

North Dakota Infrastructure Needs Studies by Jurisdiction: State, County, Township, Urban and Transit

North Dakota Symposium on Transportation Funding

Tim Horner – Program Director

Bismarck Radisson

March 14, 2018

Upper Great Plains Transportation Institute
North Dakota State University

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

Content of Today's Presentation

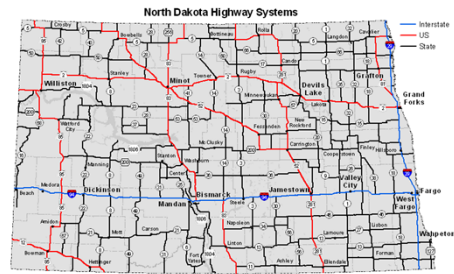
- Quick History of Needs Studies
 - Sponsor of Individual Study
 - Study Team Members
 - Methods Used
 - Data Collection Details
 - Results
- Roll-up of All Studies
- Corresponding tables are found in the blue handout

Slide 2

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota State System Needs Study

- Study Sponsor
 - NDDOT
- Year Conducted
 - 2016
 - Additionally a study of impacts of 129,000 pound trucks performed in 2016
- Team Members
 - NDDOT – Grant Levi, Steve Salwei, Scott Zainhofsky, Jack Smith
 - UGPTI – Alan Dybing, Tim Horner, Brad Wentz, Andrew Wrucke



Slide 3

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota State System Needs Study

- Methods
 - Study was performed with FHWA Highway Economic Requirements System State Version (HERS-ST) Software
 - Separate pavement analysis was performed using AASHTO-93 Pavement Analysis
 - Both processes selected pavement projects needed within a 20 year period with timing based upon maximum benefit/cost ratio
 - Bridges were analyzed separately

Slide 4

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota Truck Harmonization Study of 129,000 pound trucks - 2016

- Study Sponsor
 - 2015 Legislature
 - Study Team:
 - NDDOT, UGPTI, NDHP
 - ND Dept. of Commerce plus 8 association groups
 - 129,000 lb. trucks were modeled to project bridge inventory ratings to compare to current ratings

**North Dakota
Truck Harmonization Study**



Slide 5

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota Truck Harmonization Study of 129,000 pound trucks

- Methods
 - 7 trucks equal to or nearly equal to 129,000 pounds were used to study pavement and bridge impacts

Truck tractor with triple drive axles towing semi-trailer with tandem axles towing a full trailer with 2 sets of tandem axles.



Benefit: +23,500 LBS

<u>Current Rules ND- Non Interstate</u>		<u>Gross Vehicle Weight – 105,500 lbs.</u>	
12100	48000	34000	34000



<u>Harmonization w/ MT & SD</u>		<u>Gross Vehicle Weight – 129,000 lbs.</u>	
12100	43500	34000	34000

(As pictured above allowing for 100' of cargo carrying capacity on the national network)

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota Truck Harmonization Study of 129,000 pound trucks

Methods

- Equivalent Single Axle Loads were calculated for current trucks versus 129 k trucks.
- 129 k trucks were modeled to project bridge inventory ratings to compare to current ratings

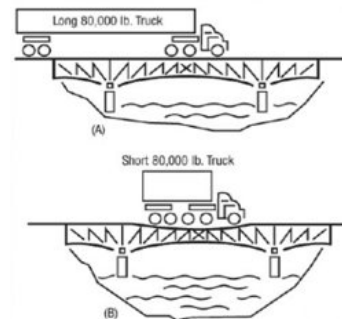
Results

- Pavement impacts were negligible since 129,000 lb. trucks have more tandem and triple axles which are more pavement friendly and result in fewer trips

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota Truck Harmonization Study of 129,000 pound trucks

- Results
 - Bridges are more sensitive to heavier trucks no matter of the axle configurations
 - Impact to state system bridges was additional \$716 million occurring sometime in the future



Slide 8

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota State Infrastructure Needs Study*

Year	Road Needs (\$million)	Improved Miles	Bridge Needs (\$million)	Total (\$million)
2016-17	\$1,182	696	\$287	\$1,469
2018-19	\$1,182	696	\$41	\$1,233
2020-21	\$777	665	\$41	\$818
2022-23	\$777	665	\$41	\$818
2024-25	\$746	614	\$42	\$788
2026-35	\$4,978	3,189	\$181	\$5,159
Truck Harmonization				\$761
2016-35	\$9,642		\$1,395	\$11,037

*Study considered only the improvement and routine maintenance costs for highways

Slide 9

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota County-Township Study

- Study Sponsor
 - 2015 Legislature
- Year Conducted
 - 2015 to 2016
- Team Members
 - NDDOT Planning Staff (Pavement Data)
 - UGPTI – Alan Dybing, Tim Horner, Brad Wentz, Dale Heglund, Andrew Wrucke, Michal Jaroszynski
 - Dynatest and Infrasence



Slide 10

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

Quick History of County-Township Studies

- 2010 study: UGPTI estimated road investment needs for the 2011 session
 - 21,500 new wells & increased ag. production
- 2012 study: Updated investment needs
 - 46,000 new wells, ag. production, & initial bridge study
- 2014 study: More comprehensive data
 - Higher roadway costs, ag. production, & 60,000 new wells
- 2016 study: First study with GRIT, Oil Production Scenarios

Slide 11

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota County-Township Study

- Methods
 - Pavement condition collected by NDDOT
 - Pavement and soil strength collected by UGPTI through Dynatest & Infrasense



Slide 12

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota County-Township Study

- Methods
 - Gravel Surveys of Counties and Townships
 - Creation of traffic model for entire state to predict truck loads on county and state roads
 - Pavement prediction model created to forecast when projects would be needed



Slide 13

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota County-Township Study

Year	Gravel (\$million)	Paved (\$million)	Bridges (\$million)	Total
2016-17	\$645	\$296	\$87	\$1,028
2018-19	\$607	\$299	\$87	\$993
2020-21	\$660	\$278	\$87	\$1,025
2022-23	\$661	\$237	\$87	\$985
2024-25	\$603	\$233	\$90	\$926
2026-35	\$2,916	\$921	\$11	\$3,848
2016-35	\$6,091	\$2,265	\$449	\$8,805

Slide 14

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota Urban Study

- Study Sponsor
 - North Dakota DOT & ND League of Cities
- Year Conducted – 2016
- Team Members
 - NDDOT – Steve Salwei
 - NDLC – Blake Crosby
 - UGPTI – Brad Wentz, Alan Dybing, Tim Horner, Andrew Wrucke, Michal Jaroszynski
 - Dynatest



Slide 15

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota Urban Study

- Methods
 - Major Collectors in 14 largest cities
 - Not on State System
 - Approximately 550 miles
 - Urban Bridges not on state system
 - UGPTI collected pavement data

Slide 16

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

North Dakota Urban Study

Year	Roads (\$million)	Bridges (\$million)	Total (\$million)
2016-17	\$141	\$8	\$149
2018-19	\$97	\$8	\$105
2020-21	\$80	\$8	\$88
2022-23	\$70	\$8	\$78
2024-25	\$43	\$8	\$51
2026-35	\$171	\$2	\$173
2016-35	\$601	\$42	\$643

Slide 17

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

Transit Needs Study

- Requested and Sponsored by ND DOT
- Conducted in 2014
- Steering committee included members of NDDOT, urban and rural transit agencies, MPOs, and AARP



NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

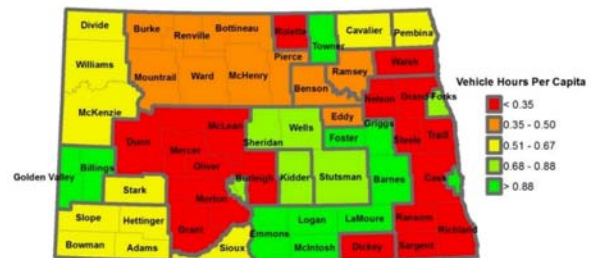
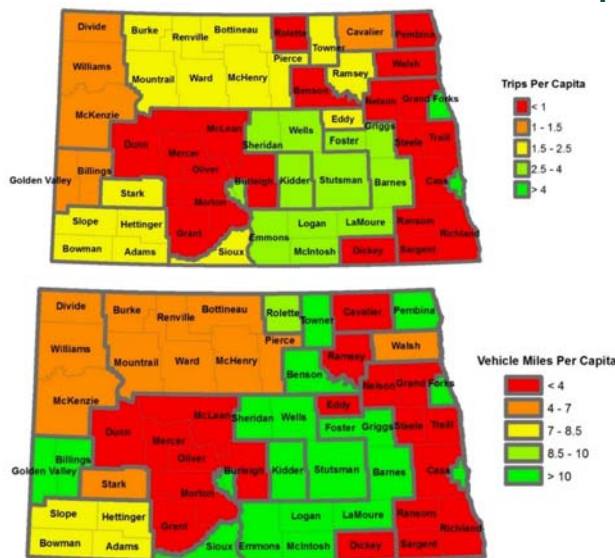
Transit Needs Study

- UGPTI team: Jeremy Mattson and Jill Hough
- Study examined the following metrics:
 - Days and hours service is available
 - Trips per capita
 - Vehicle miles per capita
 - Vehicle hours per capita



NDSU UPPER GREAT PLAINS TRANSPORTATION INSTITUTE

Regional Service Data



NDSU UPPER GREAT PLAINS TRANSPORTATION INSTITUTE

Transit Needs Study

- Scenarios examined
 - Scenario 1: Each region must meet 1 of 3 benchmarks
 - **Scenario 2: Accounts for projected population growth and must meet requirement for Scenario 1**
 - Scenario 3: Each region must meet 2 of 3 benchmarks and requirements for scenario 2
 - Scenario 4: Minimum 10% increase, and must meet requirements of Scenario 3

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

Transit Needs Study

Summary of Estimated Increase in Operating and Vehicle Expenses for Expanded Mobility Options, Assuming Projected 2020 Population

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Annual operating expense increase (million \$)	\$5.0	\$7.0	\$9.2	\$9.6
Vehicle expense (one-time cost) (million \$)	\$8.6	\$10.9	\$13.3	\$13.5

Increase in Estimated Long-Term Annual Vehicle Replacement Costs: \$1.0 million (\$200,000 non-Federal share)

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

Transit Needs Study

Year	Operating Cost (\$million)	Vehicle Cost (\$million)	Total (\$million)
2016-17	\$55	\$17	\$72
2018-19	\$57	\$9	\$66
2020-21	\$59	\$10	\$69
2022-23	\$60	\$10	\$70
2024-25	\$61	\$11	\$72
2026-35	\$314	\$55	\$369
2016-35	\$606	\$113	\$718

Slide 23

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

Statewide Infrastructure Needs – All Jurisdictions

Year	State (\$million)	County and Twp (\$million)	Urban (\$million)	Transit (\$million)	Total (\$million)
2016-17	\$1,469	\$1,028	\$149	\$72	\$2,717
2018-19	\$1,223	\$993	\$105	\$66	\$2,388
2020-21	\$818	\$1,025	\$88	\$69	\$2,000
2022-23	\$818	\$985	\$78	\$70	\$1,951
2024-25	\$788	\$926	\$51	\$72	\$1,837
2026-35	\$5,159	\$3,848	\$173	\$369	\$9,549
Harmonization	\$761				\$761
2016-35	\$11,037	\$8,805	\$643	\$718	\$21,202

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

Further Information

- Tim Horner – UGPTI
- Alan Dybing – UGPTI
- Jeremy Mattson – UGPTI
- Michal Jaroszynski - UGPTI