

# I-80 Capacity, Safety, and Reliability Enhancements Project

## 2022 Multimodal Project Discretionary Grant (MPDG) Opportunity



**Project Name** I-80 Capacity, Safety, and Reliability Enhancements  
**Project Type** Mega, INFRA Large  
**Future Eligible Project Costs** \$128,660,000  
**2022 MPDG Funds Requested** \$77,196,000

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Supporting Information can be found at: <https://www.srfconsulting.com/ndot-i-80-mpdg/>



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# I. Project Description



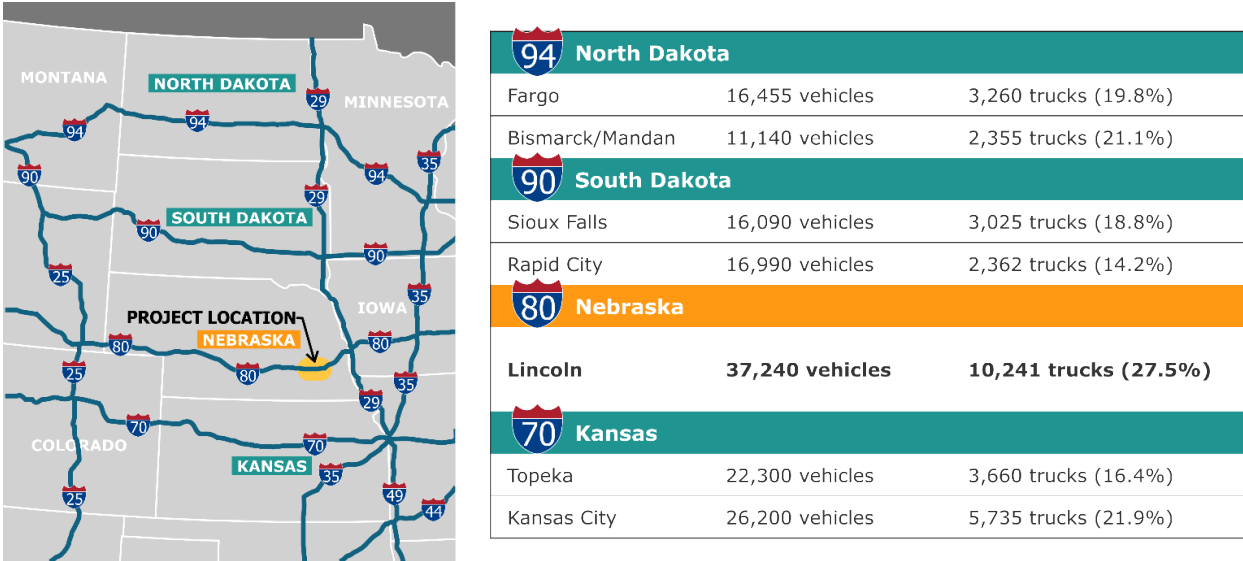
The Nebraska Department of Transportation (NDOT) is requesting **\$77.196 million** of 2022 Multimodal Project Discretionary Grant (MPDG) grant funding through one or more funding programs (MEGA, INFRA, or Rural) for the **reconstruction and expansion of Interstate 80 (I-80)**. The project limits are located in Lancaster and Seward County between mile posts 387.54 and 395.15, a distance of 7.61 miles. The project begins 0.6 miles west of N-103 and extends east to the NW 56<sup>th</sup> Street grade separation, which is near the western border of the City of Lincoln (population 295,618). This project meets the criteria for a **“rural application”**, being outside the boundaries of the 2010 Census – Urbanized Area Reference Map.

Interstate 80 is the second longest US interstate in the United States stretching from San Francisco, California to Teaneck, New Jersey, a distance of 2,906 miles. The I-80 corridor is a critical route for moving goods and people within the state and between Nebraska and the rest of the nation. I-80 traverses major metropolitan areas in San Francisco, Sacramento, Reno, Salt Lake City, and Cheyenne to the west, and Lincoln, Omaha, Des Moines, Quad Cities, Chicago, and Cleveland to the east. I-80 carries approximately 3.501 billion vehicle miles traveled annually.

**I-80 is one of the most important east/west freight routes as it carries some of the largest freight volumes of any road in the country, especially from points in Nebraska extending to the Atlantic Ocean.** Relative to competing interstate corridors of I-94, I-90, and I-70, through the nation’s midsection, I-80 through Nebraska carries significantly more freight volume and has a higher truck percentage. Additionally, the junction of I-80 and I-76, essentially created the headwaters of one of the most critical freight corridors nationwide. I-80 through the project area carries substantially more agricultural freight than competing corridors to the north and south. See Figure 1 for average annual daily traffic (AADT) numbers for east-west interstate routes in the region.

This project is of importance to Nebraskans and the country because the segment of I-80 is part of the [Eisenhower Interstate System](#), [National Highway System \(NHS\)](#) route, [National Highway Freight Network](#) Primary Highway Freight System (PHFS), and National Multimodal Freight Network and in the [National Freight Strategic Plan](#), and [Nebraska State Freight Plan](#).

**Figure 1 - East-West Interstate Route Traffic Volumes**



## Proposed Improvements

Interstate 80 and its structures were originally constructed in 1962. Since that time, only periodic maintenance has been performed along the corridor. The infrastructure in this segment has deteriorated considerably over the years and the entire system has reached the end of its useful life and needs to be replaced.

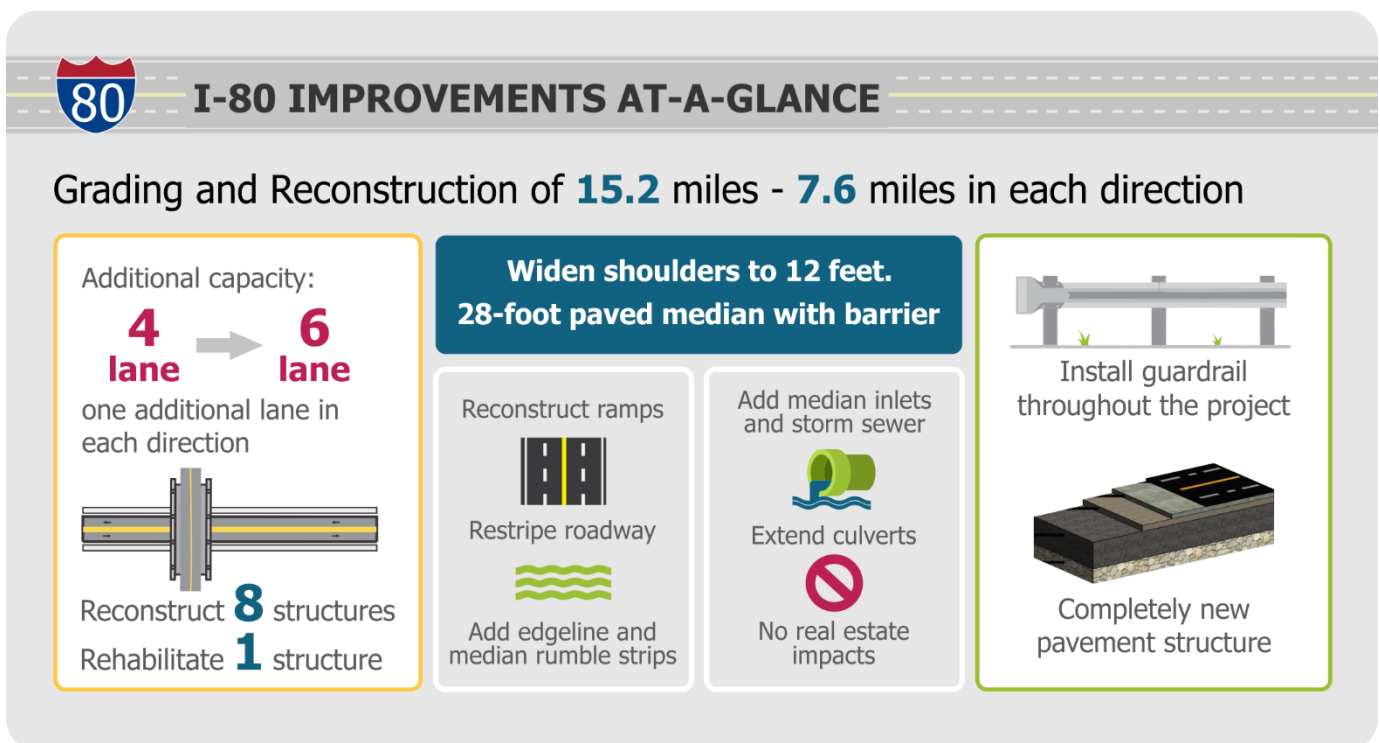
The improvements along this 7.61-mile segment include total reconstruction of I-80, replacing the pavement and bridges and expanding I-80 from four to six-lanes. Two new travel lanes (one additional in each direction) and a 28-foot paved median with concrete barrier will be constructed within the existing depressed median. The existing roadway surface will be removed and regraded and a new stronger concrete pavement surface will be installed using over eight percent recycled materials, to minimize environmental impacts and reduce project cost. New pavement markings will be included to designate the new travel pattern.

The project will reconstruct eight structures (four mainline bridges on I-80 over Middle Creek and South Branch Middle Creek, and four overhead structures) and rehabilitate one overhead bridge structure within the project area. These improvements will raise the bridge heights to meet the 16' minimum vertical clearance. Culverts will be extended to accommodate improvements. Slopes will be regraded, and the installation of new guardrail will also be included. Edge line and median rumble strips will be installed in both directions.

The westbound and eastbound entrance ramps onto I-80 at the Highway 103 interchange will be reconstructed to include an additional 1,000 feet of tapered design acceleration lanes in each direction, greatly improving safety of merging vehicles, especially heavy trucks, by allowing them appropriate time to get up to speed and allow clear vision for all drivers to the merging vehicles.

Outside paved shoulders on I-80 will be widened from 10' to 12' and inside paved shoulders will be widened from 3' to 12' allowing room for improved safety to first responders such as law enforcement, volunteer fire departments, EMT's and tow operators. Median inlets and storm sewer will be installed throughout the entire

Figure 2 - Project Improvements Summary



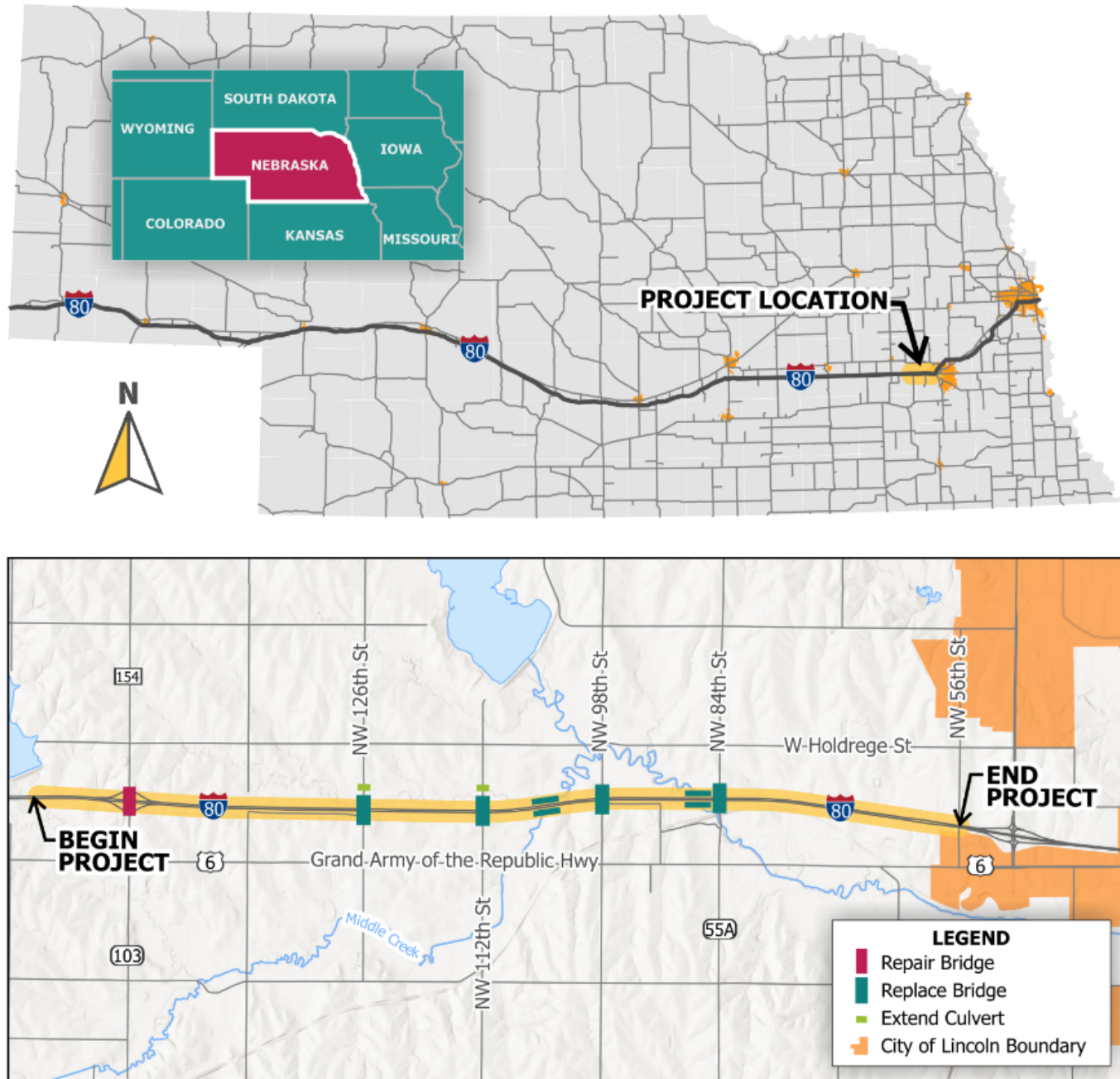
project length to reduce flooding risk throughout the corridor.



To minimize the impact on today's commerce, this project will be constructed under traffic with lane closures controlled with approved temporary traffic control devices and practices. Bridge replacements on county roads will be completed considering public involvement comments and concerns and will include signed local detour alternate routes. No property acquisitions are required to build this project as the project is located on existing alignment which essentially eliminates impacts to local landowners and minimizes potential schedule risk. Any temporary impacts that occur to locals or businesses will be mitigated by ensuring all access to adjacent properties will be maintained during construction.

A map of the project study area and proposed structure improvement locations along I-80 are shown in Figure 3.

**Figure 3 - Project Location Map**



## Transportation Challenges

The I-80 Capacity, Safety, and Reliability Enhancements project addresses three major transportation challenges.

### Challenge 1 – Safety Concerns



Challenge: The I-80 corridor has experienced crash rates that exceed the statewide average.

Solution: Several proven safety enhancements will be performed to address the corridor crash rate. A new six-lane roadway surface will be constructed and allow for I-80 to be expanded from four to six-lanes, including new pavement markings to designate the new travel lanes. A 28-foot paved median with concrete barrier, new guardrail, and widened paved shoulders (12' inside and outside) will be constructed along with edge line and median rumble strips. Ramps at Highway 103, which are original to the 1962 design, will be reconstructed to current NDOT design standards. Upgraded ramps will provide additional acceleration lane length, reducing the speed differential between entering vehicles and mainline vehicles, which will improve safety. The added capacity, along with widened shoulders will increase the safety of incident responders by minimizing their exposure to adjacent passing traffic and reduce the probability of secondary incidents.

### Challenge 2 – Deteriorating Infrastructure



Challenge: The infrastructure including roadway, structures, culverts, and guardrail are old and deteriorating rapidly. Most of the infrastructure was originally constructed in 1962 and maintenance activities have been fully maximized. All infrastructure has reached the end of its useful life and needs to be replaced.

Solution: The corridor will be reconstructed to a new condition which once built, will save on annual maintenance cost, time, labor, and energy. Ramp geometric improvements will be made, and bridges will be rebuilt or rehabilitated. Culverts will be widened, and new guardrail will be installed. New median inlets and storm sewer will be installed.

### Challenge 3 – Congested Corridor



Challenge: Interstate 80 is the primary freight corridor through the Midwest and as such, carries a high volume of heavy commercial vehicles. With the truck percentages averaging approximately 27.5 percent of the total daily volume of (37,240 vehicles), the corridor is approaching capacity and is forecasted to reach capacity (exceeding 40,000 vehicles per day) in the next two years.

Solution: Interstate 80 will be widened from four-lanes to six lanes which will improve traffic flow especially during peak periods. The added capacity will relieve overall congestion and delays, improve safety and travel time reliability for roadway users and freight haulers, and provide numerous Traffic Incident Management benefits such as reduced crashes and the ability to improve quick clearance, keeping lanes of travel open, and providing increased safe working space for first responders and emergency personnel.



## Project History

The I-80 Capacity, Safety, and Reliability Enhancements project has been in the works for several years. The project is identified in the [Lincoln Metropolitan Planning Organization Transportation Improvement Program \(TIP\) FY 2023-2026](#), page 16, the [Nebraska State Freight Plan](#), and the [Lincoln MPO 2050 Long Range Transportation Plan](#). The project will be programmed into the Statewide Transportation Improvement Program (STIP) in 2023. Preliminary engineering began in 2020 along the corridor and state investment dollars have been expended and programmed for future phases. Construction is expected to be completed in 2027 if 2022 MPDG funding is awarded.

## Previously Incurred Costs

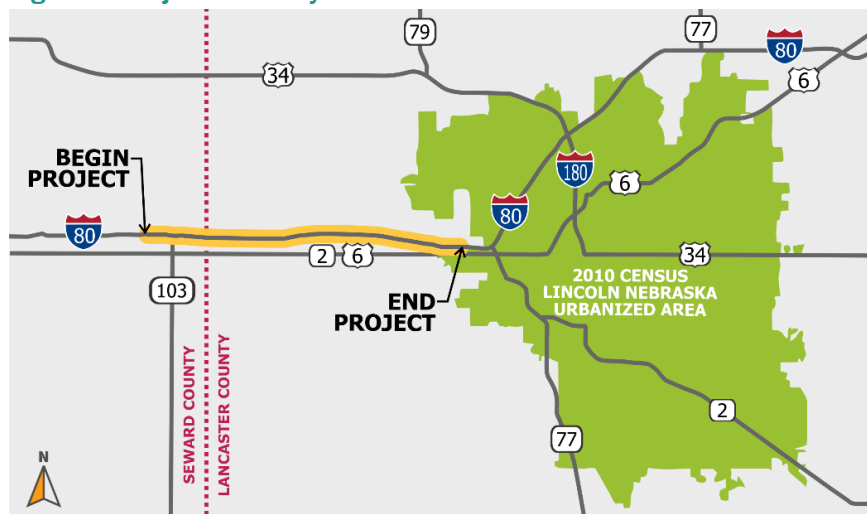
The I-80 Capacity, Safety, and Reliability Enhancements project costs are estimated at \$129.21 million. NDOT has already invested programmed dollars to see this project completed. The preliminary engineering costs of \$550,000 have already been expended by NDOT. Moving forward, costs associated with the remainder of the preliminary design, environmental documentation, and final design will be paid for by NDOT. Additionally, the Department has committed \$13.425 million towards the construction of the project and will commit to matching state funds to meet funding gap should a 2022 federal award through this MPDG program be granted.

## II. Project Location

### Geographical Description

The I-80 Capacity, Safety, and Reliability Enhancements project is located in Lancaster and Seward Counties in eastern Nebraska (See Project Location Map). As mentioned previously, the project limits are located between mile posts 387.54 and 395.15, a distance of 7.61 miles. The project begins 0.6 miles west of Highway 103 and extends east to the NW 56<sup>th</sup> Street grade separation, which is the western border of the City of Lincoln (population 295,618).

Figure 4 - Project Proximity to Lincoln Urbanized Area



This project location is located outside the Lincoln 2010 Census-designated Urbanized Area and meets the criteria for a **Mega, INFRA rural-large, and Rural application**. The project is not located in an Area of Persistent Poverty, Historically Disadvantaged Community, or in a location of one of the four federally designated community development zones. The geospatial location of the project is 40.82188°, -96.83491°.

### III. Project Parties

Nebraska Department of Transportation (NDOT) is the applicant for this 2022 MPDG funding opportunity. The MPDG program will provide necessary funding to NDOT for reconstructing I-80 and the necessary improvements to protect this critical transportation corridor. The project has documented letters of support from numerous entities.

The Lead Agency Point of Contact is:

**Primary Contact:**

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### IV. Grant Funds, Sources and Uses of Project Funds

#### Project Costs

**INFRA or MEGA Program:**

**Total Project Cost:** \$129,210,000

**Total Future Eligible Project Cost:** \$128,660,000

**MPDG Grant Request Amount:** \$77,196,000

(60 percent of future eligible project cost for INFRA and MEGA)

**Local Match Committed to Project to date:** \$13,425,000

**Previously Incurred Expenses:** \$550,000 (preliminary design)



The above figures are assuming a 60 percent MPDG grant award through either the INFRA or MEGA program. Per the [guidance](#) given in the Notice of Funding Opportunity (NOFO) and by USDOT, NDOT is also requesting to be considered eligible for federal funding through the RURAL program (up to 80 percent funding), requesting \$102.928 million through that program.

**Table 1 Project Funding Breakdown**

Project Element		Project Funding: <b>Mega &amp; INFRA</b>				Project Funding: <b>Rural</b>			
		Mega & INFRA	Other Federal	NDOT	Total	Rural	Other Federal	NDOT	Total
Previously Incurred	Environ. Assess. & Prelim. Design	\$0	\$0	\$550,000	\$0	\$0	\$0	\$550,000	\$550,000
	<b>Total Not Eligible</b>	<b>\$0</b>	<b>\$0</b>	<b>\$550,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$550,000</b>	<b>\$550,000</b>
Future Eligible Cost		Mega & INFRA	Other Federal	NDOT	Total	Rural	Other Federal	NDOT	Total
	Final Design	\$0	\$0	\$1,400,000	\$1,400,000	\$0	\$0	\$1,400,000	\$1,400,000
	Construction Cost	\$77,196,000	\$25,732,000	\$22,907,500	\$125,835,500	\$102,928,000	\$20,616,750	\$2,290,750	\$125,835,500
	ROW Acquisition	\$0	\$0	\$700,000	\$700,000	\$0	\$0	\$700,000	\$700,000
	Utility Agreements	\$0	\$0	\$724,500	\$724,500	\$0	\$0	\$724,500	\$724,500
	<b>Total Eligible</b>	<b>\$77,196,000</b>	<b>\$25,732,000</b>	<b>\$25,732,000</b>	<b>\$128,660,000</b>	<b>\$102,928,000</b>	<b>\$20,616,750</b>	<b>\$5,115,250</b>	<b>\$128,660,000</b>
MPDG Request Summary	<b>Mega &amp; INFRA Overview (60/40)</b>				<b>Rural Overview (80/20)</b>				
		<b>Mega/INFRA Request</b>	<b>\$77,196,000</b>	<b>60%</b>	<b>Rural Request</b>	<b>\$102,928,000</b>	<b>80%</b>		
		Other Federal	\$25,732,000	20%	Other Federal	\$20,616,750	16%		
		Nebraska DOT	\$25,732,000	20%	Nebraska DOT	\$5,115,250	4%		
		Total Eligible Cost	\$128,660,000		Total Eligible Cost	\$128,660,000			

\* Miscellaneous costs include mobilization, temporary pavement & drainage, construction traffic control, landscaping, and non-quantified minor items.

### **RURAL Program:**

**Total Project Cost:** \$129,210,000

**Total Future Eligible Project Cost:** \$128,660,000

**MPDG Grant Request Amount:** \$102,928,000 (80 percent of future eligible project cost for Rural).

**Local Match Committed to Project to date:** \$13,425,000

**Previously Incurred Expenses:** \$550,000 (preliminary design)

Under the Rural Program, NDOT would apply the “90/10” rule for interstates for the remaining 20 percent of eligible cost. Instead of applying the rule to the remaining \$25,732,000, NDOT has elected to operate at approximately an 80/20 split with \$20,616,750 in federal formula funds and \$5,115,250 in state funds.

### **Availability and commitment of funding sources:**

The [Lincoln MPO 2050 Long Range Transportation Plan](#) identified ten capital projects with the Lincoln MPO and has allocated and committed funding to three NDOT projects under the Fiscally Constrained Plan. This I-80 project (I-80 from Pleasant Dale to NW 56<sup>th</sup> Street – Project ID 71) is one of the three.

Regardless of the federal funding received through this application, the project will require additional locally matched funds. NDOT has provided a letter of support and commitment letter to cover any funding gap so timely construction can occur and Nebraskans and those using the interstate system can benefit from the project as soon as possible.

### **Non-Federal Funding Source**

#### **Agency**

NDOT is committed to constructing this project and will cover additional non-federal costs to cover any funding gaps to assure obligation dates are met and construction occurs on schedule. NDOT has solidified this commitment in their letter of support for the project.

#### **Other Federal Funding Sources**

For the MPDG grant application (Mega or INFRA), NDOT will supplement the 2022 MPDG awarded grant with the maximum allowable formula federal aid matched if possible and if the project schedule allows. NDOT will not delay the project schedule to obtain additional federal funds. Specific funding programs to apply for are not yet identified.

#### **MPDG Funding Need**

Any MPDG funding award would reduce the funding gap to assure project construction begins in 2024.

## **V. Project Outcome Criteria**

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### **1. Safety**

As mentioned previously, several safety enhancements will be performed as a result of the I-80 project. These include:

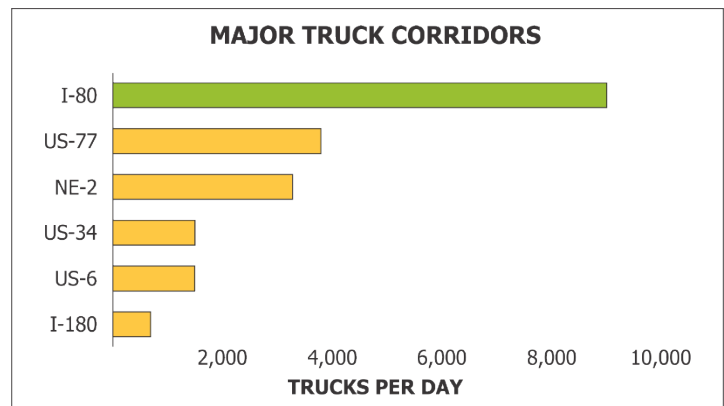
- Grading and reconstructing 15.2 miles of interstate highway (7.61 miles in each direction) to a new condition

- Expanding capacity from a four to six-lane facility (three through lanes in each direction within existing right-of-way)
- Restriping of the roadway
- Adding a 28-foot paved median with concrete barrier
- Grading out slopes and installing new guardrail
- Reconstructing interchange ramps adding 1,000' of tapered design acceleration lanes
- Installing new edge-line and median rumble strips (both sides in both directions)
- Widening outside paved shoulders from 10' to 12' and widening inside paved shoulders from 3' to 12'

All the above enhancements contribute to lessening the corridor crash rates.

I-80 within the project area was originally constructed in the early 1960s. The infrastructure has been deteriorating and is reaching the end of its useful life and needs to be replaced. This 7.61-mile stretch of I-80 has areas that do not meet the current minimum NDOT design standards and policies for an interstate highway. Roadway deficiencies including vertical clearances, ramp geometrics, narrow shoulders, and aging and degraded pavement are just some of the challenges along this segment and contribute to potential safety concerns.

**Figure 5 - Major Truck Corridors Comparison**



Source: NDOT for Truck Average Daily Traffic, 2020

This roadway is approaching capacity and is projected to carry 56,800 vehicles per day through the area by 2038. I-80 will be expected to carry an enormous volume of heavy truck traffic (exceeding 25 percent of forecasted volumes or over 14,200 trucks daily) for years to come. Infrastructure improvements are essential to protect this national backbone route for commodity flow and freight movements. Investing in this roadway now will optimize this critical national, regional, and local transportation route.

### Crash Rates Currently Above Statewide Average

This segment of I-80 (excluding junctions) experienced a crash rate of 0.341 reportable crashes per million vehicle miles travelled (crashes/mvm). **This exceeds the statewide average rate of 0.318 reportable crashes/mvm for a four-lane rural interstate section.** [Average Annual Daily Traffic Counts](#) indicate 2021 corridor volumes along I-80 carry 37,240 vehicles per day through the project area. NDOT collected crash data for a five-year period from January 1, 2016, through December 31, 2020, within the project area. During that time, this section of I-80 experienced a total of 193 crashes broken down as follows:

- Three (3) fatal injury crashes (resulting in three deaths, and five serious injuries)
- Fifty-nine (59) crashes were non-fatal injury crashes (resulting in 81 injuries)
- One hundred thirteen (113) were reportable property damage only crashes
- Eighteen (18) were non-reportable property damage only crashes

### Grading and Reconstructing Interstate to a New Condition

I-80 has maximized the number of times routine maintenance activities can occur and the full depth of the roadway surface needs to be reconstructed. The Project will remove existing pavement (4" AC/9" RCP/4")

and provide a new roadway surface and pavement markings. The new pavement will be 13” Doweled Concrete Pavement on Foundation Course 5” on Stabilized Subgrade type Fly Ash, which will accommodate heavier truck loads and improve stormwater runoff. This is especially important on a roadway which experiences extreme weather events. Thirty-five percent of the crashes on I-80 occurred during wet pavement conditions (rain, snow, slush, or icy conditions). The I-80 Capacity, Safety, and Reliability Enhancements project will provide a new roadway surface which will significantly improve safety.

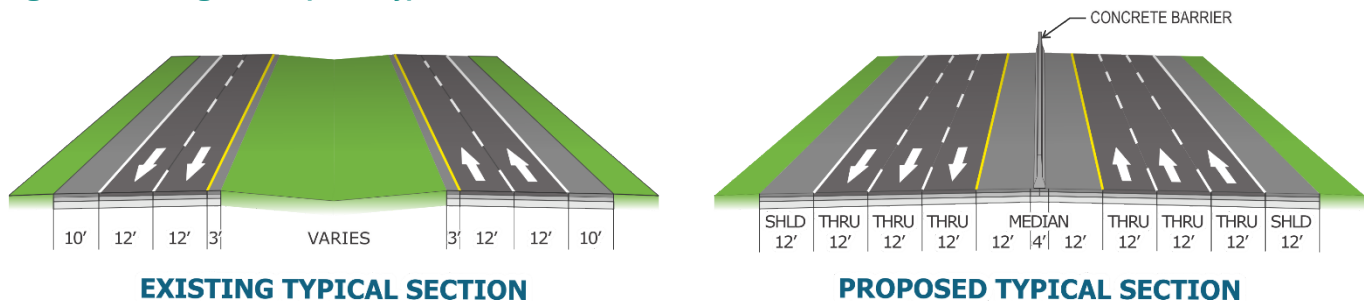
Improvements include:

- Smoother surface and better friction for all interstate users including heavy trucks and passenger vehicles and an expanded user mix of bicyclists, and pedestrians on overpass locations
- Improved storm water runoff
- Reduce the likelihood and incidences of hydroplaning

### Expanding Capacity from Four to Six-Lanes

Adding new travel lanes to the interstate system is a major undertaking. NDOT is in a great position to accomplish this as part of the Project as the additional through lanes will be constructed on the median side, eliminating the need for further right-of-way or real estate acquisition. Additional capacity will provide a safety benefit and result in lower congestion levels, higher free-flow speeds, and higher travel time reliability conditions which will improve commute times, improve freight and delivery dependability, and reduce emissions.

Figure 6 - Existing and Proposed Typical Section



### Adding a 28-foot Paved Median with Concrete Barrier and Guardrails

The Project will pave the median and construct a 28-foot paved median with a concrete barrier and install new guardrail throughout the 7.61-mile corridor.

Roadway departure crashes account for more than 50 percent of all motor vehicle traffic fatalities. Median barriers and roadside guardrails reduce the number of crossover crashes and severe injury and fatal crashes. According to the [American Traffic Safety Services Association \(ATSSA\)](#) median barriers have a measured reduction to crash modification factors (CMF’s) and are applicable to freeways and expressways where roadside guardrails and median barriers are deployed. **Guardrails are effective in reducing fatal and serious-injury crashes, ranging from 16 to 47 percent in reducing such crashes. Median barriers are very effective in reducing cross-median crashes (expected 52 percent reduction in all fatal crashes and 61 percent reduction in all serious-injury crashes).**

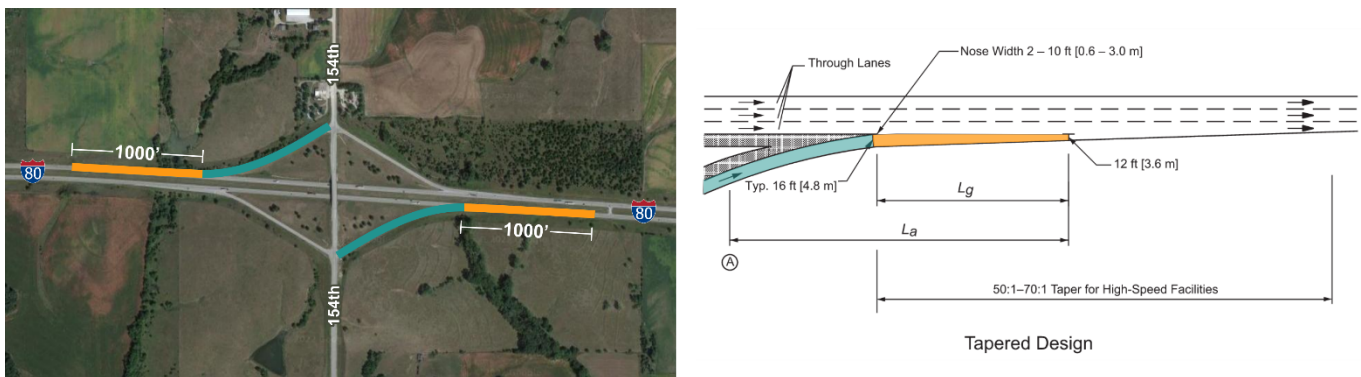


## Interchange Ramp Modifications

The I-80 Capacity, Safety, and Reliability Enhancements project investigates all entry points onto and off the interstate and makes necessary improvements to lengthen the ramps to meet NDOT standards. Dedicated acceleration lanes on interchange ramps allow traffic entering I-80 to speed up to match the flow of traffic. Interstate 80 has posted speed limits of 75 mph through the project area. At ramp interchanges, trucks carrying heavy loads need time to accelerate to merge onto the interstate and into the traffic stream.

NDOT utilizes a tapered design for interchange ramps and acceleration lanes. Acceleration lanes are currently deficient for safe merging onto a 75-mph posted speed roadway at the I-80/Highway 103 interchange for both the westbound and eastbound traffic. **The Project will reconstruct the acceleration lanes to a design speed of 80 mph and increase the L<sub>g</sub> distance to 1,000'.** The ramp to nose width distance, plus the additional L<sub>g</sub> distance of 1,154 feet, (2,154 feet) will exceed NDOT standards (2,000 feet for 80 mph) and allow for an additional 0.2 miles for entering traffic from the Highway 103 interchange to get up to speed, a critical safety component for merging traffic on a high-speed roadway to obtain merge speeds of at least 57 mph. The improved acceleration lane distance can help in reducing congestion by creating dedicated areas for merging traffic to speed up and not interfere with existing through traffic speeds.

Figure 7 – Interchange Ramp Improvement Summary



## Installing New Edge-line and Median

### Rumble Strips

New edge-line and median rumble strips will be installed as part of the project. [NCHRP Report 641](#) highlights research supporting reductions of 10 to 24 percent in fatal and injury crashes by including milled shoulder and edge line rumble strips on rural freeways. Rumble strips, along with expanded paved shoulder areas allow for drivers who have departed their lane to correct their action before a potential crash occurs.

### Paved and Widening Roadway Shoulders

The current roadway shoulders along the 7.61-mile project area of I-80 are narrow and do not meet NDOT standards for an interstate. Current roadway shoulders are 3' paved on the inside and 10' paved on the outside. Narrow shoulders combined with other factors such as high traffic volumes, high truck traffic, topography, speed, unpredictable and extreme weather events, and wildlife make I-80 a potentially unsafe road. The I-80 Capacity, Safety, and Reliability Enhancements project will **pave and expand the roadway shoulders from 3' to 12' on the inside and pave and expand the roadway shoulders from 10' to 12' on the outside.**

The existing shoulders on I-80 do not provide adequate space for the storage of disabled vehicles, law enforcement vehicles, or for vehicles completing routine maintenance activities to fully exit the travel lane without



pulling off the paved portion of the shoulder. Additionally, the narrow shoulders provide a big challenge for first responders and quick clearance of incidents on I-80.

[NCHRP Report 500](#) and [Safety Benefits of Paved Shoulders](#) indicate that paved shoulders are a proven countermeasure for single vehicle run-off-road crashes and are the most common type of fatal passenger vehicle crash in the United States.

Research indicates that crash rates grow exponentially on roadways with no shoulders or narrow shoulders. Roads with narrow shoulders do not provide a stable, clear recovery area for drivers to maneuver to avoid crashes.

## 2. State of Good Repair

The I-80 Capacity, Safety, and Reliability Enhancements project will contribute to a state of good repair by modernizing core infrastructure. The current infrastructure is old and is deteriorating rapidly: pavement is currently rated in a “fair” condition, however, is expected to quickly deteriorate to “poor” condition. Bridge conditions rate in the “poor” to “fair” range, with vertical clearances at several bridge overpass locations do not meeting NDOT standards. Interchange ramp acceleration lanes do not meet NDOT standards; and roadway, structures, culverts, and guardrail are reaching the end of their useful life and need to be replaced. In this area, pavement quality creates problems for the movement of people and goods. Poor pavement quality can cause delays, increased wear and tear on vehicles, and damage goods in transit. In particular, poor pavement quality can cause stress to live animals and can damage fragile electronics or other goods.

The investment in new infrastructure will assure Nebraskans, freight haulers, and those traveling through the state a safe and dependable interstate corridor. Without the project, ongoing maintenance projects and lane closures would occur more frequently, and only minor infrastructure improvements would be made. This would not only have an impact in dollars expended, but would also affect energy use, travel time reliability, and economic impacts in the region.

Figure 8 is a photograph of a local deck failure on an I-80 bridge that occurred on June 10, 2021. This hole took a crew five hours to repair, causing three-mile backups on I-80. Performing deck repairs, like this one, under traffic is costly and causes concrete settling issues due to the constant vibrations on bridges and high traffic. This results in repairs not lasting as long and maintenance activities needing to occur more often.

**Figure 8 - Bridge Deck Failure Example**



### Reconstructs I-80 Mainline to New Condition

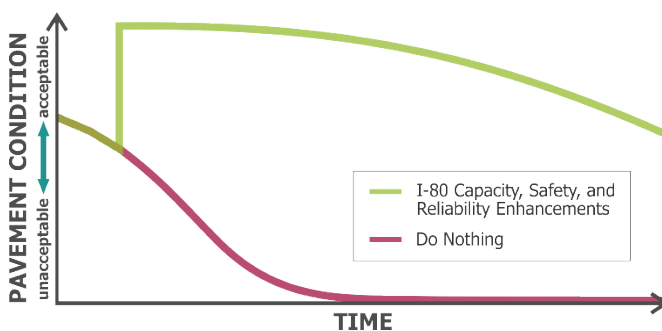
This segment of I-80 was originally constructed in 1962. As stated previously, pavement is currently rated in a “fair” condition, however, is expected to quickly deteriorate to “poor” condition. The pavement has now exceeded its 50-year design life through regular maintenance and needs to be reconstructed.

NDOT’s Pavement Management System, Materials & Research Pavement Design section, and District 1 have determined that the pavement distresses present on this section of I-80 are significant enough to warrant reconstruction.

## Bridges Originally Constructed in 1962, Several in Poor Condition

According to NDOT’s Bridge Inventory Rating System, its Bridge Division, and District 1, the distress present on eight structures within the project area is significant enough to warrant structure replacement or rehabilitation. All eight structures (four structures on I-80 and four overpasses of I-80) are currently rated in poor or fair condition on the National Bridge Inventory. Each was constructed in 1962, at the time of the Interstate opening, and have reached the end of their useful life.

Figure 9 – Pavement Condition



In addition, vertical clearances of overpasses need to be increased to accommodate larger trucks and over dimensional loads that are commonly found on the interstate. According to FHWA [vertical clearance](#) guidelines, the clear height of structures shall not be less than 16 feet (4.9 meters) on interstates and should span over the entire roadway width, including the useable width of shoulder. The [Nebraska State Freight Plan](#) indicates

all the bridges on the project corridor have a vertical clearance less than 16 feet. I-80 has substantially more locations with vertical clearance issues than the other routes. Lancaster County has 13 identified locations with vertical clearance under 16 feet, the second most of all the counties statewide.



**Project will upgrade 4 of the existing 91 bridges statewide that do not meet standards of 16.0’ vertical clearance.**

These structures are critical to the national and regional freight system. A bridge failure or closure would be catastrophic to the local, regional, and national economy and environment and could jeopardize NDOT’s economy in the short-term as product shortages and delivery delays would be experienced as longer alternate routes would be required.

Table 2 - Structure Improvement Summary

Structure Number	Location	Year Built	National Bridge Condition Rating	Lowest Rating*	2018 AADT	2033 Future AADT
S080 39012	NW 126 <sup>th</sup> Street over I-80	1962	Poor	4	180	261
S080 39112	NW 112 <sup>th</sup> Street over I-80	1962	Fair	5	130	130
S080 39213	NW 98 <sup>th</sup> Street over I-80	1962	Fair	5	55	79
S080 39312	NW 84 <sup>th</sup> Street over I-80	1962	Poor	3	885	930
S080 39165 L	I-80 over South Branch of Middle Creek	1962	Fair	5	40545	56763
S080 39165 R	I-80 over South Branch of Middle Creek	1962	Fair	5	40545	56763
S080 39294 L	I-80 over Middle Creek	1962	Fair	5	40545	56763
S080 39294 R	I-80 over Middle Creek	1962	Fair	5	40545	56763
S080 38814	N-103 over I-80	1991	Good	7	3550	6390
C005560317	NW 126 <sup>th</sup> Street	1965	Fair	5	375	637
C005510535	NW 112 <sup>th</sup> Street	1968	Poor	3	89	151

**\* Bridge Rating**

- 3 = Serious Condition – loss of section, deterioration, local failures are possible, fatigue cracks in steel or shear cracks in concrete
- 4 = Poor Condition – advanced section loss, deterioration, spalling or scour
- 5 = Fair Condition – all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour

**Improvement Type:**

- Structure Replacement**
- Structure Rehabilitation**
- Culvert Replacement**

Source: National Bridge Inventory

The I-80 Capacity, Safety, and Reliability Enhancements project will address these issues and extend the life of this section of I-80 by 60+ years by:

- Reconstructing eight structurally deficient bridges to new condition, including:
- Replacing two reinforced concrete box culverts (RCBC)
- Improving bridge and overpass clearance to 16' to meet NDOT and FHWA clearance height standards on interstates
- Replacing guardrail and
- Addressing problems with approach grading, slab replacement and bridge painting, and maintenance; including bridge deck overlays

### 3. Economic Impacts, Freight Movement, and Job Creation

The I-80 Capacity, Safety, and Reliability Enhancements project specifically addresses outcomes 1, 3, 4, and 10 (project outcome criteria) as identified in the [2022 MPDG NOFO](#). Expansion of the roadway and other improvements identified in this project will support economic impacts, freight movement, and job creation through improving system operations, decreasing transportation costs and providing timely access to employment opportunities, improve the economic strength of the region, and facilitate more efficient freight movement.

#### Increase Travel Time Reliability

As stated previously, Interstate 80 is the second longest US interstate in the United States. The I-80 corridor is a critical route for moving goods and people within the state and between Nebraska and the rest of the nation. Furthermore, I-80 currently carries 3.501 billion vehicle miles traveled annually and that number is expected to increase over time.

This project is located one mile west of the metropolitan statistical area of Lincoln (population 340,217) and about 60 miles west of the Omaha metropolitan area (994,604). Lincoln and Omaha represent the largest sales markets in the state of Nebraska and are reliant on I-80 for the movement of goods and materials, receiving and shipping hundreds of millions of tons of freight annually by way of interstate highway and railway.

The multifunctional corridor forms an essential part of the national freight network and connects residents of the project area to employment and healthcare opportunities. For a rural corridor, this segment of I-80 carries **a large volume of traffic (37,240 vpd), and heavy trucks (27.5 percent), Growth will be influenced by both the regional growth in the Lincoln MSA and anticipated increases in freight, which combine to reflect forecasted volume growth of 30 percent to 56,800 vpd by 2038. The corridor is currently operating at a Level of Service (LOS) “C” and projected to be at a LOS “D” within the next five years.**

#### **Freight Movement**

The I-80 Capacity, Safety, and Reliability Enhancements project supports the movement of freight by addressing the following criteria:

- Preserves highway infrastructure condition by improving pavement and bridge condition
- Represents capital infrastructure improvements – new roadways/lanes

- Addresses truck safety issues – investments through longer ramp acceleration lanes and increased vertical clearance
- Ensures truck mobility – additional capacity to lessen congestion
- Strengthens intermodal connectors – improves roadway conditions to multimodal facilities and freight clusters

These improvements increase economic competitiveness, encourage innovation in creative ways to move freight, encourage partnerships with private businesses, and increases collaboration between state agencies.

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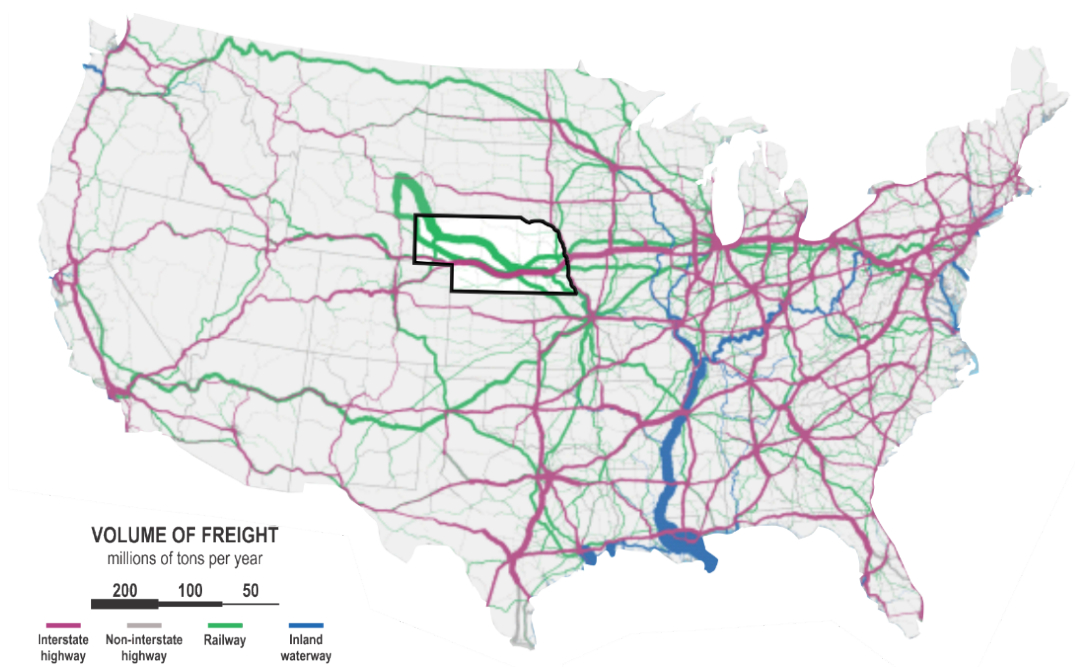
FHWA's Freight Analysis Framework (FAF) 4.2 estimates that 326.6 million tons of freight will be moved by truck in Nebraska by year 2045. This is equivalent to approximately 13.07 million fully loaded 18-wheel trucks.

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I-80 is one of the most important east/west freight routes as it carries some of the largest freight volumes of any road in the country, especially from points in Nebraska extending to the Atlantic Ocean. Couple that with extremely high volumes of freight moved by rail in and through the Lincoln metropolitan area.

Relative to competing interstate corridors of I-90, I-70, I-40 and I-20, through Nebraska I-80 carries more than twice the freight volume. Additionally, the junction of I-80 and I-76, essentially created the headwaters of one of the most critical freight corridors. I-80 through the project area carries substantially more agricultural freight than competing interstate corridors to the north and south.

**Figure 10 - National Freight Volumes**



### Increases Capacity

An important aspect in determining transportation needs is the capacity of the roadway system to meet traffic demand. Comparing current daily traffic volumes with planning level capacities (volume to capacity [V/C] ratio), can help identify congestion on the roadway network. At a planning level, NDOT has developed planning

level daily capacities per through lane to help understand when a roadway's capacity is being reached. According to NDOT standards, a freeway is anticipated to be at capacity when 20,000 vehicles per through lane are met.

In the case of I-80 through the project area, year 2021 corridor traffic volumes range between 37,240 vehicles per day (current four-lane facility) and are expected to reach 56,800 vehicles per day by 2038. Furthermore, the [Nebraska State Freight Plan](#), shows this segment of I-80 as a “congesting” corridor in 2035 when existing plus committed (E+C) projects are considered. According to the [National Freight Strategic Plan](#), without improvements, this segment will reach the "Highly Congested- High-Volume" category by 2045. Investments now are critically important to accommodate these future projections.

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The Nebraska State Freight Plan shows this segment of I-80 as a “congesting” corridor in 2035 when existing plus committed (E+C) projects are considered. According to the National Freight Strategic Plan, without improvements, this segment will reach the "Highly Congested- High-Volume" category by 2045.

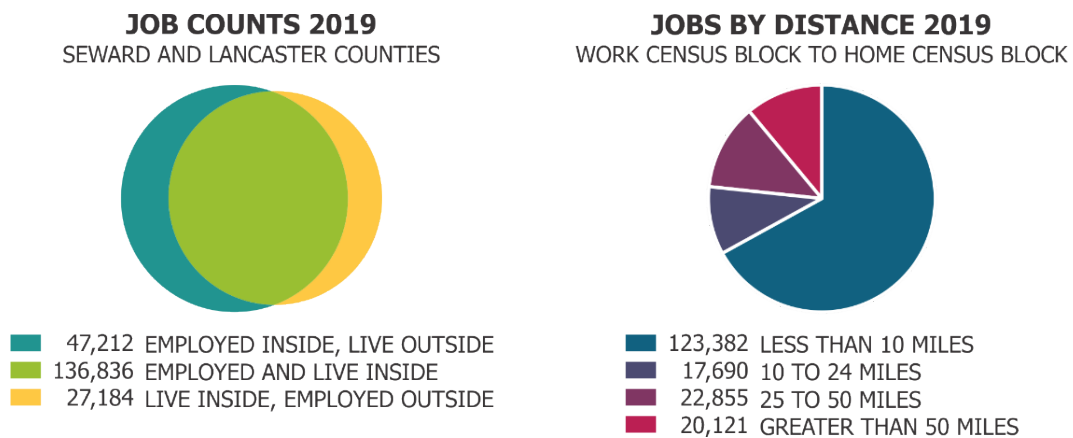
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Congestion levels will be addressed through the expansion of I-80 through the project area. **The road will be expanded from a four-lane to a six-lane interstate.** The purpose of this project is to increase traffic capacity while supporting and maintaining safe and efficient vehicular travel within the Pleasant Dale N-103 to NW 56th Street Interstate 80 (I-80) corridor. No improvements have been made in the area of the proposed project to improve traffic capacity since the facility was originally constructed in 1962.

### Access to Employment Centers and Job Opportunities

This project will provide direct access for many rural residents to the City of Lincoln, which is the major employment center in the area. Rural residents, tribal members, and the regional economy are dependent on having access to a reliable transportation system that allows movement in and out of the city.

**Figure 11 - Census Job Data**

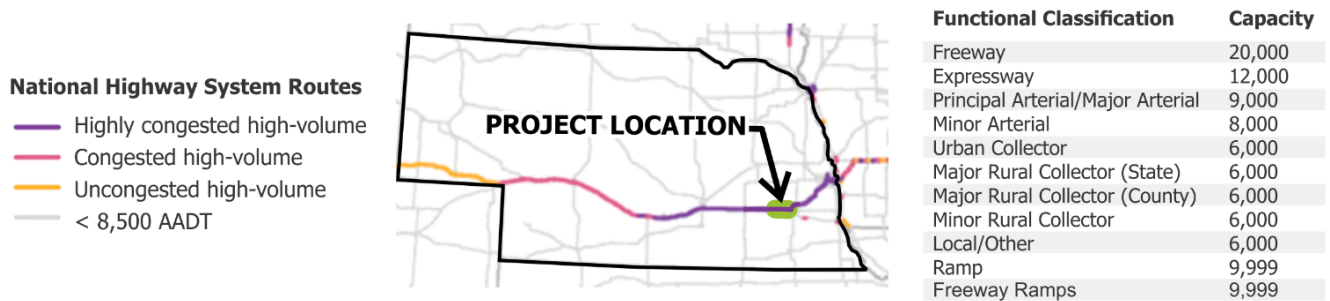


Regional job data, including job counts, inflow/outflow to jobs, and distance traveled to place of employment was examined for residents in Lancaster and Seward Counties. In 2019, there were 211,232 workers. Of those, workers, 136,836 (64.8 percent) were employed and lived within these two counties. 47,212 workers (22.4 percent) had jobs in Lincoln or Seward County, but lived outside these areas, and 27,184 (12.8 percent) lived in Lincoln or Seward County but had their place of employment outside these two counties. While 67 percent of



all employees had travel times to work less than 10 miles, over 23.3 percent traveled greater than 25 miles to their place of employment.

**Figure 12 - I-80 Congestion Levels**

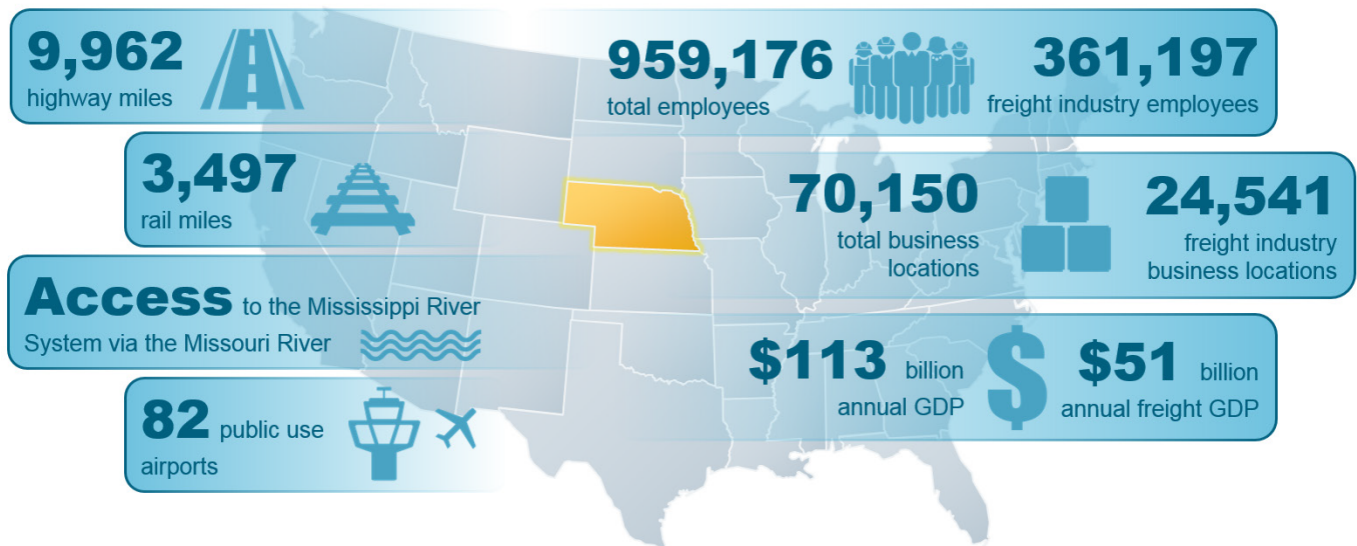


This project will improve travel time reliability, reduce congestion, and result in a more efficient transportation system providing rural residents west of Lincoln easier access to the major employment center. It will also help to strengthen the regional economy by improving linkages between rural areas west of Lincoln to the Lincoln Metropolitan area.

### Benefits to the Local and Regional Economy

According to the [Nebraska State Freight Plan](#), as of February 2021, there were 361,197 of the state’s 959,176 total employees that held jobs in freight transportation or logistics-dependent industries, accounting for 37.7 percent of the employment in Nebraska.

**Figure 13 - Nebraska State Freight Statistics**



This project will support freight movement through Nebraska by improving a vital freight corridor to ensure its continued reliable use. The movement of freight is critical to the Nebraska economy and is dependent on a reliable infrastructure network. The comprehensive multimodal freight system in Nebraska allows goods to move into, out of, through, and within Nebraska to reach customers and consumers. Furthermore, this system serves as the gateway to other states, markets, and supply chains. The core of the freight network consists of nearly 10,000 highway miles connecting to rail, air, and water facilities, as well as to the 25,000 freight-related businesses in the State. Access to markets via rail and air gateways is also critical for Nebraska’s economy.



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According to Nebraska State Freight Plan, in 2015, 882 million tons of freight moved over Nebraska's transportation system, valued at \$615 billion. By 2045 this will increase by over six percent in volume to 933 million tons, valued at \$1.1 trillion.

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## 4. Climate Change, Resiliency, and the Environment

### Climate Change

Extreme weather events are occurring in our country more often than any other time in history and the state of Nebraska recognizes the importance of developing a [statewide climate action plan](#). The plan would include a baseline measurement of the state's greenhouse gas emissions, or carbon footprint and assess risks and vulnerabilities from climate change as well as opportunities presented by adaptation and mitigation strategies. The plan would be developed with public comment and engagement, input from climate, water and other experts and examination of other states' strategic action plans. To pay for the plan, the state treasurer would transfer \$250,000 from the Petroleum Release Remedial Action Collection Fund. The State of Nebraska is still in the process of working out the details and timelines of the Climate Action Plan.

### Resiliency

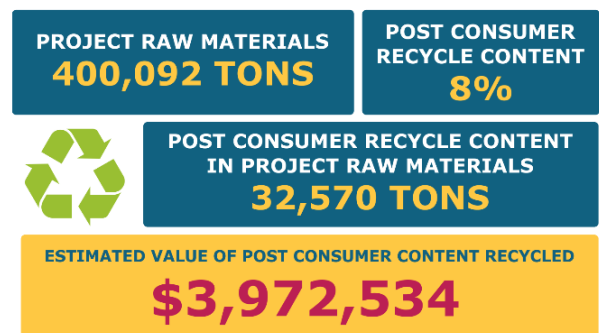
The [2019 Transportation Asset Management Plan](#) (TAMP) addresses and identifies resiliency strategies and measures. The resiliency of the State's infrastructure depends on the proper use and management of an asset throughout its service life. To attain a high level of resiliency for pavement and bridges, NDOT performs high-quality construction, maintenance, and rehabilitation efforts.

System resiliency requires the mitigation of everyday disruptions. If safe and uncongested alternative routes are not available when routine inconveniences occur, a deficiency in resiliency is indicated. Severe weather, traffic accidents, construction, and road closures are routine events that can increase travel time and reduce the safety of drivers. Moving people and freight across Nebraska's transportation system safely and efficiently is a priority.

NDOT employs several strategies to maintain resiliency, improve the operating efficiency of the State's Transportation System, and reduce the duration of incident response and clearance times. NDOT has preassigned alternate routes for key roadways, increased the use of Intelligent Transportation Systems (ITS) to improve the functionality of roadways, develops incident management plans with law enforcement and emergency responders, and strives to integrate State freight planning efforts into all local planning agencies and private stakeholder activities.

### Recycled Materials

NDOT plans to use a significant number of [recycled materials](#) to construct the I-80 Capacity, Safety, and Reliability Enhancements project. Recycled concrete and reclaimed asphalt pavement (RAP) will comprise over 32,570 tons of materials used for this project, approximately eight percent of the 400,092 tons of total raw materials needed for the project. The estimated value of this post-consumer recycled content is \$3,972,534. Besides the obvious climate and emission related benefits from



using recycled materials, NDOT has achieved very good performance and resiliency from assets that used recycled asphalt pavement. By incorporating recycled materials into the construction of the project, NDOT will reduce the excess construction emissions associated with standard concrete use and contribute to national and state goals of reducing carbon emissions.

## 5. Equity, Multimodal Options, and Quality of Life

### Equity:

The I-80 Capacity, Safety, and Reliability Enhancements project will follow federal Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, guidelines. NDOT adopted an Environmental Justice Methodology - *Guidance on Environmental Justice and NEPA*, which will also be followed for performing Environmental Justice analysis.

As a recipient of Federal funds, NDOT is required to administer a [Disadvantaged Business Enterprise \(DBE\) Program](#) in compliance with applicable laws, regulations, Executive Orders, and guidance. NDOT is committed to ensuring that certified Disadvantaged Business Enterprise (DBE) firms have equal opportunity to participate in the performance of U.S. Department of Transportation assisted (USDOT) contracts and subcontracts administered by NDOT. To that end, the NDOT DBE program has been developed in adherence to the requirements and guidance contained in Code of Federal Regulations, Title 49, Subtitle A, Part 26 (49 CFR Part 26).

The I-80 Capacity, Safety, and Reliability Enhancements project will have a DBE goal. The DBE Program seeks to “redress prior inequities” and to “create a level playing field on which DBEs can compete fairly for DOT-assisted contracts.”

An overview of NDOT’s environmental justice (EJ) methodology, which includes the [Limited English Proficiency Plan](#) is attached. An Environmental Justice Analysis will be performed on the I-80 Capacity, Safety, and Reliability Enhancements project which will identify low income, minority, and limited English proficiency populations in the project area and decide whether disproportionately high and adverse effects exist. This analysis also determines appropriate translations for public involvement materials.

NDOT’s [Training Special Provisions](#) seek to address the under-representation of minority and female workers in the construction trades through the assignment of On-the-Job Training (OJT). This training and upgrading of minorities and women toward journeyman status is a primary objective of the NDOT OJT Program. Contractors who have been assigned an OJT goal will be allowed to provide training on this project and will be reimbursed per hour of training provided.

### Quality of Life

The most important component of quality of life is the physical health of people, which includes safety and security. Every person requires safe and reliable transportation if they want to move from one point to another, whether using a sidewalk or an interstate. Roadways that increase wear and tear on vehicles, increases commuting time, and frequently encounter delays reduce the overall quality of life for the taxpayers who drive on the systems. Improving this segment before deterioration is key to not only the quality of life but to improving safety for those who use the system. This includes the safety of the travelling public, construction workers, first responders, including police, fire, and EMS are a top priority. Traffic Incident Management Quick Clearance Laws are essential National Best Practices to be followed. **Quick Clearance is the practice of rapidly and safely removing temporary obstructions – including disabled or wrecked vehicles, debris,**

and spilled cargo - from the roadway to increase the safety of incident responders by minimizing their exposure to adjacent passing traffic, reduce the probability of secondary incidents, and relieve overall congestion levels and delay.

## 6. Innovation Areas: Technology, Project Delivery, and Financing

Emerging technologies will continue to play in role in transportation and industry in Nebraska. In the upcoming years, new waves of autonomous, connected, self-driving advances are likely to transform goods movement throughout the nation. State Departments of Transportation are continuously exploring these impacts and operational improvements on infrastructure, travel patterns, policies, and programs. Most of the investments and efforts today are assuring the technological advancements will accommodate motor vehicles and trucks safely in our transportation system, although the timeline is uncertain and ever-changing. By 2025, up to one third of new trucks will be semi-autonomous eliminating the need for a full-time driver.

### Innovative Technology

NDOT is working to coordinate directly with other states in the western United States to address significant challenges to the country's freight transportation system. Specifically, NDOT is bolstering its Intelligent Transportation Systems (ITS) network by implementing variable speed limit sites along the I-80 corridor, as well as radio technology to disseminate messaging directly to freight vehicles as needed. These technologies, among others to be implemented, build upon the existing ITS along the corridor in order to improve safety and efficiency of traffic conditions along I-80, addressing critical challenges in this economically significant freight corridor.

A variable speed limit (VSL) system is proposed for installation at various sites along the I-80 corridor. VSL systems impose changing speed limits on a roadway based on roadway, traffic, and weather conditions, alerting drivers to potentially adverse conditions on the roadway, or, alternatively, improving efficiency during non-impact events and clear traffic conditions. The goal of this system is to reduce risk and improve safety during severe weather events, road closures, and other adverse traffic conditions and improve efficiency during normal conditions. NDOT is working to implement this system to complement similar systems in proximate states along the I-80 corridor, creating a cohesive, multi-state, interrelated VSL system.

NDOT is also implementing connected vehicle (CV) systems to integrate with other existing systems in proximate states, extending the application of these technologies to cover over 1,000 miles of the I-80 corridor. These systems would utilize roadside and onboard equipment to transmit a variety of critical traffic messages, including 1) infrastructure to vehicle (I2V) situational awareness messaging, 2) work zone warnings, and 3) spot weather impact warnings.

These short-range radio communications would enable NDOT to direct relay vital traffic information to freight drivers along the critical corridor, alerting them to adverse conditions, closures, or other pertinent information that improves safety and efficiency along the corridor. These CV systems would integrate with existing systems in proximate states, creating a cohesive and interconnected communication system along this vital economic corridor.

NDOT plans to use a significant amount of recycled asphalt pavement and concrete to construct this project. NDOT has used these recycled materials in several projects in recent years and have recorded great performance of the pavement. Additionally, NDOT also gives contractors the option to use asphalt millings either as foundation course or to incorporate into any asphalt mixes as recycled asphalt pavement. Because of this option,

NDOT has been able to allow some of the highest percentages of recycled asphalt pavement in the nation, with exceptional results.

### **Innovative Project Delivery**

NDOT is committed to ensuring that traffic within the project area is not significantly impeded while the I-80 Capacity, Safety, and Reliability Enhancements project is being constructed. To do this, lane crossovers will be created to shift traffic around the project area, allowing for work to be done without stopping traffic completely. This reduces construction time and eliminates the need to shut down the roadway. Additionally, in case of any incidents on the roadway during project construction, NDOT plans to divert traffic to nearby US 6. By using crossovers and planning for detours due to traffic incidents, NDOT is prepared to deliver the project with little to no effect on existing highway operations.

### **Innovative Financing**

No innovative financing methods will be used on this project, however, the existing roadway surface will be removed and regraded and a new stronger concrete pavement surface will be installed using recycled materials to the extent possible, to minimize environmental impacts and reduce project cost.

## **VI. Benefit Cost Analysis**

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The objective of a benefit-cost analysis (BCA) is to bring all the direct effects of a transportation investment into a common measure (dollars). Generally, costs of a transportation project, such as the I-80 project, are incurred in the initial years, while benefits accrue over an extended period of time. The primary elements that can be monetized are travel time, changes in vehicle operating costs, vehicle crashes, environmental impacts, remaining capital value, and maintenance costs. The results of the BCA are summarized below.

### **No Build Alternative**

The No Build Alternative assumes no major capital construction projects will occur to improve the condition of the I-80 corridor. Two bridge structures initially constructed in 1962 along I-80 are anticipated to reach the end of their design life by year 2045 (Structure #S080 39165LR over South Branch Middle Creek & S080 39294LR over Middle Creek). These structures will require full deck replacements in year 2045 and various maintenance and repair activities until then. As part of the No Build Alternative, it was assumed that these major capital investments will not be made and that the bridges would close in year 2045. This analysis identified and monetized the impacts of a detour from I-80 to US 6 (I-80 Alternative) due to future anticipated closure of bridges on the I-80 corridor.

### **Build Alternative**

The Build Alternative consists of the following specific design elements considered in this BCA:

- Reconstruction of two bridges along I-80
- Reconstruction and expansion of I-80 from four-lanes to six-lanes
- Install 28-foot paved median with concrete barrier along entire length of project corridor
- Reconstruction of the Highway N-103 Interchange (modernize ramp lengths)

### **BCA Methodology**

The primary cost and benefit components analyzed in the BCA included:

- Travel time/delay
- Vehicle operating costs
- Crashes by severity
- Environmental and air quality impacts
- Initial capital costs: capital costs are expected to be incurred in years 2024 through 2027
- Operating and maintenance costs

Other analysis considerations included:

- It was assumed that the Build Alternative would be constructed over a four-year period in years 2024 through 2027. Therefore, 2028 was the first year that most benefits would begin accruing.
- The present value of all benefits and cost was calculated using 2020 as the year of current dollars.
- A benefit-cost analysis period of 30 years was used to determine net project costs and benefits.

## Project Costs

Year 2020 project cost for the MPDG Grant components of the overall project is expected to be about \$124.01 million. The current 2020 project costs discounted at a rate of seven percent is approximately \$81 million.

## BCA Results

The benefit-cost analysis provides an indication of the economic desirability of a scenario, but results must be weighed by decision-makers along with the assessment of other effects and impacts. Projects are considered cost-effective if the benefit-cost ratio is at least 1.0. The larger the ratio number, the greater the benefits per unit cost. Results of the benefit-cost analysis are shown in the table below. See Attachment A for the complete benefit-cost analysis workbook.

**Table 3 - Benefit Cost Analysis Summary**

	Capital Cost (2020 Dollars)	Project Benefits (2020 Dollars)	<b>Benefit-Cost Ratio (7% Discount Rate)</b>	Net Present Value (2020 Dollars)
No Build vs. Build	<b>\$81 million</b>	<b>\$247 million</b>	<b>3.05</b>	<b>\$166 million</b>

## VII. Project Readiness & Environmental Risk

### Technical Feasibility

Planning studies have been completed for the I-80 Capacity, Safety, and Reliability Enhancement project. Preliminary engineering and environmental documentation are underway to ensure the MPDG statutory deadline is met. Right-of-way acquisition and utility relocation are not anticipated for the project.

The project will not result in traffic disruptions requiring detours, temporary roads, or ramp closures that are greater than 30 working days. This project will be constructed under traffic with lane crossovers.

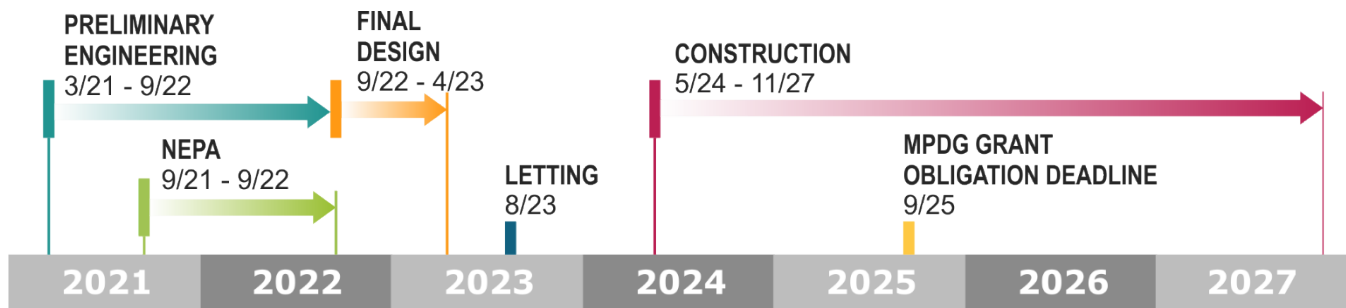
### Project Schedule

The I-80 Capacity, Safety, and Reliability Enhancement project is part of a carefully considered investment strategy. NDOT relies on a funding distribution team to evaluate the current process and make recommendations that would provide the citizens of Nebraska with a quality roadway system regardless of the funding level. NDOT's Funding Distribution Team allocates highway funds and recommends giving top priority to preserving the state's existing highway and bridge assets.

After all asset preservation needs have been met, the next priority is to allocate funds for capital improvements. NDOT uses a two-tier system to rank capital improvement projects based upon estimated economic benefit to the highway users. Given the importance of this segment to I-80 and both national and regional mobility, NDOT has prioritized this project.

NDOT has a history of successfully delivering highway infrastructure improvements, which have improved service and allowed for expanded travel service in the state and region. NDOT is committed to meeting the construction dates outlined in the Project Schedule shown below.

**Figure 14 - Project Schedule**



NDOT anticipates I-80 project construction will begin in 2024, if 2022 MPDG funds are awarded. Further, NDOT understands that if awarded INFRA or RURAL funding through 2022 MPDG, a commitment that all necessary activities will be completed to allow funds to be obligated before the statutory deadline of September 30, 2025, and if awarded a MEGA, no statutory obligation deadline applies. NDOT anticipates completing the project over a three-year period.

## Required Approvals

### Environmental Permits & State and Local Approvals

The I-80 Capacity, Safety, and Reliability Enhancement project requires a National Pollutant Discharge Elimination System (NPDES) storm water permit. Erosion control plans and storm water pollution prevention plans (SWPPP) are required on all projects that have one acre or more of disturbed soil. NDOT inspects all erosion and sediment control best management practices (BMP's) including devices every 14 days minimum and after every precipitation event of 0.5 inch or greater as per the requirements in the General Construction Storm Water Permit. Any BMP adjustments and repairs are to occur within seven days of the inspections to ensure that water quality is being protected to the maximum extent practicable. The SWPPP shall be maintained, and discharge points shall be monitored by the NDOT District Staff until the site is 70 percent re-vegetated. At that time the Notice of Termination with the Nebraska Department of Environmental Quality for the General Construction Storm Water Permit and completion of the SWPPP responsibilities shall be filed. Per NDOT standards, this permit will be secured three months before the construction start date. The U.S. Army Corps of Engineers enforces Section 404 permit provisions. Section 404 of the Clean Water Act requires a permit before dredged or fill materials may be discharged into United States waters. EPA is responsible of Section 401 certifications.

A NEPA Categorical Exclusion (CE) began last fall and is expected to be completed in fall 2022.



## Federal Transportation Requirements Affecting State and Local Planning

The Federal Highway Administration (FHWA) requires each state highway agency to develop a Statewide Transportation Improvement Program (STIP). The STIP must list all highway and transit projects that will be using federal funds as well as all regionally significant transportation projects using non-federal funding sources. It covers a period of four years and in Nebraska is updated every year on October 1<sup>st</sup>. As mentioned previously, the I-80 project is already listed in the [Lincoln Metropolitan Planning Organization Transportation Improvement Program](#) (TIP) FY 2023-2026, page 16, and will be added to the STIP on October 1, 2022.

## Assessment of Project Risks and Mitigation Strategies

NDOT has identified potential project risks and mitigation strategies to minimize potential for delays or uncertainties. The table below identifies potential risks and mitigation strategies. The probability of risks identified below are minimal.

**Table 4 – Risk Management and Mitigation Strategies**

Risk	Mitigation Strategy
Changes to project scope	The project has completed the preliminary engineering phase. Cost estimates have been completed; however, it is understood that changes in the design do arise in the field. If this occurs, NDOT will work to identify scope changes as early as possible to reduce budget or allocate additional funding to ensure implementation.
Environmental document delays	A Categorical Exclusion (CE) environmental document is needed. No real estate or right of way acquisitions are anticipated greatly reducing the likelihood of any project delays through the NEPA process. NDOT and their consultants have capacity and delivered hundreds of environmental documents should unforeseen environmental conditions emerge.
Schedule delays	A detailed project schedule has been prepared to keep track of the project and assure all necessary installation, design, and construction tasks are met. If schedules slip due to unforeseen circumstances, like weather events, or availability of materials/staffing, all attempts will be made to expedite other items of the schedule.  NDOT’s practice is to commit funds once a project is in the Project Specifications and Estimates (PSE) phase so that it can be procured and constructed. The project will not enter PSE if construction funding is not available for it.
Weather events	Weather events, including ice, snow, and rain can lead to flooding and cause non-working days during construction. Contractors will work diligently to minimize disruption and missed days in the field during construction.
Construction cost overruns	Market conditions are difficult to predict even a few years into the future, so contingencies for labor and materials are included in the estimates. If additional project funds are needed NDOT will cover any amount outside of the maximum federal award granted.

## VIII. Statutory Project Requirements

**Requirement #1 – The project will generate national, or regional economic, mobility, or safety benefits.**

The project will generate national and regional economic, mobility, and safety benefits through the reconstruction and expansion of this portion of I-80. Safety will be addressed through the construction of a 28-foot paved median with concrete barrier, new guardrail, widened paved shoulders (12’ inside and outside) with edge line and median rumble strips and upgraded on and off-ramps. Additionally, expansion of the roadway from four to six lanes will support economic impacts, freight movement, and job creation through

improving system operations, decreasing transportation costs and providing timely access to employment opportunities.

**Requirement #2 – The project will be cost effective.**

Adjusted to 2020 dollars, the I-80 Capacity, Safety, and Reliability Enhancements project has an initial capital cost of \$80.0 million and a total project benefit of \$253.7 million, which corresponds to a benefit cost ratio of 3.13. Benefit cost analysis details are included in the BCA Memo and Workbook.

**Requirement #3 – The project will contribute to 1 or more of the national goals described under Section 150. (Not applicable for MEGA)**

The I-80 Capacity, Safety, and Reliability Enhancements project contributes to the following national goals:

Goal	Project Outcome
(1) Safety	The project will contribute to the national safety goal by constructing a 28-foot paved median with concrete barrier, new guardrail throughout the project area, widen paved shoulders, install edge line and median rumble strips, and upgrade ramps to allow vehicles to reach traffic speeds prior to merging.
(2) Infrastructure Condition	The project will reconstruct 15.2 miles of I-80, reconstruct 8 structures, and rehabilitate one bridge, restoring this section of I-80 to new condition, reducing the associated maintenance costs, and extending its viable life.
(3) Congestion Reduction	Interstate 80 will be widened from four-lanes to six lanes which will improve traffic flow especially during peak periods. The added capacity will relieve overall congestion and delays, improve safety and travel time reliability for roadway users and freight haulers
(4) System Reliability	The project will expand the capacity of this section of I-80, reducing congestion, increasing travel time reliability, and improving the overall efficiency of the system. The added capacity, along with widened shoulders will also increase the ability of responders to address and clear incidents and will reduce the probability of secondary incidents.
(5) Freight Movement and Economic Vitality	Interstate 80 is one of the most significant east/west freight routes in the country. This project will strengthen the National Freight Network by preserving highway infrastructure condition, ensuring truck mobility by adding additional capacity to reduce congestion, improving roadway connections to multimodal facilities and freight clusters, and addressing truck safety issues through construction of longer ramp acceleration lanes and bridge heights.
(6) Environmental Sustainability	The project will utilize a significant number of recycled materials to construct the infrastructure improvements. Approximately eight percent of the raw materials needed for this project will be from recycled concrete and reclaimed asphalt pavement (RAP).
(7) Reduced Project Delivery Delays	It is anticipated that construction on this project will occur over a three-year period. This project will be constructed under traffic with lane crossover, so it will not result in traffic disruptions requiring detours, temporary roads, or ramp closures that are greater than 30 working days. Right-of-way acquisition and utility relocation are not anticipated for the project, which will further expedite project delivery.

**Requirement #4 – The project is based on the results of preliminary engineering. (Not applicable for MEGA)**

Preliminary engineering for the project began in March 2021 and is anticipated to be completed in September 2022. The environmental document is underway and is expected to be completed in fall 2022, allowing the project to proceed with final design. Topographic surveys, metes and bounds surveys, geotechnical investigations, hydrologic analysis, utility engineering, traffic studies, general estimates of the types and quantities of materials have all occurred in advance of this application submittal.

**Requirement #5 – With respect to related non-federal financial commitments, 1 or more stable and dependable sources of funding and financing are available to construct, maintain, and operate the project, and contingency amounts are available to cover unanticipated cost increases. (Not applicable for Rural)**

Nebraska Department of Transportation has committed financially to covering any funding gaps that exist beyond a 2022 MPDG federal award (letter of support) to ensure that construction occurs in a timely manner. The project is identified in the [Lincoln Metropolitan Planning Organization Transportation Improvement Program \(TIP\) FY 2023-2026](#), page 16, and over \$13 million is committed to date. The project is also identified in the [Nebraska State Freight Plan](#), and the [Lincoln MPO 2050 Long Range Transportation Plan](#), and will be added to the STIP in October, 2022. I-80 is maintained and operated by NDOT which has consistent and dependable funding to ensure efficient operation. A cost breakdown of amounts by project component can be found in Table 1.

**Requirement #6 – The project cannot be easily and efficiently completed without other Federal funding or financing available to the project sponsor. (Not applicable for Rural)**

If federal funding was not available, the scope would likely be reduced, or the project would be delayed increasing the construction timeline and negatively impacting all travelers along I-80. Costs would increase and availability of materials is unknown. Assuming an inflation rate of four percent annually compounded, over just two years the price of construction would rise by \$10.55 million. The time is now to reconstruct as the benefit-cost analysis shows.

**Requirement #7 – The project is reasonably expected to begin not later than 18 months after the date of obligation of funds for the project.**

If MPDG funds are awarded, NDOT anticipates that construction will begin in spring 2024. NDOT understands that if awarded INFRA or RURAL funds, a commitment that all necessary activities to allow funds to be obligated before the statutory deadline of September 30, 2025. The project schedule has very low risk as it is managed by NDOT who has delivered hundreds of successful projects over the years. Additionally, environmental risk is minimized with the construction all occurring within existing NDOT owned right-of-way.

## **IX. Supporting Documents**

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Links to supporting documents are included throughout this narrative. All supporting documents and the MPDG grant application narrative are available to view at the following webpage:

<https://www.srfconsulting.com/ndot-i-80-mpdg/>



## Memorandum

**To:** Jarrod Walker, Freight & Economic Development Liaison  
Nebraska Department of Transportation

**From:** Nick Semeja, PE  
Matt Flanagan

**Date:** May 19, 2022

**Subject:** I-80 Capacity, Safety, and Reliability Enhancements – 2022 MPDG Grant  
Application Benefit-Cost Analysis Memorandum

### Introduction

This memorandum summarizes the assumptions, methodology and results developed for the benefit-cost analysis of the No Build and Build Alternatives evaluated as part of the I-80 Capacity, Safety, and Reliability Enhancements – 2022 MPDG Grant Application. The objective of a benefit-cost analysis (BCA) is to bring all the direct effects of a transportation investment into a common measure (dollars), and to account the fact that benefits accrue over an extended period while costs are incurred primarily in the initial years. The primary elements that can be monetized are travel time, changes in vehicle operating costs, vehicle crashes, environmental impacts, operating and maintenance costs, remaining capital value, and capital costs. The benefit-cost analysis can provide an indication of the economic desirability of an alternative, but decision-makers must weigh the results against other considerations, effects, and impacts of the project.

### Project Overview

The Nebraska Department of Transportation (NDOT) is planning to reconstruct, expand, and improve safety along Interstate 80 (I-80). The project limits are in Lancaster and Seward Counties between mile posts 387.54 and 395.15, a distance of 7.61 miles. The project begins 0.6 miles west of N-103 and extends east to the NW 56th Street grade separation, which is near the western border of the City of Lincoln (population 295,618).

### Description of Alternatives

For the purpose of this analysis, two alternatives, No Build and Build, were evaluated and are described below.

#### No Build Alternative

The No Build Alternative assumes no major capital construction projects will occur to improve the condition of the I-80 corridor. Two bridge structures initially constructed in 1962 along I-80 are

anticipated to reach the end of their design life by year 2045 (Structure #S080 39165LR over South Branch Middle Creek & Structure S080 39294LR over Middle Creek). These structures will require full deck replacements in year 2045 and various maintenance and repair activities until then. As part of the No Build Alternative, it was assumed that major capital investments will not be made and that the bridges would close in year 2045<sup>1</sup>. This analysis identified and monetized the impacts of a detour from I-80 to US 6, also known as I-80 Alt, due to future anticipated closure of bridges on the I-80 corridor.

Additional details on detour routes and costs associated with these detours are provided in Section 4 of this memorandum.

### **Build Alternative**

The Build Alternative consists of the following specific design elements considered in this BCA:

- Reconstruction of the two bridges noted above along I-80
- Reconstruction and expansion of I-80 from four-lanes to six-lanes
- Install 28-foot paved median with concrete barrier along entire length of project corridor
- Reconstruction of the Highway N-103 Interchange (modernize ramp lengths)

### **BCA Methodology**

The following methodology and assumptions were used for the benefit-cost analysis:

1. **Main Components:** The main components analyzed included:
  - Travel time/delay
  - Vehicle operating costs
  - Crashes by severity
  - Environmental and air quality impacts
  - Initial capital costs: Capital costs were expected to be incurred in years 2024-2027
2. **Analysis Years:** This analysis assumed that the Build Alternative would be constructed over a four-year period starting in year 2024 with completion in year 2027. Construction activities are expected to occur throughout all four years (2024-2027), with the majority of the I-80 mainline work expected in 2026 and 2027. Year 2028 was assumed to be the first full year that benefits will be accrued from the project. The analysis primarily focused on annual benefits for the thirty-year period from 2028 to 2057<sup>2</sup>, while some user costs were quantified during the construction phases of the project.

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<sup>1</sup> It was assumed that routine maintenance on the bridges would still occur under the No Build to fix local deck failures and other nonrecurring issues.

<sup>2</sup> A thirty-year benefit cost analysis period was assumed since the project includes a full reconstruction of pavement and will provide a service life far beyond the analysis period.

3. **Economic Assumptions:** Value of time, vehicle operating costs, emissions costs, and cost of crashes were obtained from the *Benefit Cost Analysis Guidance for Discretionary Grant Programs*, dated March 2022 (Revised)<sup>3</sup>. The present value of all benefits and costs was calculated using 2020 as the year of current dollars. This analysis assumes a real discount rate of 7 percent per year.
4. **Development of Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT):** Year 2022 and year 2042 I-80 corridor VMT and VHT were developed using existing and forecast Annual Average Daily Traffic (AADT) volumes and anticipated route choices under the No Build and Build Alternatives. Existing year 2022 and forecast year 2042 corridor AADTs were obtained through coordination with NDOT Planning, Traffic Forecasting and Modeling staff. This analysis assumes a linear annual average growth rate of 1.55 percent per year along I-80 and was obtained from the NDOT Travel Demand Model. Existing corridor length data and travel time data were obtained using Google Maps.

It was assumed that construction on the I-80 mainline would take place during a seven-month period during 2026 and 2027, and that the posted speed limit would be reduced from 75 mph to 65 mph. Differences in travel times due to this speed limit reduction were quantified for each phase of the project and considered a disbenefit for the Build Alternative. This disbenefit impacts both directions of travel, 24 hours per day during that period. Similar disbenefits were quantified during major rehabilitation activities anticipated for the Build Alternative but with a construction duration of three months per year instead of seven months.

After consultation with NDOT Roadway Design Division staff, the bridges along I-80 (Structure #S080 39165LR over South Branch Middle Creek & S080 39294LR over Middle Creek) were assumed to close in year 2045 based on remaining service life under the No Build Alternative. Detour routes and associated mileage and travel times were determined using Google Maps and were compared to trip distances and travel times along the I-80 route, as described in the BCA workbook. The BCA Workbook also contains detailed information regarding bridge service life assumptions, detour routes, trip distances and travel times.

Travel times and trip distances were applied to year 2022 and year 2042 daily traffic volumes to determine total VHT and VMT, respectively. Benefits for the years between 2022 and 2042 were interpolated using an annual growth rate, and benefits for years beyond 2042 were extrapolated using the same growth rate. Total user costs per alternative is the sum of all user costs for the period from 2026 to 2057 (i.e., includes construction years and thirty years beyond the opening of the last bridge project). Benefits due to change in VMT and VHT were calculated using costs per mile and per hour that account for vehicle occupancy and different vehicle types.

5. **Vehicle Occupancy and Vehicle Types:** The composite cost per mile used in the benefit-cost analysis accounted for both vehicle occupancy and percent split of automobiles and trucks traveling in the area. Key assumptions for these areas included:

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<sup>3</sup> <https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%29.pdf>



- The corridor-wide truck percentage used in the analysis was 25 percent and was based on year 2022 daily traffic and heavy truck counts obtained through coordination with NDOT Planning, Traffic Forecasting and Modeling staff.
- Vehicle occupancy that was used in the analysis is consistent with values provided by *Benefit Cost Analysis Guidance for Discretionary Grant Programs*, dated March 2022 (Revised). The analysis assumed occupancy of 1.67 people per automobile and 1.00 people per truck.

**6. Safety Analysis:** The Build Alternative improves safety in the project area by providing the following elements quantified in this Benefit-Cost Analysis:

- Addition of concrete barrier throughout the entire project corridor
- Expanding capacity from a four to six-lane facility (three through lanes in each direction)
- Reconstructing interchange ramps and adding 1,000' of tapered design acceleration lanes

Three-years of crash data along the I-80 corridor was obtained for years 2017 through 2019 from NDOT to determine average annual number of crashes by severity<sup>4</sup>. Reductions in crashes along the I-80 corridor were estimated using the following Crash Modification Factors (CMFs) taken from the CMF Clearinghouse database: Install Median Barrier (CMF ID: 42)<sup>5</sup>, Install Median Barrier (CMF ID: 43)<sup>6</sup>, Increase from four to six Lanes (CMF ID: 7933)<sup>7</sup> and Modify Length of Acceleration Lane (CMF ID: 5216)<sup>8</sup>. These CMFs are summarized below:

- "Install Median Barrier" (CMF ID: 42) - The crash modification factor was applied to all fatal segment crashes (non-junction crashes only). This CMF predicts an annual reduction of 43 percent in all types of fatal crashes.
- "Install Median Barrier" (CMF ID: 43) - The CMF was applied to all type A, B and C segment crashes (non-junction crashes only). This CMF predicts an annual reduction of 30 percent for all applicable crashes.
- "Increase From 4 Lanes To 6 Lanes" (CMF ID: 7933) - The CMF was applied to all type K, A, B, C, and PD segment crashes (non-junction crashes only). This CMF predicts an annual reduction of 29.8 percent for all applicable crashes.
- "Modify Length of Acceleration Lane" (CMF ID: 5216) - The CMF equation is an exponential function which relies on the change in length of the acceleration lane as the input variable and is applicable to all crash types. CMF was calculated for applicable ramp junctions where existing crashes were located. Existing acceleration lane lengths were determined using measurements from Google Earth aerial imagery.

Expected number of crashes in year 2042 were calculated by multiplying the base year crashes by the percent change in traffic volumes between the base year (this analysis assumed 2019 being the center of the crash analysis period due to available AADT data) and forecast year 2042. Forecast year crash costs were calculated for the No Build Alternative and Build

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<sup>5</sup>CMF ID: 42: <http://www.cmfclearinghouse.org/detail.cfm?facid=42>

<sup>6</sup>CMF ID: 43: <http://www.cmfclearinghouse.org/detail.cfm?facid=43>

<sup>7</sup>CMF ID: 7993: <https://www.cmfclearinghouse.org/detail.cfm?facid=7933>

<sup>8</sup>CMF ID: 5216: <http://www.cmfclearinghouse.org/detail.cfm?facid=5216>

Alternative. Crash costs were obtained by applying the appropriate crash modification factors to the No Build Alternative crash costs.

The safety benefit associated with the installation of the concrete barrier, capacity expansion, and the extension of acceleration lanes were calculated for years 2022 and 2042 and interpolated (or extrapolated) based on an annual growth rate to determine total safety benefits for the period from years 2028 to 2045 (prior to detours routing traffic off I-80).

The crash cost savings associated with the detour due to closure of the bridges along I-80 were monetized by calculating existing crash rates by crash severity along the detour routes using 2017-2019 crash data obtained from the NDOT NTIP Crash Portal<sup>9</sup> and AADT data obtained from the NDOT Annual Average Daily Traffic Counts GIS Map<sup>10</sup>. Crash costs for existing year 2022 and forecast year 2042 were calculated based on the change in VMT between the No Build Alternative and Build Alternative caused by the diversions described in Section 4 of this memorandum, “Development of Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT).” The shift of traffic to the detour route is expected to result in increased crash costs for the No Build since severe crash rates on the I-80 freeway corridor are lower than those on the two-lane undivided design of I-80 Alt (detour route). Crash costs for years 2046-2057 were extrapolated based on the existing year 2022 and forecast year 2042 annual crash costs. Crash data for years 2017-2019 is presented in the BCA Workbook.

Crash cost assumptions are consistent with values and methodologies published in the *Benefit Cost Analysis Guidance for Discretionary Grant Programs*, dated March 2022 (Revised).

7. **Environmental and Air Quality Impacts:** Annual VMT is expected to be impacted by the bridge closures along I-80 (Structure #S080 39165LR over South Branch Middle Creek & S080 39294LR over Middle Creek). The change in VMT between the No Build Alternative and Build Alternative was caused by the diversions described in Section 4 of this memorandum, “Development of Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT).” Average emission rates per vehicle type were obtained from the Environmental Protection Agency’s Motor Vehicle Emission Simulator (MOVES) version 3<sup>11</sup>. Emission rates per vehicle type are provided in the attached BCA Workbook. Total change in emissions was valued in accordance with the *Benefit Cost Analysis Guidance for Discretionary Grant Programs*, dated March 2022 (Revised).
8. **Operating and Maintenance Costs:** Changes in annual roadway maintenance costs are expected due to the additional lane-miles on the corridor under the Build Alternative. In addition to routine annual maintenance, major rehabilitation activities are expected over the lifespan of the Build Alternative to keep the project serviceable. These activities were only assumed for the Build Alternative since it was assumed pavement maintenance and rehabilitation would no longer occur under No Build conditions. A schedule of major rehab

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<sup>9</sup> NDOT NTIP Crash Portal: <https://ntip.nebraska.gov/Map>

<sup>10</sup> NDOT Annual Average Daily Traffic Counts GIS Map:  
<https://gis.ne.gov/portal/apps/mapviewer/index.html?webmap=9da1b7650dfe4f07af4911a5bdf95e6a>

<sup>11</sup> Average emission rates per vehicle type were obtained from the Environmental Protection Agency’s Motor Vehicle Emission Simulator (MOVES) version 3: <https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves>

activities with their costs per lane-mile is shown in Table 1. Additional details are provided in the BCA workbook.

**Table 1 – Major Rehab Activities Per Lane Mile for Build Conditions (2020 Dollars)**

Project Year	Cost
7	\$5,500
10	\$66,000
15	\$22,000
19	\$192,500
24	\$5,500
27	\$93,500
31	\$5,500
35	\$220,000
41	\$7,700
45	\$302,500
48	\$7,700

9. **Calculation of Remaining Capital Value:** Because many components of the initial capital costs have service lives well beyond the 30-year analysis period, the remaining capital value was calculated for the Build Alternative. This value was expressed in terms of 2020 dollars and was added to other project benefits in accordance with USDOT guidance. The assumed service life for the Build Alternative was 50 years, which was based on typical ages of concrete roadway until a full reconstruction is required assuming the major rehabilitation activities provided in Table 1 are carried out throughout the project life. Considering the last full construction of the I-80 corridor pavement was carried out in the 1960s, a service life of 50 years can be considered conservative. In determining the remaining capital value of the Build Alternative, the project was assumed to have a linear depreciation from the time construction was completed to the end of the benefit-cost analysis period.
10. **Factors Not Quantified:** Several factors were not quantified as part of the analysis that could potentially add to the benefits assumed in the BCA. These factors include the following:
  - Increased travel time reliability in the study area due to a reduction in crashes from safety improvements and enhanced pavement condition.
  - Flattening of backslopes to help with the removal of snow traps and melting
  - Correction of inslopes to ensure proper roadway drainage
  - New pavement markings that are more visible and reflective during adverse driving conditions
  - Installation of outside guard-rail along I-80 Mainline

## BCA RESULTS

The benefit-cost analysis provides an indication of the economic desirability of a scenario, but results must be weighed by decision-makers along with the assessment of other effects and impacts. Projects are considered cost-effective if the benefit-cost ratio is at least 1.0. The larger the ratio number, the greater the benefits per unit cost. Results of the benefit-cost analysis are shown in Table 2. See Attachment A for the complete benefit-cost analysis workbook.

**Table 2 – Total Project Results**

	<b>Initial Capital Cost (2020 Dollars)</b>	<b>Project Benefits (2020 Dollars)</b>	<b>Benefit-Cost Ratio (7% Discount Rate)</b>	<b>Net Present Value (2020Dollars)</b>
No-Build vs. Build	\$81.0 million	\$247.0 million	3.05	\$166.0 million

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**Attachment A**

**Benefit-Cost Analysis Worksheet**

