

# STATE HIGHWAY NEEDS ASSESSMENT



NEBRASKA

Good Life. Great Journey.

DEPARTMENT OF TRANSPORTATION

2022

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DIRECTOR

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GOVERNOR

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## I-80 Needs

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). Since that time, 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 & Operation**, and **Capital Improvement**.

These decisions are made based on the condition of the existing system, project deliverability, and revenue projections, and are reflected in the annual [Nebraska Surface Transportation Program \(STP\) book](#). The STP book holds revenue forecasts, the one-year construction program, the five-year planning program, and a summary of changes made since the last book was published. The list of projects under construction can be found in the STP book posted on the NDOT website at <https://dot.nebraska.gov/projects/publications/program-book-2023/>.

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.

*Cover photo: Work on Fremont SE Beltway*

# 2022



## LETTER FROM DIRECTOR SELMER

Every year, the Nebraska Department of Transportation submits an analysis of Nebraska’s anticipated transportation needs over the next 20 years. This is a crucial effort to ensure the NDOT can be prepared and successfully plan for the future outcomes necessary for our highway system and the desired enhancements identified by our customers. We endeavor to accomplish this while being good stewards of our transportation infrastructure and the public’s trust.

Every citizen in Nebraska is dependent on our transportation system, whether directly as a motorist or indirectly through the conveyance of resources and services. We acknowledge the public’s high expectation. This motivates us to ensure our transportation system is not just safe and well maintained, but also reliable and convenient, so Nebraskans can continue to enjoy the high quality of life we have in our state.

Nebraska’s entire system is comprised of 95,000 miles of state, county, and municipal roads and more than 15,000 bridges. This analysis only focuses on the portion the department has jurisdiction, 10,000 miles of highway and 3,500 bridges. While this portion is a significantly smaller subset of Nebraska’s system as a whole, it has a vital role as the “backbone.” The state system carries about 64% of traffic and more than 86% of freight traffic. Additionally, the 3,500 state bridges average five times the size of county or municipal bridges. This distinction is important to articulate because of the impact in determining the needs of our system.

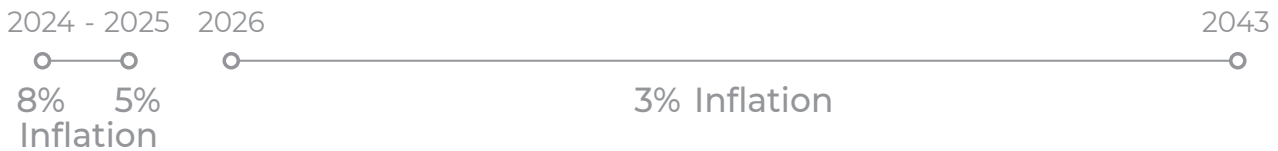
Despite the challenges that 2022 threw at us—staffing challenges due to low unemployment, supply chain delays, and material shortages—I’m proud of the program NDOT delivered to maintain and improve our system. Through hard work, innovation, and ingenuity, we made improvements to processes that resulted in mitigating cost escalations to deliver our program, such as rehabilitation methods, use of innovative materials, and timing of projects. These efforts resulted in our total needs going down by approximately 2%. In today’s dollars this is \$14.5 billion.

# EXECUTIVE SUMMARY

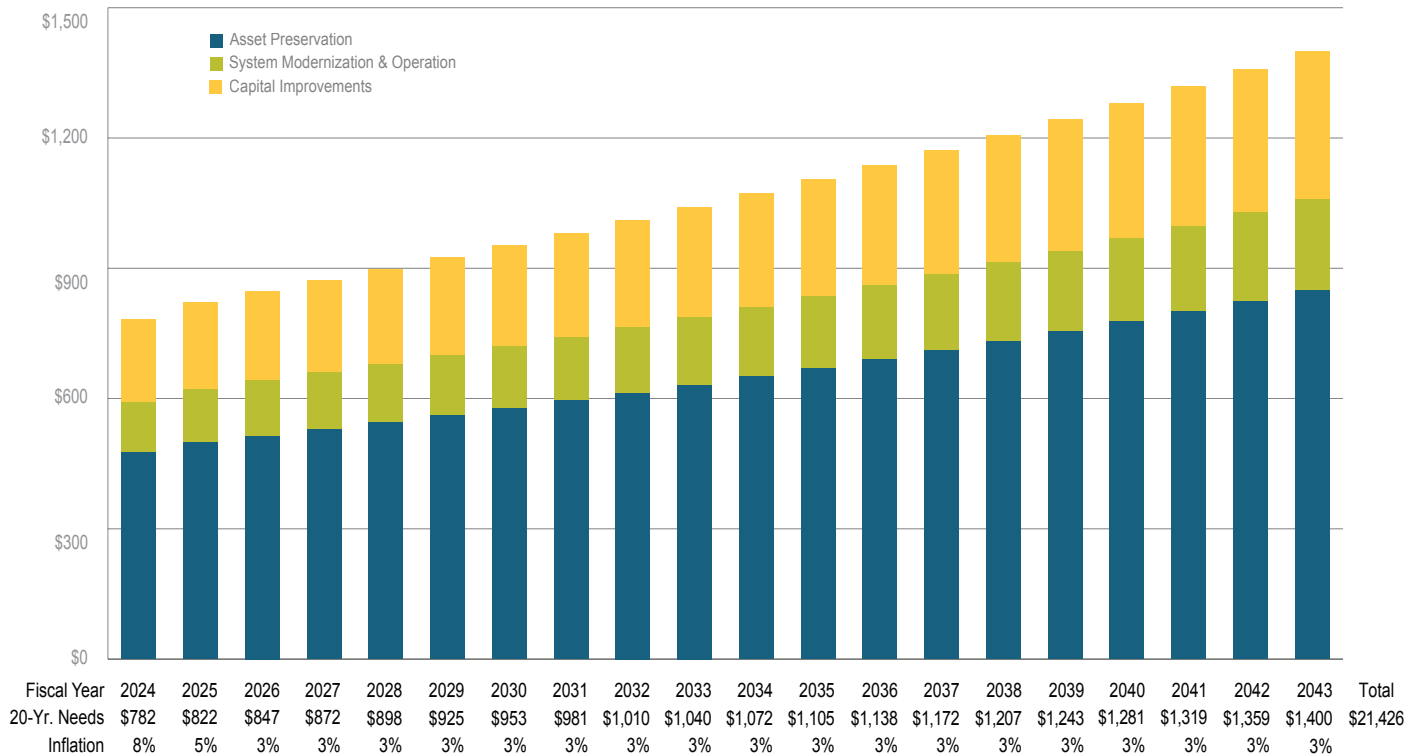
This report identifies the needs for the next 20 years at \$14.5 billion in today's dollars. With inflation applied at 8% for FY-2024, 5% for FY-2025 and 3% for the remaining 18 years, over the next 20 years the total cost of the 2022 needs is estimated at \$21.4 billion.

**\$14.5B**  
2024

**\$21.4B**  
2043



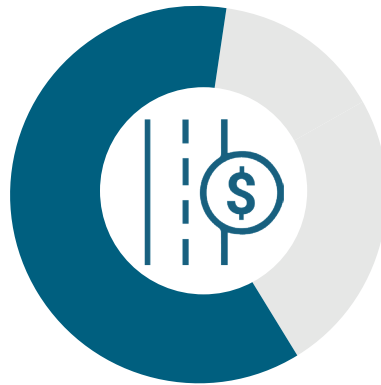
## 2022 State Highway System Inflated Needs in Millions



# SUMMARY OF NEEDS



ASSET  
PRESERVATION



Maintenance to improve and extend the life of existing assets.

**\$8.8B**



SYSTEM  
MODERNIZATION  
& OPERATION



Safety, geometric, or mobility upgrades that do not add capacity.

**\$2.2B**



CAPITAL  
IMPROVEMENTS



Add capacity or support economic growth.

**\$3.5B**



# ASSET PRESERVATION

20-YEAR PROJECTED NEEDS

**\$8.8B**

Many factors affect pavement and bridge preservation needs, including previous work, environmental conditions, traffic volumes and loads, and yearly maintenance. 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.



## PAVEMENT PRESERVATION

**\$7.9B**

The entire State Highway System's pavement condition is evaluated each year using the Nebraska Serviceability Index (NSI), which measures factors such as cracking, faulting, rutting, and ride quality.

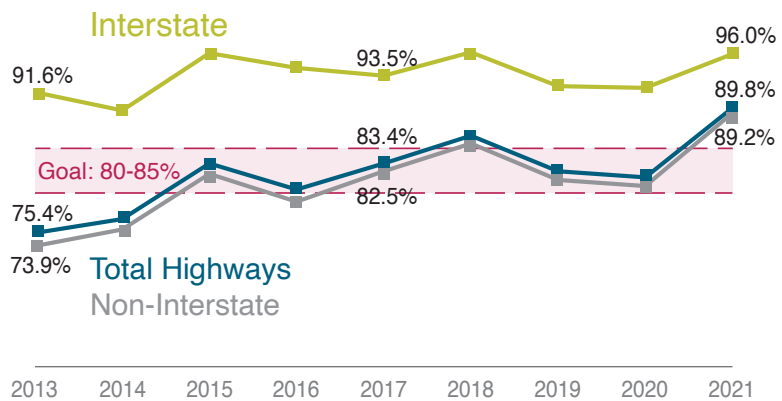
These factors are then used in a formula that calculates the overall condition of the roadways for an NSI rating, which is then used in a benefit/cost analysis tool to identify the right preservation treatment at the right time.

NSI Ratings	
0-30	Very Poor
30-50	Poor
50-70	Fair
70-90	Good
90-100	Very Good

[NSI rating photos for asphalt and concrete](#)

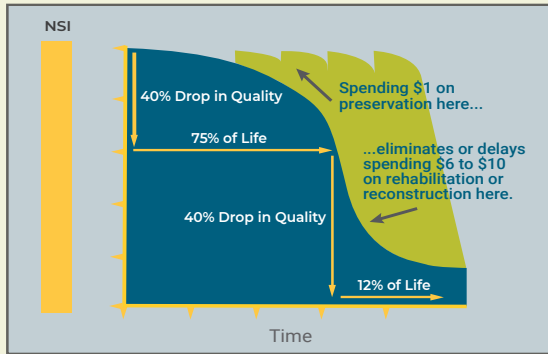


Percent of Miles at Least "Good" (NSI ≥ 70)

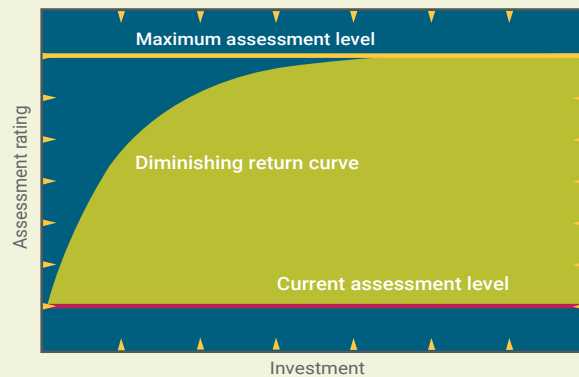


Investing in pavements and bridges in the early stages of their life allow's NDOT to use less costly treatments while providing a high level of service/condition. Additionally, NDOT realizes that there is a "sweet-spot" maintaining our pavements and bridges to maximize the benefit.

### Pavement Performance Curve



### Diminishing Returns



## BRIDGE PRESERVATION \$936M

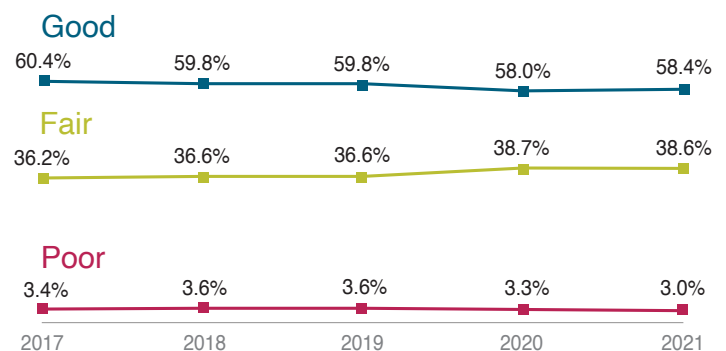
Bridge preservation is focused on maximizing the long-term value of operations of Nebraska's bridge assets. Every bridge in the state is inspected at regular and frequent intervals to gather substantial data on the current bridge condition. This data is utilized to guide our Bridge Management Program on potential actions to take on each state-owned bridge, and when the optimal time to take such action should occur.

Some actions are cyclical in nature and can be expected to be needed regularly, such as replacement of a bridge deck joint. Other actions are in response to an observed deterioration which can be traced through historical inspection records and anticipated damage, or damage resulting from an impact or incident. Rehabilitation is applied to older bridges which includes major construction work required to ensure continuing structural integrity of the bridge. These actions can include, but are not limited to, concrete repair, painting, deck replacement, or substructure repairs.

Each action is guided by the goal of ensuring safety of the structure for the traveling public and extending bridge service-life, therefore optimizing bridge-related expenses. Additional efforts are made to plan bridge preservation construction at the same time as adjacent roadway construction.

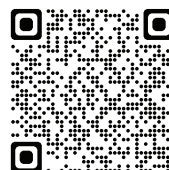
A significant effort of bridge preservation expenses in recent years have been associated with bridge decks. Beyond the expense of construction of a new bridge, the second greatest cost with management of bridge assets is replacement of bridge decks. NDOT has been frequently employing asphalt overlays with bridge deck membranes, concrete overlays, and epoxy polymer overlays in order to significantly extend the life of bridge decks and to provide a smooth driving surface. Effective use of preventative preservation techniques extends the service-life of a bridge and serve to optimize long-term economy.

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



#### Bridge Inspection Considerations

Condition ■ Deterioration rate ■ Age ■ Traffic ■ Cost/benefit



<https://dot.nebraska.gov/business-center/>

# SYSTEM MODERNIZATION & OPERATION

20-YEAR  
PROJECTED NEEDS

**\$2.2B**

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.



ROADWAY  
MODERNIZATION

**\$1.3B**

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

Roadway modernization needs are compiled and updated annually by calculating the construction costs, including resurfacing and right-of-way costs.

Modernization needs for rural intersections are determined by the need to improve intersections due to high-traffic volumes and documented crash histories.

The costs to bring these roadways up to current standards are based on annual construction costs, in addition to the costs to remove deficiencies and modernize systems such as cameras, message boards, and fiber optics, 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.

<p><b>36,000 &amp; greater</b> <i>(six or more lanes warranted)</i></p> <p><b>10,000 - 35,999</b> <i>(four lanes warranted)</i></p> <ul style="list-style-type: none"> <li>• 12' surfaced lane width</li> <li>• Outside shoulder 8' of the 10' shoulder paved</li> <li>• Inside shoulder 3' of the 5' shoulder paved</li> </ul>	<p><b>4,000 - 9,999</b></p> <ul style="list-style-type: none"> <li>• 12' surfaced lane width</li> <li>• 8' shoulder width w/6' paved</li> </ul> <p><b>2,000 - 3,999</b></p> <ul style="list-style-type: none"> <li>• 12' surfaced lane width</li> <li>• 6' shoulder width w/2' paved</li> </ul> <p><b>Stopping sight distance</b></p> <ul style="list-style-type: none"> <li>-No vertical crest curve &gt;20 mph below posted speed limit</li> <li>-No vertical sag curve &gt;25 mph below posted speed limit</li> </ul>	<p><b>750 - 1,999</b></p> <ul style="list-style-type: none"> <li>• 12' surfaced lane width</li> <li>• 3' shoulder width</li> </ul> <p><b>Under 750</b></p> <ul style="list-style-type: none"> <li>• 11' surfaced lane width</li> <li>• 2' shoulder width</li> </ul> <p><b>Stopping sight distance</b></p> <ul style="list-style-type: none"> <li>-No vertical crest curve &gt;20 mph below posted speed limit</li> <li>-Existing vertical sag curve condition allowed</li> </ul>
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## RAIL CROSSING AND RURAL TRANSIT MODERNIZATION

# \$609M

The at-grade rail crossing needs include all passive-warning device locations with an exposure factor of 3,000 or greater.

The Federal Transit Administration (FTA) defines a rural area as one with 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 services and metro area vanpool subsidies.



## BRIDGE MODERNIZATION

# \$222M

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.

## RURAL TRANSIT MODERNIZATION NEEDS



**OPERATING ASSISTANCE** – Costs associated with direct operation of rural transit systems (including intercity bus) and projected costs of operating scheduled intercity bus routes in the Panhandle Region and Kearney-Hastings-Grand Island.



**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. 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 trip planner.



**RIDESHARE PROGRAMS** – Includes subsidized vanpool projects in the metro and rural areas. Cost projection assumes the program will grow to approximately 100 vans. As of September 2022, NDOT supported 48 vanpools across the state.



**INTERCITY BUS PROGRAM** – Cost of subsidizing existing intercity bus service. NDOT is required to spend at least 15% of our rural apportionment on intercity bus service. Cost projection assumes NDOT will meet this requirement through increased intercity service connecting Hastings, Kearney and Grand Island and expanding service in the Panhandle Region.

# CAPITAL IMPROVEMENTS

20-YEAR  
PROJECTED NEEDS

**\$3.5B**

Capital improvement needs are associated with those projects that add highway capacity and provide infrastructure for economic development.



## ROADWAY EXPANSION

**\$3.4B**

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.

Needs are determined as follows:

- 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.
- 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.
- 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 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.
- Costs of implementing the Metro Area Travel Improvement Study (MTIS) which was completed in 2019.



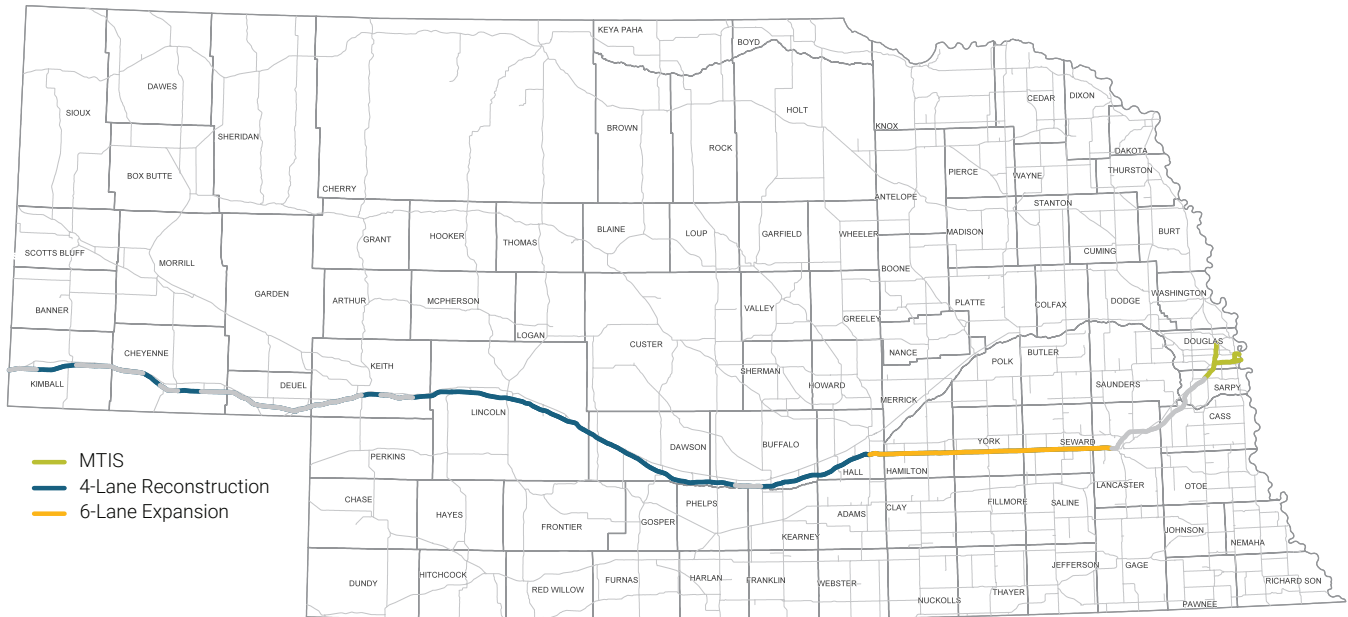
## GRADE SEPARATIONS

**\$173M**

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

# I-80 NEEDS

In 2009, NDOT formulated a 30-year I-80 reconstruction plan. The map below shows the remaining 194 miles of 4-year reconstruction needs, 83 miles of 6-lane expansion needs, as well as MTIS project needs in the Omaha metro area.



*Top* - 6-lane I-80 between Lincoln and Omaha.

*Right* - 4-lane I-80 near Grand Island planned for future 6-lane expansion.







Photos: Lincoln South Beltway  
Fremont Southeast Beltway