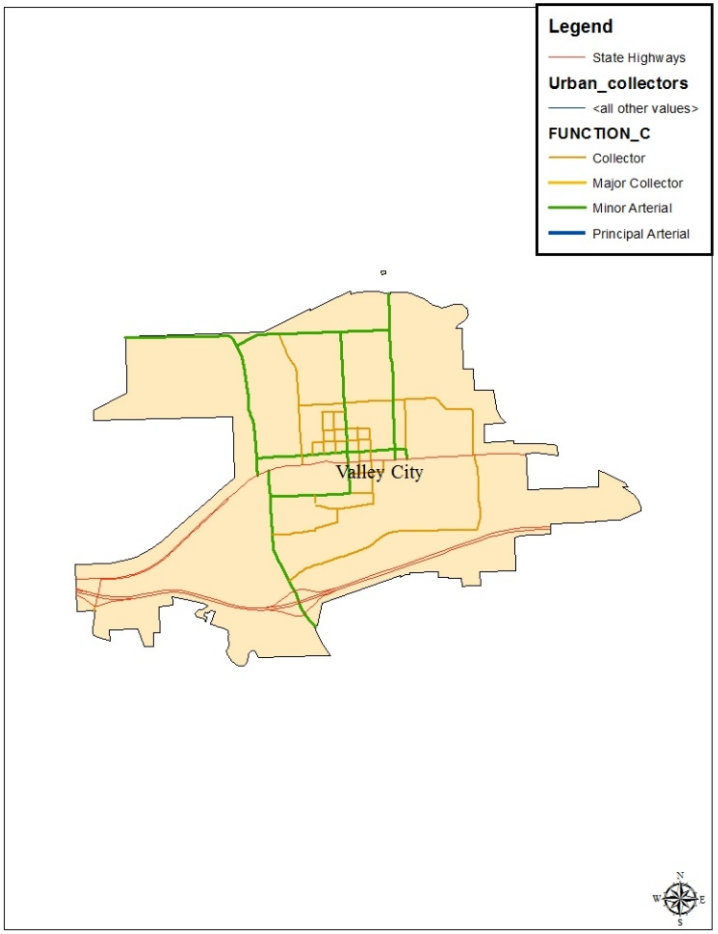
Study Network - Mandan



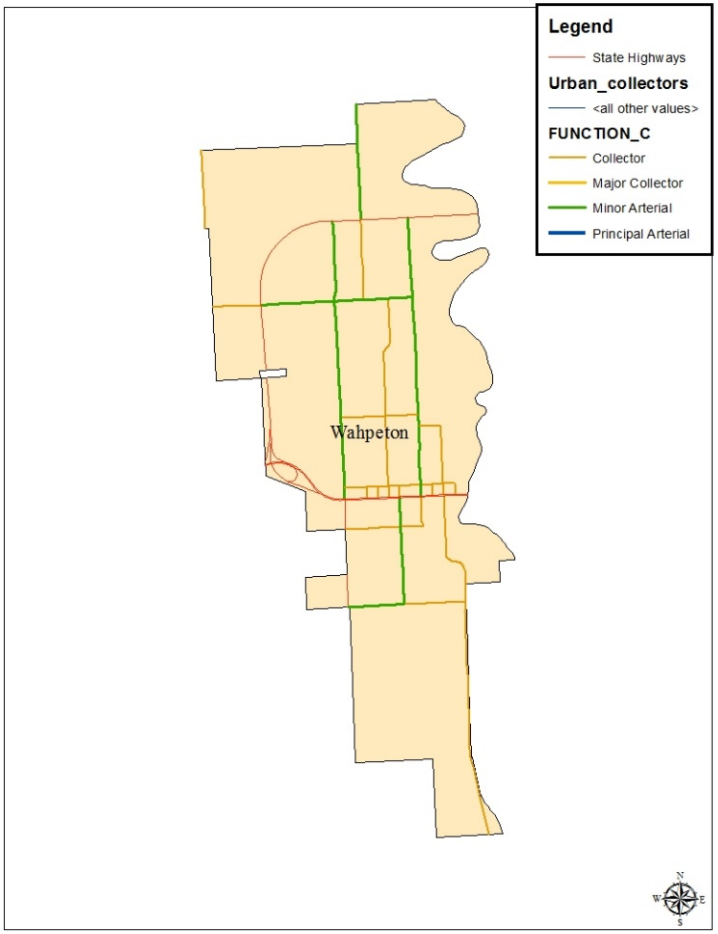
Study Network - Minot



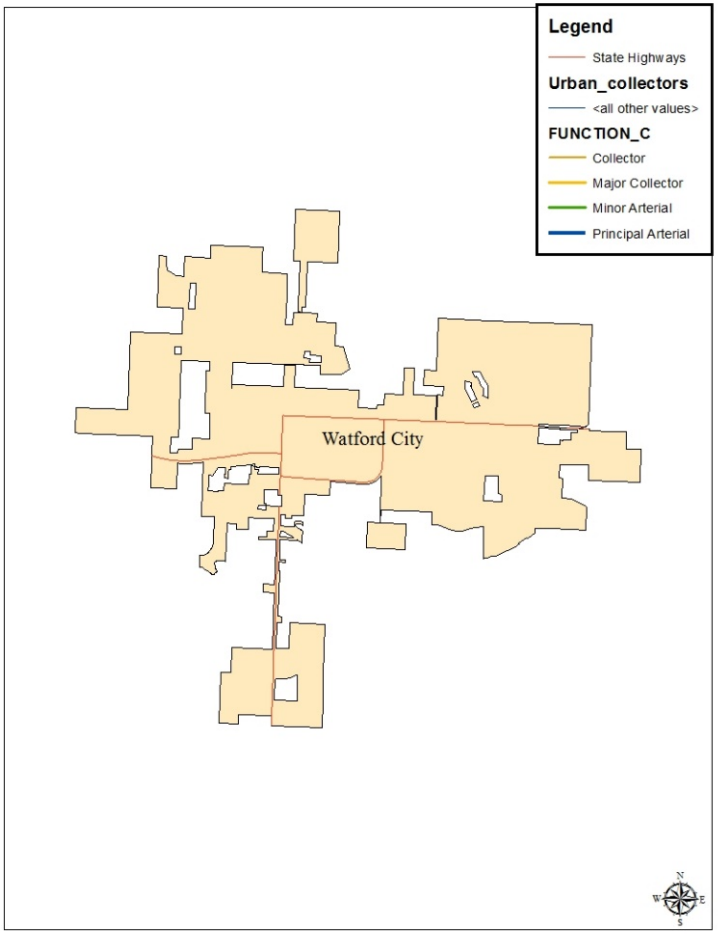
Study Network – Valley City



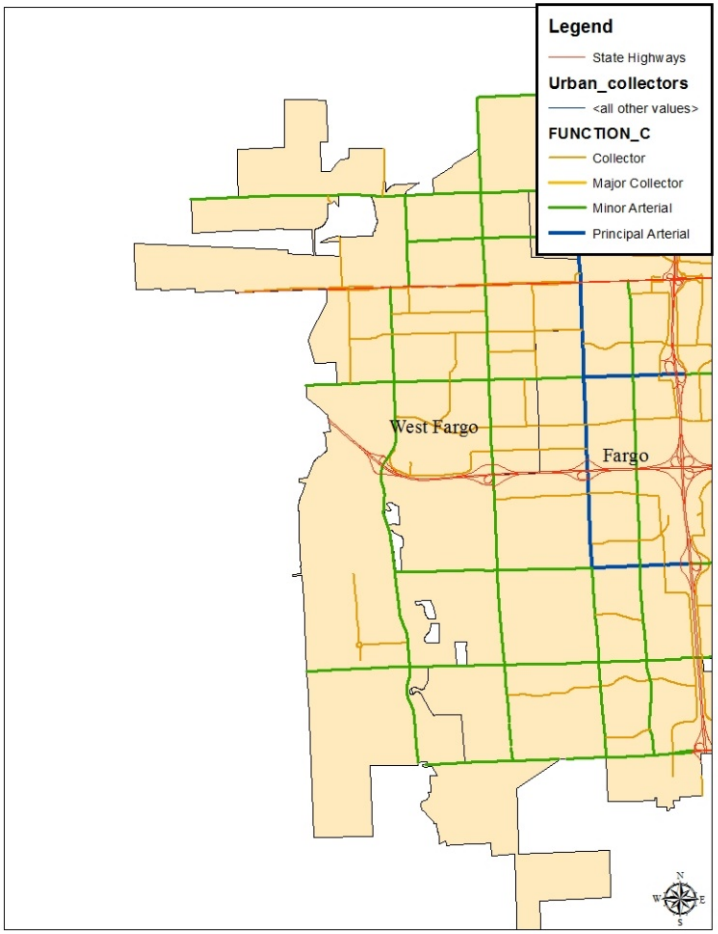
Study Network - Wahpeton



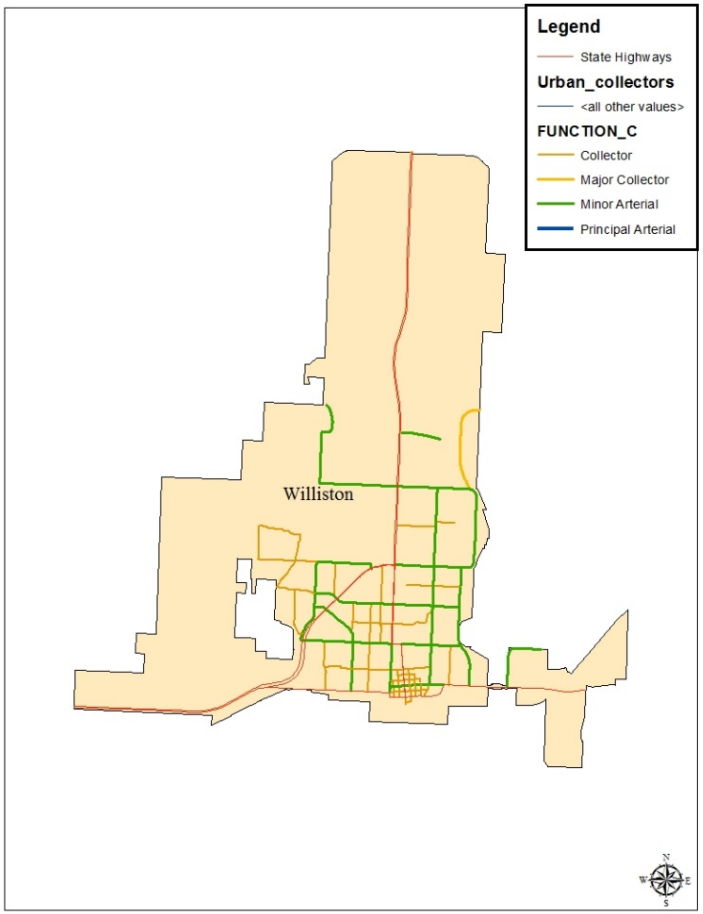
Study Network – Watford City



Study Network – West Fargo



Study Network - Williston



Study Network - Mileage

City	Mileage
Devils Lake	23.00
Dickinson	46.50
Fargo	139.75
Grafton	10.75
Grand Forks	78.00
Jamestown	32.00
Mandan	28.00
Minot	61.00
Valley City	15.00
Wahpeton	12.50
Williston	54.00
West Fargo	41.00
Watford City	5.00
SUM	546.50

Bismarck contracted separately and supplied data to UGPTI

2016 UGPTI Urban Study Activities

Will Review Existing City LRTPs Surveys		
Report	**Year**	**MPO/Consultant**
Bismarck - Mandan	2014	MPO
Dickinson	2013	KLJ
Fargo - West Fargo	2014	MPO
Grand Forks	2014	MPO
Jamestown	2015	RDG Planning
Minot	2015	SRF Consulting
Wahpeton	2011	Hoisington Koegler Group
Williston	2010	SRF Consulting

2016 UGPTI Urban Study Activities

- Trained Cities on how to input data into GRIT
- Have received data from 9 of the 14 cities
- Waiting on:
  - West Fargo
  - Valley City
  - Jamestown
  - Mandan
  - Devils Lake

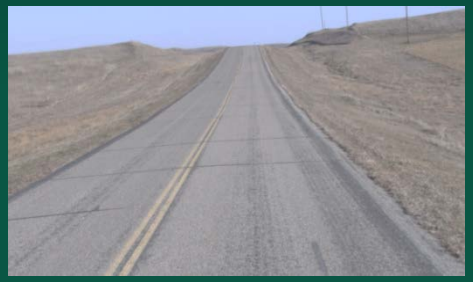
2016 UGPTI Study Activities – Next Steps

- Build traffic model for each city network
  - Will use existing MPO models when available
- Project LOS D levels for number of lanes and traffic levels
- Develop cost estimates for various pavement improvements
- Apply AASHTO 93 Pavement Model
- Project pavement needs
- Project capacity issues (mainline – not intersections)

2016 UGPTI Urban Study Activities – Next Steps

- Research LRTP's for corridor costs into the future
- Analyze urban bridges needs
- Write draft report and present to NDDOT and NDLoC
- Sometime this fall – hope for end of October

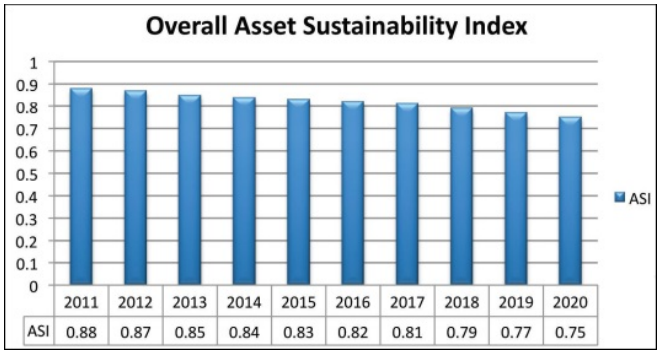
UGPTI GEOGRAPHIC ROADWAY INVENTORY TOOL (GRIT)



Brad Wentz
Upper Great Plains Transportation Institute

Local Roads Asset Inventory Toolkit

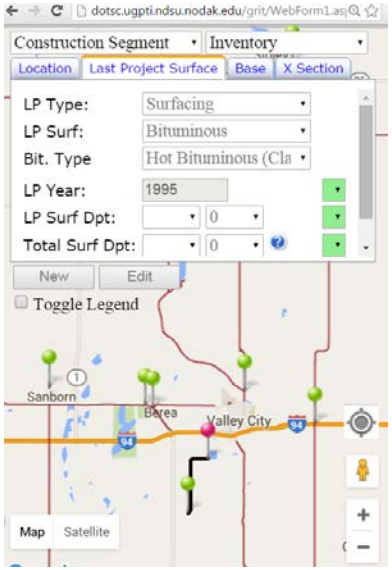
- Advanced by UGPTI Advisory Council
- 2015 Legislature Appropriated Funds for an Asset Management Initiative.
  - Provide tools for local governments to preserve and maintain roads and bridges.



Asset Inventory Tool Objectives

Easy to use software – free

Initial data to support Needs Study



Map based – Google Maps

Web browser based – any platform

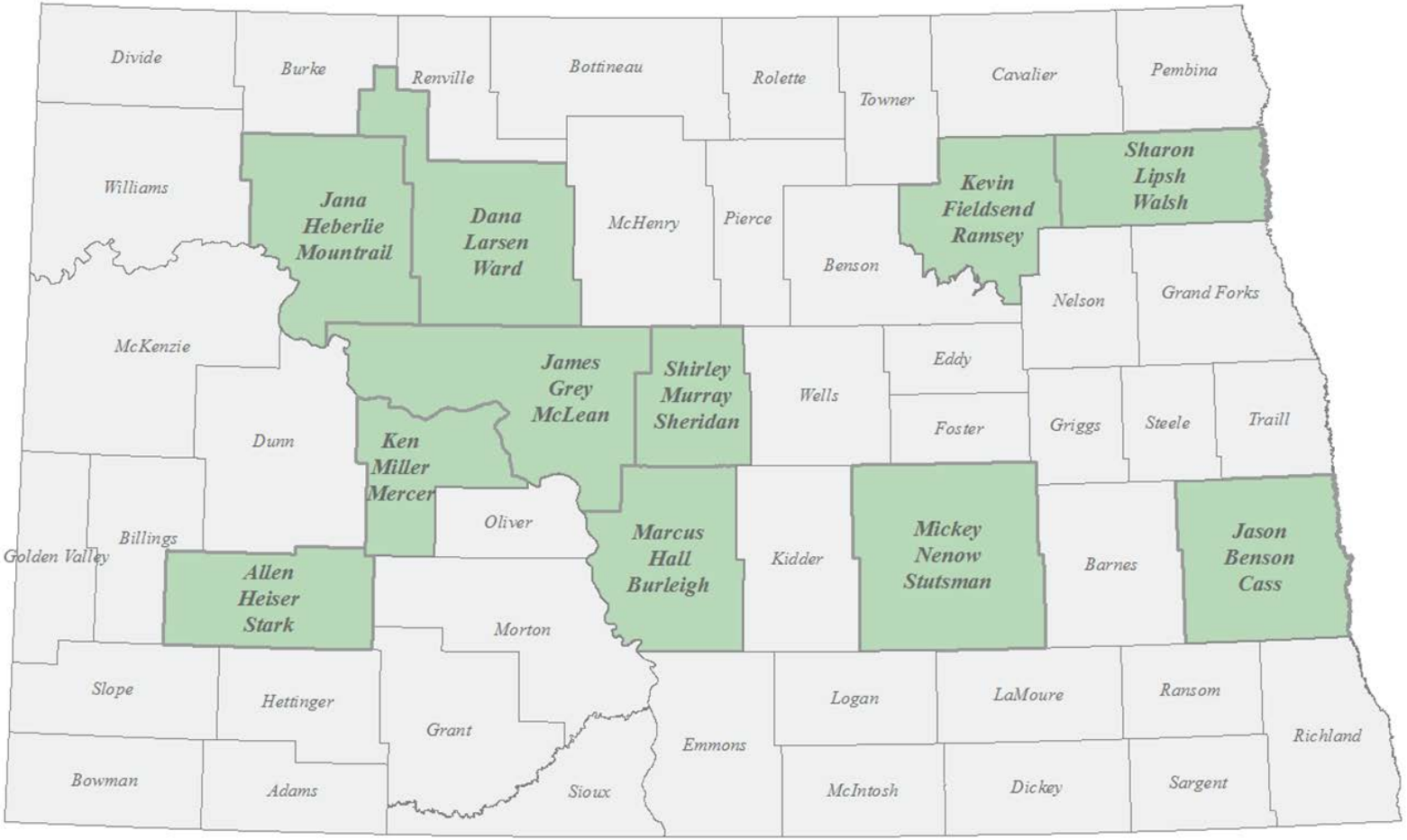
- Mobile/touchscreen capable with GPS

County independent data editing

Compatible with existing interactive map

Linear Referencing or compatible with…

Steering Team



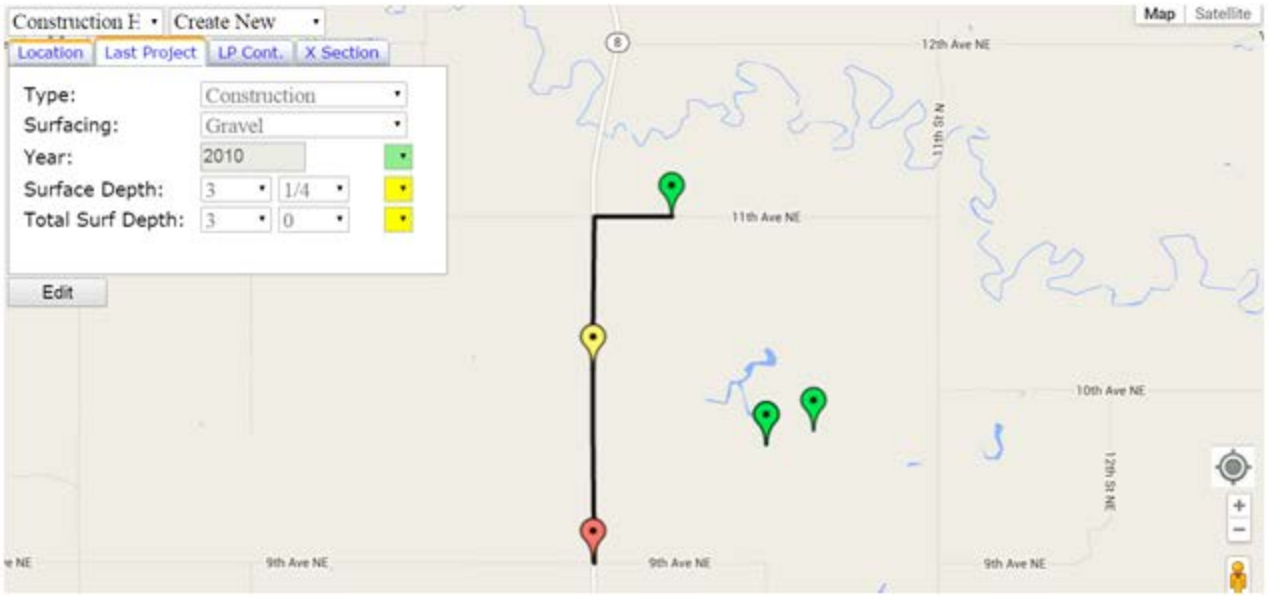
Demonstration of GRIT

Geographic Road Inventory Tool

Brad Wentz

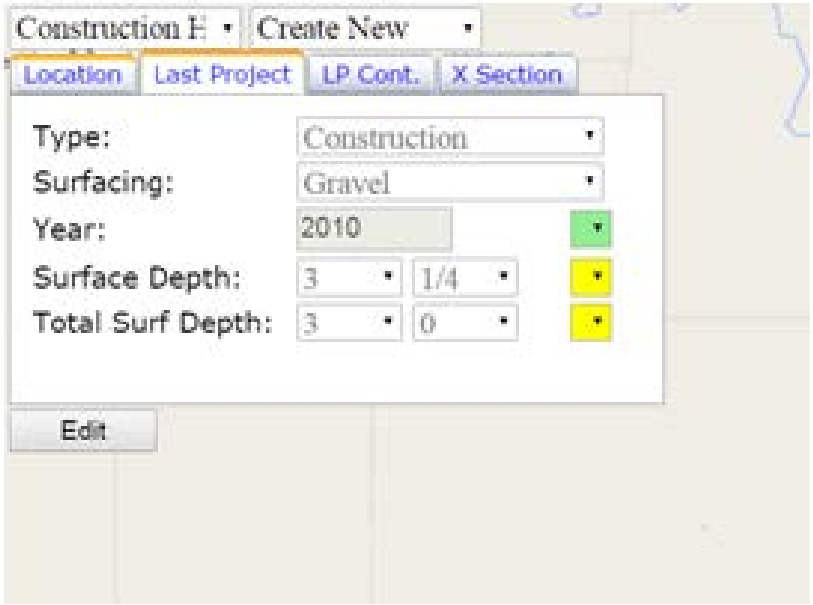
Local Roads Asset Inventory Toolkit

- Building Data Inventory Examples:



Local Roads Asset Inventory Toolkit

- Building Data Inventory Examples:



GRIT Based Approach For City Study

- Develop draft study network for each city to review and approve
- Add city networks to GRIT system for city input – pavement history and depth and width/number of lanes
- Collect Pavement Data via Consultant Survey
- Build traffic estimates for each corridor

GRIT Based Approach For City Study

- Develop pavement unit costs for review and city/NDDOT approval
- Perform Pavement analysis/cost projection for maintenance and future capacity
- Acquire Future Corridor Expansions From LRTPs
- Perform Bridge Needs Analysis
- Summarize Results in draft report

Traffic Volume/Capacity Process

- Use MPO Traffic models to cover 5 cities
  - Fargo, West Fargo, Bismarck, Mandan, Grand Forks
- Use models to forecast traffic issues and prioritize projects including, pavement improvements, road widening and traffic upgrades
- Use NDDOT Data and LRTP for traffic in other cities

Pavement Construction Costs

- Develop pavement construction cost scenarios
  - Costs based on past bid tabulations
  - Maintenance, Overlays, Reconstruction, New Construction
  - Integrate storm sewer, traffic upgrades as a general add-on costs to main project type

Proposed Approach

- Analyze existing bridge inventory
  - NBIS will provide bridge data
- Estimate costs by 5 year increments
- Written draft report to be presented in Fall 2016

Questions/Discussion

Tim Horner
701-328-9859
timothy.horner@ndsu.edu

Brad Wentz
701-231-7230
bradley.wentz@ndsu.edu