

2019 State Highway Needs Assessment



Hwy. 385 south of Alliance

NEBRASKA

Good Life. Great Journey.

DEPARTMENT OF TRANSPORTATION

Pete Ricketts
Governor

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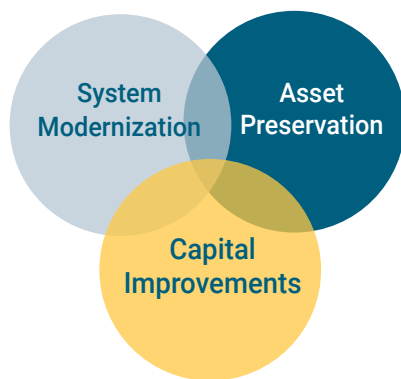
Executive Summary

The ***“2019 State Highway System Needs Assessment”*** report identifies the needs for the next 20 years at \$12.6 billion, in today's dollars. With inflation applied at 5 percent for FY-2021 and FY-2022, and 3 percent for the remaining 18 years, over the next 20 years the total cost of the 2019 needs are estimated at \$18.1 billion. The average construction expenditures towards these needs are approximately \$500-600 million per year.

Introduction

In 1988, the Nebraska State Legislature assigned the task of annually reporting the needs of the State Highway System to the Nebraska Department of Transportation (NDOT) (Neb.Rev.Stat. 39-1365.02). Since that time, the NDOT has made steady progress identifying and addressing the dynamic needs of the State Highway System.

To address Nebraska’s needs, each year, NDOT determines how much of the construction program will be dedicated to asset preservation, system modernization, and capital improvement. These decisions are made based on the condition of our existing system, project deliverability, and revenue projections. The annual Nebraska Surface Transportation Program (STP) Book reflects these decisions. The STP book contains revenue forecasts, the 1-year construction program, the 5-year planning program, and a summary of changes made since the last book was published.



As stated, the needs of the State Highway System are divided into three categories:

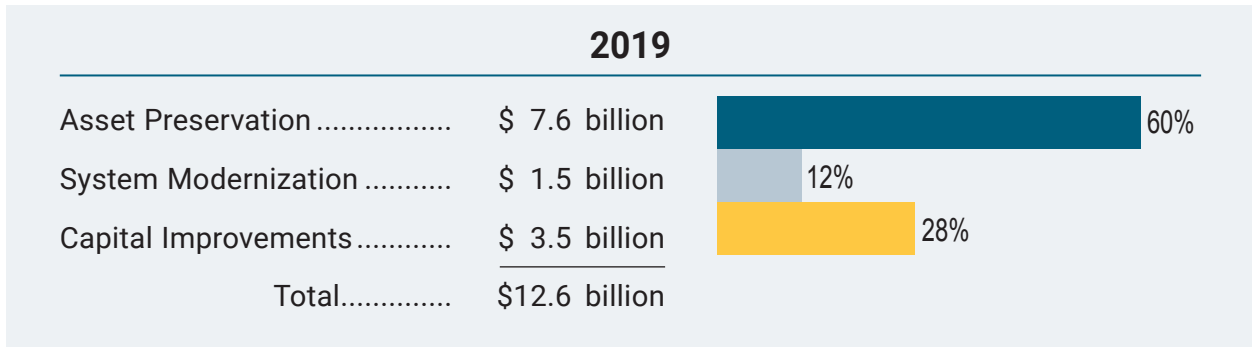
- **Asset Preservation** – Maintenance of the system
- **System Modernization** – Safety, geometric, or mobility improvements that do not add capacity to the roadway
- **Capital Improvements** – Improvements that add capacity or support economic growth

Some highway projects may have aspects that fall into more than one category or all three; however, no costs were double counted in this report. See pages 3-6 for a brief description of how the needs are determined for each category.

Recent Changes

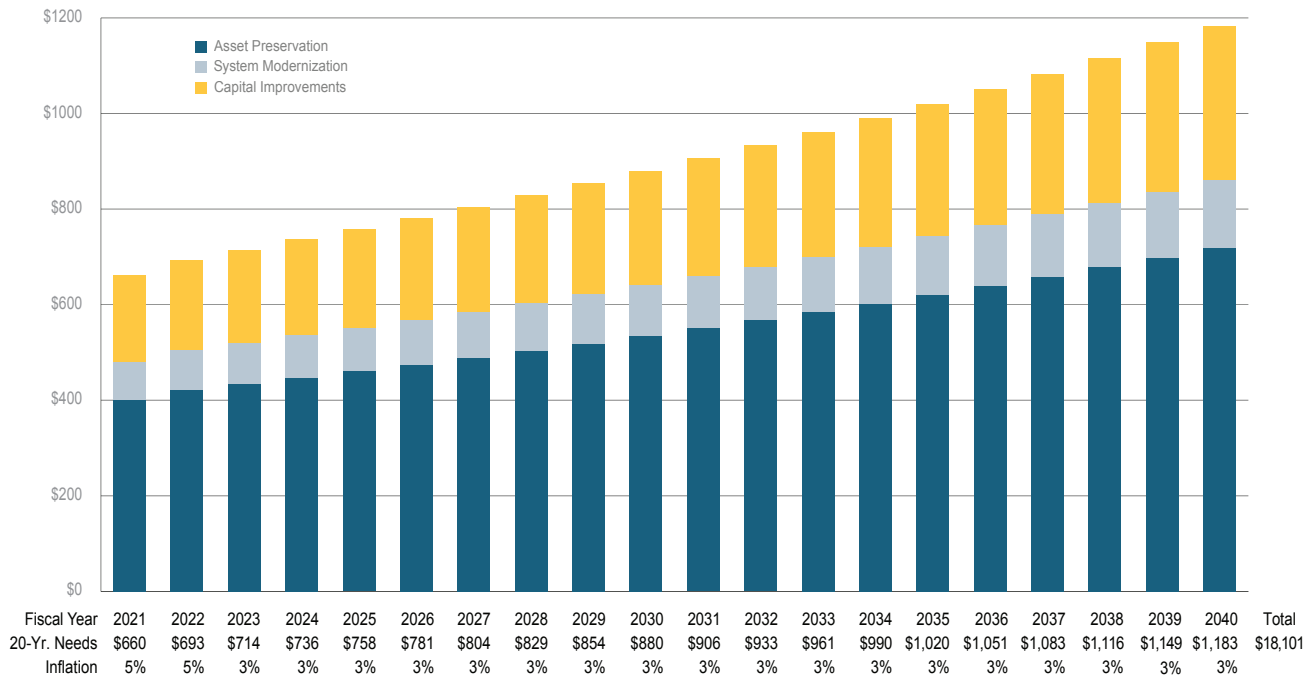
The Metro Area Travel Study was finalized in October 2019 and costs added to the needs. Approximately \$515 million in capital improvements will be required to provide the anticipated capacity needs on state highways over the next 20 years in the metropolitan area of Omaha.

Summary 20-Year Needs



Current and Projected Needs

2019 State Highway System Inflated Needs in Millions



Asset Preservation

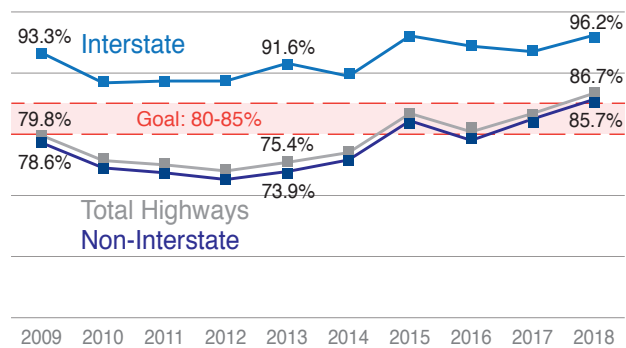
Many different factors affect pavement and bridge preservation needs; including the previous year's work, environmental conditions, traffic volumes, traffic loads, and yearly maintenance. The NDOT continues to explore new technology and materials that may lead to improved pavement and bridge performance and may also extend the life of pavements and bridges.

The projected 20-year asset preservation needs, in current dollars, are estimated to cost \$7.6 billion and include the following:

Pavement Preservation - \$6.9 billion

The entire State Highway System is rated each year in order to evaluate its overall pavement condition. Distress factors such as cracking, faulting, rutting, and ride quality are inserted into formulas which have been developed to calculate the overall condition of the roadway, called the Nebraska Serviceability Index (NSI). This NSI rating is then used in a benefit/cost analysis tool to identify the right preservation treatment at the right time to maintain the highway system at a specified pavement condition level. Preservation treatments include, but are not limited to, crack/joint sealing, armor coats, milling, resurfacing, and replacements.

Percent of Miles at Least "Good" (NSI ≥ 70)

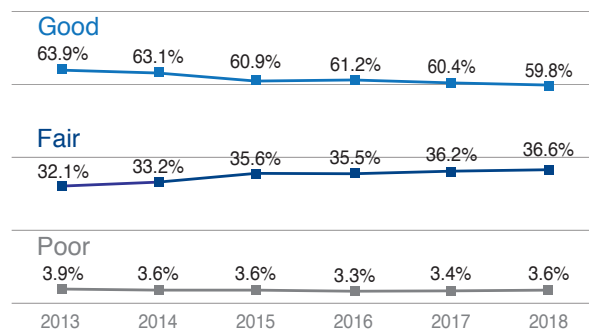


Bridge Preservation - \$720 million

Similar to pavements, bridges are inspected for safety and condition. Bridges in Nebraska are typically inspected every two years. NDOT uses a bridge needs program that takes into consideration factors such as condition, deterioration rate, age, traffic, and cost/benefit to determine when to apply the proper treatments at the proper times. Preservation includes preventative maintenance, repair, re-decking, rehabilitation, and replacement of bridges that meet the required width. Bridges continually deteriorate so bridge needs are not static, but change yearly. NDOT is doing more systematic preservation, such as asphalt overlays with waterproof membranes, expansion joint replacements, and thin epoxy/polymer overlays to keep our good bridges in good condition for longer periods of time.

The timing of solutions for bridge needs varies, but efforts are made to plan bridge construction at the same time as the adjacent pavement and road construction.

Percent of State-Owned Bridges in Good, Fair or Poor Condition



Major Bridge Components - bridge deck, superstructure, substructure

Good - major bridge components are all in good condition or better

Poor - one or more major bridge components are in poor condition or worse

Fair - all other bridges

System Modernization

System modernization is associated with roadway improvements that do not increase capacity. These needs are associated with deficiencies, such as pavement width, shoulder width, vertical curves, and bridge width. Interstate roadway or bridge deficiencies, as defined by Nebraska's minimum design standards, are included in the needs assessment. The non-interstate rural system modernization needs are defined using the standards shown in the sidebar.

The projected 20-year system modernization needs, in current dollars, for the interstate, rural, and municipal highways are estimated to cost \$1.5 billion and include the following:

Roadway Modernization - \$1.0 billion

Roadway modernization describes changes made to existing roadways to correct certain deficiencies. Such changes as widening lanes and shoulders, straightening curves, and cutting down hills make roadways safer to travel.

All highway plans are reviewed to ensure that the NDOT's database contains the most current geometric information. The roadway system modernization needs are compiled by calculating the construction costs, including resurfacing and right-of-way costs, required to correct the deficiency. These costs are updated annually. The State currently operates and maintains approximately 39 miles of gravel highways. The costs to surface and bring these roadways up to current standards are based on annual construction costs.

Modernization needs for rural intersections are determined by the need to improve intersections due to high-traffic volumes and a documented crash history. The costs associated with these needs are based on the average cost per intersection improvement times the number of intersections that would either meet the 20-year traffic volume or crash history criteria.

In addition to the costs to remove deficiencies, costs for modernization of intelligent transportation systems such as cameras, message signs, and fiber optics are included, as well as lighting and traffic signal needs.

Criteria to identify non-interstate roadway geometric deficiencies are grouped into six Average Daily Traffic (ADT) categories.

Future ADT

36,000 & greater
(six or more lanes warranted)

10,000 - 35,999
(four lanes warranted)

- 12' surfaced lane width
- Outside shoulder
8' of the 10' shoulder will be paved
- Inside shoulder
3' of the 5' shoulder will be paved

4,000 - 9,999

- 12' surfaced lane width
- 8' shoulder width w/6' paved shoulder
- Stopping sight distance
 - No vertical crest curve more than 20 mph below the posted speed limit
 - No vertical sag curve more than 25 mph below the posted speed limit

2,000 - 3,999

- 12' surfaced lane width
- 6' shoulder width w/2' paved shoulder
- Stopping sight distance
 - No vertical crest curve more than 20 mph below the posted speed limit
 - No vertical sag curve more than 25 mph below the posted speed limit

750 - 1,999

- 12' surfaced lane width
- 3' shoulder width
- Stopping sight distance
 - No vertical crest curve more than 20 mph below the posted speed limit
 - Existing vertical sag curve condition allowed

Under 750

- 11' surfaced lane width
- 2' shoulder width
- Stopping sight distance
 - No vertical crest curve more than 20 mph below the posted speed limit
 - Existing vertical sag curve condition allowed

Bridge Modernization - \$209 million

Modernization needs for bridges are determined by the need to widen bridges and remodel bridge rails to meet current standards. The costs associated with these needs are based on the bridge's condition at the time of improvement and can include remodeling bridge railings, widening an existing bridge, or replacing a bridge with a wider bridge.

Rail Crossing and Rural Transit Modernization - \$307 million

The rail at-grade crossing needs include all passive warning device locations with an exposure factor (defined as the number of trains multiplied by the number of vehicles) of 3,000 or greater.

The Federal Transit Administration (FTA) defines a rural area as one encompassing a population of less than 50,000 people that has not been designated in the most recent decennial census as an "urbanized area." The term "transit" refers to public transportation and specialized transportation for the elderly and disabled. For the purposes of this needs estimate, only the transit needs for rural areas are considered with the exception of proposed, scheduled Lincoln-Omaha intercity bus service and metro area vanpool subsidies.

- **Operating Assistance** – Costs associated with direct operation of rural transit systems (including intercity bus) and projected cost of operating a scheduled Lincoln-Omaha route.
- **Vehicles** – Cost of expanding and replacing an aging fleet of transit vehicles. Costs associated with this task meet the FTA's transit asset management requirements.
- **Capital Facility Construction** – Cost of constructing or remodeling transit-related buildings for bus storage and office space. Assumes 20 capital construction projects at an average cost of \$600,000 each. Given the increased emphasis on asset management and interest in the rural areas for capital construction projects, the number of projects has doubled over previous estimates.
- **Consultant Services** – Costs associated with procuring the services of content area experts to provide technical assistance and professional development opportunities to NDOT and subrecipients. Includes an ongoing partnership with the University of Nebraska, drug and alcohol testing content area expert and continued consultant involvement in the Statewide Mobility Management project.
- **Technology** – Costs associated with securing hardware and software for scheduling, dispatching, ridesharing and data collection.
- **Rideshare Programs** – Includes subsidized vanpool projects in the metro and rural areas. Cost projection assumes the program will double in upcoming years to at least 100 vanpools.
- **Intercity Bus Program** – Cost of subsidizing existing and new intercity bus service. NDOT is required to spend at least 15% of our annual Section 5311 (rural) apportionment on intercity bus service. Cost projection assumes NDOT will meet this requirement through increased intercity service between Lincoln and Omaha and new service connecting Hastings, Kearney and Grand Island. In previous projections this cost has been included in operating assistance.

Capital Improvements

Capital improvement needs are associated with those projects that add vehicle capacity or provide infrastructure for economic development. The projected 20-year capital improvements needs, in current dollars, are \$3.5 billion, and include the following:

Roadway Expansion - \$3.2 billion

Roadway expansion is a broad category, which includes costs for future bypasses, new roads, interchanges, additional lanes, upgrading freeways, and the completion of the expressway system.

The needs associated with roadway expansion were determined as follows:

- The costs for projects selected for design and construction under Build Nebraska Act (BNA) and Transportation Innovation Act (TIA) between 2020 and 2033 are determined using historical material and project costs, planned length, and scope.
- The costs for expanding the interstate to six lanes between Lincoln and Grand Island includes all pavement, interchanges, and bridge work. The six-lane interstate needs are determined by projecting when the traffic density will reach level-of-service (LOS) D, as defined in the Highway Capacity Manual.
- The costs for the widening or reconstruction of urban state highways are based on historical cost per mile values which are then used to calculate the needs. The urban-capacity needs, for cities with a population greater than 5,000, are determined by identifying those roads with a fair-to-poor pavement condition and average daily traffic (ADT) that requires additional lanes. The urban-bridge needs are extracted from the bridge needs program output and are included in this category.
- The costs for planning and research to investigate new strategies and to develop the projects mentioned above also are included.
- The costs of implementing the Metro Area Travel Improvement Study.

Grade Separations - \$235 million

These needs include all on-system, at-grade railroad crossings that are expected to warrant a grade separation due to a projected exposure factor of 75,000 or greater within the next 20 years.



Highlights

Highway Safety Crash Data

The Traffic Engineering Highway Safety Section identified the need to modernize our crash records and analysis systems. A new, cloud-hosted crash database is being developed to meet the National Highway Traffic Safety Administration's (NHTSA) current version of the Model Minimum Uniform Crash Criteria (MMUCC). The new crash database allows the officer to enter more information about the contributing factors to the crash and Traffic Incident Management, which leads to improved safety analysis. To streamline NDOT's reporting process, the capability to report crash fatality data directly to NHTSA is being added. After completion of the new crash database, NDOT will lead the nation in crash reporting and will be a national model for crash data.

The Highway Safety Section has also partnered with the University of Nebraska–Lincoln to leverage our crash data in a new mapping and diagramming tool called Nebraska Transportation Information Portal (NTIP). The UNL team is innovating at the cutting edge of crash analysis software. The current phase of the NTIP project is focused on improving crash pattern displays, creating new map visualizations, and setting up security to share access to NTIP with our law enforcement and planning organization partners. These crash records and analysis systems modernization initiatives will give NDOT and our partners improved tools for reducing the \$5.5 billion in annual societal costs from crashes in Nebraska.

Longe Range Transportation Plan



The NDOT is in the process of updating its Long Range Transportation Plan (LRTP) to help refine how the NDOT plans for and prepares to meet the state's transportation needs and priorities over the next two decades. Last revised in 2012, the LRTP is a federal requirement that will utilize scenario based planning to: Identify influences that may impact Nebraska's transportation system over the next two decades; analyze data to explore and understand impacts; and provide recommendations that will guide NDOT as it looks to maintain the best possible transportation system for the movement of people and goods.

The proposed plan framework will include the following:

1. Inventory of the existing condition of Nebraska's transportation system and development of a statewide traffic model;
2. Research into the future influences on transportation, including a technology forum to bring professionals from across Nebraska together to learn more about emerging technologies;

3. Analysis of the 20-year transportation needs in Nebraska;
4. Forecast of revenue for transportation projects in Nebraska;
5. Development of strategic direction for Nebraska's transportation system to 2040 including goals and objectives.

Information derived from public and stakeholder engagement will be an important component to the plan and vital to its success. Through calendar year 2020, the NDOT will be working through scenarios to develop a roadmap for the future of Nebraska's state transportation network.

Costs Not Included in this Needs Assessment

Aviation

The 2002 Aviation System Plan outlined the needs for Nebraska's airport system based on four performance categories.

- **Access** – Percentage of the state's population within a 30-minute drive time of an airport.
- **Economic** – Importance of airports to serve the state's economic and trade centers.
- **Physical** – Ability of the airports to meet standards and the types of facility improvements that are needed to improve the systems performance.
- **Social/Cultural** – Ability to serve the state's tourism and cultural centers, as well as isolated areas.

The recommendations in this plan were used to identify projects for inclusion in the Capital Improvement Plan for FY2002-2021. The 2002 estimate for these improvement projects was approximately \$500 million.

The Aeronautics Division will undertake a State Aviation System Plan Update in 2020. This update, with an expected publication date of 2022 will outline the twenty year needs of the Nebraska Aviation System.



Preservation work in District 6



Traffic on Hwy. 275



Construction on Hwy. 385 near Dalton



Paving work on Hwy. 385 south of Alliance



Construction on Hwy. 385 near Dalton

NDOT Mission Statement

We provide the best possible statewide transportation system for the movement of people and goods.