

FY 2022 RAISE GRANT APPLICATION

Submitted by
NEBRASKA

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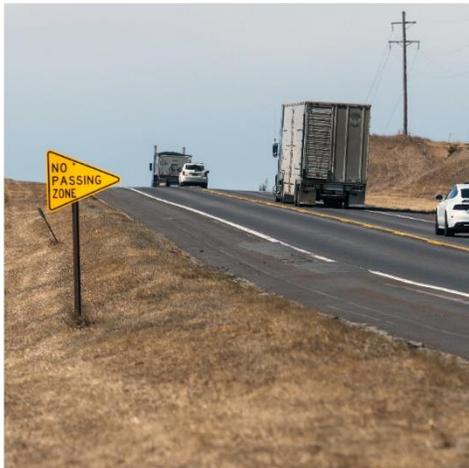
DEPARTMENT OF TRANSPORTATION

April 14, 2022



NEBRASKA US-275

NORFOLK TO N-15



Connecting people and goods in northeast Nebraska

Nebraska Department of Transportation's plan to support economic vitality and improve quality of life in rural America.

Prepared for:
Office of the Secretary of Transportation
U.S. Department of Transportation
1200 New Jersey AVE. SE
Washington, DC 20509

Cover Page

Project Name	US 275, Norfolk to N-15
Project Description	The project will fund construction activities to expand approximately 11 miles of US Highway 275 from east of Norfolk to Nebraska Highway 15 in Stanton and Cuming Counties.
Urban/Rural	Rural
Urbanized Area	
Capital or Planning	Capital
Amount Requested	\$25,000,000
Project Location County	NE - Stanton County
Additional Project Counties	Cuming County
Project Location Census Tract	9622
Other Project Census Tracts	9622, 9621, 9727
Project Located in an Area of Persistent Poverty?	No - it is not located in area of persistent poverty
Project Located in a Historically Disadvantaged Community?	No
Project Location Zip Code	68768
Project Location Latitude	42.01870
Project Location Longitude	-97.11811
Project Located in a Federally-Designated Community Zone?	None
Project Type	Road - New Capacity
US DOT FY22 Discretionary Application?	Rural Surface Transportation Grant, INFRA Grant
Other Federal Agency Assistance?	
Total Project Cost	\$71,383,000
Total Federal Funding	\$57,106,400
Total Non-Federal Funding	\$14,276,600
Tribal Government?	No
Tribal Benefits?	N/A
Private Corporation Involvement	No
Private Corporation Name(s)	
TIFIA/RRIF?	No
Department Financing Program?	No

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1.0 Project Description

The Nebraska Department of Transportation (NDOT) is seeking Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant funding to expand approximately 11 miles of US Highway 275 (US-275) from east of Norfolk to Nebraska Highway 15 (N-15) in Stanton and Cuming Counties.

US-275 is a key part of Nebraska’s Priority Commercial System and is a Critical Rural Freight Corridor, providing a vital connection to Interstate 80 and the national Priority Highway Freight System. **This project will build on NDOT’s more than \$450 million investment along the US-275 corridor by transforming the existing two-lane highway into a new, four-lane expressway that will improve the safety, mobility, efficiency, continuity, and reliability of a key connector route in northeast Nebraska (see Figure 1).**



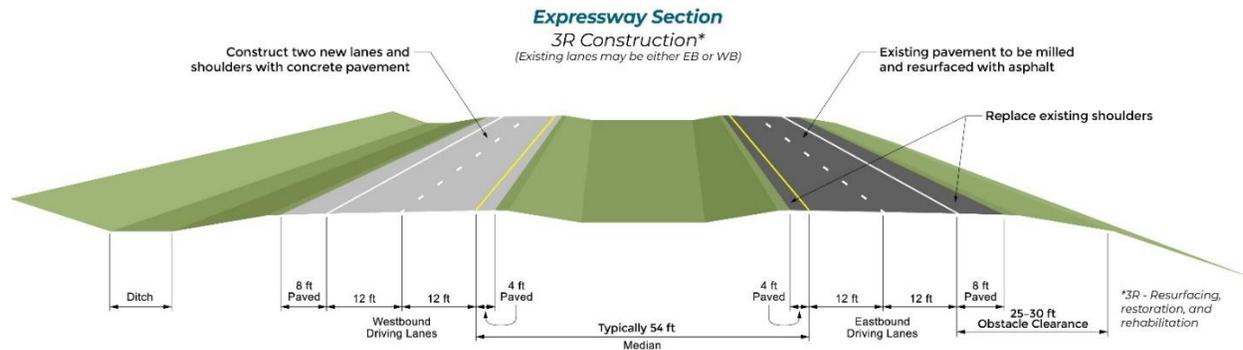
Figure 1: Enhanced Regional Mobility

The Norfolk to N-15 project provides the following specific benefits:

- Provides travelers with *safer, more convenient* transportation options
- Provides *additional capacity* for freight and passenger vehicles
- *Reduces vehicle travel times*
- *Improves travel reliability* by allowing travelers and freight to reach destinations on time more consistently
- *Decreases delays and lowers shipping costs* making consumer goods more affordable
- Adds to *supply chain resiliency* for key industries such as agriculture and steel production
- *Reduces conflicts* between freight, passenger, and agricultural vehicles and improves safe passing opportunities
- *Reduces highway maintenance and congestion costs*

This project will expand US-275 from the existing two-lane highway to a four-lane expressway using the 2+2 construction technique of building a new, parallel, two-lane roadway on one side of the existing US-275. **Figure 2** provides an illustration of a typical 2+2 expressway cross section in Nebraska. A Resurfacing, Restoration, and Rehabilitation (3R) strategy will be applied to the existing two lanes to extend the life of the roadway. The project begins at the junction of US-275 with Nebraska Highway 57 (N-57), east of Norfolk in Stanton County, and extends approximately 11 miles through the eastern junction with N-15 in Cuming County. Improvements will tie into the existing four-lane facility at N-57 to provide system continuity.

Figure 2: Typical Expressway Cross Section



This project will improve intersection geometrics at three state highway junctions and at various county road intersections. Tapered offset right-turn lanes will be provided at high-volume intersections along US-275 to provide deceleration length for turning vehicles and to improve intersection sight distance. The existing left-turn lanes at the two N-15 intersections will be improved to offset left-turn lane designs and provide deceleration lengths for turning US-275 traffic. Left-turn lanes with deceleration lengths will be added at county road locations along US-275 that do not currently have them. Farmstead and rural residence driveways will have short left-turn lanes to provide turning vehicles protection from mainline US-275 traffic. Additionally, county roads will be realigned, as needed, to provide better sight distance and improve traffic operations. Existing bridges will either be rehabilitated or replaced, and new bridge structures would be constructed for the new two-lane roadway. The project will improve safety and operations while enhancing reliable connections for northeast Nebraska.

Preliminary design and National Environmental Policy Act (NEPA) review are currently underway and are expected to be completed in 2023. Final design will occur from August 2023 through August 2024. This RAISE grant proposal seeks funding to support construction of the Norfolk to N-15 portion of US-275.

Broader Context of the US-275 Corridor

With a population of nearly 25,000, Norfolk is northeast Nebraska’s economic powerhouse and regional hub. Designated as a first-class city, Norfolk has major employers that provide jobs to thousands of workers from around the region, including Nucor Steel and Tyson Fresh Meats. Northeast Nebraska’s steelmakers, manufacturers, meat processors, livestock producers, farmers, and small businesses are impeded from accessing major markets due to inadequate transportation infrastructure. Agriculture remains one of the primary industries of small businesses in the region, as well as a major factor of growth in commerce. Easier access to markets enables small

producers the ability to compete regionally while simultaneously growing their communities at home. These infrastructure issues also hamper regional access to healthcare and educational facilities centered in Norfolk. The US-275 improvements will provide more reliable regional access to national markets, thereby enhancing the economic, employment, service, healthcare, and educational connections for the surrounding region. The community understands the need for and economic benefit of this effort, and local support for the completion of the US-275 expressway has been strong and sustained for decades.

Expanding and improving the US-275 corridor will have long-reaching positive impacts on the region. This project will actively support the region's economic competitiveness by providing a more efficient and reliable connection to national freight networks. By reducing congestion and unexpected delays and improving reliable travel times, this project will decrease transportation costs, enhance economic resiliency, improve job access, ease access to healthcare and education, and improve freight access for both shippers and residents of rural communities along this segment. In short, the Norfolk to N-15 Project will:

- Provide safer, more convenient transportation options
- Decrease freight delays and lower shipping costs
- Reduce conflicts between freight, passenger, and slower moving agricultural vehicles while improving passing opportunities
- Provide additional capacity for freight and passenger vehicles, reducing bottlenecks
- Reduce travel times and improve travel time reliability
- Reduce transportation emissions and improve air quality through improved vehicle operations
- Reduce maintenance costs

These project benefits are consistent with the US Department of Transportation's (USDOT) Rural Opportunities to Use Transportation for Economic Success (R.O.U.T.E.S.) initiative, which seeks to expand opportunities for rural projects to receive funds to tangibly improve safety and economic competitiveness in all parts of the country.

Project History

The Nebraska Legislature had the visionary idea decades ago to create an Expressway System that better connected urban and rural areas across the state. The Expressway System was created



in 1988 and designed to link Nebraska communities with populations of 15,000 or more to the Interstate System via four-lane highways. Today, more than 30 years after it became law, approximately 425 of the plan’s original 600 miles have been completed, leaving only 175 miles unfinished. Although NDOT has steadily advanced construction of these projects and spent over \$450 million alone on the US-275 expressway in northeast Nebraska, the remaining two-lane portion represents roughly one quarter of the state’s unfinished Expressway System.

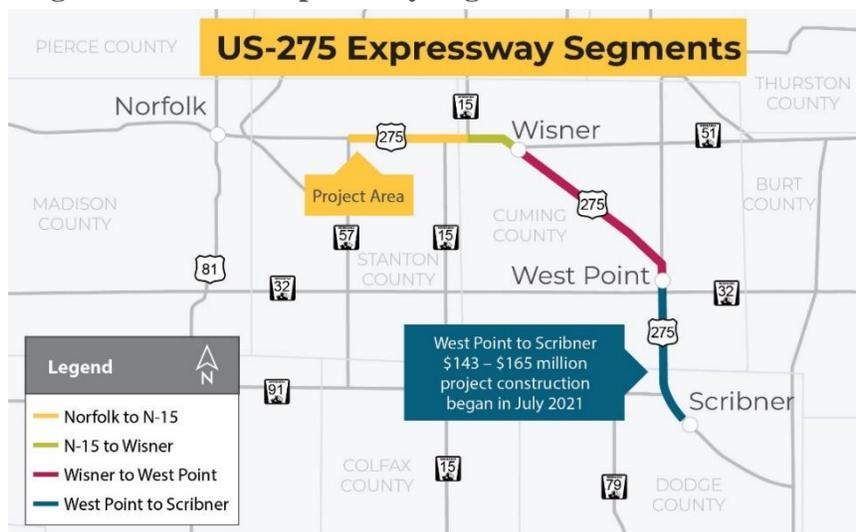
This portion of US-275 was originally constructed in 1939 as a two-lane highway. NDOT first identified the need for an Expressway System for northeast Nebraska in 1969 to enhance connectivity in this region. To date, NDOT has completed approximately 71 of 115 miles of the US-275 Norfolk to Omaha expressway, primarily between Omaha and Scribner. Construction of an additional 18.6 miles began in July 2021.

In the past decade, the Nebraska Legislature reinforced its commitment to the expressway program by allocating additional funding for transportation projects. Nebraska is a pay as you go state and does not create debt for projects. With this tradition in mind, Nebraska lawmakers passed the innovative Build Nebraska Act in 2011. This act dedicated one quarter of one percent of sales tax receipts to expand the Expressway System, improve federally designated high priority corridors, and preserve the existing transportation system. In April 2016, Nebraska lawmakers provided additional funding with the Transportation Innovation Act (TIA). This act created a transportation infrastructure bank and programs to accelerate roads projects. The TIA is focused on fast-tracking the completion of Nebraska’s Expressway System to improve mobility and support economic development. A \$50 million transfer from the state’s cash reserve and revenue collected from fuel taxes initially funded the transportation infrastructure bank. In addition, the Build Nebraska Act will allocate over \$450 million to projects prioritized by NDOT between July 1, 2016, and June 30, 2033. In summer 2016, NDOT held a series of stakeholder and public input sessions on project prioritization. During these meetings, citizens in the region reinforced their support of this particular project. In September 2016, NDOT announced eight new road construction priorities, including the US-275 corridor between Norfolk and Omaha.

NDOT has divided the remaining 48 miles of the unfinished US-275 expressway corridor into four construction segments: Norfolk to N-15, N-15 to Wisner, Wisner to West Point and West Point to Scribner (see **Figure 3**).

These rural segments of the US-275 expressway are in Stanton, Cuming, and Dodge Counties, with a combined population of approximately 52,000 residents. In July 2021,

Figure 3: US-275 Expressway Segments



NDOT began construction on the southernmost segment, from West Point to Scribner, using all state funds.

The Norfolk to N-15 Project is part of NDOT's efforts to complete the conversion of US-275 from a two-lane highway to a four-lane expressway that connects Norfolk and Omaha. The Norfolk to N-15 segment is the next step in addressing local needs while also accomplishing the next phase in the legislative mandate to connect commerce and communities in northeast Nebraska to the Interstate System and national markets.

Solving the Transportation Challenge

In addition to the typical challenges that a state agency faces in delivering safe, reliable, and efficient roadway networks, NDOT faced an extraordinary set of environmental circumstances three years ago. In March 2019, a combination of rapid snowmelt and heavy rains on frozen ground resulted in widespread flooding throughout the State of Nebraska and directly caused losses of life, livestock, crops, and infrastructure. This weather system resulted in substantial damage to the transportation network in northeast Nebraska. Flooding damaged critical NDOT infrastructure, with 27 state highway bridges and approximately 200 miles of pavement requiring significant repairs or outright replacement. Restoring and reconstructing state system roadways and bridge structures damaged in the flood cost \$200 million. Damage to local federal-aid system roads is estimated to exceed \$60 million. Even with Federal Emergency Relief funding, which does not cover the full cost of all repairs, NDOT continues to face significant, unexpected expenditures that affect the state's ability to fully deliver its capital improvement program. Today, NDOT is still experiencing the effects of this flooding on its overall transportation improvement program delivery.

The Norfolk to N-15 Project achieves the following:

- *Improves* safety and reliability
- *Improves* a critical freight corridor
- *Maximizes* past transportation dollar investment by utilizing the existing transportation infrastructure and ROW
- *Improves* key highway connections within the region, and improves overall regional connectivity for all users in northeast Nebraska, including commercial freight traffic

Additionally, the COVID-19 pandemic reduced the amount of funds NDOT received in state surface transportation revenues in 2020 by approximately \$15 million. This was due to reduced consumer expenditures on fuel and transportation-related services and has further stretched NDOT's financial resources. The requested RAISE grant will help mitigate the financial implications of both the historic flooding and COVID-19 pandemic on the state's efforts to move forward with the Norfolk to Omaha expressway.

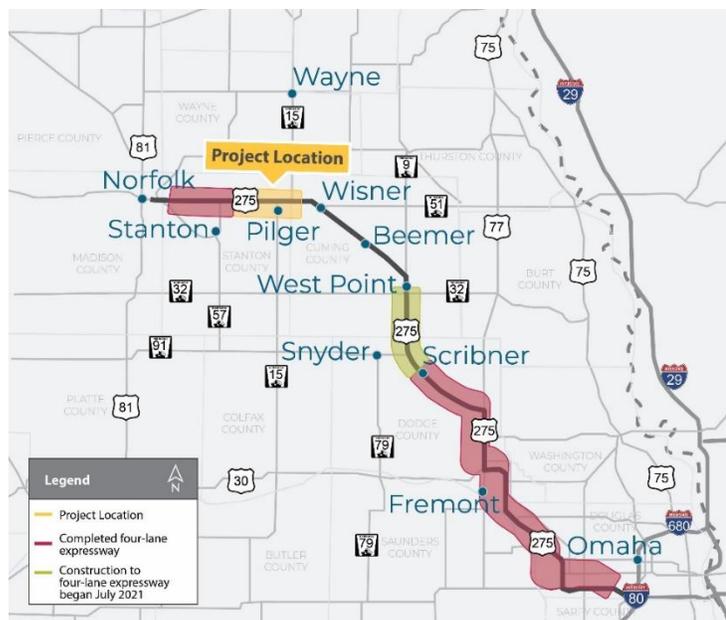
2.0 Project Location

NDOT is improving approximately 11 miles of US-275 in Stanton and Cuming Counties. The project, located in a rural area, begins at the junction of US-275 and N-57, where the existing four-lane roadway ends, and extends to the east junction with N-15 (see **Figure 4**).

This segment of US-275 is connected to highways that provide access to rural communities, including N-57 and N-15. US-275 also connects to local roads that provide access to farming operations and homes. **This project will enhance northeast Nebraska’s regional, statewide, and national connectivity as US-275 from Norfolk to Omaha connects to Interstate 80 (I-80) and other critical roadways and would provide enhanced reliable access to the US Interstate System.**

Nebraska is a rural state where urban areas serve their surrounding region of smaller communities with resources and opportunities. While this project is not directly located in an Area of Persistent Poverty, it will provide improved connections between Norfolk and Nebraska’s only county defined as an Area of Persistent Poverty: Thurston County. Located 20 miles east of the project area, Thurston County is home to the Omaha and Winnebago tribal reservations. Norfolk remains a vital center of commerce and opportunity for these communities. Additionally, the Ponca Tribe of Nebraska operates within a 15-county service area, including Norfolk and the surrounding areas. The improved US-275 corridor will provide a more efficient, reliable connection for commuters and residents to jobs and services in Norfolk, creating more opportunities to access employment, healthcare and education.

Figure 4: Project Location



3.0 Grant Funds, Sources, and Uses of All Project Funding

RAISE grant funding will complete the \$71.4 million in funding needed to construct the US-275 corridor from Norfolk to N-15. NDOT has committed \$14.3 million in state funds (see [Appendix A](#), page 42 of NDOT’s 2022-2025 Statewide Transportation Improvement Program [STIP]), \$32.1 million in other federal funds, and is requesting \$25 million in RAISE grant funding to complete the project. As shown in the STIP, NDOT currently anticipates using \$71 million in state funding for the project. The STIP would be amended to incorporate federal funds if the RAISE grant were awarded. NDOT is committed to delivering the Norfolk to N-15 Project through a traditional design-bid-build contract and will secure all necessary approvals prior to construction, including NEPA compliance and other required permits. **The requested \$25 million of RAISE funds** will build upon current investments of over \$450 million in the US-275 corridor.

Requested RAISE funds will support far reaching opportunities and provide substantial economic benefits that extend throughout northeast Nebraska and beyond. **Table 1** shows total project costs, broken down by major components, along with the amount of RAISE funding

necessary to complete the project. Preliminary design was approximately 40 percent complete when project construction costs and funding sources were estimated.

Table 1: Project Construction Costs and Funding Sources

	Non-Federal	RAISE	Other Federal	Total	Percent Funding Sources
Future Project Activities with Potential Federal and RAISE Participation					
Construction	\$13,342,200	\$23,363,800	\$30,004,000	\$66,710,000	93%
Construction Engineering	\$667,600	\$1,169,000	\$1,501,400	\$3,338,000	5%
Contingency	\$266,800	\$467,200	\$601,000	\$1,335,000	2%
Totals	\$14,276,600	\$25,000,000	\$32,106,400	\$71,383,000	100%
Percent Non-Federal/Federal	20%	35%	45%	100%	-

NDOT has project development activities currently underway. **Table 2** shows the distribution of pre-construction activities, costs that have already been incurred, and future costs for each activity. All pre-construction activity funds are non-federal.

Table 2: Project Pre-Construction Costs by Activity

	Past Non-Federal Spending	Future Non-Federal Spending	Total
Project Activities Already Initiated by NDOT			
Engineering	\$1,519,000	\$1,972,000	\$3,491,000
Right of Way	\$432,000	\$1,323,000	\$1,755,000
Utilities	\$0	\$1,946,250	\$1,946,250
Total	\$1,951,000	\$5,241,250	\$7,192,250

Contingencies to Cover Overruns

As a part of the \$71.4 million total project cost, \$1.3 million has been budgeted using state, federal, and RAISE funding as a contingency to cover unanticipated costs, including change orders, inflation, and cost overruns.

4.0 Selection Criteria

Safety

NDOT completed a crash analysis in accordance with the Highway Safety Manual (HSM) methodology using crash data from the Nebraska Transportation Information Portal (NTIP) for 2016 through 2020. NTIP crash data spans calendar years 2016 through 2020 but does not provide in-depth details highlighted in the existing crash analysis. Data available from 2014 through 2018 provide the following key findings:

- There were 49 crashes reported within the project limits over this period, including 13 non-fatal, injury crashes.
- The crash rate at the east junction of US-275 with N-15 is nearly double the statewide average for similar facilities.
- Crashes along the highway (not at intersections) make up the majority of crashes (38 out of 49).
- Twelve crashes involved rear-end collisions.
- Fixed object crashes and crashes involving an animal were the second and third most common crash types, respectively.

NDOT also utilized the HSM Predictive Method with crash data for 2016 to 2020 to determine the expected number of crashes within the project limits for 2021 and for future years (2025, 2030, 2035, and 2045) if the roadway remains a two-lane undivided highway. The expected crash frequency methodology was used because there was a small degree of fluctuation in annual observed crashes when historical crash data was considered for US-275, and it was appropriate to normalize annual crash fluctuations. Additionally, the US-275 corridor was modeled as a two-lane undivided roadway for the existing and future no-build conditions to ensure that the facility type remained constant. The expected crashes were then multiplied by crash modification factors (CMF) developed by the University of Central Florida to determine the safety benefits associated with converting US-275 to a four-lane divided highway. The following tables highlight expected crash outcomes for two-lane facilities (see **Table 3**) and the expected reduction in crashes within the project limits (see **Table 4**).

Table 3: Expected Number of Crashes with Two-Lane Highway Configuration

	2021	2025	2030	2035	2045
Fatal and Injury	4.33	4.64	4.96	5.28	5.91
Property Damage	8.22	8.81	9.43	10.03	11.25
Total	12.55	13.45	14.39	15.31	17.16

Table 4: Expected Number of Crashes with Four-Lane Divided Highway Configuration

	2021	2025	2030	2035	2045
Fatal and Injury	—	2.47	2.64	2.81	3.15
Property Damage	—	6.82	7.30	7.76	8.70
Total	—	9.29	9.94	10.57	11.85

The CMFs estimate improved safety through designed improvements, primarily roadway widening. Roadway widening is projected to reduce total crashes by 4.16 crashes annually in 2025 and by 5.31 crashes annually in 2045, which constitutes a 47 percent annual decrease in fatal and injury crashes and a 24 percent annual decrease in property damage only crashes. The safety analysis and results, which support the National Roadway Safety Strategy of providing safer roads, are documented in [Appendix B](#).

The Nebraska Strategic Highway Safety Plan (SHSP) identified six critical emphasis areas for improvements to highway safety: 1) increasing seat belt usage, 2) reducing roadway departure

crashes, 3) reducing impaired driving crashes, 4) reducing intersection crashes, 5) reducing young driver crashes, and 6) reducing older driver crashes. The SHSP analysis indicates these categories all had a high occurrence rate in rural areas (58%-80%). The proposed US-275 improvements support the SHSP for specific emphasis areas. The proposed improvements align with these emphasis areas. Reducing intersection crashes is addressed as this project improves intersection geometrics at three state highway junctions and various county road intersections. The proposed improvements also reduce roadway departure crashes through lane widening and increased shoulder width, allowing for more area on the roadway for a driver to utilize before running off the roadway. Roadway departure is a critical emphasis area, and the Nebraska SHSP identifies a high percentage of crashes that run off the roadway are young drivers (48%) and older drivers (24%).

NDOT's commitment to safety goes beyond designing and constructing safe roads. NDOT promotes the Strategic Highway Research Program 2 (SHRP2) Traffic Incident Management (TIM) Program. That program has trained over 62 percent of all Nebraska emergency responders, exceeding the national goal of 55 percent. NDOT also launched a statewide Buckle Up, Phone Down campaign to prevent crashes and reduce injuries. Norfolk Senior High School is a participating school targeting younger drivers. Additionally, NDOT partners with emergency responders, the national weather service, and other safety partners to provide unified and consistent safety messages that encourage safe driving behaviors.

Environmental Sustainability

Environmental Justice

NDOT recently completed an Environmental Justice Policies and Procedures manual, which is currently in draft form. This policy will dictate how environmental justice analyses are completed on federal aid projects in Nebraska. NDOT procedures for environmental justice are grounded in the Federal Highway Administration (FHWA) December 16, 2011, memorandum titled [Guidance on Environmental Justice and NEPA](#). The Norfolk to N-15 Project has been evaluated under NDOT's established environmental justice procedures, and it was determined that this project does not disproportionately affect low-income or minority populations.

Census block group locations of low-income and minority populations in the vicinity of the Norfolk to N-15 Project were identified using EPA's EJSCREEN tool (see **Figures 5 and 6**). The EJSCREEN tool reports areas of low-income and minority populations using percentiles as a means of comparing block groups to the national population. Significance thresholds to identify low-income and minority populations within the Norfolk to N-15 Project area were identified as the 50th percentile for low-income and the 30th percentile for minority population. **No environmental justice populations were identified directly adjacent to the project. As a result, no disproportionately high or adverse impacts on environmental justice populations are anticipated.** As discussed in this and the Quality of Life sections, NDOT anticipates this project will have a positive impact on low-income and minority populations by providing a streamlined, safe transportation gateway to major population centers like Norfolk and Omaha.

Climate Change

The project is focused on expanding access to markets for northeast Nebraska businesses and residents through safer, more reliable freight and passenger travel in the following ways:

Air Pollution and Greenhouse Gas Emissions: As demonstrated in the [Economic Competitiveness and Opportunity](#) section, the project will provide more reliable travel speeds with reduced delays over the long term horizon, in addition to reducing traffic incidents that lead to idling traffic and result in increased emissions that negatively impact air quality. These two project factors are anticipated to limit greenhouse gas emissions from transportation sources in the corridor upon project construction. Additionally, a more reliable US-275 will help encourage the use of lower-carbon transit modes along the corridor by regional transit service providers such as the North Fork Area Transit (NFAT) and Ponca Express.

Infrastructure Recycling: The project will limit its carbon footprint by reusing the two existing lanes of US-275. This fiscally and environmentally responsible decision will require less raw material and will reduce construction equipment activity, leading to reduced greenhouse gas emissions from project inputs compared to a complete reconstruction of the corridor. The project will also use recycled asphalt millings for a significant portion of foundation course or in recycled asphalt pavement (RAP). NDOT estimates that the project will **post-consumer recycle approximately 26,700 tons of project raw materials**. This will account for 16 percent of the project raw materials, at a value of over \$2.13 million.

Resiliency: The US-275 corridor serves a critical connection between major food producers, American-made steel, and the wider US economy. According to the 2017 Census of Agriculture,¹ **the counties adjacent to the corridor have some of the highest levels of cattle production in the US**. For example, Cuming County has one of the highest US rates at 89 head of cattle per 100 acres. This corridor also provides direct access to several plants that package meat for consumers. The early months of the COVID-19 pandemic led to food shortages and highlighted the need for a resilient food supply system. An improved US-275 provides a more reliable connection to the national distribution system, including the proposed intermodal facility in Fremont and the broader National Highway Freight Network. Furthermore, **Nucor's Norfolk makes steel products used in the transportation and heavy equipment industries**. Given the expanded investments funded by the Infrastructure Investment and Jobs Act providing these American-made products efficiently and reliably to market is even more critical.

The need for a resilient US-275 corridor is further highlighted by the Federal Emergency Management Administration's (FEMA) National Risk Index, which is based on a risk score compared to state and national averages. The risk index analysis shows that several census tracts adjacent to the Norfolk to N-15 Project have Relatively Moderate to Relatively High risk, mainly due to the potential for severe weather events. Strengthening the resiliency of the region's infrastructure network can reduce potential harm to nearby communities.

The project will improve resiliency to future adverse weather events, like the 2019 floods, through best practices engineering strategies and Federal Flood Risk Management Standard guidance. The western project area has hilly topography with several small basins crossing the highway. Improvements to several 1930s era culverts will meet modern hydraulic criteria and reconstruct the profile grade through this portion to reduce the incidence of localized overtopping. The eastern project area includes the Elkhorn River Valley and crosses several of its tributaries.

¹ United States Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS)

Proposed improvements in this flatter portion will increase the resiliency of larger structures over Elkhorn River tributaries, like Humbug Creek, by providing increased hydraulic capacity and implementing modern design criteria such as minimum freeboard requirements.

Avoidance of Adverse Environmental Impacts

The environmental review and NEPA documentation for the Norfolk to N-15 Project is currently underway; hence the specific avoidance of impacts is not known at this time. However, the use of NDOT's 2+2 construction method limits impacts to farmland and inherently minimizes environmental impacts by maximizing the reuse of existing infrastructure and right-of-way (ROW) and avoiding additional impacts that would result from construction on a new alignment. It is NDOT's practice to avoid environmental impacts whenever possible.

Rural Underserved Populations

Executive Order 13985, issued by President Biden on January 20, 2021, seeks to provide equal opportunity and treatment for individuals who belong to underserved communities that have historically been denied such treatment. These communities include nonwhite people, persons who live in rural areas, and persons otherwise adversely affected by persistent poverty or inequality. The US-275 corridor provides a critical connection for rural communities across northeast Nebraska. Rural communities have long had reduced access to health care, education, and employment opportunities, and this corridor can expand access within the region.

Low-Income and Minority Populations

The Norfolk to N-15 Project offers the possibility of improved connections between key low-income and minority populations and employment and other services in northeast Nebraska. These improved connections are demonstrated in the [Environmental Justice](#) section. **Figures 5 and 6** show the EJSCREEN results for northeastern Nebraska. As northeast Nebraska's regional economic hub, Norfolk provides employment opportunities to low-income and minority residents across the region. US Census Bureau Longitudinal Employer-Household Dynamics (LEHD) data and the 2021 EJSCREEN data provide key takeaways, including:

- Several block groups within the City of Norfolk are above the 50th percentile for minority population and 75th percentile for low-income. An enhanced, reliable US-275 connection would provide enhanced jobs and services access to the surrounding area.
- The Omaha and Winnebago Tribal Reservations are approximately 30 miles east of the corridor and include over 90 percent minority populations and 50 percent low-income populations. Most block groups within the reservations exceed the thresholds for both minority and low-income populations. The US-275 project provides the most direct connection between Norfolk's educational, service, and job opportunities and the reservations. Data from Safegraph, Replica, and LEHD indicate a connection between the reservations and Norfolk for medical and work trips. An improved US-275 would enhance access to these communities.
- NFAT provides trips for a range of transit users in and around Norfolk. The service area extends to a 30-mile radius around Norfolk, including residents along the Norfolk to N-15 Project and those traveling to and from Wisner for services. The project will provide a more reliable connection for this service.

- The Ponca Tribe of Nebraska provides no- to low-cost transit service to both tribal and community members in northeast Nebraska, including in and around Norfolk via the US-275 project corridor. Norfolk is one of the tribe’s major service areas between the Ponca Tribe’s other locations from Niobrara to Omaha.

Figure 6: Low-Income Block Groups

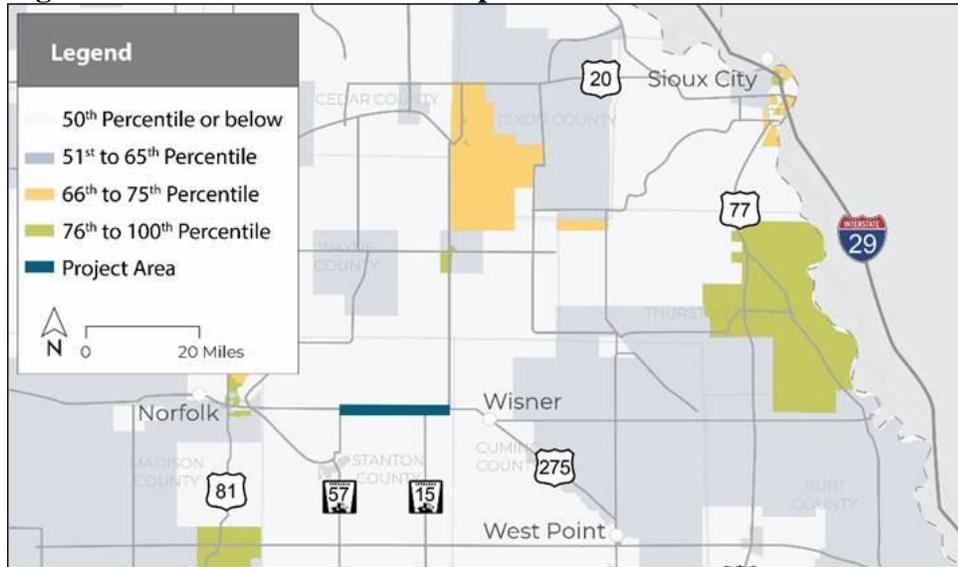
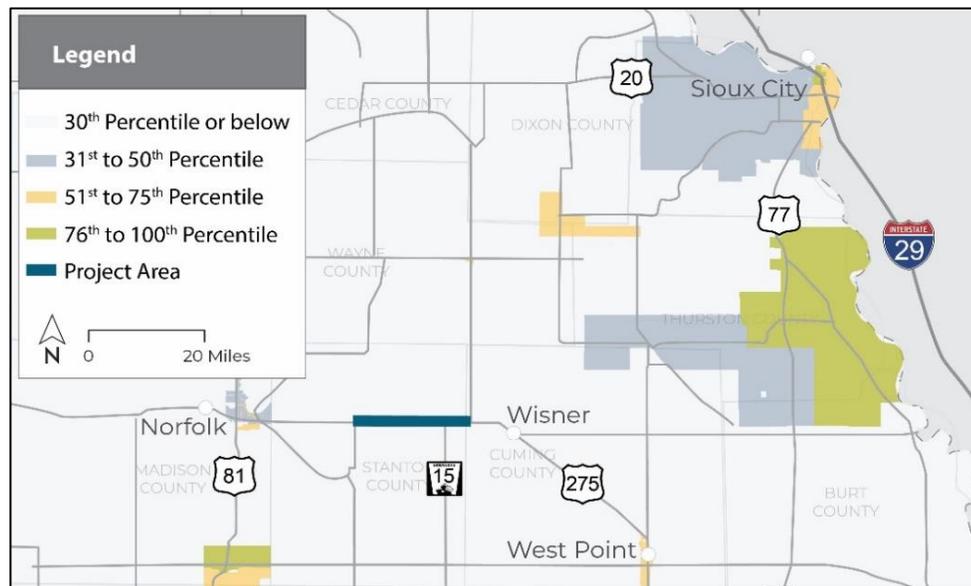


Figure 5: Minority Block Groups



The US-275 Norfolk to N-15 project allows these populations reduced travel time, increased productivity, lower stress, more personal time, and better air quality. The enhanced reliability and reduced conflicts with slower moving agricultural traffic will benefit commuters and freight alike. Additionally, the new paved shoulders will provide enhanced safety with extra roadway

width for oversize vehicles and law enforcement during incidents and traffic enforcement.

Quality of Life

This segment of US-275 is situated in a rural area and serves as the primary route for rural residents. Modernizing the roadway and enhancing connectivity decreases rural isolation. The Norfolk to N-15 Project will benefit rural residents through improved access to critical services in the region, including employment opportunities, social services, health care, and education services.

The Norfolk to N-15 Project creates a more reliable and accessible corridor to connect several communities and constituencies throughout northeast Nebraska. Some of those communities include underserved, low-income, and minority populations that could realize improved access to opportunities through this project.

Demographic data from Replica indicate typical weekday users of the US-275 project corridor are 13 percent non-white and/or Hispanic and a median household income of \$38,500 annually.

This project will enhance the unique characteristics of rural communities along this corridor by safely improving the accessibility of people and freight to urban markets, enhancing access to goods and jobs. Living in a rural area should not reduce an individual's quality of life. Due to the nature of the rural landscape, a reliable system is critical for the quality of life of those who may have to travel more than 50 miles one way to reach a doctor's office, hospital or higher-education/trade school facility. This project is more than "just" a four-lane expressway for the communities along the route—it would provide a more reliable connection between small town America and larger cities. Choices are limited for many rural residents in terms of grocery store options, health care, or what school to send their children to. An improved connection like the Norfolk to N-15 Project, helps expand the choices of rural individuals and their communities for the possibility of a better life and environment.

In addition to rural considerations, NDOT has several programs, policies and plans in place that ensure racial equity in overall project delivery and implementation. The organization's [Disadvantaged Business Enterprise Program Plan](#) ensures certified DBE firms have equal opportunity to participate in contracts and seeks to redress prior inequities. The [Special Training Provisions](#) seek to address the underrepresentation of minority and female workers in the

The Ponca Express

The Ponca Tribe of Nebraska offers no- to low-cost transportation to both tribal and community members within its service area, including in and around Norfolk.

The tribe's Ponca Express service offers portal-to-portal, demand-response, ADA transit services **that increase access to services among tribal members, as well as to provide a vital service to a variety of populations in northeastern Nebraska.** The Ponca Express is very affordable option to improve mobility in the region, with prices at \$2 per stop within 0-30 miles from the Norfolk transit office, and \$10 per round trip for journeys more than 31 miles from the Norfolk transit office. Children 3 years old and younger can ride free. The transit system uses the Norfolk to N-15 Project corridor in its regular service and would benefit from having an improved roadway.

construction trades through on-the-job training goals, NDOT is committed to improving quality of life for those that are involved in project procurement, material sourcing, construction, inspection, and hiring.

Improves Mobility and Community Connectivity

US-275 will better connect small, rural communities throughout northeast Nebraska through the transformation of the existing two-lane highway to a four-lane expressway. This expressway will serve as a major thoroughfare that will better connect communities and move high volumes of passenger and freight traffic when primary routes are impassible. For example, NDOT has previously identified the US-275 corridor as an alternate route in the [Nebraska Statewide Interstate and Expressway Alternate Route Study](#). Expanding US-275 to a four-lane expressway will enhance US-275's reliability as an alternate route.

Currently, the only segments along the unimproved portions of the US-275 corridor that have four-lanes for passing are within the small towns and cities along the route. The heavy volume of slower moving truck and agricultural vehicular traffic leads to platooning, where a line of faster-moving vehicles is held up by slower-moving vehicles. This often leads to dangerous passing maneuvers on rural, two-lane segments and encourages vehicles to speed around slower vehicles inside the town limits where the existing section expands to four lanes. This speeding causes safety concerns on the main streets for pedestrians and turning traffic. The four-lane project would allow passenger vehicles more time and opportunities to safely pass slower-moving vehicles outside of towns and cities, reducing the incentive to speed through town.

Additionally, mobility and the quality-of-life impacts will be minimal as NDOT plans on maintaining traffic on the existing two-lane highway while the new two lanes are under construction.

Economic Competitiveness and Opportunity

The Norfolk to N-15 Project will contribute to economic vitality by providing national, regional, and local connectivity for the movement of goods and people. This segment of US-275 is situated in a predominantly rural area and meets the RAISE requirements to be considered a rural area. The sections below describe how the project will **address the unique challenges of rural transportation networks including freight connectivity, safety, and infrastructure condition.**

Economic Competitiveness

Expanding and improving this section of US-275 will help support regional economic competitiveness by better connecting Nebraska's freight and passenger transportation network. The project will decrease transportation costs and improve access for shippers and residents of adjacent rural communities by reducing unexpected delays and supply chain bottlenecks and improving travel times.

A Regional Employment Connection

The importance of US-275 in the regional economy goes beyond supporting local industry. US-275 serves as a connection for the region's diverse workforce. Demographic and mobility data indicate that individuals commuting from Thurston County, which is home to historically disadvantaged communities, are nearly 25 percent minority with a median household income of \$38,461.

Tourism expansion in northeastern Nebraska is one of the main goals of a study commissioned by the Nebraska Legislature in summer 2021. The Statewide Tourism and Recreational Water Access and Resource Sustainability study identified two state-owned recreational assets in the region that could benefit from significant capital investment and improvements: Niobrara State Park and Lewis and Clark State Recreation Area. The legislature has voted to include funding for these projects in the state budget, and the outcome of these projects will increase tourism and opportunity in the region. The corridor identified in this project would be one of the main routes Nebraskans would use to access that region.

Benefits to Local Communities & Commuters

Today, northeast Nebraska's steelworkers, manufacturers, livestock producers, farmers, and small businesses are impeded from accessing major markets by inadequate transportation infrastructure. While tremendous potential for new growth and increased quality of life exists, outdated infrastructure is costing the region and the state. Local support for the completion of the US-275 expressway is strong and has only grown in the aftermath of environmental disasters such as the 2019 flooding. Sentiments expressing community support can be found in the [Community Quotes](#) section. As noted previously, the corridor serves as a commuter connection between surrounding communities and Norfolk. **The project will increase safety and travel reliability for those commuters.**

Improved Freight Connectivity

The agricultural activities of rural Nebraska drive much of the state's economy. Nebraska's state highways support the movement of commodities and goods throughout the state, region, nation, and world. The US-275 corridor is key to connecting northeast Nebraska's agriculture and manufacturing output to the rest of the world. The importance of this corridor was also confirmed through the [Nebraska State Freight Plan](#). The plan identified the US-275 corridor as essential to freight flows in Nebraska and is designated by the plan as a Critical Rural Freight Corridor (CRFC). For example, Lincoln Premium Chicken Plant in Fremont, Nebraska relies on US-275 to transport poultry to and from its facility (located approximately 50 miles southeast of the project). NDOT has also recently provided Fremont with \$350,000 in road improvement funding to support the development of a \$50 million cold protein storage facility with an estimated economic impact of \$90.5 million during its first six years of operations.

An improved US-275 from Norfolk to N-15 is key to connecting food producers and truckers near the Norfolk to N-15 corridor to the national rail network. And by improving this corridor to

Revitalizing a Devasted Rural Community

The community of Pilger, Nebraska, a village located a half-mile south of the Norfolk to N-15 portion of US-275, would especially benefit from a four-lane corridor. Pilger was dealt a devastating blow on June 17, 2014, when violent twin tornadoes followed the same path in the town of approximately 300 people, destroying homes, agricultural facilities, and key infrastructure. Eight years on, this community is still rebuilding its infrastructure and its population. Expanding US-275 will facilitate this recovery by making the community more competitive with improved access and connections to nearby employment and service opportunities.

make freight movement more efficient and reliable, agricultural processing and logistics companies will be more likely to keep their business in this region and potentially add new services. Agricultural output in this area is vitally important to the economy on all levels.

In addition to the manufacturing and cold storage facility connections, the US-275 improvements would support a proposed intermodal rail terminal in Fremont. The intermodal facility will expand the availability of lower cost, safer, and more efficient market access for freight due to its strategic location with direct National Highway System access via US-275, US-30, and US-77.

The intermodal rail terminal would be on the Union Pacific Railroad's east-west mainline across Nebraska, one of the nation's busiest rail lines, and would improve the logistical efficiency of regional industries like manufacturing and food processing. The resulting cost savings for regional shippers from this transload/carload facility investment is estimated at nearly \$16 million annually, with another \$3.6 million annually in emission, safety, and highway infrastructure savings. An Economic Impact Analysis conducted by the Greater Omaha Chamber, at the direction of the Greater Fremont Development Council, estimates that this facility would add **\$872.1 million to the local economy** annually and create more than **3,514 jobs** in Dodge County, resulting in **\$164.2 million additional dollars in annual earnings** for the Dodge County workforce. The intermodal facility will have broader impacts across the state by adding **\$1.1 billion to the state economy annually**, an additional **940 jobs**, and **\$224.8 million additional dollars in annual earnings** for the state's workforce. Providing a resilient corridor that facilitates local and regional mobility for highway freight builds on these significant economic investments in the region. The Norfolk to N-15 Project would provide a safer, more convenient, and more reliable US-275 and would support the intermodal rail yard to reach its full regional economic potential.

Northeast Nebraska's Economic Impact

The Norfolk to N-15 corridor is at the heart of the Northeast Nebraska Economic Development District, which represents 16 counties. This region's activities impact economies around the world. The economic output of northeast Nebraska accounts for:

- \$4.7 billion in annual food exports outside of Nebraska (nearly \$700 million of which is exported to foreign markets)
- \$2.5 billion in agricultural product exports outside of Nebraska (over \$1 billion of which exported to foreign markets)
- \$1.7 billion in manufactured goods, including over \$900 million in metals products.

As a result of the 2017 Freight Plan, NDOT has continued to support freight planning by building the Nebraska Supply Chain Optimization Model (NESCOM). NESCOM focuses on origin-destination commodity movements by tonnage and estimated value and was used to estimate existing freight flows through the US-275 corridor. The regional and national impact of freight flow in the US-275 corridor is remarkable and can be summarized as follows:

- The corridor carries **\$5 billion in freight annually** with \$3 billion of that valuation in products traveling beyond Nebraska's borders.

- The corridor carries **5 million tons of freight annually** with 1.6 million of that traveling beyond Nebraska’s borders.
- The corridor carries approximately 271,000 truck trips annually with an average value of \$18,000 per payload (37,000 pounds).

Freight commodities hauled through the US-275 corridor represent additional corridor user value that may be lost due to congestion tied to the corridor’s physical limitations (corridor geometry inhibiting travel speeds) or to delays caused by non-recurring congestion (crashes, incidents, and weather). User value estimates associated with the expected reduction in freight delay resulting from the Norfolk to N-15 Project are included in the [Benefit-Cost Analysis](#) section.

Table 5: Average Annual Vehicle Hours of Delay

Vehicle Hours of Delay Reduced	
2028	87,000
2030	95,700
2035	121,800
2045	191,500

Travel Time Savings

As shown in **Table 5**, the **Norfolk to N-15 Project will provide 87,000 annual hours of vehicle travel time savings for travelers and freight in its opening year of 2028. That number will increase to 191,500 hours in annual time savings in 2045.** In addition, the project will lead to vehicle operating savings associated with reduced fuel costs that accrue as a result of reduced travel time. The full traffic and reliability analysis can be found in [Appendix C](#).

State of Good Repair

In addition to the construction of two new adjacent lanes, the Norfolk to N-15 Project will include pavement repair and/or replacement of existing lanes to maintain and improve the road as it ages. The expanded four-lane facility will require fewer repairs over time since existing pavement will be rehabilitated and the new pavement will reduce wear by balancing traffic across more lanes. NDOT is committed to minimizing ROW for both the rehabilitated existing lanes and the two new adjacent lanes by the 2+2 and 3R construction approach, as noted in previous sections.

NDOT constructs their pavement with a design service life and continuously measures pavement condition to adjust the timing of maintenance projects to maintain the roadway in a state of good repair, both of which are demonstrated through NDOT’s [Pavement Management Systems Manual](#) and [Transportation Asset Management Plan](#). Reductions in repairs, extended pavement life, and reduced wear because of lower per-lane traffic volumes will improve long-term, per-lane-mile maintenance costs. NDOT takes pride in maintaining its transportation system to a high standard to best support the State of Nebraska.

Partnership and Collaboration

NDOT is leading all project components in consultation with area stakeholders and the public through a defined Public Involvement Plan. The Public Involvement Plan includes a section for a Title VI, Environmental Justice and Limited English Proficiency Plan. The plan notes that there are no anticipated disproportionately high and adverse human health or environmental effects to

minority and low-income populations, as defined in FHWA Order 6640.23A, because these protected populations are not present in the project area.

Because this project has been top-of-mind in this region for many years, communication regarding next steps has also been ongoing. NDOT has held meetings as part of Transportation Improvement Plan (TIP) project prioritization, conducted town hall listening sessions with community members, and held numerous meetings with various stakeholders. Local stakeholders have been engaged throughout the process, including representatives from chambers of commerce, economic development organizations, schools, agricultural operations, and special interest groups. Community consensus is that this project is needed to improve safety along with the movement of goods and people through this economically diverse portion of US-275. One special interest group, 4 Lanes 4 Nebraska, has organized to advocate for progress in completing this important link in the state's Expressway System at the state level.

NDOT will perform ROW activities from October 2023 through October 2024, and the agency is committed to minimizing ROW impacts to the greatest extent possible. No relocations of residents or businesses are expected as a result of the ROW process and minimal new ROW is expected on the 3R side.

Table 6 identifies key stakeholders, including local communities, businesses, and state officials, that are joining forces to help move this project forward. Letters in support of this project can be found in [Appendix D](#).

Community Quotes

“The 275 corridor is cattle country, one of the largest cattle feeding areas in America,” said JD Alexander, owner of Alexander Cattle and Farms of Pilger. *“More cattle are hauled up and down this road by more trucks every day. We need a better and safer highway.”*

“Expanding Highway 275 is critically important to Nucor,” said Dirk Petersen, General Manager of Nucor Steel in Norfolk. *“We are poised for significant new growth. Having access to an interstate [via the US-275 expressway] to realize that growth is crucial.”*

“Manufacturers rely on safe, efficient roadways to get products to market,” said Jeff Scherer, Chief Financial Officer of Smeal Fire Apparatus Company of Snyder. *“This is a manufacturing corridor. We need to get the right infrastructure in place.”*

“This is one of the most productive agricultural areas in the state,” said Dennis Baumert, owner of Scribner Grain in Scribner. *“Our farm products end up all over the country and all over the world but getting them in and out of this area is more difficult than it should be.”*

**Community quotes courtesy of 4 Lanes 4 Nebraska*

Table 6: Key Stakeholders

Stakeholder	Description
Nebraska Department of Transportation – Owner	NDOT is responsible for planning, development, design, construction, maintenance, and administration of the state highway system. NDOT preserves billions of dollars invested by Nebraskans in their state highway system, making transportation safe, efficient, and cost-effective.
City of Norfolk, Nebraska	Norfolk is located in northeast Nebraska, 112 miles northwest of Omaha, 121 miles north of Lincoln, and 75 miles southwest of Sioux City, Iowa. US Highways 81 and 275 and Nebraska Highways 24 and 35 intersect in Norfolk and serve a population of 25,000. Norfolk is the economic center for an area encompassing six counties. Major economic activities include manufacturing, agriculture, education, and wholesaling. Manufacturing employs over 4,000 people. Norfolk is the major retail trade center for northeast Nebraska.
City of Wisner, Nebraska – Wisner Community Development	Located in northeast Nebraska and nestled in the Elkhorn Valley, Wisner is home to more than 1,200 people. US-275 and Nebraska Highway 51 serve Wisner. The Elkhorn River borders the south edge of Wisner. Wisner is known as the livestock center of the state.
Stanton County	Stanton County, home to more than 6,000 people, is situated between Norfolk and Wisner, with US-275 serving as the primary connection between these two communities.
4 Lanes 4 Nebraska	4 Lanes 4 Nebraska is an industry and business coalition working to raise awareness of the economic, social, and public safety benefits of finishing Nebraska’s Expressway System and connecting our communities with 21st century infrastructure.
Heartland Expressway Association	Heartland Expressway is a volunteer group that advocates for four-lane expressway construction in Colorado, Nebraska, South Dakota, and Wyoming. The group aims to improve safe travel and promote economic and energy development for the region and the United States.
Aksarben Foundation, Northeast Nebraska Growing Together	This economic development initiative in northeast Nebraska focuses on proactive transformation of the regional economy and population growth.
Faith Regional Health Services	A 129-bed acute care facility in Norfolk that serves a regional population of 156,000 from 13 counties in northeast Nebraska.

Stakeholder	Description
Local Businesses	<p>Nucor Corporation is located in Norfolk and supplies high-quality, low-cost steel and steel products.</p> <p>Norfolk Iron and Metal is located north of Norfolk and is a family-run business that offers high-quality carbon steel products.</p> <p>EBM Construction is a millwright contractor specializing in designing feed and grain facilities for the region.</p> <p>Elkhorn Lofts are historic lofts located in downtown Norfolk.</p> <p>US-275 serves as a critical link for the traffic and freight traffic generated by these businesses.</p>
Elected Officials	<p>US Senator, Deb Fischer</p> <p>Nebraska Governor, Pete Ricketts</p> <p>Nebraska State Senator, Curt Friesen</p> <p>Nebraska State Senator, Mike Flood</p> <p>Mayor of Norfolk, Josh Moenning</p> <p>Mayor of West Point, Bruce Schlecht</p>

Innovation

The Norfolk to N-15 Project will address all three innovation areas—technology, project delivery, and financing. Together, these innovation areas have the potential to significantly enhance the safety, efficiency, and performance of the US-275 corridor and the surrounding transportation network.

Innovative Technologies

NDOT has not yet determined which, if any, specific technology features will be updated or incorporated into this segment of US-275. The following features, which NDOT has implemented in recent, similar construction activities, will be considered as part of final design activities and do not require extraordinary permitting, approval, exemptions, waivers, or other procedural actions and are not anticipated to impact the project delivery timeline:

- Closed-circuit television (CCTV) cameras, to monitor traffic flow and identify and respond to incidents in real time.
- Work Zone data exchanges, or related data exchanges, to increase safety during construction.
- Other Intelligent Transportation Systems (ITS) that benefit project users directly and improve traffic flow, safety, and reliability.

NDOT offers the following examples of its commitment to technology:

- NDOT is using supply chain and transportation network analysis to effectively identify and prioritize investment opportunities for an optimized freight network that lowers transportation costs for Nebraska businesses and promotes business growth. NESCOM development was undertaken in conjunction with Nebraska’s Statewide Freight Plan in

2017. NDOT views the optimization tool as an on-going resource for project prioritization, as well as a resource to identify future economic development and freight opportunities.

- Nebraska created a statewide policy authorizing the use of **automated driving systems and driverless-capable vehicles** in 2018. The law sets the framework that allows autonomous vehicle manufacturers the ability to work with the state and to safely test their products in Nebraska. The law is considered model legislation that other states will begin to adopt.
- NDOT is in the process of developing a **Statewide Electric Vehicle Plan**, which will support electric vehicle infrastructure on key corridors throughout the state. NDOT's plan will intend to connect to the national and regional alternative fuels network and foster the use of electric vehicles in the state.
- Nebraska, Iowa, Kansas, Missouri, and Wisconsin have collaborated on the **Smart Work Zone Deployment Initiative** since 1999. Through this pooled-fund study, researchers investigate ways to better control traffic through work zones. Their primary objective is to promote and support research and outreach activities that focus on innovative, practice-ready policies, processes, tools, and products that enhance the implementation and constructability, safety, and mobility impacts of all types of work zones.

Innovative Project Delivery

Contracting

At this time, NDOT does not anticipate using innovative contracting methods as part of the US-275 Project, with the possible exception of schedule bonuses to ensure the project is delivered on time.

Environmental Requirements

To streamline and expedite federal and state agency reviews, NDOT utilizes existing agency agreements and early agency coordination. NDOT has programmatic agreements with US Fish and Wildlife Service and the Nebraska State Historic Preservation Office that streamline approvals under the Endangered Species Act and the National Historic Preservation Act as part of the NEPA review. Additionally, federal and state agencies have been able to present concerns and provide input throughout project development. These coordination meetings have occurred during the scoping phase, preliminary alternative development, and impact review. NDOT has long-standing relationships with all state and federal regulatory agencies who may have authority over environmental resources in the project area and is confident that all permits and approvals will be obtained prior to the funding obligation in 2026.

Public Involvement

NDOT recognizes the importance of the US-275 corridor, not only for the state but for the communities that live nearby and drive it every day. Stakeholder engagement is an important step and responsibility during the transportation planning and project development process.

The Norfolk to N-15 Project is a high-priority project located along US-275 in an area that experiences high truck traffic and local commuters. In an effort to connect with these stakeholders, NDOT will leverage innovative techniques identified in the Federal Highway Administration's Every Day Counts (EDC) initiative. In addition to public meetings, targeted

mailings, and social media posts, NDOT plans to include project visualizations in the form of a static 3D rendering to aid those interested in visualizing the project's potential completion. NDOT also plans to incorporate online storyboards and virtual meetings to foster participation via technology to engage stakeholders more effectively and efficiently.

Innovative Design Practices

Practical Design

NDOT has found that reasonable modifications to design criteria can greatly affect project costs. NDOT is implementing a practical design approach that is not strictly constrained by traditional design criteria. Instead, this approach prioritizes safety and reliability within a wider range of design criteria. This allows NDOT to make design decisions that focus on the project's needs and address the most important aspects of the transportation system. This approach prioritizes transporting people and goods to their destinations safely and quickly while realizing cost savings and reducing overall project costs, whenever possible, by using flexible design standards.

2+2 Construction

Practical design will be combined with NDOT's 2+2 construction, in which the existing roadway continues to serve traffic while new lanes are being constructed. Once the new lanes are open to traffic, the existing lanes will be rehabilitated and overlaid to serve as one set of expressway lanes while maximizing reuse of all elements of the current facility to reduce construction costs. Using 2+2 construction will maximize reuse of existing roadway assets and features. In conjunction with a practical design approach, this will allow the project to be delivered in a faster timeline and provide cost savings and efficiencies to NDOT and the freight shippers and travelers it serves. Also, using this design practice will reduce the carbon footprint and environmental impact of the design and build process. **NDOT expects to save approximately \$3 million per mile by using 2+2 construction instead of full reconstruction.**

Innovative Bridge Design

Increasingly, pre-cast, pre-stressed concrete bridges are being constructed as continuous-span structures to increase span length and achieve greater economy. However, bridge designers are constrained severely by standard girders of the American Association of State Highway and Transportation Officials. Where appropriate, NDOT will utilize NU I-girders on the Norfolk to N-15 Project. The NU I-girder series, which were developed by the University of Nebraska's Center for Infrastructure Research in cooperation with NDOT, spans farther than any other standard I-girder shape available today.

Precast Concrete Box Culverts

During final design, NDOT will evaluate concrete box locations to determine if pre-cast concrete box culverts could be used. Pre-cast culverts provide an opportunity to expedite construction and a higher level of assurance that the culverts meet design requirements than traditional cast-in-place concrete box culverts because pre-cast culverts are built in a controlled factory environment.

Every Day Counts Initiative

NDOT will utilize other innovations and enhanced business processes promoted through FHWA’s EDC initiative to shorten the project delivery process, enhance roadway safety, reduce congestion, and improve environmental sustainability. Some of the key innovations from EDC Rounds 1 through 6, not discussed elsewhere in this application, are summarized in **Table 7**.

Table 7: Application of Every Day Counts Innovation Measures to the US-275 Project

Every Day Counts Innovation Measure	Application to the US-275 Project
Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE)	2D hydraulic modeling is being used in basins within the corridor.
3D Engineered Models for Construction	3D grading models are being prepared and will be delivered to the selected contractor.
Ultra-High Performance Concrete for Bridge Preservation and Repair	NDOT is considering using Ultra-High Performance Concrete to maximize fiscal responsibility, efficiency, and bridge durability, where applicable, on US-275.
Road Weather Management – Weather-Savvy Roads	NDOT, the National Weather Service, and the Nebraska State Patrol participate in FHWA’s Pathfinder program.
Next-Generation TIM: Integrating Technology, Data, and Training	NDOT is collecting TIM performance measures as part of crash reports and facilitates a statewide TIM program to train and collaborate with emergency responders.
Crowdsourcing for Advancing Operations	NDOT is partnering with Waze to provide construction notification, road closure data, and advance notice of major traffic events.
Community Connections	The US-275 corridor is critical for connecting rural Nebraskans safely and efficiently to employment, education, healthcare, global markets, and other essential services.
Implementing Quality Environmental Documents (IQED)	NDOT is using a more public friendly approach on the Environmental Assessment that incorporates a question-answer format.
Virtual Public Involvement	NDOT provides virtual public meeting materials and leverages social media to inform and engage with the public. Static 3D renderings will also be used to illustrate how a new US-275 expressway will look and function.
Data-Driven Safety Analysis	The HSM Predictive Method was used to analyze crash and roadway data to predict project safety impacts.
Reducing Rural Roadway Departures	NDOT has employed cost-effective countermeasures such as new pavement, rumble strips, and guardrail.

Innovative Financing

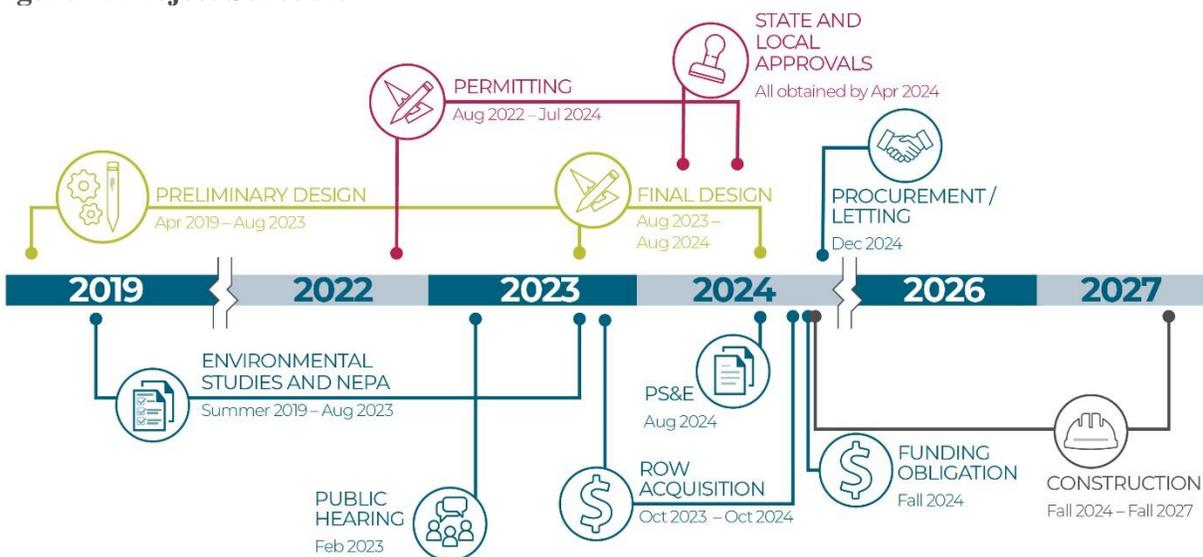
NDOT has a long history of identifying innovative transportation funding sources, since Nebraska is a pay-as-you-go state that is constitutionally prohibited from incurring debt. The agency believes in innovative, responsible investment that will improve economic vitality and quality of life in the state. The **Build Nebraska Act of 2011** provides a 20-year funding mechanism that reassigns a portion of existing state sales tax receipts to state and local roads and streets; 85 percent of which is for expansion and reconstruction of the Expressway System and federally designated high-priority corridors. The **Transportation Innovation Act of 2016** was a new tool to accelerate highway investment through a total allocation of \$450 million for targeted infrastructure investment with a Transportation Infrastructure Bank with funds through 2033. These demonstrate Nebraska’s commitment to new revenue, programs, and tools to increase mobility, freight, economic growth, and safety in the state. See the [Project History](#) section for more information about the Build Nebraska Act and the Transportation Innovation Act.

5.0 Project Readiness

Project Schedule

A simplified project schedule outlining key milestones is shown in **Figure 7** and a detailed line item schedule is included in [Appendix E](#). Preliminary design and NEPA review for the project are currently underway and are expected to be completed in August 2023. Final design will begin immediately after completion of the NEPA process, and plans, specifications, and estimates (PS&E) will be submitted in August 2024. ROW design will begin concurrent with final design. Property acquisition is expected to start in October 2023 and be completed no later than fall 2024. Permitting will be ongoing during final design, with all permits acquired no later than April 2024. Based on the preliminary design and environmental studies completed to date, **NDOT is confident that funds for the project can be obligated by September 30, 2026 and will be spent steadily and expeditiously with construction starting in fall 2024.** Construction is expected to be complete in 2027, well ahead of the expiration of RAISE funds in 2029.

Figure 7: Project Schedule



Required Approvals

NDOT is a seasoned recipient of Federal funds, receiving approximately \$400 million in annual Federal transportation funding.

Environmental Permits and Reviews

NEPA Status

The Norfolk to N-15 Project is being reviewed under NEPA as an Environmental Assessment. The Draft Environmental Assessment is currently underway with publication and a public hearing expected in the first quarter of 2023 and a decision document expected in the third quarter of 2023. NDOT is confident the project will receive a Finding of No Significant Impact (FONSI) and does not anticipate environmental issues will affect the overall schedule based on the environmental reviews and agency coordination completed to date.

Environmental Reviews, Permits, and Approvals

NDOT has engaged all federal and state agencies since the beginning of project development, and agencies have been able to present concerns and provide input on the project at key stages of project development (scoping phase, purpose and need development, and alternative development and analysis). Based on this emphasis on early coordination and NDOT's long-standing relationships with all state and federal regulatory agencies who have authority over environmental resources in the project area, NDOT is confident that all permits and approvals will be obtained prior to funding obligation in 2026.

NDOT's environmental review process includes obtaining required approvals from resource agencies. The Norfolk to N-15 Project will require the following:

- Endangered Species Act, Section 7 Approval (with NEPA approval)
- National Historic Preservation Act, Section 106 Approval (with NEPA approval)
- Floodplain Development Permit
- Construction related permits (Air Quality, Solid Waste Management, Notice of Demolition, etc.) from Nebraska Department of Environment and Energy
- Clean Water Act, Section 404 Permit
- Clean Water Act, Section 401 Water Quality Certification
- Clean Water Act, National Pollutant Discharge Elimination System General Stormwater Discharge Permit

Environmental studies and reviews supporting the Norfolk to N-15 Project are 80 percent complete overall. To date, the following environmental reviews have been completed:

- Threatened and endangered species – a Biological Assessment and habitat connectivity assessment have been completed under NDOT's programmatic agreement with the US Fish and Wildlife Service and Nebraska Game and Parks Commission. These agencies have provided a determination of “may affect, not likely to adversely affect” for listed species in the project area with the inclusion of species-specific conservation conditions.
- Hazardous materials – a Hazardous Materials Review was completed and determined that it is unlikely that any contamination would be encountered during project construction.

- Environmental justice and limited English proficiency (as documented in *Section 4.0*).
- Delineation of wetlands and waters of the US.
- Wetland delineations have been completed and a Jurisdictional Determination has been requested from the US Army Corps of Engineers.
- Permit applications for wetland impacts under Section 404 of the Clean Water Act and Nebraska Title 117 will be submitted in 2023, allowing ample time for agency review prior to contract letting.
- A wetland mitigation site has been acquired and design is currently underway.
- Floodplains – hydrologic and hydraulic analyses have been completed and determined that acquisition of local floodplain development permits should be straightforward.
- Historic properties – a review of standing structures and archeological sites has been completed and two properties eligible for the National Register of Historic Places have been identified:
 - Sharpe Homestead archeological site – a data recovery plan and memorandum of agreement will be developed.
 - Former NDOT Rest Area – impacts on this property would be avoided.
 - Section 4(f) properties – impacts on Section 4(f) properties are expected to be addressed via a *de minimis* finding.
 - Noise – a preliminary noise study has been completed and determined that noise abatement will not be required.
 - Air quality – the State of Nebraska is in attainment for all National Ambient Air Quality Standards; therefore, a detailed air quality study is not required.

State and Local Approvals

Besides environmental approvals, all planning approvals are in place and the project is included in Nebraska's Statewide Transportation Improvement Program (STIP).

Coordination with FHWA-Nebraska

FHWA-Nebraska is fully supportive of the Norfolk to N-15 Project for a RAISE grant and is working closely with NDOT to complete the Environmental Assessment for this project.

Public Engagement

NDOT is committed to actively and transparently engaging their stakeholders. Since 2015, NDOT has convened an Innovation Task Force who meet regularly to discuss key transportation topics, such as potential project partnerships or connected and automated vehicles. This same stakeholder engagement model has been used as part of their TIP project prioritization and the statewide Long-Range Transportation Plan (LRTP), both of which included the US-275 corridor. The Norfolk to N-15 Project has been discussed with the public and stakeholders for many years, and communication regarding next steps has been ongoing. NDOT has held meetings as part of their TIP project prioritization and LRTP, has conducted town hall listening sessions, and has held numerous meetings with various stakeholders. These stakeholders have been engaged throughout the process and include local elected officials, chambers of commerce, economic development organizations, agricultural organizations, and special interest groups. Previous community input supports the safety and efficiency benefits of the project. Letters in support of this project can be found in [Appendix D](#).

NDOT has implemented a tailored public involvement plan for the Norfolk to N-15 Project that engages individual stakeholders and the general public. To date, comments received at public and stakeholder meetings have been supportive of the preferred alternative, and comments from stakeholders included continued project support. NDOT has considered stakeholder input and revised the design to accommodate the needs of those effected by the project. For example, input from Wisner-Pilger Schools led to the modification of the project design to include additional intersection improvements near the school campus for improved operations and safety for buses, students, and parents. Additional public involvement and comments are upcoming as the NEPA document is developed, including a public hearing.

Assessment of Project Risks and Mitigation Strategies

An assessment of risks that may pose a threat to the project meeting its objectives and schedule, along with proposed mitigation actions, is presented in **Table 8**.

Table 8: Assessment of Risks

	Management and Procurement	Environmental	Right-of-Way
Description	Implementing this project will compete with other state transportation projects and programs for executive oversight and project management resources.	Completion of NEPA requirements and acquiring permits could result in delays.	Property acquisition will be required.
Mitigation Strategies	NDOT has dedicated staff and procured consultant assistance to prioritize project delivery, using NDOT’s proven project development process that draws upon the experience NDOT has gained through the successful delivery of thousands of highway projects.	The NEPA study is currently underway. Delay risk is minimal as the project team has engaged resource agencies from project outset. Additionally, the project design is at a level that allows NDOT to determine that potentially significant impacts are highly unlikely. NDOT has engaged stakeholders at an early stage to allow sufficient time to address stakeholder concerns and mitigation needs.	Early public involvement activities and landowner coordination allows NDOT to address landowner concerns prior to ROW acquisition, expediting the process. The project is rural and associated stable land prices makes NDOT confident that ROW acquisition costs will not exceed project budget and contingencies.

Engineering and Design Studies

NDOT initiated preliminary design for the Norfolk to N-15 segment of US-275 in 2019. To date, preliminary design has established design criteria, developed horizontal and vertical alignments, and created 3-D project models. Existing conditions hydrologic and hydraulic studies of the adjacent Elkhorn River and other waterways the project crosses have been completed for input into bridge design. Other engineering studies and analyses that have been completed include traffic, safety, and geometric studies used to identify safety, travel time, and reliability benefits

associated with the project as well as specific geometric improvements to include in the project. The project cost estimate was developed using quantities based on the detailed preliminary design models and standard NDOT cost estimation procedures. The estimates are based on past and current project bids that NDOT has received from contractors. Estimates also include a contingency factor for inflation and estimated future construction material costs.

6.0 Benefit-Cost Analysis

The cost effectiveness and net benefits of the US-275 improvements from Norfolk to N-15 were estimated through a complete Benefit-Cost Analysis (BCA) as per USDOT’s Benefit-Cost Analysis Guidance for Discretionary Grant Programs (March 2022). The BCA quantifies and monetizes, as thoroughly as possible, the benefits generated under the criteria defined by the RAISE program and compares them against the project’s costs. The analysis shows that the project generates readily monetized benefits that are slightly less than its capital costs; the project also generates significant other non-monetized benefits that are not included in the benefit-cost analysis, and therefore results in a quantified net benefit to society.

Results of the Benefit-Cost Analysis

Table 9 summarizes the monetization of the main benefits resulting from the proposed improvements. The detailed benefit-cost analysis can be found in [Appendix F](#).

A 28-year analysis period was used to estimate the project’s benefits and costs, which includes nine years of design and construction (including engineering, ROW acquisition, utilities, and construction engineering) and 20 years of operation.² Annual benefits and costs are estimated through 2047. The residual value of land acquired for the project is assessed in the final year of analysis.

The project’s most significant benefits are travel time and crash cost savings. Travel time savings accrue for passenger vehicles and trucks due to the upgraded roadway corridor allowing for higher average speeds compared to conditions in the “No Build” scenario. Crash cost savings were calculated using the HSM Predictive Model and by applying CMFs to NDOT’s historic crash data. Additionally, there are significant safety and travel time savings benefits with avoided work zone impacts compared to the no-build condition, as found

- 136,000 fewer travel time hours due to
- 1.89 fewer crashes (0.16 serious injur

Table 9: Benefit Estimates, 2019 Dollars

Benefit Categories	7% Discount Rate
Travel Time Savings	\$25,641,000
Crash Cost Savings	\$17,432,000
Operations and Maintenance Cost Savings	\$88,940
Avoided Work Zone Impacts	\$2,837,000
Residual Land Value	\$271,170
Total Estimated Benefits*	\$46,270,122

Benefit Categories	7% Discount Rate
Travel Time Savings	\$31,400,000
Crash Cost Savings	\$18,900,000
Operations and Maintenance Cost Savings	\$96,400
Residual Land Value	\$132,400
Total Estimated Benefits*	\$50,600,000

² Project support costs are assumed to be incurred from 2028.

Considering all monetized benefits and costs, the project’s internal rate of return is estimated at 5.7 percent. With a 5.7 percent discount rate, the project would result in a **monetized net present value of negative \$6.7 million and a benefit-cost ratio of 0.9**. A more conservative 20-year period associated with project widening was used. If the project were evaluated with the 30-year operational cost-benefit period for the reconstruction aspects of this project, the benefit-cost ratio would be 1.09.

Table 10 provides the overall 20-year results of the BCA.

The project will generate other benefits that have not been monetized due to lack of USDOT guidance or methodology. Should these benefits be quantified and monetized, they would increase the overall benefit-cost ratio above 1.00. These benefits are:

- **Travel Time**

Reliability: Adding two additional travel lanes to US-275 will decrease the variability of travel time throughout the corridor, allowing motorists and freight haulers to reach their destination on time more consistently. The travel time savings estimated in the BCA includes time savings from reduced delays, but the BCA does not consider the additional benefit of increased reliability beyond that of its incremental time value. In other words, just the fact that travel along the route is more reliable, and thus a traveler has a lower chance of experiencing a delay during a particular trip, has an intrinsic value to many. Travel time reliability is important for firms that depend on just-in-time deliveries as well as for individuals who need to be on time for work or other appointments. Improved reliability allows drivers to reduce the amount of “buffer” time they need to budget to account for unexpected delays.

- **Inventory Cost Savings:** Higher average speeds along US-275 means that trucks spend less time on the road and can reach their destinations faster. The faster delivery times will lead to inventory cost savings, which are important to improve connectivity between production and consumption sites and to increase the fluidity of the movement of goods.
- **Vehicle Operating Cost Savings and Emissions Benefits:** Improvements that lead to fewer travel delays will allow vehicles to travel at more consistent speeds with less braking and less time spent idling in traffic. This will reduce wear-and-tear on vehicles and reduce the amount of pollutants emitted while vehicles idle in traffic. Additionally, new, resurfaced pavement will lead to smoother travel, reducing vehicle wear.

The inclusion of these benefits would increase the overall benefit-cost ratio.

The Norfolk to N-15 Project will improve more than safety, roadway capacity, and freight movements. The project will enhance access to employment, social services, health care, and education. Travelers will spend less time getting to and from their destinations due to higher

Table 12: Results of Benefit-Cost Analysis

Project Evaluation Metric	7% Discount Rate
Total Discounted Benefits	\$46.7 million
Total Discounted Costs	\$53.0 million
Net Present Value	-\$6.7 million
Benefit-Cost Ratio	0.9
Internal Rate of Return	5.6%
Discounted Payback Period	N/A

operating speeds that will lead to increased productivity, lower stress, more personal time, and better air quality. This project will also enhance travel time reliability by increasing passing opportunities and improving system resiliency. Whether commuting, hauling freight, or simply trying to get to an appointment, frequent travelers in this area will have a reliable estimate of the time it will take to get to their destinations.

Credible Plan to Address Full Lifecycle Costs

While the new two-lane roadway constructed in this project will require future maintenance, the 3R strategy applied to the existing two lanes will extend the life of that roadway segment and decrease future costs. As a result, the estimated twenty-year lifecycle maintenance cost of the relevant roadway segment will decrease from **\$175,990** under current conditions to **\$87,050** as a result of the Norfolk to N-15 Project (discounted at 7 percent). These costs were estimated as part of the BCA process. NDOT is keenly aware of the critical need to maintain its system to move people and freight safely and efficiently. Maintaining roadways in an efficient and timely manner allows products from Nebraska's rural areas to reach wider national and international markets and promotes the economic vitality of our state and nation.

NDOT's program is structured to prioritize emergency response, while preserving the existing infrastructure, followed by capital improvements. Nebraska has a demonstrated history of maintaining its highway system and investing more in asset preservation than any other work type. This approach has maintained pavements and bridges in a state of good repair cost-effectively, as shown by state performance measures and targets. NDOT anticipates this investment strategy will also continue to achieve national performance goals, provided the public commitment to roadway infrastructure is maintained.

NDOT is committed to meeting the operations and maintenance (O&M) needs and costs of the Norfolk to N-15 Project. NDOT will perform O&M, supplemented with contracted service providers as necessary. NDOT's overall program will fund O&M costs.

NDOT has developed and maintains a risk-based Transportation Asset Management Plan (TAMP) for the National Highway System in Nebraska. One of the NDOT TAMP's strategic goals is: "Asset Management – To operate, maintain, upgrade, and expand physical assets effectively throughout their life cycle." NDOT's asset management process follows these steps:

1. Inspections are performed to assess and monitor the condition and performance of roads and bridges. Performance gaps are identified, and options are considered to minimize those gaps at the lowest practical cost.
2. Existing funding levels and their overall impact on asset management practices are evaluated to develop meaningful performance targets and to ensure Nebraska roads and bridges are maintained in a State of Good Repair.
3. Condition and desired performance targets are used in a life-cycle cost analysis to identify projects for inclusion on a 10-year project candidate list.
4. Projects from the 10-year project candidate list are prioritized for inclusion in the Surface Transportation Program book.
5. After construction work is complete, pavement condition is documented during annual inspection.
6. System-wide condition and performance are compared with established targets.

Appendix F – Benefit-Cost Analysis Supplemental Documentation

Date: Thursday, April 07, 2022

Project: US-275 Norfolk to N-15

To: Nebraska Department of Transportation

From: HDR

Subject: Benefit-Cost Analysis Supplemental Documentation Memo Supporting RAISE Grant Application

Executive Summary

The Nebraska US-275 Norfolk to N-15 Project is the next step in a larger vision to connect commerce and communities in Northeast Nebraska with each other and with the interstate highway system. The Nebraska Department of Transportation (NDOT) is working to improve approximately 10 miles of US-275 from 8.5 miles east of Norfolk, Nebraska to Nebraska Highway 15 (N-15).

This project will build upon over \$450 million in investments that NDOT has made along the US-275 corridor by transforming the existing two-lane highway into a new four-lane expressway that will improve safety, efficiency, and reliability of a key connector route in northeast Nebraska.

This project will maximize utilization of existing transportation infrastructure and right-of-way and better connect key highways within the region. It will improve the safety and reliability of the roadway while improving regional connectivity for all users in Northeast Nebraska, including commercial truck traffic.

A table summarizing the changes expected from the project is provided below.

Table ES-1: Summary of Infrastructure Improvements and Associated Benefits

Changes to Baseline / Alternatives	Type of Impacts and Benefits	Benefits	Summary of Results (millions of discounted \$2020)	Section
Improve safety along US-275 and at intersections	Reduced risk of crashes	Crash Cost Savings	\$17.4	7.1
Improvements to roadway and intersections to improve level of service	Improved Travel Times	Travel Time Savings	\$25.6	7.2
	Reduced Vehicle Operating Costs		Not estimated	
Resurfaced roadway reduces future recurring maintenance costs.	Operations and Maintenance Cost Savings	State of Good Repair: Infrastructure Condition	\$0.09	7.3
	Acquisition of land with long-term value	Residual Land Value	\$0.3	
Avoided construction work zone impacts due to two-plus-two layout	Improved safety and travel time during construction	Mobility and Community Connectivity	\$2.8	
Improvements to roadway and intersections to improve level of service	Improved reliability of traffic flow	Quality of Life: System Reliability	Not estimated	
Reduced idling along roadway reduces energy consumption	Reduced emissions	Environmental Sustainability	Not estimated	7.4

The period of analysis used in the estimation of benefits and costs is 29 years, including nine years of project development and construction and 20 years of operation. The total (undiscounted) project costs are \$78.6 million in 2020 dollars according to the distribution shown in Table ES-2. The \$25 million RAISE grant funding request, in current day dollars, is approximately 35 percent of future project costs.

Table ES-2: Summary of Project Costs, 2020 Dollars

Cost Category	Undiscounted Project Cost	Percentage of Undiscounted Total Project Capital Cost
Engineering	\$6.83 million	8.7%
Right-of-Way	\$1.76 million	2.2%
Utilities	\$1.95 million	2.5%
Construction	\$68.05 million	86.6%
TOTAL COST	\$78.58 million	

A summary of the relevant data and calculations used to derive the benefits and costs of the project are shown in the BCA model. Benefits and costs are quantified in 2020 dollars. Based on the analysis presented in the rest of this document, the project is expected to generate \$46.3 million in discounted benefits and \$53.0 million in discounted costs over 20 years, using a 7 percent real discount rate. The project is expected to generate a Net Present Value of -\$6.7 million and a Benefit/Cost Ratio of 0.9. If a 30-year horizon is utilized, the net benefits increase to \$58.0 million with a Net Present Value of \$5.0 million and a Benefit/Cost Ratio of 1.1.

Table ES-3: Summary of Project Net Benefits, 2019 Dollars

Project Evaluation Metric	Constant Dollars	7% Discount Rate
Total Discounted Benefits	\$146.6 million	\$46.3 million
Total Discounted Costs	\$75.5 million	\$53.0 million
Net Present Value	n/a	-\$6.7 million
Benefit / Cost Ratio	n/a	0.9
Internal Rate of Return (%)	5.7%	
Undiscounted Payback Period	N/A	

Introduction

This document provides detailed technical information on the economic analyses conducted in support of the grant application for the Nebraska US-275 Norfolk to N-15 project.

Section 3, Methodological Framework, introduces the conceptual framework used in the BCA. Section 4, Project Overview, provides an overview of the project, including a brief description of existing conditions and proposed alternatives; a summary of cost estimates and schedule, and a description of the types of effects that the Nebraska US-275 Norfolk to N-15 Project is expected to generate. Section 5, General Assumptions, discusses the general assumptions used in the estimation of project costs and benefits, while estimates of travel demand and traffic growth can be found in Section 6, Demand Projections. Specific data elements and assumptions pertaining to the long-term outcome selection criteria are presented in 7, Benefits Measurement, Data and Assumptions, along with associated benefit estimates. Estimates of the project's Net Present Value (NPV), its Benefit/Cost ratio (BCR) and other project evaluation metrics are introduced in Section 8, Summary of Findings and BCA Outcomes. Next, Section 9, BCA Sensitivity Analysis, provides the outcomes of the sensitivity analysis. Additional data tables are provided within the BCA model including annual estimates of benefits and costs to assist the U.S. Department of Transportation (USDOT) in its review of the application.¹

Methodological Framework

The BCA conducted for this project includes the monetized benefits and costs measured using USDOT guidance, as well as the quantitative and qualitative merits of the project. A BCA provides estimates of the benefits that are expected to accrue from a project over a specified period and compares them to the anticipated costs of the project. Estimated benefits are based on the projected impacts of the project on both users and non-users of the facility, valued in monetary terms.²

While BCA is just one of many tools that can be used in making decisions about infrastructure investments, USDOT believes that it provides a useful benchmark from which to evaluate and compare potential transportation investments.³

The specific methodology developed for this application was developed using the BCA guidance developed by USDOT and is consistent with the RAISE program guidelines. In particular, the methodology involves:

- Establishing existing and future conditions under the “Build” and “No-Build” scenarios;
- Assessing benefits with respect to the criteria identified in the RAISE 2022 Notice of Funding Opportunity (NOFO);
- Measuring benefits in dollar terms, whenever possible, and expressing benefits and costs in a common unit of measurement;

¹ While the models themselves do not accompany this appendix, they are provided separately as part of the application.

² USDOT, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised).

³ Ibid.

- Using USDOT guidance to estimate the value of travel time savings and safety benefits, and relying on industry best practice for other impacts;
- Discounting future benefits and costs with the real discount rate recommended by USDOT (7 percent); and
- Conducting a sensitivity analysis to assess the impacts of changes in key estimating assumptions.

Project Overview

Nebraska DOT (NDOT) is continuing efforts to complete the expansion of US-275 from a two-lane highway to a four-lane expressway in the general area between Norfolk and Fremont. The current project is the next step in a larger vision to connect commerce and communities in Northeast Nebraska with each other as well as to the interstate system.

US-275 was originally constructed as a two-lane highway in Northeast Nebraska in 1939. In 1969, the Nebraska Department of Roads first identified the need for an expressway system for Northeast Nebraska to better connect urban and rural areas and to improve connectivity between the state's economically diverse regions.

Officially created in 1988, the Expressway System was designed to link Nebraska communities with 15,000 or more in population to the Interstate System with four-lane highways. Approximately 425 of the plan's original 600 miles have been completed, but vital segments remain incomplete. US-275 in Northeast Nebraska represents roughly one quarter of the remaining miles that are left unfinished.

US-275 between Norfolk and Omaha extends for approximately 92 miles, but to date NDOT has completed only approximately 44 miles of US-275 expansion in this area, primarily between Fremont and Omaha (the sixth-largest and largest cities in Nebraska, respectively). NDOT has divided the remaining 48 miles of the Norfolk to Omaha expressway into four construction segments:

- Norfolk to N-15
- N-15 to Wisner
- Wisner to West Point
- West Point to Scribner

These segments constitute the rural portion of the Norfolk to Omaha expressway and are located in Stanton, Colfax and Dodge counties, with a total population of approximately 51,400. Development of the West Point to Scribner segment – which includes numerous constraints and permitting issues associated with extensive wetlands, frequent flooding and nearby levees – is ongoing.

The next logical priority segment is the northernmost portion, from Norfolk to N-15, which is the focus of this RAISE grant application. The improvements included in this project are as follows:

1. Expand the existing US-275 two-lane highway to a four-lane expressway by constructing a new, parallel, two-lane roadway (2+2 construction) on one side of the existing US-275.
2. Apply a Restoration, Rehabilitation, and Resurfacing (3R) treatment to improve the existing two lanes of US-275.
3. Modify and improve various county road intersections with US-275.
4. Modify and improve the intersection of N-15 with US-275 at two locations east of N-57.

This project will maximize utilization of existing transportation infrastructure and right-of-way, including connecting key highways within the region. It will improve safety and reliability of the roadway while improving regional connectivity for all users in Northeast Nebraska, including commercial truck traffic. Efforts also fulfill Nebraska Legislature mandates.

Today, area steelmakers, manufacturers, cattle feeders, farmers, and small businesses are somewhat isolated from major markets. While tremendous potential for new growth and increased quality of life exists, outdated infrastructure is costing the region and the state. A local coalition of support has been established to advocate for the completion of the Norfolk to Omaha expressway, and this project will help enhance connectivity within Northeast Nebraska and beyond.

Base Case and Alternatives

The “No-Build” and “Build” scenario conditions are straightforward differences in roadway design. The No-Build Scenario includes the current two-lane highway design, existing road conditions, and existing design of county road and N-15 intersections with US-275. The Build Scenario condition includes a four-lane US-275 expressway built with 2+2 construction techniques, a 3R treatment to the existing two lanes of US-275, and improved intersections with US-275 and various county roads and N-15.

Project Cost and Schedule

The period of analysis used in the estimation of benefits and costs corresponds to 29 years, including nine years of project development and construction and 20 years of operation. The total (undiscounted) project costs are \$78.6 million in 2020 dollars according to the distribution shown in Table 2. The \$25 million requested grant amount is approximately 35 percent of the project cost denominated in dollars as of Q4 2022.

Table 1: Summary of Project Costs, 2020 Dollars

Cost Category	Undiscounted Project Cost (\$MM)	Percentage of Undiscounted Project Capital Cost
Engineering	\$6.83	8.7%
ROW	\$1.76	2.2%
Utilities	\$1.95	2.5%
Construction	\$68.05	86.6%
TOTAL COST	\$78.58	

Disruptions Due to Construction

Disruptions due to construction will be minimal due to the “2+2 construction” method employed in this project. Roadway construction and intersection modifications will primarily occur along a corridor that is not currently used for transportation, minimizing disruptions on the existing corridor. Some traffic disruption could occur along north-south routes that intersect the US-275 corridor during construction. The timing of construction will be managed to minimize disruption. The benefits of avoided work zone impacts due to the “2+2 construction” as opposed to typical disruptions during construction or roadway repairs are discussed later in this document.

General Assumptions

The BCA measures benefits against costs throughout a period of analysis beginning at the start of project development and including 20 years of operation. The monetized benefits and costs are estimated in 2020 dollars with future dollars discounted in compliance with RAISE requirements using a 7 percent real discount rate. A 3 percent discount rate is also used as a sensitivity test.

The methodology makes several important assumptions and seeks to avoid overestimation of benefits and underestimation of costs. Specifically:

- Input prices are expressed in 2020 dollars;
- The period of analysis begins in 2019 and ends in 2047. It includes project development and construction years (2019-2027) and 20 years of operations (2028-2047);
- A constant 7 percent real discount rate is assumed throughout the period of analysis; and
- Opening year demand is assumed to be fully realized in Year 1.

Demand Projections

Demand projections are a key driver of future benefits. For US-275, demand consists of roadway users – both automobiles and trucks. The traffic analysis conducted for the US-275 corridor evaluated existing and future traffic conditions, and the task was completed using existing traffic

volumes, observed turning movements at intersections along the US-275 corridor, and projections for future turning movements. Additional information on the employed methodology and demand projections can be found in the traffic and safety technical memorandums that accompany this application package.

Methodology

As detailed in the traffic technical memorandum that accompanies this application package, traffic modeling software was used to model the corridor as a two-lane highway for the No-Build scenario and as a four-lane divided highway for the Build scenario. Each relevant roadway segment was analyzed separately and then combined to determine the overall performance of the US-275 corridor. This analysis was conducted for existing conditions as of 2019 and modelled No-Build and Build conditions for 2025, 2030, 2035, and 2045. Technical traffic model specifications are further discussed in the corresponding technical memorandum that accompanies this application package.

Benefits Measurement, Data and Assumptions

This section describes the approach used to estimate each benefit category identified above and provides an overview of the associated data, assumptions, and results.

Safety

The proposed project would contribute to promoting safety through a reduction in automobile crashes.

Methodology

As detailed in the safety technical memorandum that accompanies this application package, a crash analysis was performed to evaluate the existing and predicted future safety along the US-275 corridor. The crash analysis for existing safety conditions was conducted using crash data provided by NDOT for 2014 through 2018. The expected future safety analysis utilized crash data from the Nebraska Transportation Information Portal (NTIP) for 2016 through 2020. The Highway Safety Manual (HSM) Predictive Method was then used to determine the expected safety of the corridor if it were to remain a two-lane undivided highway. Crash modification factors (CMF) were applied to no-build results to determine the expected reduction in crashes from converting the roadway to a four-lane divided highway. Technical safety model specifications, including additional information on the CMFs used in the analysis, are further discussed in the corresponding technical memorandum that accompanies this application package.

Safety Projections

The resulting projections for Fatality and Injury (FI), Property Damage Only (PDO), and Total crashes for the No-Build and Build scenarios are presented in the tables below.

Table 2: US-275 Safety Projections: No-Build Scenario

Crash Type	2021 No-Build	2025 No-Build	2030 No-Build	2035 No-Build	2045 No-Build
FI	4.33	4.64	4.96	5.28	5.91
PDO	8.22	8.81	9.43	10.03	11.25
Total	12.55	13.45	14.39	15.31	17.16

Table 3: US-275 Safety Projections: Build Scenario with Future Wide Medians

		2025		2030		2035		2045	
Crash Severity	CMF ^a	Build	Reduction	Build	Reduction	Build	Reduction	Build	Reduction
FI	0.533	0.25	2.17	2.64	2.32	3.81	2.47	3.15	2.76
PDO	*	6.82	1.99	7.30	2.13	7.76	2.27	8.70	2.55
Total	0.691	9.29	4.16	9.94	4.45	10.57	4.74	11.85	5.31

Parameter Assumptions

The parameter assumptions used in the estimation of safety benefits are summarized in the table below. These parameter assumptions were applied to the safety projections above to calculate safety benefits.

Accident cost parameter inputs are sourced from USDOT, *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*, March 2022 (Revised). Appendix A, Tables A-1 and A-2. Vehicles per crash and injury and fatality rates are sourced from Nebraska DOT’s *Traffic Crash Facts 2020 Annual Report*. Injury and fatality rates are calculated from all Nebraska “Rural,” “Other State Highways” accidents recorded in 2020.

Table 4: Parameter Assumptions

Accident Cost Parameter Inputs		
Cost of Fatality (K)	\$ 11,600,000	2020\$ / event
Cost of Incapacitating Injury (A)	\$ 554,800	
Cost of Non-Incapacitating Injury (B)	\$ 151,100	
Cost of Possible Injury (C)	\$ 77,200	
Cost of No Injury (O)	\$ 3,900	
Cost of Injury--Severity Unknown (U)	\$ 210,300	
Cost of Damaged Vehicle (PDO)	\$ 4,600	2020\$ / vehicle
Vehicles per Crash	1.83	vehicles / crash
Injury and Fatality Rates		
Fatalities per FI Crash	0.07	fatalities / crash
Injuries per FI Crash	1.40	injuries / crash

Alternative injury and fatality rates are also included as a sensitivity test. These alternative rates are calculated using observed crashes, injuries, and fatalities along the US-275 corridor during calendar years 2014-2018. State-wide Nebraska “Rural,” “Other State Highways” accidents were employed as the “base case” assumptions due to the larger sample size that the state-wide numbers provide. For example, while a fatality did occur on US-275 just east of the N-15 interchange during the 2014-2018 calendar years, zero fatalities were recorded on the corridor between N-57 and N-15 during this time period. The lack of observed fatalities during that time does not imply, however, that zero fatalities would occur on the same stretch over a 20-year future period of operation if road conditions remain unchanged.

Table 5: Alternative Sensitivity Parameter Assumptions

Alternative Injury and Fatality Rates		
Fatalities per Crash, excluding PDO Crashes	0.00	Nebraska DOT. Historic Crash Statistics: US-275 from N-57 to Wisner, 2014 - 2018.
Injuries per Crash, excluding PDO Crashes	1.77	

Benefit Estimates

Table 6 shows that at a 7% discount rate the present value benefits of safety amounts to about \$18.9 million.

Table 6: Estimates of Safety Benefits, 2020 Dollars

	Over the Project Lifecycle	
	In Constant Dollars	Discounted at 7 percent
Crash Reduction	\$54.2 million	\$17.4 million

Travel Time Savings

The proposed project would contribute to enhancing freight movement and economic competitiveness through improvements in the mobility of people and goods within and through the study area.

It is important to note that improvement to the current Norfolk to N-15 segment of US-275 is just one element of a broader US-275 expansion effort. Accordingly, due to network effects, the total economic benefit of a fully-widened US-275 through Northeast Nebraska is greater than the sum of its parts, and additional system benefits exist beyond those quantified in this analysis.

Methodology

Widening of US-275 from a two-lane to a four-lane corridor and improving intersections along the corridor will reduce traffic delays and increase the reliability of the roadway. The traffic technical memorandum that accompanies this application explains in the depth the methodology used to develop estimates of travel-time savings associated with this project. The resulting projections for increased roadway reliability and decreased roadway delay for the No-Build and Build scenarios are presented in the table below.

Table 7: Summary of Decreased Delay Benefits

	2019	2025		2030		2035		2045	
	Existing	No-Build	Build	No-Build	Build	No-Build	Build	No-Build	Build
Norfolk to N-15									
VHT60	71	92	75	112	90	135	107	187	143
Annual Delay (veh-hrs)	308,957	400,339	326,363	487,369	391,636	587,453	465,611	813,732	622,266

Assumptions

The parameter assumptions used in the estimation of travel-time benefits are summarized in the table below. These parameter assumptions were applied to the corridor delay projections above to calculate travel-time benefits.

Truck percentage assumptions were calculated from observed traffic data. All other parameter inputs are sourced from USDOT, *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*, Appendix A, Tables A-3 and A-4.

Table 8: Assumptions Used in the Estimation of Travel Time Savings

Travel Time Parameters		
Truck Percentage, N-57 to N-15	23.6% to 31.3%	%
Passenger Vehicle Average Vehicle Occupancy (AVO)	1.67	persons / vehicle
Truck Average Vehicle Occupancy (AVO)	1.00	
Value of Time, All Purposes Local Travel	\$ 17.80	2020\$ / hour
Value of Time, Truck Drivers	\$ 32.00	

Benefit Estimates

Table 9: Estimates of Travel-Time Benefits, 2020 Dollars

	Over the Project Lifecycle	
	In Constant Dollars	Discounted at 7 percent
Travel Time Savings	\$86.1 million	\$25.6 million

Avoided Work Zone Impacts

The implementation of “2+2 construction” will avoid user delays and safety impacts during the construction period. The roadway requires a major rehab in 2026; the impacts of this rehab would be mitigated by construction of the new facility. Details of the work zone impact analysis can be found in Appendix G of this application.

Methodology and Assumptions

The work zone analysis quantifies performance measures that impact US-275 for an anticipated one lane, two-way work-zone alternative. This alternative includes likely person delay and vehicle-based crashes which would be avoided under the build scenario. Note that costs of routine and preventive maintenance that are mutual to both the No Build and Build scenarios are excluded from this analysis. It is assumed that all No Build rehabilitation activities would occur in 2026. The change in baseline crashes is an additional 0.16 Serious Injury crashes, 0.26 injury crashes, and 1.47 PDO crashes, for a total of 1.89 avoided crashes. Additionally, it is expected that there would be 136,323 hours of vehicle delay, including 28,628 hours for trucks. The average vehicle occupancies shown in Table 8 are applied to these delay times, which average 5.8 minutes per vehicle, to determine the travel time delay.

Benefit Estimates

Table 10: Estimates of Avoided Work Zone Impacts, 2020 Dollars

	Over the Project Lifecycle	
	In Constant Dollars	Discounted at 7 percent
Travel Time Savings	\$4.3 million	\$2.8 million

Operations and Maintenance Cost Savings

In addition to improving safety and travel speeds along the US-275 corridor – primarily through widening the roadway and improving intersections – this project will also employ a 3R strategy to improve the roadway surface of the existing two lanes of US-275. As a result of this roadway improvement, as well as the reduced traffic in any given lane due to the addition of lanes, roadway operation and maintenance cost benefits will be achieved.

Methodology and Assumptions

Per Nebraska DOT through 2019, the current 5-year average roadway maintenance cost for the relevant two-lane section of the US-275 corridor is \$2,695 per year per mile, which equates to \$2,722 in 2020 dollars. Following a 3R roadway treatment, it is expected that the new 5-year average roadway maintenance cost for the expanded four-lane section of the US-275 corridor will be \$1,346 per year per mile in 2020 dollars. This \$1,376 annual savings will be realized over every mile in each year of the project’s benefits period.

Benefit Estimates – Operations & Maintenance Savings

Table 11: Estimates of Operations & Maintenance Savings, 2020 Dollars

	Over the Project Lifecycle	
	In Constant Dollars	Discounted at 7 percent
US-275: Norfolk to N-15	\$270 thousand	\$89 thousand

Residual Value

Methodology and Assumptions

Included in the cost of this project is the \$1.7 million (in 2020 dollars) acquisition of additional land for roadway right-of-way. This land will retain its value beyond the benefits period. This residual land value is quantified and included in the BCA.

Benefit Estimates

Table 12: Estimates of Residual Land Value, 2020 Dollars

	Over the Project Lifecycle	
	In Constant Dollars	Discounted at 7 percent
Residual Land Value	\$1.7 million	\$1.7 million

Qualitative Benefits

In addition to the benefits discussed in the previous sections, there are benefits to this project that are not easily quantified or monetized. These are discussed below.

Vehicle operating cost savings

Another benefit associated with increased roadway reliability and decreased travel times relates to lower vehicle operating costs. More consistent travel speeds and reduced delays mean that cars and trucks do not spend as much time idling in traffic, and that cars and trucks are less likely to need to brake when traveling US-275. Less braking will reduce wear-and-tear on vehicles, and less time spent idling in delays will reduce fuel expenditures. Improved roadway surface conditions will also reduce vehicle wear-and-tear. While these benefits will be realized by vehicles traveling the US-275 corridor, they are conservatively not quantified in this BCA.

Environmental Sustainability

Reducing the delays of vehicles along the US-275 Corridor will contribute to improved air quality by reducing vehicle emissions. As vehicles spend less time sitting in traffic and are able to travel at more consistent speeds they will reduce their emissions relative to a roadway design that necessitates braking, acceleration, and idling. The monetized value of these reduced emissions is not included in this BCA, but emissions benefits would still likely be realized as a result of this project.

Summary of Findings and BCA Outcomes

The tables below summarize the BCA findings. Annual costs and benefits are computed over the lifecycle of the project (nine years of planning and construction followed by 20 years of operations). As stated earlier, construction is expected to be completed in 2027. Benefits accrue during the full operation of the project.

Table 13: Overall Results of the Benefit Cost Analysis, 2020 Dollars

Project Evaluation Metric	7% Discount Rate	3% Discount Rate
Total Discounted Benefits	\$46.3 million	\$86.7 million
Total Discounted Costs	\$53.0 million	\$64.6 million
Net Present Value	-\$6.7 million	\$22.1 million
Benefit / Cost Ratio	0.9	1.34
Internal Rate of Return (%)	5.7%	
Discounted Payback Period	N/A	24 years

Considering all monetized benefits and costs over a 20-year benefits period, the estimated internal rate of return of the project is 5.7 percent. With a 7 percent real discount rate, the \$53.0 million investment would result in \$46.3 million in total benefits and a Benefit/Cost ratio of 0.9.

BCA Sensitivity Analysis

The BCA outcomes presented in the previous sections rely on assumptions and long-term projections, both of which are subject to considerable uncertainty.

The primary purpose of the sensitivity analysis is to help identify the variables and model parameters whose variations have the greatest impact on the BCA outcomes: the “critical variables.”

The sensitivity analysis can also be used to:

- Evaluate the impact of changes in individual critical variables – how much the final results would vary with reasonable departures from the “preferred” or most likely value for the variable; and
- Assess the robustness of the BCA and evaluate whether the conclusions reached under the “preferred” set of input values are significantly altered by reasonable departures from those values.

For this project, sensitivity assessments include extending the benefits period to 30 years to better align with the anticipated useful life of the improvements, changes to construction schedule and operating cost impacts. A more conservative 20-year period associated with project widening was used. If the project were evaluated with the 30-year operational cost-benefit period for the reconstruction aspects of this project, the benefit-cost ratio would be 1.09.

The outcomes of the sensitivity analysis for the Nebraska US-275 Norfolk to N-15 Project, using a 7 percent discount rate, are summarized in the table below. The table provides the project

NPVs associated with variations in variables or parameters (listed in row), as indicated in the column headers.

Table 14: Quantitative Assessment of Sensitivity, Summary

Parameters	Change in Parameter Value	New NPV	New B/C Ratio
Benefits Period	Benefits Period of 30 Years	\$5.0 MM	1.1
Accelerated Construction Schedule	Accelerate Construction Schedule to Finish at Year-End 2026	-\$5.2 MM	0.9
Observed Injury and Fatality Rates: N-57 to N-15, 2014-2018	Decrease in fatalities and increase in injuries per FI crash	-\$17.8 MM	0.7
Operations & Maintenance Savings	Remove O&M cost savings benefits from the analysis	-\$6.8 MM	0.9

