State Highway Needs Assessment

2020

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EXECUTIVE SUMMARY

The ***"2020 State Highway System Needs Assessment"*** report identifies the needs for the next 20 years at $13.6 billion, in today's dollars. With inflation applied at 5 percent for FY-2022 and FY-2023, and 3 percent for the remaining 18 years, over the next 20 years the total cost of the 2020 needs are estimated at $19.3 billion.

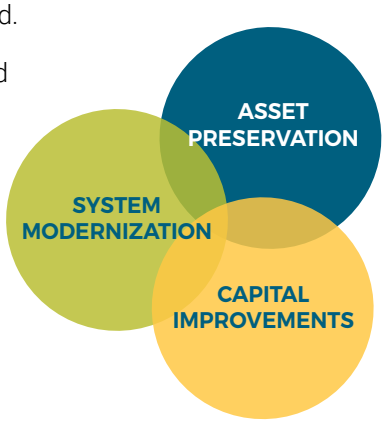
INTRODUCTION

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 yearly progress identifying and addressing the dynamic needs of an evolving 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 Nebraska Surface Transportation Program (STP) Book, published annually, 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 to improve and extend the life of existing assets.
- **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.

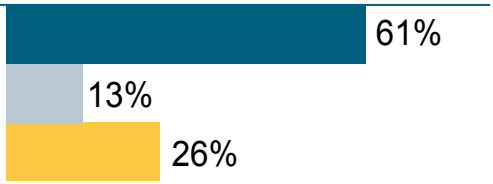


Some highway projects may have aspects that fall into more than one category or all three; however, no costs were double counted in this report. See pages 3-6 for a brief description of how the needs are determined for each category.

SUMMARY 20-YEAR NEEDS

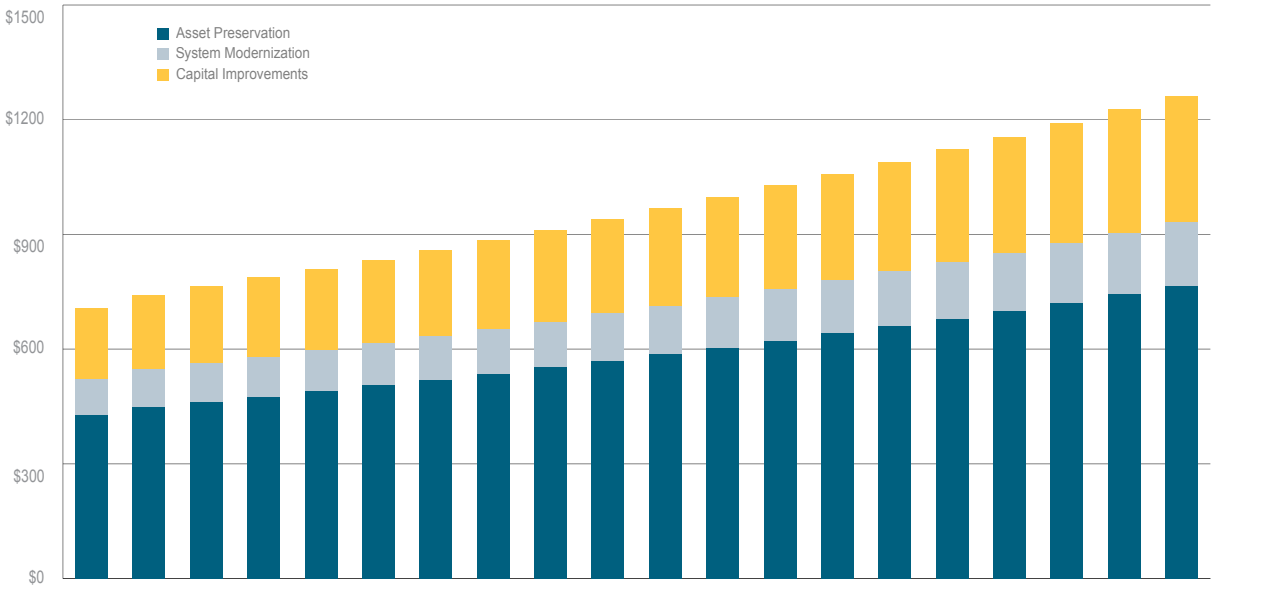
2020

Asset Preservation.....	$ 8.2 Billion
System Modernization.....	$ 1.8 Billion
Capital Improvements.....	$ 3.6 Billion
Total	$13.6 Billion



CURRENT AND PROJECTED NEEDS

2020 State Highway System Inflated Needs in Millions



Fiscal Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	Total
20-Yr. Needs	$707	$742	$764	$787	$810	$834	$859	$885	$911	$939	$967	$997	$1,027	$1,058	$1,089	$1,122	$1,155	$1,190	$1,226	$1,263	$19,332
Inflation	5%	5%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	

ASSET PRESERVATION

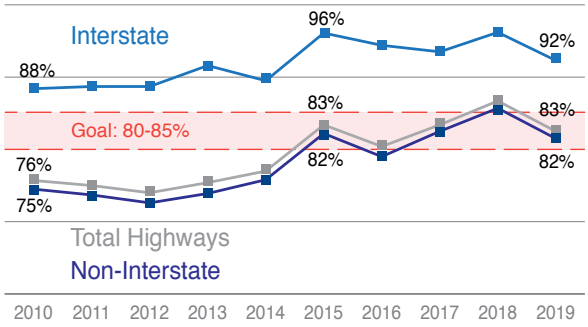
Many different factors affect pavement and bridge preservation needs; including the previous year's work, environmental conditions, traffic volumes, traffic loads, and yearly maintenance. The NDOT continues to explore new technology and materials that may lead to improved pavement and bridge performance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

The projected 20-year asset preservation needs, in current dollars, are estimated to cost $8.2 billion and include the following:

Pavement Preservation - $7.4 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)

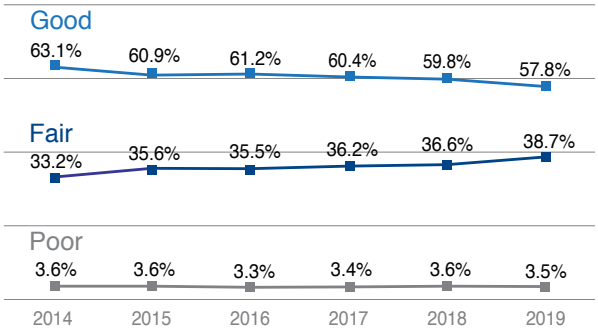


Bridge Preservation - $761 Million

Similar to pavements, bridges are inspected for safety and condition rating. All 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 $1.8 billion and include the following:

Roadway Modernization - $1.1 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 multiplied by 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 boards, 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

Bridge Modernization - $215 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 - $450 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.

The main items included in the Rural Transit Modernization needs are:

- **Operating Assistance** – Costs associated with direct operation of rural transit systems (including intercity bus).
- **Vehicles** – Cost of expanding and replacing an aging fleet of transit vehicles. Priority for replacement will be vehicles that have met or exceeded their useful life benchmark as defined in NDOT's Transit Assessment Management Plan.
- **Capital Facility Construction** – Cost of constructing or remodeling transit-related buildings for bus storage and office space. Assumes two capital construction projects per year, at an average cost of $800,000 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 of state and federal funds. 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. Also includes the purchase and implementation of one-call/one-click software for a statewide transportation scheduling program.
- **Rideshare Programs** – Includes subsidized vanpool projects in the metro and rural areas. Cost projection assumes the program will grow to approximately 100 vans.
- **Intercity Bus Program** – Cost of subsidizing existing 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. The estimate for this service is based on an NDOT/consultant study completed in 2020.

CAPITAL IMPROVEMENTS

Capital improvement needs are associated with those projects that add highway capacity and provide infrastructure for economic development. The projected 20-year capital improvement needs, in current dollars, are $3.6 billion, and include the following:

Roadway Expansion - $3.3 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 (MTIS) which was completed in the fall of 2019. Costs for MTIS were first included in the 2019 State Highway Needs Assessment.

Grade Separations - $252 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.

TSMO strategies focus on mobility through technology. The 2020 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 Traffic Incident Management (TIM), Intelligent Transportation Systems (ITS), collaboration with regional partners, transportation data and other TSMO-related tools as a category of need under system modernization. The NDOT is currently developing a strategic plan that will aid in outlining the future TSMO needs for the department.

AVIATION

NDOT began work on a State Aviation System plan in 2020. This plan will be developed in collaboration with the Federal Aviation Administration and our stakeholders and will determine the needs of our statewide aviation system. The plan will identify the Nebraska industries that rely on our aviation infrastructure and tie airport development plans to the needs of these industries with a focus on safety and economic development. The Nebraska Aviation System Plan will provide a platform for tracking system performance and providing solid analysis of how Nebraska can create the maximum return for our investment in aviation infrastructure. This plan is funded with a 90 percent grant from the Federal Aviation Administration and should be completed in 2022. Aviation costs are not included in this assessment.

INTERCITY BUS SERVICE IN NEBRASKA

The Federal Transit Administration (FTA) defines intercity bus service as regularly scheduled service for the general public that operates with limited stops over fixed routes connecting two or more urban areas. In Nebraska, existing intercity bus service is limited to narrow corridors with scheduled stops at times which have been described as inconvenient and limiting for commuters and the general traveling public.

In 2019-2020, two feasibility studies which were a continuation of the Nebraska Mobility Management Project were completed and identified the need to increase service and improve access to the intercity bus network. The final determination to address the needs is to increase participation in the most concentrated labor markets in the state, facilitate access to higher education, increase access to enhance the health benefits for those seeking specialized medical care, increase safety and reduce greenhouse gas emissions by reducing the number of vehicles on the highway/interstate system.

Strategies to coordinate and improve transportation options for Nebraskans include:

- ## Lincoln-Omaha Intercity Bus Service

  This study examined current demand and work patterns to develop a service plan for efficient, value-added and convenient service to link Nebraska's two largest cities. The need includes three routes to provide a high level or weekday service to meet multiple trip demands and a service plan for efficient, value-added, and convenient service to Nebraska's two largest cities. Two routes will follow the I-80 corridor and the third route will travel along U.S. Highway 6 to provide connectivity for rural communities between Lincoln and Omaha including Waverly, Greenwood, Ashland and Gretna.

- ## Tri-City Intercity Bus Service

  During the public engagement process in the Tri-City area, participants identified benefits similar to those for the Lincoln-Omaha Intercity Bus Study. The final study report identified the need to enhance the existing intercity bus network in Grand Island, Kearney, and Hastings with additional trips and stops, raise awareness and usage of intercity bus service, and create a convenient bus stop infrastructure at designated locations. Connectivity with existing local bus providers is also a key component of the tri-city service so passengers have options for connections to final destinations in each community.

HIGHLIGHTS

LONG RANGE TRANSPORTATION PLAN

The NDOT is finalizing 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 as well as stakeholder input 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 in a rapidly changing environment. Among the recommendations that have been drafted are some new functions not executed in NDOT's past that will affect the NDOT's future needs. NDOT anticipates these needs will have a major impact on the transportation industry in the future.

A strategic TSMO team will be involved in the prioritization and implementation of these future technology needs. As with other DOT's across the nation, as opportunity presents itself to NDOT, we remain committed to working with public and private partners to address common concerns or collaborate on investment opportunities.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