

2018 State Highway Needs Assessment



NEBRASKA

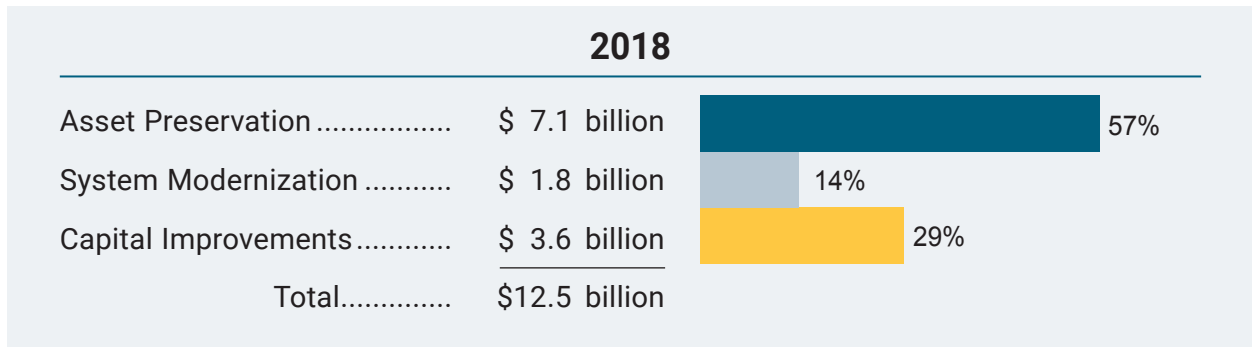
Good Life. Great Journey.

DEPARTMENT OF TRANSPORTATION

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Governor

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Director

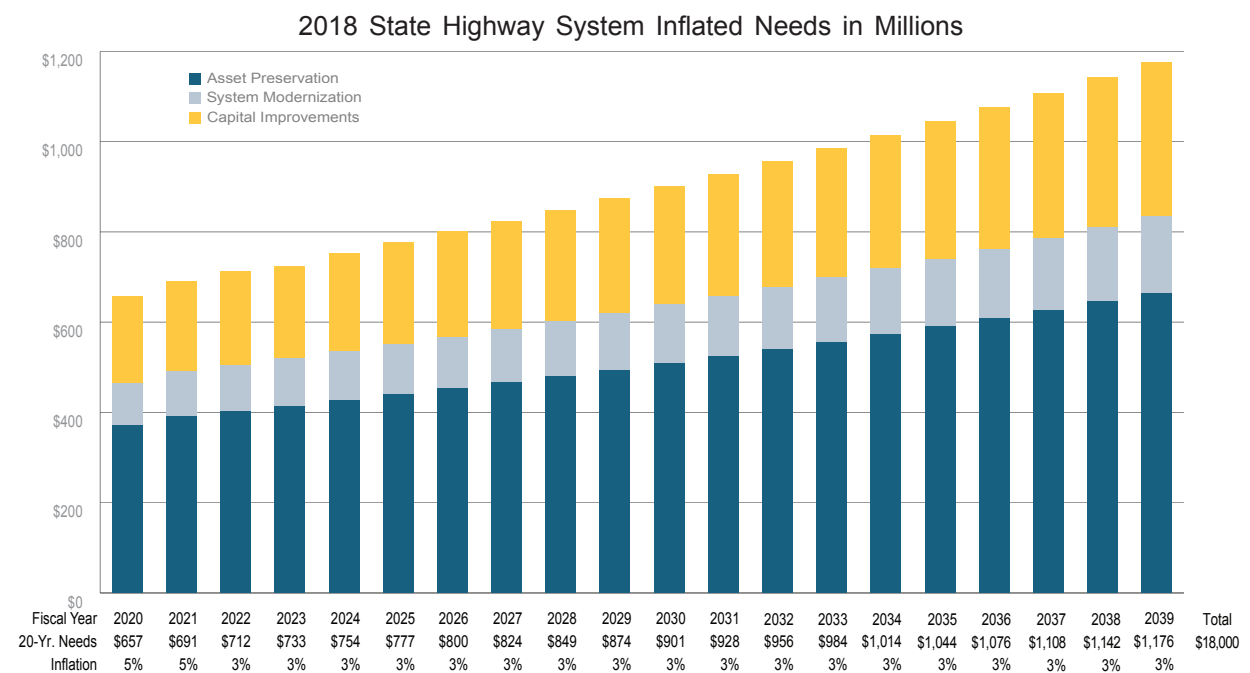
Summary 20-Year Needs



Executive Summary

The **“2018 State Highway System Needs Assessment”** report identifies the needs for the next 20 years at \$12.5 billion, in today’s dollars. With inflation applied at 5 percent for FY-2020 and FY-2021, and 3 percent for the remaining 18 years, over the next 20 years the total cost of the 2018 needs are estimated at \$18 billion. The average construction expenditures towards these needs are approximately \$500 million per year.

Current and Projected Needs



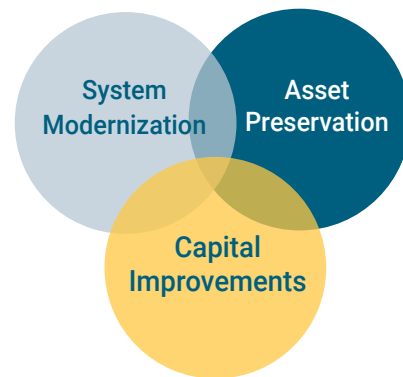
Introduction

In 1988, the Nebraska State Legislature assigned the task of annually reporting on the needs of the State Highway System to the Nebraska Department of Transportation (NDOT) (Neb.Rev. Stat. 39-1365.02). Since that time, the Department 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, or capital improvement. These decisions are made based on 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

Needs for system modernization changed for the 2017 Needs Assessment. This change was based on the new Nebraska Administrative Code, Title 428, Rules and Regulations of the Board of Public Roads Classifications and Standards, which went into effect May 17, 2016. These new standards changed how vertical curve deficiencies were identified and removed the requirement for pavement widening in the Sandhills area. These new standards, which are shown in the sidebar on page 4, bring NDOT more in line with national standards. This change reduced the anticipated needs by \$214 million from 2016 to 2017.

In 2018, estimated costs from the Metro Area Travel Study became available and were added to the needs. Approximately \$590 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. (See *Highlights on page 6*)

Beginning in 2018, budgeted costs for Transportation Systems Management and Operations (TSMO), including Intelligent Transportation System (ITS) needs, were tracked separately in the needs assessment. NDOT currently spends approximately \$4 million per year on ITS technologies, including cameras, message boards, traffic control, and communications. This added \$80 million to needs. In the coming years, as the transportation industry becomes increasingly infused with technology, these needs will continue to grow. (See *Highlights on page 6*)

Asset Preservation

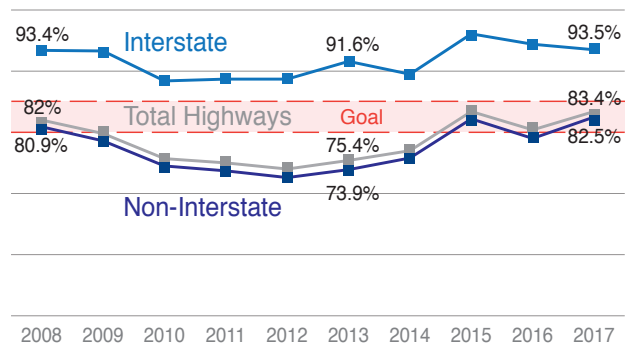
Many different factors affect pavement and bridge preservation needs; including the previous year's work, environmental conditions, traffic volumes, traffic loads, and yearly maintenance. The Department continues to explore new technology and materials that may lead to improved pavement and bridge performance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

The projected 20-year asset preservation needs, in 2018 dollars, are estimated to cost \$7.1 billion and include the following:

Pavement Preservation - \$6.4 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)

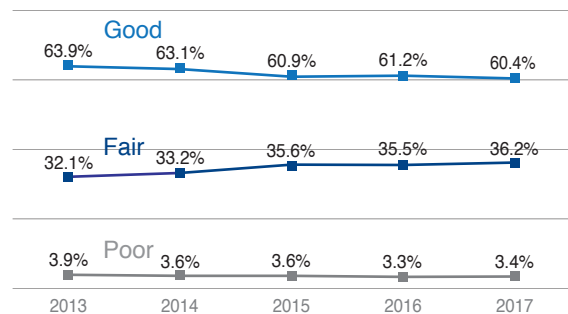


Bridge Preservation - \$700 million

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 2018 dollars, for the interstate, rural, and municipal highways are estimated to cost \$1.8 billion and include the following:

Roadway Modernization - \$1.3 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 Department'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 other roadway improvements, such as lighting and traffic signal needs, are determined based on an average of previous years' costs. New this year are the costs to modernize intelligent transportation systems such as cameras, message signs, and fiber optics. (See *Highlights on page 6*)

Bridge Modernization - \$200 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.

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

Rail Crossing and Rural Transit Modernization - \$300 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 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.” “Transit” refers to transportation for the general public and specialized transportation for the elderly and disabled. This needs estimate covers the transit needs for rural areas and also the proposed Lincoln-Omaha service and metro area vanpool service.

- **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. Includes projected costs to purchase large buses for future, scheduled Lincoln-Omaha routes.
- **Capital Facility Construction** – Cost of constructing or remodeling transit-related buildings for bus storage and office space. Assumes 10 capital construction projects at an average cost of \$600,000 each.
- **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 at Omaha 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.

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 2018 dollars, are \$3.6 billion, and include the following:

Roadway Expansion - \$3.4 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. (*See Highlights on page 6*)

Grade Separations - \$200 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

Transportation Systems Management and Operations

Transportation Systems Management and Operations (TSMO) is an integrated set of strategies that can be leveraged to optimize the performance of existing infrastructure. TSMO evaluates performance from a systems perspective, allowing DOT's to implement a holistic approach to meeting current and future mobility needs without adding capacity. TSMO strategies can be utilized to improve safety, reduce congestion and increase economic vitality, thus improving overall quality of life.

Technology is a significant component to TSMO strategies. The 2018 needs reflect NDOT's planned efforts in implementing TSMO strategies to deliver safe, efficient and reliable transportation infrastructure. In order to best plan for the needs of the future, NDOT will assess ITS and other TSMO-related tools as a category of need under system modernization. The budgeted 20-year needs under TSMO are \$80 million.

Metro Area Travel Improvement Study

The NDOT, in coordination with the Metropolitan Area Planning Agency (MAPA), is finalizing a comprehensive study that establishes future interstate, freeway and non-freeway capital improvement needs and proposes transportation improvements in the MAPA region. The region includes all of Douglas and Sarpy Counties in Nebraska, the western portion of Pottawattamie County in Iowa, a small segment of Cass County along US-75 northwest of Plattsmouth in Nebraska, and a small portion of Mills County in Iowa between I-29 and the Missouri River, down to the new US-34 crossing of the Missouri River.

The study established the base conditions, then evaluated scenarios with multi-model solutions as methods to solve transportation problems anticipated over the next 20 years. The plan creates a vision that recognizes that future interstate and freeway needs are integrally connected with the improvements made to arterials, transit systems and bicycle and pedestrian facilities. The plan considers all these modes and will determine where the future improvements or enhancements are needed to meet study mobility goals and performance measures.

As part of this study, it has been established that the State Highway System non-inflated capital improvements needs for interstate, freeway and non-freeway improvements in the MAPA region are estimated at \$590 million. This plan and preliminary cost estimate will be detailed in the Metro Area Travel Improvement Study upon its completion.

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.

An updated Aviation System Plan is needed to better understand the current aviation needs, which when identified may be included in future Needs Assessments. With the merger of Aeronautics and the Department of Roads into the NDOT, a new system plan will be developed, likely in 2022.

An aerial photograph of a rural landscape. The foreground and middle ground are dominated by large, brown, harvested fields with visible tire tracks. A paved road runs horizontally across the middle of the frame, with a few vehicles visible. In the background, there is a small cluster of houses and trees, followed by more fields extending to the horizon under a clear sky. The image is framed by a dark teal bar at the top and a light green bar at the bottom.

NDOT Mission Statement

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