

North Dakota Agriculture Outlook

Key Considerations

- US crops facing competitive pressure by currency, and transportation and infrastructure impediments
- US spring crop plantings skewed toward more corn, soybeans and wheat
- Black Sea concerns given Russia's war with Ukraine
- Supply chains recovering from monumental disarray
- Despite EPA announcement on November 30, biofuels offer promise and support to crop production to fulfill feedstock requirements
- Waters of the United States has important implications to agriculture
- US rail strike averted, service still to be restored
- US West Coast ports, terminals and shippers continue negotiations with International Longshore and Warehouse Union; cargo diversions from West Coast to Gulf and East Coasts
- Infrastructure investment makes a difference

Infrastructure Needs: North Dakota's County, Township and Tribal Roads and Bridges: 2021-2040

Report Requested by North Dakota Legislative Assembly
November 2020

The following UGPTI staff contributed to this study:
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Satpal Singh Wadhwa, Neeraj Dhingra, Sharijad Hasan

Summary of Study

This report is the response to the North Dakota Legislature's request for a study of the transportation infrastructure needs of all county and township roads in the state. In this report, infrastructure needs are estimated using the most current production forecasts, traffic estimates, and roadway inventory and condition data available. Agricultural and oil-related traffic are modeled in detail at the sub-county level. Oil-related traffic is predicted for individual spacing units, whereas agricultural production is estimated at the township level.

A significant data collection effort was undertaken to provide the most complete and current data on the condition of the state's county and township roadway system. Condition information was collected on all county paved roads using the latest smartphone ride and photolog technology. Traffic counts were collected on the county and township road system across the entire state in 2019. The effort was a combination of additional counts requested of NDDOT along with 400 counts and vehicle classifications conducted by NDSU-UGPTI students and a consultant. The data was needed to calibrate a statewide travel demand model, which was used to forecast future traffic levels. The GRIT (Geographic Roadway Inventory Tool) was used to gather and verify county roadway inventory information such as base thickness, pavement age, and pavement thickness, directly from local road authorities.

An enhanced county-level survey was developed to assess unpaved roadway component costs such as blading, gravel purchasing, hauling and placement costs for each of the 53 counties in North Dakota. Training on how to accurately complete the survey was provided to counties via live and recorded webinar. A secondary analysis of survey results was performed to identify significant variations from county to county by region within the state.

For traffic forecasting, the Upper Great Plains Transportation Institute (UGPTI) developed a travel demand model (TDM) for the entire state. The TDM network includes the origins of key inputs to the oil production process (e.g., fresh water, sand, scoria, gravel, and pipe), destinations for crude oil and saltwater shipments, and the capacities of each source or destination. The origins of movements on the highway network include railroad stations where sand, pipe, and other inputs are transferred from rail to truck. The destinations of crude oil shipments include refineries and railroad and pipeline transfer facilities. In the model, the estimated capacities of transfer sites are expressed in throughput volumes per day, while the capacities of material sources are expressed in quantities of supplies available during a given time period.

Using the TDM, inputs and products are routed to and from wells to minimize time and/or cost, subject to available supplies and capacities. A comparable model is used to predict the trips of each crop produced in each township to elevators and/or processing plants, subject to the demands of these facilities. When all trips have been routed, the individual movements over each road segment are summed to yield the total truck trips per year. Using truck characteristics and typical weights, these trips are converted to equivalent single axle loads (ESALs) and trips per day. These two factors, in conjunction with the condition ratings and structural characteristics of roads, are used to estimate the improvements and maintenance expenditures needed for the expected traffic. While the focus is on agricultural and oil-related activities, other movements (such as farm inputs and shipments of manufactured goods) are also included in the analysis.

Unpaved Road Analysis and Needs

The following types of improvements to unpaved roads are analyzed in this study: increased graveling frequency, intermediate improvements, and asphalt surfacing. On heavily impacted gravel surface roads, the graveling interval decreases and the number of bladings per month increases as traffic volumes grow. For example, a non-impacted road has an expected graveling interval of five years and a blading interval of once per month, while an impacted section has an expected gravel interval of two to five years and a blading interval of twice per month. This doubles the gravel maintenance costs over the same time period.

As shown in Table A, the predicted statewide unpaved infrastructure needs estimate is \$6.14 billion over the next 20 years.

Table A: Summary of Unpaved Road Investment and Maintenance Needs for Counties and Townships in North Dakota (Millions of 2020 Dollars)

Period	Statewide
2021-22	\$ 611.08
2023-24	\$ 602.19
2025-26	\$ 616.21
2027-28	\$ 615.89
2029-30	\$ 602.76
2031-40	\$ 3,008.07
2021-40	\$ 6,056.34

Paved Road Analysis Needs

As shown in Table B, \$2.67 billion in paved road investment and maintenance expenditures will be needed during the next 20 years. Almost 60% of these expenditures will be required in the first decade because of a shortfall of timely investments in previous years.

Table B: Summary of Paved Road Investment and Maintenance Needs for Counties and Townships in North Dakota (Millions of 2020 Dollars)

Period	Statewide
2021-22	\$ 388.46
2023-24	\$ 406.97
2025-26	\$ 304.56
2027-28	\$ 264.53
2029-30	\$ 222.20
2031-40	\$ 1,081.77
2021-40	\$ 2,668.49

Bridge Needs

Table G shows the estimated bridge investment and maintenance needs for county and township bridges from 2021-2040. Most of the improvement needs are determined by the study's improvement model to be backlog needs and occur during the first study biennium. Based on past discussions with NDDOT Bridge and Local Government Divisions, these needs have been distributed evenly over the first five biennia of the study period because it would not be possible to replace all the eligible bridges in one biennium with existing construction resources.

Table G: Summary of Bridge Investment and Maintenance Needs for Counties and Townships in North Dakota (Millions of 2020 Dollars)

Period	Statewide
2021-22	\$94.39
2023-24	\$94.40
2025-26	\$94.74
2027-28	\$94.63
2029-30	\$94.48
2031-40	\$26.17
2021-40	\$498.81

Total Statewide Needs

As shown in Tables H and I, the combined estimate of infrastructure needs for all county and township roads is \$9.3 billion over the next 20 years. Unpaved road funding needs comprise approximately 66% of the total. If averaged over the next 20 years, the annualized infrastructure need is equivalent to \$466 million per year.

The values shown in Tables H and I do not include the infrastructure needs of Forest Service roads or city streets within municipal areas. The infrastructure needs of Indian Reservation roads are presented separately in the report and detailed results are presented for county and township roads.

Table H: Summary of All Road and Bridge Investment and Maintenance Needs for Counties and Townships in North Dakota (Millions of 2020 Dollars)

Period	Statewide
2021-22	\$ 1,093.93
2023-24	\$ 1,103.56
2025-26	\$ 1,015.51
2027-28	\$ 975.05
2029-30	\$ 919.44
2031-40	\$ 4,195.91
2021-40	\$ 9,223.64

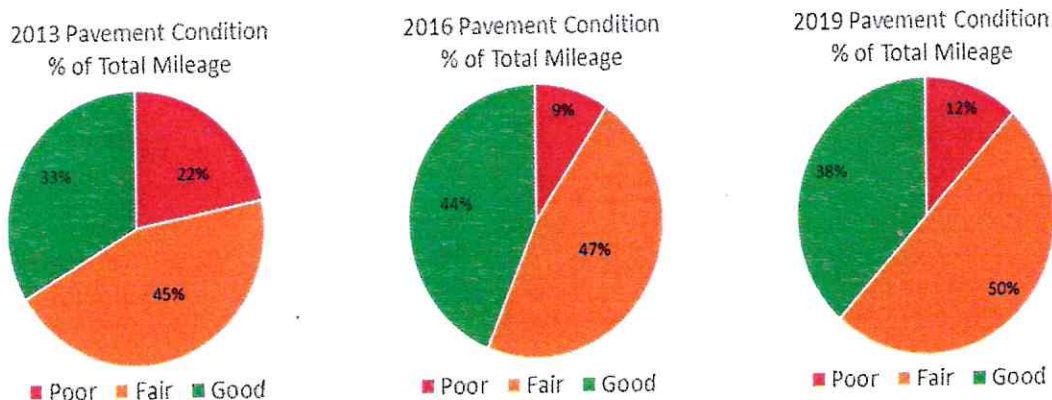
Table I: Summary of All Road and Bridge Investment and Maintenance Needs for Counties, Townships and Tribes in North Dakota (Millions of 2020 Dollars)

Period	Unpaved	Paved	Bridges	Total
2021-22	\$ 611.08	\$ 388.46	\$ 94.39	\$ 1,093.93
2023-24	\$ 602.19	\$ 406.97	\$ 94.40	\$ 1,103.56
2025-26	\$ 616.21	\$ 304.56	\$ 94.74	\$ 1,015.51
2027-28	\$ 615.89	\$ 264.53	\$ 94.63	\$ 975.05
2029-30	\$ 602.76	\$ 222.20	\$ 94.48	\$ 919.44
2031-40	\$ 3,008.07	\$ 1,081.77	\$ 26.17	\$ 4,116.01
2021-40	\$ 6,056.34	\$ 2,668.49	\$ 498.81	\$ 9,223.64

General Comparison with 2013 and 2016 and 2019 Studies

Increased investments in the paved roads during the 2014 and 2016 bienniums improved overall pavement condition as shown in the 2016 chart below in Figure A. However, the 2019 pavement condition data indicates a slight increase in miles of poor-condition roads and a decrease in miles of good-condition roads. This slight decrease in overall pavement condition is likely due to somewhat reduced investments in pavement beginning in the 2018 biennium.

Figure A. Pavement Condition Change from 2013 to 2019



The current 2020 study also shows an increase of approximately \$400 million in 20-year pavement needs compared to the 2016 study. Much of the increase is because of inflation of construction and maintenance costs for pavements over the 4 years. Some of the increase is also due to the approximately 140 miles of paved roads added to the system since 2016.

The costs for unpaved roads/gravel increased by about 6% (approximately \$360 million) over the 20 years. Much of this increase is because of more uniform reporting by counties as a result of a revised survey instrument and related webinar training provided to counties during this study. Unit prices for gravel have not changed significantly.

Projections of bridge funding needs have increased slightly but are close to the previous study. Both studies showed a large backlog of bridges needing improvements or replacement. The number of bridges needing improvement or replacement declined slightly since 2016, but unit prices have increased since 2016. Bridge inspections are performed every 2 years and during the 4-year period between studies, additional bridges have deteriorated enough that improvement or replacement is suggested.

Senator Wanzek,

In May 2022, UGPTI wrote a grant for 13 of the applications that we received from the Township totaling \$2.5 million. With this applications we used the ones that had the best chance of meeting the grant requirements.

We are currently working with UGPTI to review the additional applications that we received from the Townships to see which ones will best fit into the "Resiliency grant" opportunity that is supposed to come out next month.

Here are some total numbers that we have seen to date from the Townships. In general, most grant applications go in asking for 50% of the cost of the project to be federally funded.

- ~2,500 applications
 - Over \$200,000,000 requested
 - 25 projects greater than \$1,000,000
 - 2 projects are \$9M and \$10M
 - 47 projects greater than \$500,000
 - 302 projects between \$100K - \$500K
 - 353 between \$50,000 - \$100,000
 - 1,034 between \$10,000 - \$50,000
 - 328 between \$5,000 - \$10,000
 - 358 between \$0 - \$5,000
- Townships in 45 Counties submitted applications

Let me know if you have any questions

Ron Henke, P.E.

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Wanzek, Terry M.

From: Brandenburg, Michael D.
Sent: Friday, January 20, 2023 10:49 AM
To: Wanzek, Terry M.
Subject: FW: Township Information

From: Mathiak, Adam <amathiak@ndlegis.gov>
Sent: Friday, January 20, 2023 10:17 AM
To: Brandenburg, Michael D. <mbrandenburg@ndlegis.gov>
Cc: Knudson, Allen H. <aknudson@ndlegis.gov>
Subject: Township Information

Representative Brandenburg:

This email is in response to your question regarding the total number of townships in North Dakota.

Based on information from the State Treasurer:

- North Dakota has 2,045 townships, including 1,434 organized townships and 611 unorganized townships.
- North Dakota has 1,632 townships in non-oil-producing counties, including 1,180 organized townships and 452 unorganized townships.
- North Dakota has 413 townships in oil-producing counties, including 254 organized townships and 159 unorganized townships.
- For purposes of this analysis, "townships" means congressional townships with dimensions of 6 miles by 6 miles, and "non-oil-producing counties" counties means a county that received no allocation of funding or a total allocation of less than five million dollars under subsection 2 of section 57-51-15 in the most recently completed even-numbered fiscal year before the start of each biennium (in this case **fiscal year 2020**).
- Please note that Stark County is included as a non-oil-producing county based on fiscal year 2020, but for the 2023-25 biennium, Stark County will be an oil-producing county based on the current definition of a non-oil-producing county. Stark County has 39 townships, all of which are unorganized.

Please let us know if you have any questions. Thanks.

Adam Mathiak
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