

# US 12 Rural Reconstruction Morristown to Watauga

2022 REBUILDING AMERICAN INFRASTRUCTURE WITH SUSTAINABILITY AND EQUITY (RAISE) PROGRAM



**Project Name:** US 12 Rural Reconstruction Morristown to Watauga

**Project Type:** Rural Capital Project

**Total Project Cost:** \$21,400,364

**2022 RAISE Funds Requested:** \$21,400,364

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**Supporting Information can be found at:**

[Link to supporting info](#)

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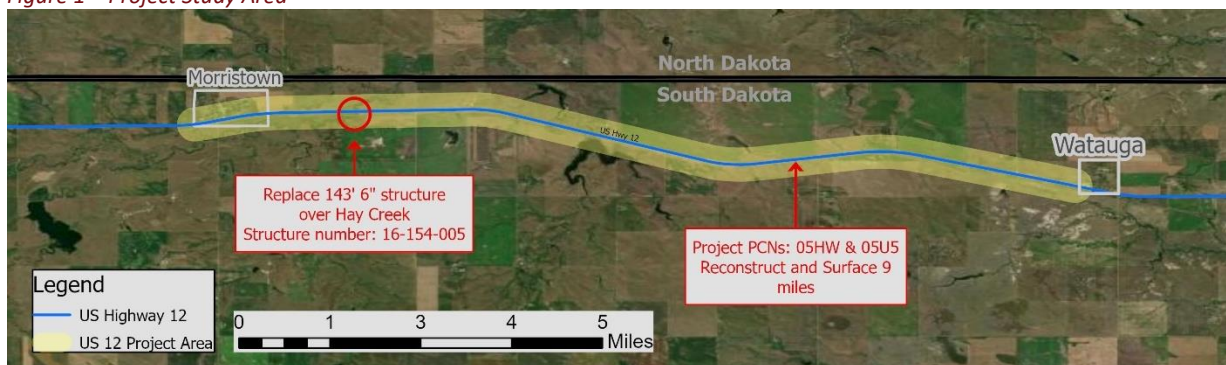
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## I. Project Description



The South Dakota Department of Transportation (SDDOT) is requesting \$21.4 million of 2022 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant funding for South Dakota US Highway 12 (US 12). The project limits are from Morristown to Watauga, South Dakota in Corson County, approximately nine miles. This project is of critical importance to South Dakotans because **US 12, a National Highway System (NHS) route, is the only east-west highway serving a remote and rural area of South Dakota entirely within the boundaries of the 2.3 million acre Standing Rock Indian Reservation.** This segment of US 12 is in an area of persistent and concentrated poverty, in a historically disadvantaged community, in one of the poorest areas in the nation with severely limited access to essentials, including groceries, fuel, and basic health care needs, and has a population with disproportionately high mortality rates. A map of the project study area can be found in Figure 1.

Figure 1 – Project Study Area



The project will reconstruct the two-lane US 12 highway with new pavement, widen the roadway to include six-foot shoulders, replace a 143.5-foot deteriorating bridge over Hay Creek, install three box culverts where there are currently pipe culverts, and replace nearly 19 miles of right-of-way fencing. This portion of US 12 was constructed in 1949 and was resurfaced in 1959, 1988, and 2006. This infrastructure, including the roadway, bridge, and culverts, will be 74 years old at time of replacement and will have reached the end of its useful life.

Specifically, the US 12 project includes the following improvements:

- Reconstructs nine miles of roadway to new condition
- Widens and paves roadway shoulders from two feet to six feet
- Installs edge-line rumble strips
- Replaces one bridge built in 1949 (fair condition) over Hay Creek
- Replaces three large pipe culverts with box culverts
- Replaces of 19 miles of right-of-way fencing
- Mitigates 14 vertical curves with a design speed of 60 mph or less
- Evaluates access management, including driveway density and spacing
- Flattens backslopes to help with the removal of drifting snow traps and melting
- Corrects inslopes to ensure proper roadway drainage

## Transportation Challenges

This segment of US 12 does not meet the current minimum SDDOT design standards and policies for a rural arterial roadway with a 65-mph posted speed. Narrow roadway shoulders and functionally obsolete and aging bridge contribute to transportation challenges shared by highway users. Five specific transportation challenges facing US 12 are described in this section.

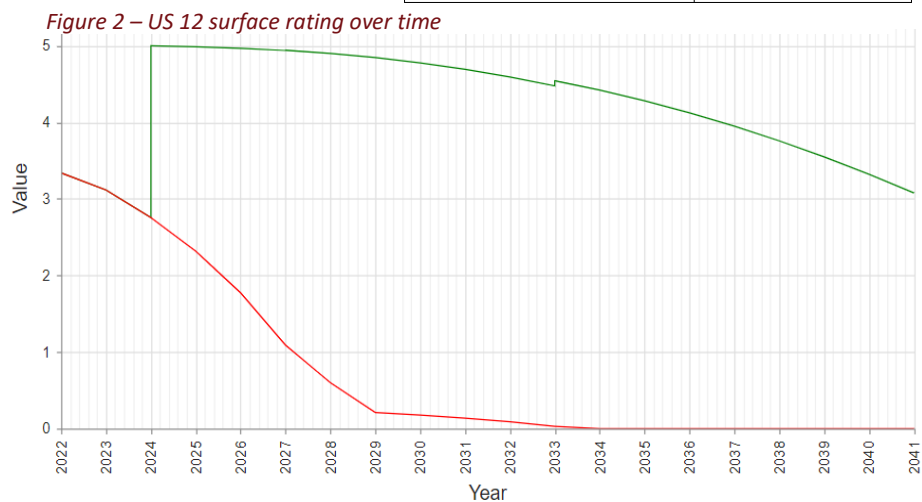
### Challenge 1: Deteriorating Pavement Condition

The current (Year 2022) pavement condition composite index value for US 12 is “fair” (3.34). With the project, US 12 pavement will be replaced in 2024 to a new condition. As a result, US 12 pavement will remain in excellent condition (above 4.5) until year 2033, and in good condition (above 3.40) until 2040.

*Table 1 – SDDOT Pavement Condition – Composite Index Values*

SDDOT Composite Index Values	Rating
5.00 to 4.50	Excellent
4.49 to 3.40	Good
3.39 to 2.10	Fair
2.09 to 0.00	Poor

Without the project, US 12 pavement will continue to degrade from its current rating of fair (3.34). By 2025, the pavement will decline to poor condition (2.09 or lower) and reach “0” by 2033, where the roadway and infrastructure would shut down completely. Figure 2 shows the US 12 deteriorating surface rating over time.



*The green line represents US 12 with the project, while the red line shows US 12 pavement degradation without pavement replacement in 2024 as part of this project*

The US 12 project will provide a new roadway surface which will significantly improve safety. Improvements include:

- Smoother surface and better friction for all users including heavy trucks, vehicles, bicyclists, and pedestrians
- Improved storm water runoff
- Reduce the likelihood and incidences of hydroplaning





### Challenge 2: Narrow Roadway Shoulders

The current roadway shoulders along the nine-mile project area of US 12 are two feet wide. Narrow shoulders combined with other factors such as topography, speed, unpredictable and extreme weather events, and wildlife make US 12 a potentially unsafe road. **The US 12 project will expand and pave roadway shoulders from two feet to six feet.**



*The project will expand roadway shoulders from 2 feet to 6 feet. The 6 foot shoulders along with the installation of edge line rumble strips will allow drivers to make a correction to avoid a run-off the road crashes.*

Research indicates that crash rates grow exponentially on roadways with no shoulders or narrow shoulders. Roads with narrow shoulders do not provide a stable, clear recovery area for drivers to maneuver to avoid crashes. Additionally, over correcting on a soft shoulder (one tire on gravel or grass and the other on pavement) is common due

to the change of traction and roadway elevation. The existing shoulders on US 12 do not provide adequate space for the storage of disabled vehicles, for the location of law enforcement vehicles, or for routine maintenance activities. Additionally, the two-foot shoulders on US 12 make it nearly impossible for bicyclists and pedestrians to use roadways.

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*In a five-year period from 2014-2018, US 12 had a reported crash rate of 1.54\*, which is above the statewide weighted crash rate of 1.46 for rural principal arterial roadways.*

*\* Crashes per million vehicle miles traveled*

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### Challenge 3: Structurally Deficient and Aging Structures

The US 12 reconstruction includes the replacement of one 143.5 foot bridge (structure 16-154-005 Hay Creek) and three large pipe culverts. All structures are nearing the end of their useful service life.

According to the SDDOT Bridge Management Engineer, the 143.5 foot structure over Hay Creek (structure 16-154-005), has four to eight years of life before it would need to close if no repairs are performed on the bridge. The spalls and delamination in the first two spans would limit the ability to carry traffic at highway speeds. The existing bridge

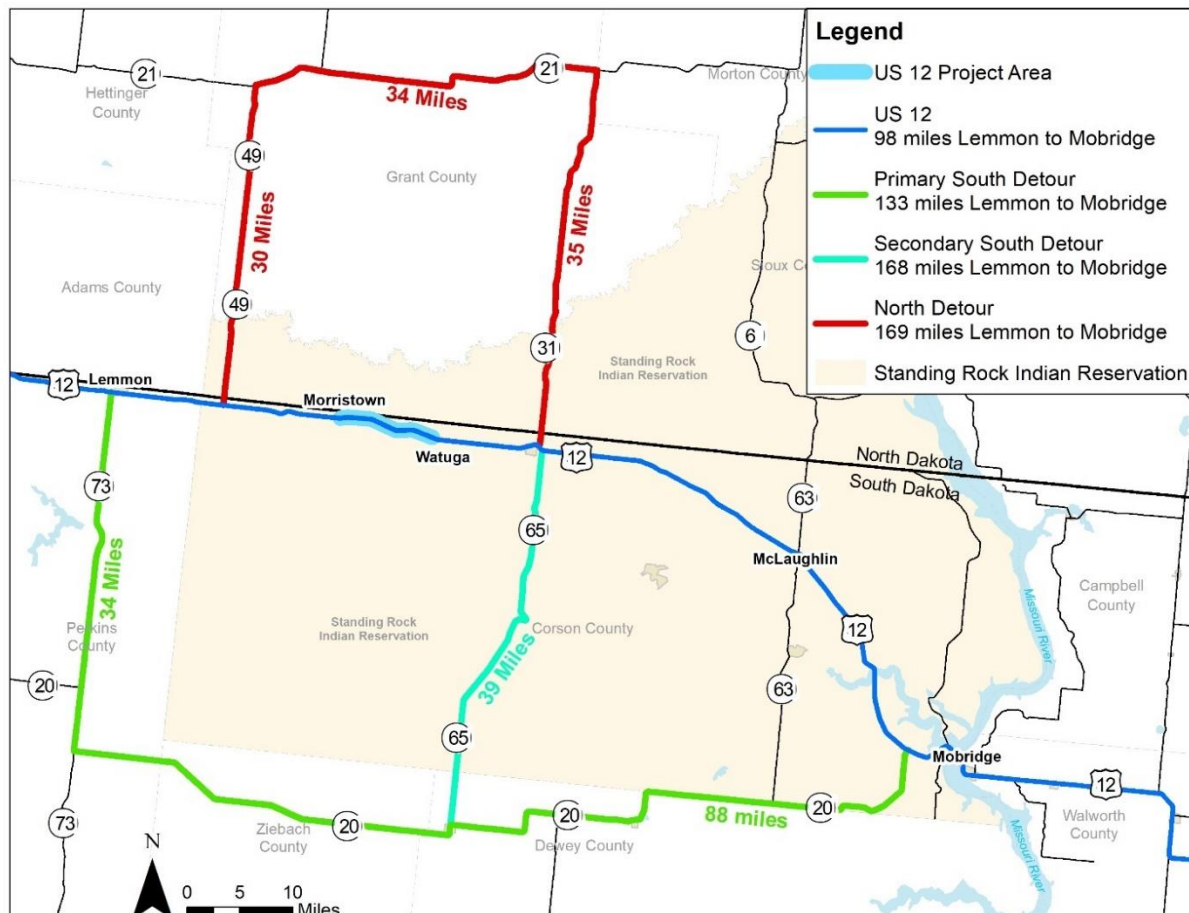


includes a 30-foot-wide roadway which does not meet current SDDOT width standards. According to the Federal Highway Administration (FHWA) National Bridge Inventory (NBI), the structure has received a rating of fair. According to a report published by the American Road and Transportation Builders Association, using data from the FHWA NBI, 17.3 percent of bridges in South Dakota are structurally deficient, which is the fourth highest rate in the country. Additionally, in 2021, there were 2,404 bridges that needed repair.<sup>1</sup> The need to address many other statewide bridges is a reason why obtaining RAISE grant funding is important.

#### Challenge 4: Alternate Routes are Limited

Due to the very rural nature of this portion of US 12, there are few alternate east-west routes available. US 12 is the only highway that provides east-west travel across the Standing Rock Indian Reservation and within a 64-mile area. If US 12 between Morristown and Watauga became unusable, detours would require traveling 30-34 miles to the north or south to use ND 21 or SD 20, respectively. The full detour distance would exceed 100 miles and would add a minimum of 60 miles to each trip. Figure 3 illustrates the available detours.

*Figure 3 – Available detours around project area*



<sup>1</sup> National Bridge Inventory: South Dakota. American Road and Transportation Builders Association.  
<https://artbabridgereport.org/state/profile/SD>

Due to the length of the detours, travel times, fuel consumption, and emissions would increase substantially if this portion of US 12 were closed for any duration. For example, using US 12, Morristown is about 45 miles (approximately a 42-minute drive) from the City of McLaughlin. If US 12 were closed or unavailable, a trip between Morristown and McLaughlin would triple in distance and travel time to about 140 miles and about 2 hours and 15 minutes.

Further, if a secondary incident were to occur, travel options would become even more limited for area residents and the traveling public. In some cases, closure of US 12 and a secondary route would result in no routes available, forcing residents to wait for the incident to be cleared.

If US 12 were to be closed, it would:

- Reduce access to economic opportunities, medical care, and other goods and services
- Increase the time spent in motor vehicles and exposure to unsafe winter driving conditions
- Increase vehicle miles traveled and greenhouse gas emissions; and
- Reduce the reliability of the route

#### Challenge 5: Substandard Vertical Curves

US 12 is posted at 65 mph. There are 14 vertical curves with design speeds of 60 mph or less which include six (sags) that only meet 55 mph design speed. **The US 12 project will address all 14 vertical curves to achieve 70 mph design speeds, thus improving sight distance.**



#### Benefits to Rural Populations

The US 12 project will improve safety for the traveling public, enhance quality of life for its residents, and enable economic opportunities in one of the most economically depressed regions of the United States. The success of a region's employment base is closely tied to the quality of the transportation system. Investments into the NHS allows businesses to be more efficient, and dependable transportation infrastructure allows goods to be delivered in a timely matter and at a lower cost to consumers. This transportation investment will improve safety for all users. When there is a medical emergency, well-maintained roads that are free of congestion are vital. Whether traveling by car,



bicycle, or as a pedestrian, we benefit, sometimes unknowingly, from thoughtful road design and proper roadway maintenance.



This section of US 12 provides a critical east-west connector for many rural communities and the Standing Rock Indian Reservation. This project will address dilapidated and old infrastructure. This transportation investment will ensure highway access to numerous communities between Lemmon and Mobridge.

The US 12 project supports several functions:

- 1) Connects many small communities across the US 12 Corridor, serving as the only east-west route within the Standing Rock Indian Reservation
- 2) Provides access to economic opportunity and vital services

### **Connects many small communities across the US 12 Corridor**

The population within five miles of the specific project area is limited; however, this stretch of US 12 provides a vital connection for many small communities along US 12 (Thunder Hawk, Keldron, Morristown, Watauga, McIntosh, Walker, McLaughlin, and Mahto) to the more populous cities of Lemmon (population 1,239) to the west and Mobridge (population 3,385) to the east.

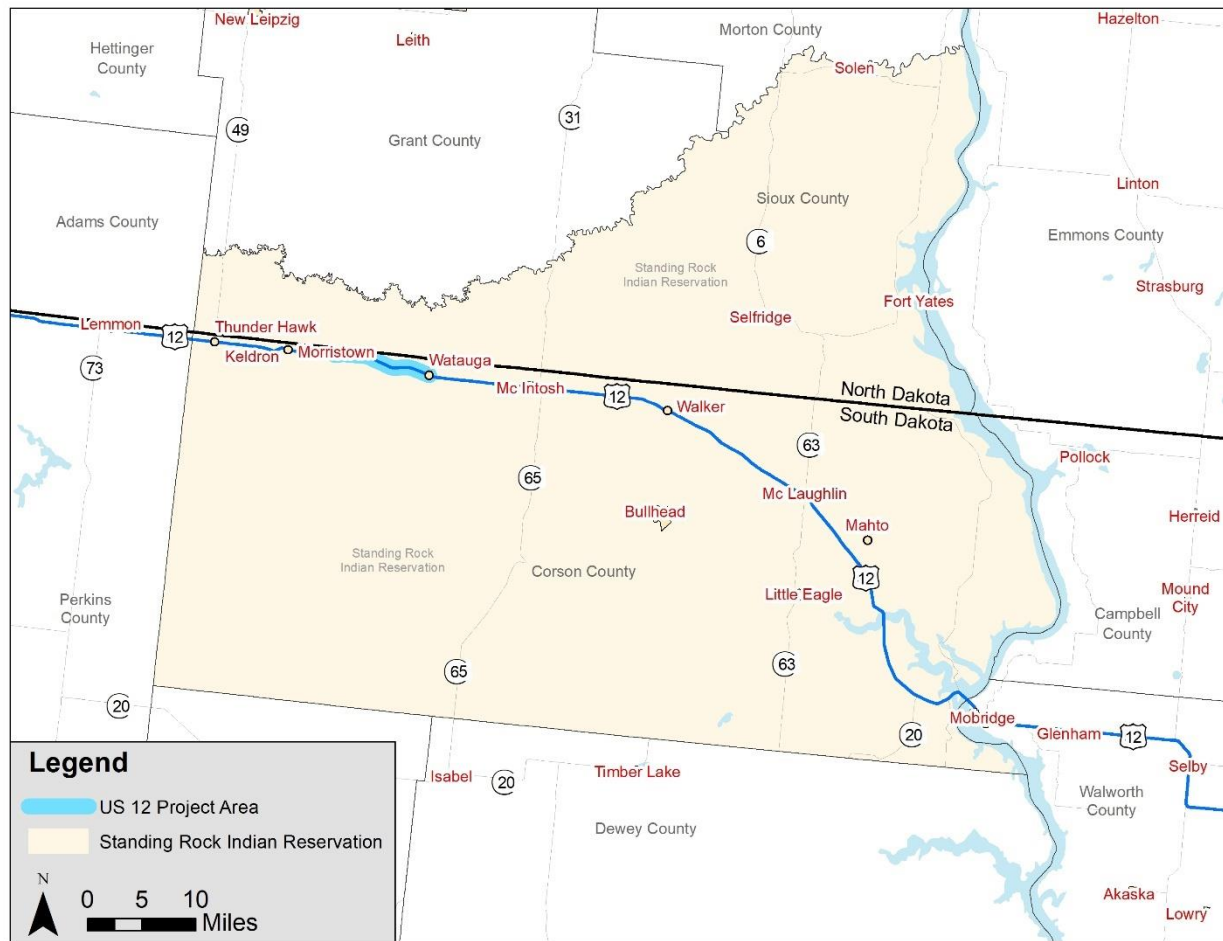
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*US 12 serves as the only east-west connector highway across the Standing Rock Indian Reservation.*

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The US 12 project will improve the connectivity and reliability of this area for residents, businesses, and anyone traveling to and from the Standing Rock Indian Reservation. This serves as a critical transportation connector in an area that is lagging economically behind the rest of South Dakota and the rest of the county. This project will improve the resiliency and ensure continued use of the transportation connection by reconstructing the roadway and replacing bridges and culverts that are nearing the end of their useful life.

Figure 4 – Communities dependent on US 12 as a transportation corridor



### Provides access to economic opportunity and services

US 12 serves as a key transportation corridor providing residents of Corson County and the Standing Rock Indian Tribe access to employment and services. The communities along this portion of US 12 are small and residents travel long distances to access vital services and employment.

### Employment

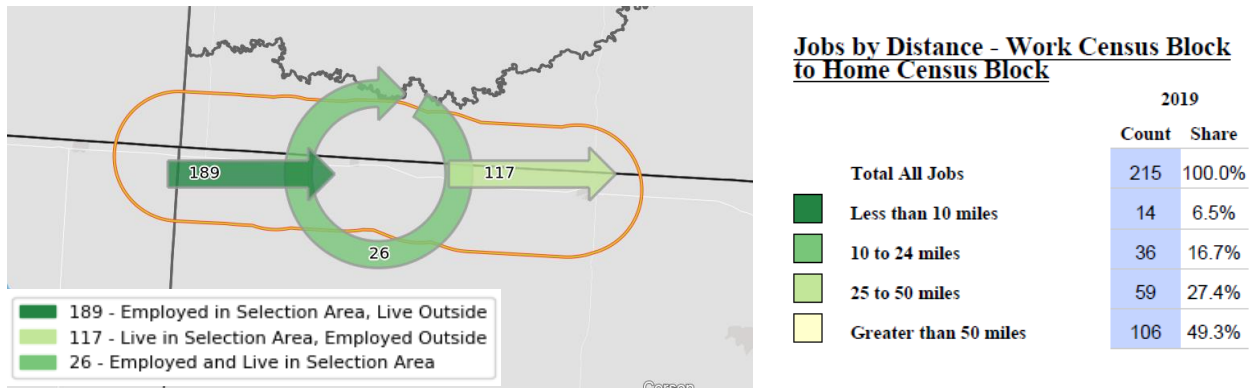
The United States Census Bureau indicates there are approximately 215 people employed within five miles of US 12 between the western Corson County border and the City of McIntosh. About half of them (106), travel more than 50 miles each way for their employment, while an additional 27 percent travel between 25 and 50 miles each way for work.<sup>2</sup> Many of those people are traveling east and southeast to their place of employment, which indicates that they use US 12 for commuting. **The average commute time for Corson County residents to work was 21.6 minutes in 2019, which is 26 percent higher than the average for South Dakota (17.2 minutes).**<sup>3</sup> This illustrates the rural nature of the area.

<sup>2</sup> OnTheMap. United States Census Bureau. <https://onthemap.ces.census.gov/>

<sup>3</sup> American Community Survey 2019 5-Year Estimates. United States Census Bureau.

*Residents depend on US 12 to get to their place of employment. Half of all workers within five miles of US 12 between the western Corson County border and the City of McIntosh travel more than 50 miles for work, while an additional quarter travel between 25 and 50 miles each way for work.*

Figure 5 – OnTheMap data showing commuting patterns for residents near the project area.



#### Services

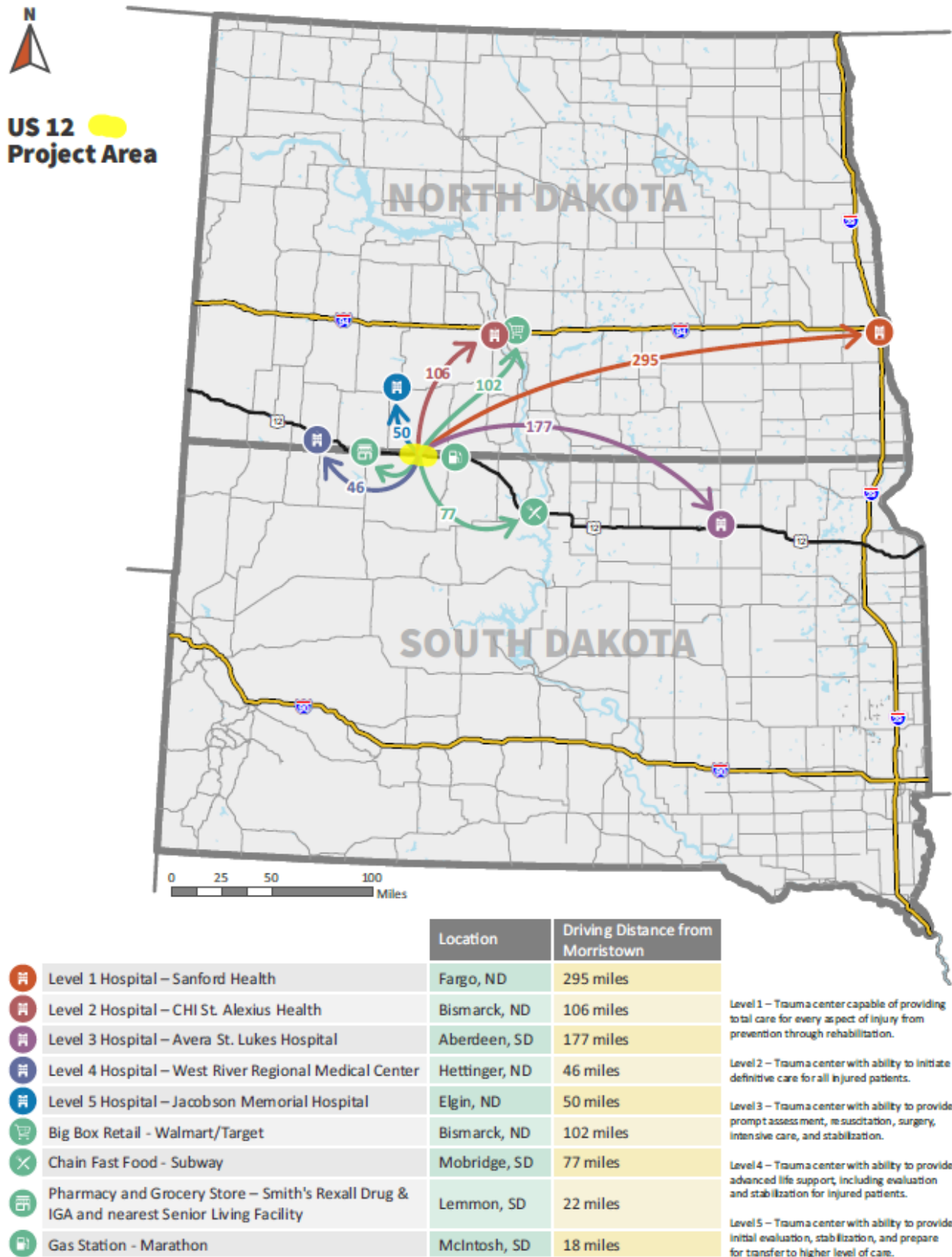
illustrates the distance from Morrystown to a variety of the nearest medical, service, and retail shopping opportunities. The improved roadway will provide safer travel for longer trips and ensure the most direct regional access to these necessary services and locations. Residents of the Standing Rock Indian Reservation are traveling great distances to access daily necessities and essentials.



US 12 in Morrystown, South Dakota. Source: Google.com

*The location of the US 12 project is very rural, which requires residents to travel long distances to access medical care and daily necessities including prescriptions, groceries, and big box retail.*

Figure 6 – Distance from Morristown, SD to the nearest medical services and shopping options.





## Project History

Preliminary engineering commenced in 2018 and was completed in early 2021. All environmental documentation is completed. Bid letting and construction will begin in 2023, grading and structure replacement will begin in 2023, and final surfacing will be completed in the fall of 2024.

A public meeting was held for the US 12 Highway project on June 20, 2019. The purpose of the meeting was to involve the public in the planning and design process, provide a project overview, and gather input, comments, and concerns from the public. Additionally, property owner meetings were conducted on January 28, 2020. Notes from these meetings as well as a copy of the PowerPoint presentation can be found in the appendices.

## Statement of Work

The US 12 project will be constructed in two phases in 2023 and 2024. The two phases will be considered one project with differing letting dates.

- Phase 1 – PCN 05HW – This phase will consist of grading and interim surfacing the entire nine-mile project area to increase the shoulder width and to flatten deficient vertical curves. It will include the replacement of a bridge over Hay Creek (Structure # 16-154-005).
- Phase 2 – PCN 05U5 - This phase is the follow up asphalt concrete (AC) surfacing project, completing surfacing for the entire nine-mile project area. It will include installation of pavement markings, permanent signing, and grinding of edge rumble strips.

US 12 will remain open during construction and local traffic and emergency vehicle access will always be maintained.

## Project Parties

South Dakota Department of Transportation (SDDOT) is the applicant for this 2022 RAISE grant. The RAISE grant will provide necessary funding to SDDOT for constructing this important highway project. The project has documented support from the state of South Dakota, Corson County, the Standing Rock Sioux Tribe, as well as two US Senators and South Dakota's lone member of the US House of Representatives.

### Primary Contact:

The Lead Agency Point of Contact is:

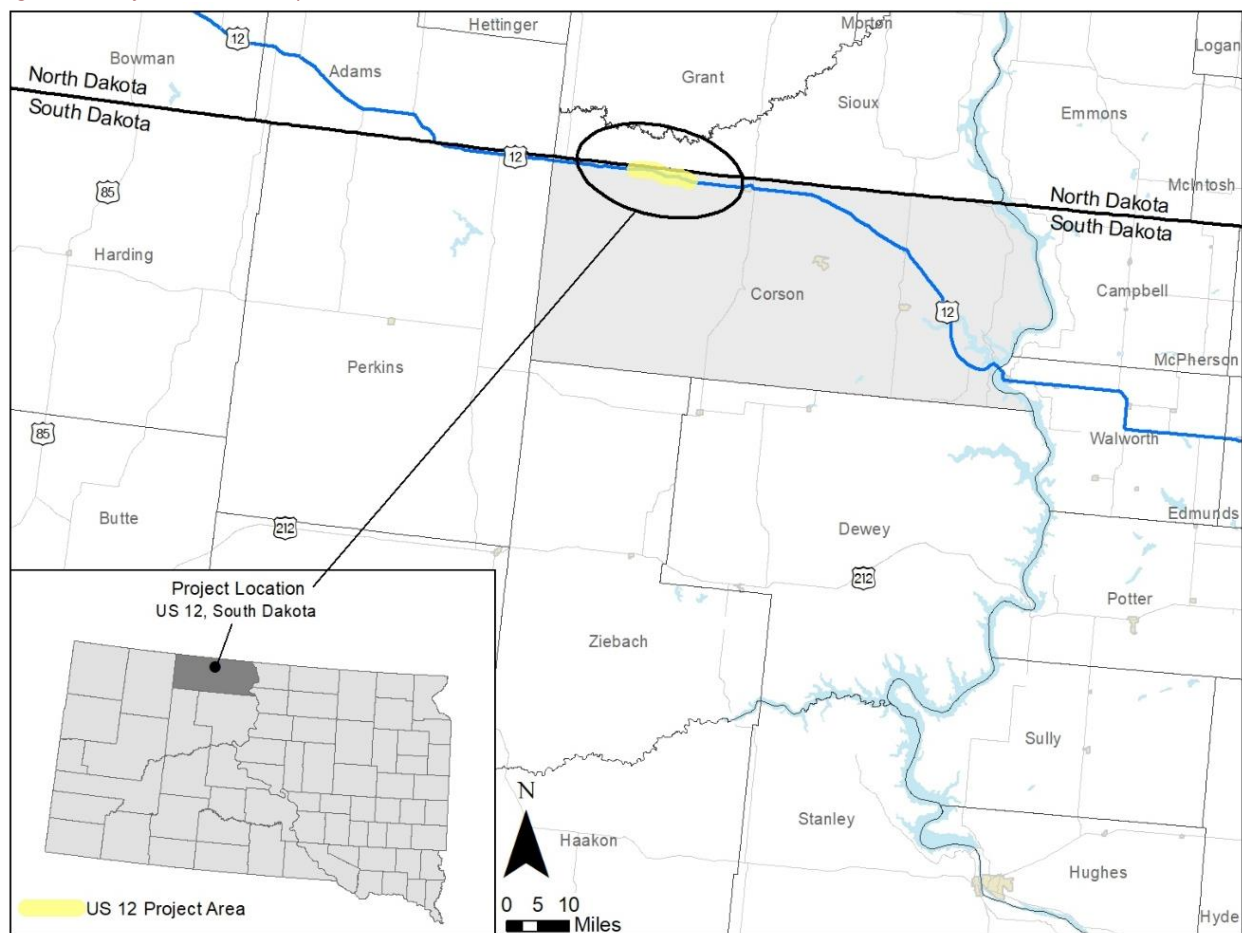
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## II. Project Location and Demographics

### Geographical Location

The US 12 project is located in Corson County, South Dakota and the Standing Rock Indian Reservation. US 12 runs generally east-west, crossing into North Dakota about 30 miles west of the project area. The project extends from mileage reference marker 112 to mileage reference marker 121 on the west edge of Watauga. The project is almost entirely rural and is not part of a Census designated urban area, although it travels through the City of Morristown (population 47 in 2020). The entire project is located within Census Tract 9410 with a geospatial location of 45.927751°, -101.620727°. Figure 7 shows the location of the US 12 project.

*Figure 7 – Project Location Map*



### Area Demographics

#### Corson County

Established in 1909, Corson County is home to the cities of McIntosh, which is the county seat, and McLaughlin, which is the largest city in the county. Corson County has a 2020 population of 3,902 which ranks 41 among the 66 counties in South Dakota and has an area of 2,530 square miles, which makes it

the fifth largest county by size in the state. The County population has decreased as farm and ranch size have increased due to larger farm equipment and more efficient operations.

As of the 2020 census, the population density was about 1.5 people per square mile. The racial makeup of the county is 70 percent American Indian or Alaska Native, 25 percent White, 0.5 percent Asian, 0.15 percent Black or African American, and five percent two or more races. In 2019, the median age was 29 years old, and 49 percent of residents were female.

### Standing Rock Indian Reservation

The Standing Rock Indian Reservation is the fifth largest reservation in the United States and is located along the North Dakota and South Dakota border. It contains 2.3 million acres and is bordered by the Missouri River on the east. The Reservation is home to the Standing Rock Sioux Tribe which is made up of Lakota and Dakota people.

### Morristown

Morristown caps the western edge of the US 12 project area. Under the 2020 Census the City's population was 47, which represents a decline from the 2010 census (67 people). The Town's population was the largest under the 1920 Census, peaking at a population of 269.

### Watauga

Watauga is an unincorporated community that caps the easternmost point in the project area.

### City of McIntosh

The City of McIntosh is located on US 12, along the western portion of the project area. In the 2020 Census, the city had a population of 111 people. The city has seen a decline in population over the past 100 years, after peaking at 727 people during the 1920 Census.

### Project Area Demographics

The project area is located within an area of persistent poverty, having poverty rates consistently above 40 percent, and a historically disadvantaged community, with the project being located on Tribal land, entirely within the Standing Rock Indian Reservation.<sup>4</sup> As is illustrated in Table 2, Corson County has consistently seen some of the highest rates of poverty in the country.

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*Corson County is an area of persistent poverty and a historically disadvantaged community. In 2018, 44 percent of the county population had incomes below the poverty level, which was the 7<sup>th</sup> highest poverty rate among the 3,007 US Counties.*

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Dating back to 1990, more than 40 percent of Corson County's population met the definition of being in poverty. According to the 2000 Census, 41 percent of the county population was below poverty status,

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<sup>4</sup> Areas of Persistent Poverty & Historically Disadvantaged Communities. U.S. Department of Transportation.  
<https://www.transportation.gov/RAISEgrants/raise-app-hdc>

which was the 9<sup>th</sup> highest rate among United States counties. More recently, the 2018 American Community Survey 5-year estimates indicated that 44 percent of the county population was below poverty level, which was the 7<sup>th</sup> highest rate among counties in the United States. Further, over the past 30 years, median household income in Corson County has lagged significantly behind incomes for South Dakota as a whole. Specifically, in 2018, Corson County's median household income was only 62 percent of the state median.

*Table 2 – Income and Poverty 1990-2018*

Survey/Census year	Corson County		South Dakota	
	Poverty Rate (%)	Median Household Income (\$)	Poverty Rate (%)	Median Household Income (\$)
1990 Census	42.5	14,324	15.9	22,503
2000 Census	41.0	20,654	13.7	35,282
2010 SAIPE <sup>5</sup>	40.9	27,233	14.6	45,861
2018 ACS 5-year	44.3	35,411	13.6	56,499
2020 ACS 5-year	41.0	36,705	12.8	59,896

Census Tract 9410 has also been identified under other transportation disadvantage indicators. Those indicators show that the project is located within a Tract with a health disadvantage, economic disadvantage, and resilience disadvantage.<sup>6</sup> Beyond that, a relatively low percentage of the area's population has a broadband internet subscription. Depending on the specific project area geography, between 59 percent and 68 percent of the population has broadband, compared to 85 percent for South Dakota and 87 percent for the nation. To further describe the project area, Table 3 shows other relevant data from the 2019 American Community Survey 5-Year Estimates.

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*The US 12 project is located within a Census Tract with a health disadvantage, economic disadvantage, and resilience disadvantage.<sup>7</sup> Only 59-68 percent of the population has broadband, which is far fewer than the 85 percent for South Dakota and 87 percent for the nation.<sup>8</sup>*

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*Table 3 – Other relevant demographic data (2015-2019 American Community Survey 5-Year Estimates)*

Measure	Census Tract 9410	Corson County	Standing Rock Indian Reservation	City of McIntosh
Population	1,825	4,150	8,553	193
Zero-Vehicle Households (%)	1.8%	2.8%	N/A	0.0%
Below Poverty Status (%)	42.9%	44.8%	41.3%	23.3%
Mean Travel Time to Work (min)	20.6	21.6	19.8	11.3
Individuals with a Disability	168 (9%)	446 (11%)	970 (11%)	23 (12%)
Households with a Broadband Subscription (%)	68.3%	60.5%	59.2%	64.2%

<sup>5</sup> 2010 Small Area Income and Poverty Estimates. United States Census Bureau.

<sup>6</sup> Transportation Disadvantaged Census Tracts (Historically Disadvantaged Communities). U.S. Department of Transportation. <https://usdot.maps.arcgis.com/apps/dashboards/d6f90dfcc8b44525b04c7ce748a3674a>

<sup>7</sup> Ibid.

<sup>8</sup> American Community Survey 2015-2019 5-year Estimates. US Census Bureau. <https://data.census.gov/cedsci/>



### Environmental Justice Indicators

Corson County ranks poorly based on many indicators used by the Environmental Protection Agency (EPA) to analyze environmental justice. EJScreen, hosted by the EPA, uses a combination of demographic and environmental data to provide 12 environmental indicators covering a range of topics. The measures provide an additional method of evaluating how vulnerable a community is. According to EJScreen, Corson County ranks in the 84<sup>th</sup> or higher state percentile for all twelve indicators. Similarly, the county scores in the 59<sup>th</sup> or higher national percentile for all twelve indicators.<sup>9</sup> This indicates that, relative

#### EJScreen Environmental Indicators:

- particulate matter 2.5 (PM 2.5)
- ozone
- 2017 diesel particulate matter
- 2017 air toxics cancer risk
- 2017 air toxics respiratory hazard
- traffic proximity and volume
- lead paint
- superfund proximity
- risk management plan (RMP) facility proximity
- hazardous waste proximity
- underground storage tanks (UST) & leaking UST
- wastewater dischargers

to the rest of the state and the nation, Corson County residents are at relatively high risk of exposure to all 12 environmental indicators and thus, are more vulnerable to impacts from each of the 12 indicators. This project will help stabilize the area by providing a reliable transportation system that gives residents access the vital services, health care, and daily necessities.

## III. Grant Funds, Sources, and Uses of all Project Funding

### Project Budget

The US 12, Morristown to Watauga, South Dakota, project costs are estimated at approximately \$21.4 million. The full funds for constructing the project would come from the \$21.4 million requested in this 2022 RAISE grant application. Table 5, below, shows the breakout of project costs.

This project is located in a rural area, a historically disadvantaged community, and an area of persistent poverty, so no local match is required. However, the state has already invested programmed dollars to see this project completed. Much of the preliminary engineering and environmental documentation has already been completed with over \$400,000 already expended by the SDDOT.

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<sup>9</sup> EJScreen. United States Environmental Protection Agency. <https://www.epa.gov/ejscreen>

Table 4 – Project Budget Table

	Funding by Source		
	RAISE	Other Federal	State
<b>Preliminary Engineering (PE)/Environmental/ROW (Encumbered/Expended)</b>			
PCN 05HW	0	0	397,495.56
PCN 05U5	0	0	5,749.79
<b>Total Already Expended</b>	<b>0</b>	<b>0</b>	<b>403,627.78</b>
<b>Anticipated Remaining PE/Environmental/ROW</b>			
PCN 05HW	0	0	345,070.55
PCN 05U5	0	0	262,627.78
<b>Total Anticipated Engineering</b>	<b>0</b>	<b>0</b>	<b>607,698.33</b>
<b>Total PE/Environmental/ROW</b>	<b>0</b>	<b>0</b>	<b>1,010,943.68</b>
<b>Construction</b>			
PCN 05HW	15,783,580.25	0	0
PCN 05U5	5,616,783.85	0	0
<b>Total Construction</b>	<b>21,400,364.10</b>	<b>0</b>	<b>0</b>

## IV. Merit Criteria

The South Dakota US 12 project advances many of the USDOT’s Merit Criteria for RAISE Grants. This project emphasizes improving quality of life for residents in north central South Dakota, ensuring mobility and community connectivity, and replacing aging structures to ensure infrastructure is in a state of good repair.

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*“The [US 12] project promotes equity by improving transportation access to a disadvantaged area. It improves mobility, connectivity, and economic competitiveness of the Standing Rock Reservation and the surrounding region and advances economic vitality, reduces climate change impacts, reduces barriers to opportunity, leverages Federal funding, attracts non-Federal investment, and holds grant recipients accountable for their performance.”*

*Janet Alkire, Chairwoman, Standing Rock Sioux Tribe*

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## Safety

The US 12 project will provide multiple safety outcomes for those who use US 12 in Corson County. Those outcomes will be realized through:

- Reconstructing nine miles of roadway to new condition
- Expanding and paving of roadway shoulders from two feet to six feet
- Installing edge-line rumble strips
- Improving 14 vertical curves with a design speed of 60 mph or less
- Evaluating access management, including driveway density and spacing
- Correcting roadway inslopes to improve road drainage



*Narrow bridge with poor sight distance*

## Reconstruction and Resurfacing the Entire Roadway

This project will reconstruct, regrade, and resurface the entire nine-mile project area of US 12. The reconstruction and resurfacing will enhance the safety of the roadway by providing:

- More paved roadway surface due to the installation of wider shoulders
- A smoother driving surface and better friction/traction for all users, including heavy trucks, motor vehicles, bicyclists, and pedestrians
- Improved stormwater runoff and roadway drainage reducing the likelihood of hydroplaning
- A reduction of debris accumulating on the highway surface
- New pavement markings that are more visible and reflective during adverse driving conditions

## Widening Shoulders

The proposed improvements to US 12 will pave and widen shoulder widths from two feet to six feet for the entire nine-mile corridor. The safety effects of paving and widening shoulders to six feet are significant. The Federal Highway Administration specifies guidelines for shoulder widths. Safety and efficient traffic operations can be adversely affected as shoulder widths get narrower. Wider shoulders will lessen the likelihood of rear-end crashes with parked or disabled vehicles, particularly on high-speed two-lane roadways. Safety benefits include:

- Emergency storage of disabled vehicles
- Adequate space for law enforcement
- Adequate space for maintenance activities
- Area for drivers to maneuver to avoid rear end crashes
- Area with a stable, clear recovery for drivers who have departed the travel lane
- Improved safety and areas for bicyclists and pedestrians
- Improved driver comfort

A Transportation Research Board Record 1195 paper titled “Safety Effects of Cross-Section Design for Two-Lane Roads” determined that crashes will be reduced when wider roadway shoulders are present. The study found that providing a shoulder that is paved and four-feet wider than the existing one will result in crash reductions of 29 percent on two-lane highways.<sup>10</sup>

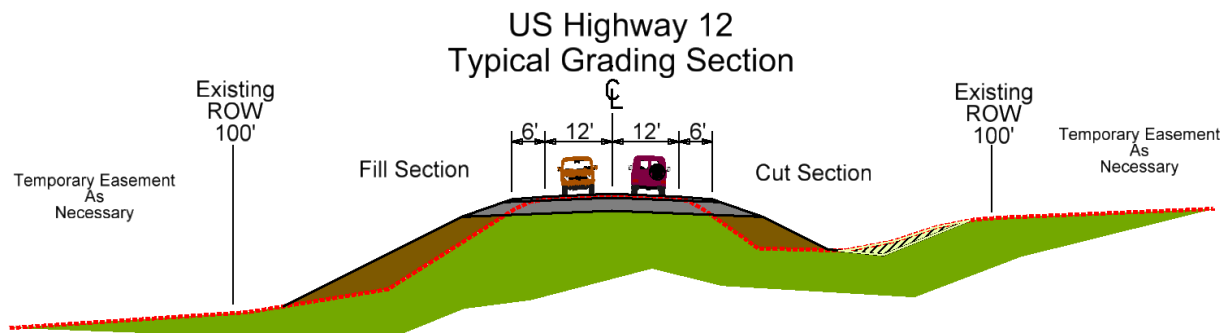
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*This project will pave and widen the roadway shoulders along US 12 from an existing 2 feet to 6 feet. Studies have shown that widening shoulders on two-lane rural highways by four-foot typically results in a reduction of crashes by 29 percent.*

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In addition, widening roadway shoulders could lead to a health benefit for area residents and provide opportunities for recreation and alternate modes of transportation. With safer conditions for alternative uses, residents could choose to walk, bicycle, or run along the roadway.

Figure 8 – US 12 Project Typical Grading Section



### Adding Edge Line Rumble Strips

Edge line rumble strips will be installed throughout the entire nine-mile project area. In combination with wider shoulders, rumble strips allow drivers to make corrections and avoid run-off-the-road crashes. Edge line rumble strips are known to reduce single vehicle run-off-the-road crashes.

Additionally, South Dakota weather is extreme, with heavy rains, snow, fog, and quickly changing weather conditions that can lead to poor visibility. Rumble strips can be used by motorists as navigational aids in bad weather. The vibration provided by rumbles can assist drivers from unintentionally crossing the edge line in poor weather conditions or when pavement markings cannot be seen due to snow cover. Rumbles also contribute to safety when the reflectivity of pavement markings is reduced by poor weather conditions or deteriorating visibility in the marking

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<sup>10</sup> Zegeer, Reinfurt, Hummer, Herf, and Hunter, Safety Effects of Cross-Section Design for Two-Lane Roads  
<http://onlinepubs.trb.org/Onlinepubs/trr/1988/1195/1195-003.pdf>



itself. If pavement marking is placed within the rumble strip, the vertical component of the rumble will often still be visible in adverse weather conditions.<sup>11</sup>

Installations and investments in rumble strips have proven worthwhile not only as a safety benefit but also due to an almost nonexistent maintenance need. Rumble strips are essentially self-cleaning, as snow, ice, rain, or sand do not typically remain for any length of time; this is attributed to the wind created by passing vehicles. Milled rumble strips typically require little to no maintenance<sup>12</sup> and do not increase deterioration of pavement condition.<sup>13</sup>

#### Address 14 vertical curves

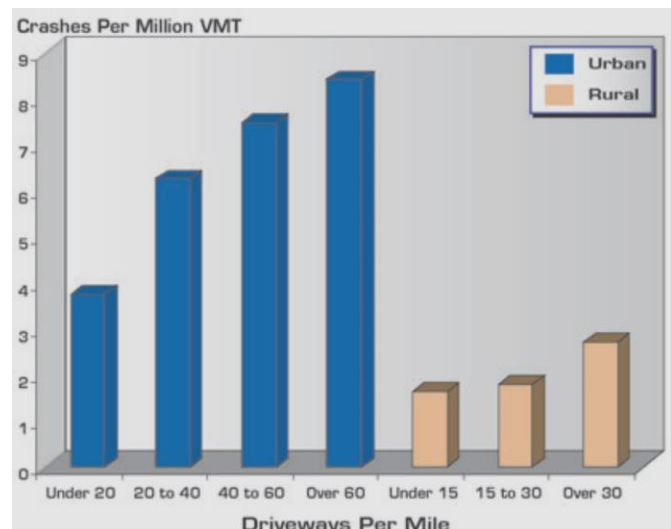
As part of the proposed construction on US 12, improvements to fourteen vertical curves will be made. The vertical road alignment will increase the radius of several crests by leveling off the top of the hill which will improve site distance which will contribute to a safer roadway.

#### Evaluating Access Management in Morristown

Access management in Morristown and along the entire nine-mile segment of US 12 will be evaluated as part of this project.

Within the City of Morristown, there are 14 access points (nine north and five south) directly onto US 12. On average, that is one access point every 160 feet or 33 access points per mile. High numbers of access points increase the number of potential conflict points along roads and generally correlate with increased crash rates. According to US Department of Transportation (USDOT) Federal Highway Administration (FHWA), reducing the number of driveways per mile will result in fewer rear-end crashes.<sup>14</sup>

Figure 9 – Crashes Based on Number of Access Points Per Mile



#### Environmental Sustainability

As has already been discussed, US 12 provides a vital east-west corridor across the Standing Rock Indian Reservation. If the road were to be closed, the length of detour routes around the project area would be

<sup>11</sup> Federal Highway Administration, Impacts of Rumble Strips, T5040.40, Revision 1, November 2011 - [https://safety.fhwa.dot.gov/roadway\\_dept/pavement/rumble\\_strips/t504040/](https://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504040/)

<sup>12</sup> E.R. Russel and M.J. Rys, NCHRP Synthesis 339: Centerline Rumble Strips – A Synthesis of Highway Practices, Transportation Research Board, National Cooperative Highway Research Program (Washington, DC: TRB 2005). Federal Highway Administration, Maintenance Concerns for Keeping the Rumble Strips [https://safety.fhwa.dot.gov/roadway\\_dept/pavement/rumble\\_strips/media/RumbleStripGuide\\_Pavement/pavement\\_bpg.cfm](https://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/media/RumbleStripGuide_Pavement/pavement_bpg.cfm)

<sup>13</sup> Federal Highway Administration, Maintenance Concerns for Keeping the Rumble Strips [https://safety.fhwa.dot.gov/roadway\\_dept/pavement/rumble\\_strips/concerns\\_main.cfm](https://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/concerns_main.cfm)

<sup>14</sup> Benefits of Access Management. US DOT Federal Highway Administration. [https://ops.fhwa.dot.gov/access\\_mgmt/docs/benefits\\_am\\_trifold.pdf](https://ops.fhwa.dot.gov/access_mgmt/docs/benefits_am_trifold.pdf)

substantial, adding at least 60 miles to a one-way trip. Detours were previously illustrated in Figure 3. These additional miles would result in increased greenhouse gas emissions from both local traffic and regional truck traffic. Based on current truck volumes, a one-week closure would result in at least 100 additional metric tons of carbon dioxide emissions from freight alone.<sup>15</sup>

Further, US 12 plays a key role in maintaining community resilience in the face of climate change. Native American tribes are uniquely vulnerable to climate change, in part because many live in relatively inhospitable parts of the country.<sup>16</sup> The impacts of climate change are making it more difficult for indigenous people to access traditional sources of food and other goods,<sup>17</sup> and Standing Rock is no exception.<sup>18</sup> Standing Rock entrepreneurs and community organizations have taken a proactive approach to all aspects of environmental sustainability and self-reliance with the introduction of local solar power generation<sup>19</sup> and home-grown food programs.<sup>20</sup> Within the reservation, travel distance has been shown to have a meaningful impact on access to fresh produce markets.<sup>21</sup> By improving transportation access to local resources, this project will promote resilience for all US 12 users, area residents, and those populations within the Standing Rock Indian Reservation.

## Quality of Life

Improving quality of life is a primary purpose for the US 12 project. The Standing Rock Indian Reservation is the fifth-largest reservation in the United States, covering 2.3 million acres.<sup>22</sup> The Reservation is home to 16,100 enrolled members and a population base of over 15,000.

Corson County and the Standing Rock Indian Reservation are areas with very low access to opportunity and disproportionately high levels of vulnerability. This is an area of persistent poverty, with poverty rates consistently greater than 40 percent, nearly four times the state average. Further, in Corson County, 17 percent of households were living on less than \$10,000 per year according to the 2020 American Community Survey 2016-2020 5-year estimates. That is an increase from 12.7 percent in 2010 (inflation adjusted to 2020 dollars), which indicates that there is an increasing number of Corson County residents living well below the poverty level.

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<sup>15</sup> The Green Freight Handbook: A Practical Guide for Developing a Sustainable Freight Transportation Strategy for Business. <https://storage.googleapis.com/scsc/Green%20Freight/EDF-Green-Freight-Handbook.pdf>

<sup>16</sup> Treisman, Rachel. "How loss of historical lands makes Native Americans more vulnerable to climate change." National Public Radio. November 2, 2021. <https://www.npr.org/2021/11/02/1051146572/forced-relocation-native-american-tribes-vulnerable-climate-change-risks>

<sup>17</sup> <https://toolkit.climate.gov/topics/tribal-nations>

<sup>18</sup> Wolfe, David. "Climate Change Perspectives from Indian Country." The Hill, February 2, 2016. <https://thehill.com/blogs/pundits-blog/energy-environment/267784-climate-change-perspectives-from-indian-country/>

<sup>19</sup> <https://www.mic.com/impact/why-native-americans-at-standing-rock-are-building-solar-farms-three-years-after-the-nodapl-pipeline-protests-18546399>

<sup>20</sup> <http://indianguiver.firstnations.org/nl20200102-02/>

<sup>21</sup> Ruelle, Morgan & Kassam, Karim-Aly. (2013). Foodways Transmission in the Standing Rock Nation. Food and Foodways. 21. 10.1080/07409710.2013.850007.

<sup>22</sup> Travel South Dakota – Standing Rock Sioux Tribe. <https://www.travelsouthdakota.com/trip-ideas/article/standing-rock-sioux-tribe>

While data specific to the Standing Rock Indian Reservation was not available, in general data shows that Native Americans have long experienced significantly worse health outcomes compared to non-native Americans. Alcoholism, drug addiction, and suicide occur at higher rates within reservations and according to the Indian Health Service, there is a significant disparity in mortality rates for American Indians compared to all US races. Specifically, American Indians are over six times more likely to die due to alcohol consumption, one and a half times more likely due to die due to drugs or suicide, and twice as likely to die through homicide. Mortality rates also show disparities related to disease and other accidents.<sup>23</sup>

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*“American Indians/Alaska Natives had the highest drug overdose death rates in 2015 and saw the largest percent change in the number of deaths over time.”<sup>24</sup>*

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US 12 is a key east-west transportation corridor, providing numerous Standing Rock Indian Reservation residents their primary access to economic opportunities, retail shopping, and vital services, such as health care.

#### Access to Health Care Facilities

As discussed above, there are significant health disparities faced by Native Americans. In the Standing Rock Indian Reservations, these disparities are magnified by the very rural nature of the reservation. There are very few health care centers in the immediate area and no high-level trauma centers (Level 1 or 2) located within 100 miles. Reliable roads are vital to provide access to these services and are necessary for allowing emergency response.

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*Native Americans are faced with disproportionately high mortality rates. Life expectancy for American Indians is five and a half years lower than the US all races population (73 years to 78.5 years, respectively).<sup>25</sup>*

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In particular, the Indian Health Service has a health center located in McLaughlin, South Dakota, which is located on US 12, east of the project area. The McLaughlin Health Center is staffed by Family Nurse Practitioners and Registered Nurses and provides outpatient primary care services. The nearest hospital to the project area is West River Regional Medical Center, a level 4 trauma center, located in Hettinger,

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<sup>23</sup> Disparities. Indian Health Service. <https://www.ihs.gov/newsroom/factsheets/disparities/>

<sup>24</sup> Illicit Drug Use, Illicit Drug Use Disorders, and Drug Overdose Deaths in metropolitan and Nonmetropolitan Areas – United States. Centers for Disease Control and Prevention. <https://www.cdc.gov/mmwr/volumes/66/ss/pdfs/ss6619.pdf>

<sup>25</sup> Illicit Drug Use, Illicit Drug Use Disorders, and Drug Overdose Deaths in metropolitan and Nonmetropolitan Areas – United States. Centers for Disease Control and Prevention. <https://www.cdc.gov/mmwr/volumes/66/ss/pdfs/ss6619.pdf>

ND, approximately 45 miles west of Morristown.<sup>26</sup> For more severe medical care needs, including emergencies, surgeries, and access to therapists, and specialty care (psychiatrists, psychologists, oncologists, etc.), residents need to travel at least 100 miles for a level 2 hospital, and almost 300 miles for level 1 care.

Access to other health care services is also severely limited. The two nearest pharmacies are in Lemmon and Mobridge, which are about 95 miles apart along US 12. The two nearest dentists are in Hettinger, North Dakota and Mobridge, about 120 miles apart along US 12. Finally, access to mental health services is limited, with the nearest behavioral health clinic located along I-94 in North Dakota, over 100 miles away.

US 12 is a key transportation corridor that Corson County and Sanding Rock Indian Tribe residents depend on for access for health care of all kinds. This project is key in ensuring the long-term use of US 12 for accessing these vital services.

### Access to Everyday Goods

Due to the rural nature of this area, residents have limited options for accessing everyday retail goods. The project is in a food desert, where residents have “few to no convenient options for securing affordable and healthy foods”.<sup>27</sup> Specifically, the nearest grocery stores are in Lemmon and McLaughlin, about 65 miles apart along US 12. Lack of a reliable transportation system is a key contributor to the creation of food deserts.<sup>28</sup> The proposed highway project will help to ensure that US 12 remains a useable and reliable transportation corridor for residents.

Additionally, the nearest gas stations to the project area are located in Lemmon, McIntosh, and McLaughlin, providing residents limited options to purchase fuel. There is no big box retail in close proximity (the nearest Walmart is in Bismarck, ND over 100 miles away) and access to other services is also limited (see Figure 6) for a list of the nearest stores and services to Morristown, SD). As a result, residents are dependent US 12 for access to a variety of smaller retail stores and service providers that are scattered throughout the corridor.

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*The US 12 project is located within a food desert. According to the U.S. Department of Agriculture, food deserts are those census tracts that have low levels of income and have low access to groceries. Low-access tracts are those where 33 percent or more of rural residents travel more than ten miles to the nearest grocery store.<sup>29</sup>*

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<sup>26</sup> Indian Health Service. Standing Rock Service Unit.

<https://www.ihs.gov/greatplains/healthcarefacilities/standingrock/>

<sup>27</sup> Food Deserts in the United States. Annie E. Casey Foundation. February 13, 2021.

<https://www.aecf.org/blog/exploring-americas-food-deserts>

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

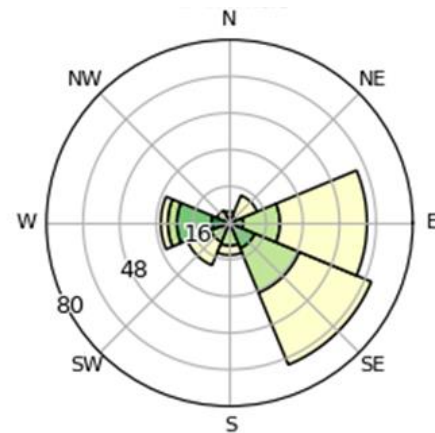
## Improves Mobility and Community Connectivity

Improving mobility and community connectivity is a key aspect of the US 12 project. This section of US 12 is a key east-west connector through a very rural area. This road connects numerous small communities and provides area residents access to their employment and goods and services.

Currently, US 12 has only two-foot-wide shoulders, which do not provide opportunities to safely walk or bicycle. While this is a rural road that primarily serves motor vehicles and truck traffic, the project will widen shoulders to provide non-vehicular mobility opportunities, such as walking, bicycling, and running. This will improve the mobility options for those who do not have access to a motor vehicle but must still travel to access goods and services.

The reconstruction of the bridge over Hay Creek is key to maintain US 12 as a road for the transportation of freight and connecting multiple communities. If that bridge were to collapse or be closed due to structural deficiencies, communities would be cut off from each other and would be left with very few viable alternate routes.

*Figure 10 – Direction of travel and number of jobs, employment census block to home census block.*



## Economic Competitiveness and Opportunity

The US 12 project will allow continued use of a transportation corridor in an area with high levels of poverty and low access to opportunity. US 12 has also been identified as a key freight transportation route for South Dakota and North Dakota.

### Access to Employment

US 12 crosses a very rural area, so few alternate routes are available for residents. The US 12 project will improve the economic competitiveness of the area by providing improved access to opportunities through a safe and reliable transportation network that gives area residents easier and more consistent access to employment. It also improves mobility, which is a critical factor in strengthening agriculture in the area. About half of all workers within five miles of US 12 between the western Corson County border and McIntosh travel more than 50 miles each way to their places of employment. An additional 27 percent travel between 25-50 miles each way for employment. A majority of those workers are traveling along the east-west corridor, which makes them dependent on US 12 to access their places of employment. Figure 10 shows the number of jobs based on their direction of travel.



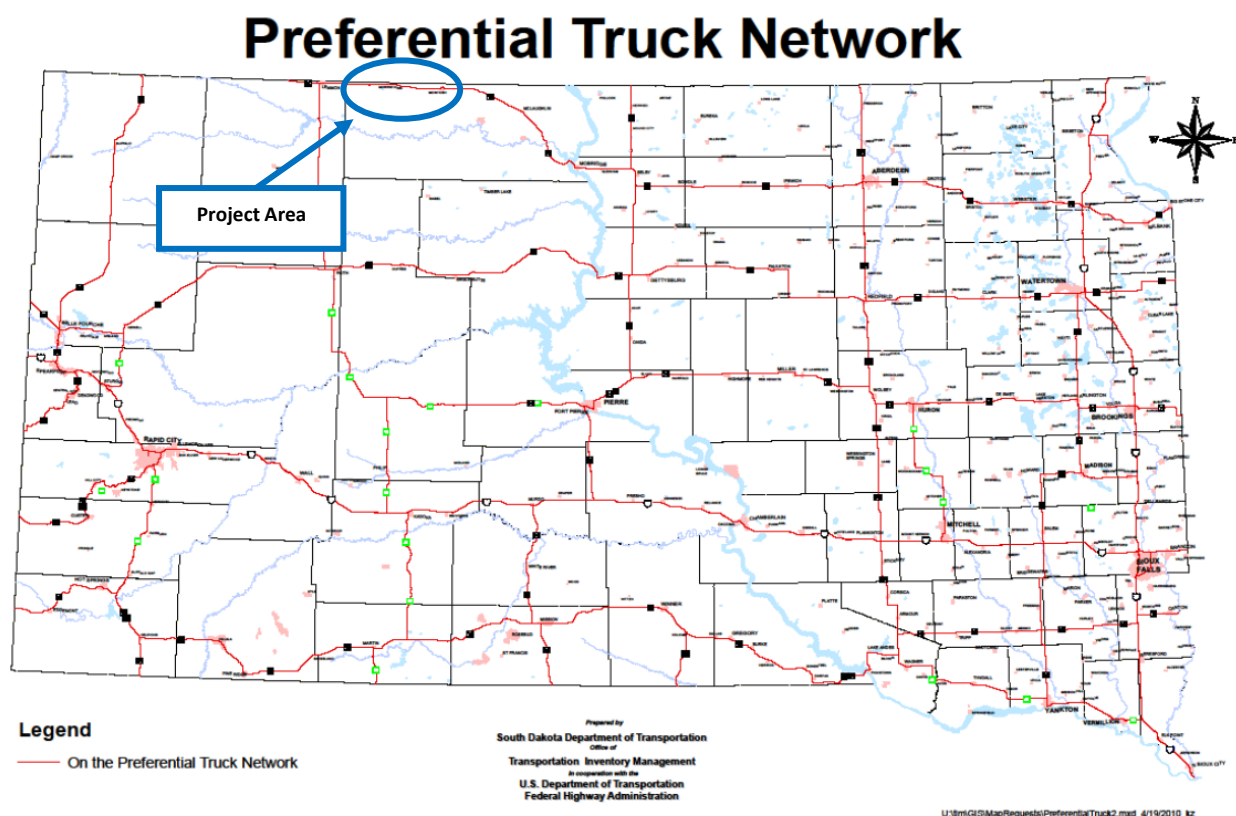


## Freight Route

US 12 is a key east-west trucking route along the South Dakota and North Dakota border. The portion of US 12 within South Dakota has been identified as a Preferential Truck Route in the South Dakota Freight Plan, while the portion in North Dakota has been labeled a Level One Highway in the North Dakota State Strategic Freight System. Current traffic volumes indicate that 28 percent of the vehicular traffic on US 12 between Morristown and Watauga is trucks.<sup>30</sup>

Additionally, two rail grain shuttle facilities are served by US 12, one in Lemmon, to the west of the project area, and a second in McLaughlin, to the east of the project area. The facilities serve trains with 110 rail cars or more along the main BNSF rail line, providing freight between South Dakota and west coast ports. According to the South Dakota Freight Plan, Corson County produces an estimated 5,000 to 20,000 grain trucks per year, many of which are dependent on US 12 for transport.

Figure 11 – South Dakota Preferential Truck Network<sup>31</sup>

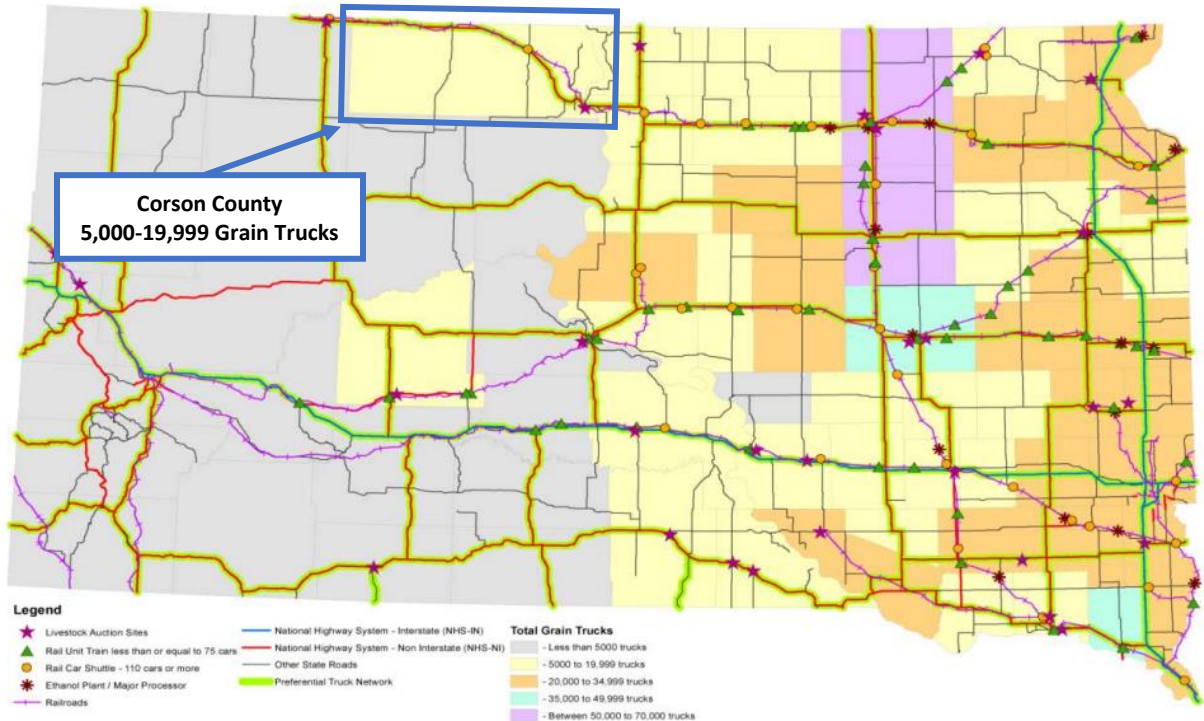


<sup>30</sup> Highway Needs and Project Analysis Report (Needs Book) 2020 – Interactive Map. South Dakota Department of Transportation. <https://apps.sd.gov/hr53needsbook/>

<sup>31</sup> South Dakota Freight Plan. South Dakota Department of Transportation. August 2017.  
<https://dot.sd.gov/media/documents/SDDOTFreightPlanApproved.pdf>

*US 12 serves as a part of South Dakota and North Dakota's Long Combination Truck Network (allows vehicles over 81.5 feet in length) from the Montana state line to I-29 in South Dakota.<sup>32</sup>*

Figure 12 – South Dakota Estimate of Annual Commodity Movement by Trucks.<sup>33</sup>



## State of Good Repair

The bridge over Hay Creek (1.3 miles east of Morristown) was built in 1949. According to the Office of Bridge Design, the structure has a rating of fair, and is reaching the end of its useful life. As discussed above, because the bridge is 30 feet wide, it does not meet current width standards and is functionally obsolete. Reconstruction of this bridge is key for maintaining US 12 as a useful corridor for local and regional travel and for the movement of goods and services in and throughout the area.

Further, this section of US 12 has deteriorating pavement condition. Over the 70-year life span of the road, it has had maintenance overlays and other activities occur every 15 to 20 years. Most of the project area rates at a 3.34 on the Surface Condition Index, which is “fair” condition. This section of US 12 was last improved in 2006 and sealed in 2009. For comparison, other nearby sections of the highway

<sup>32</sup> <https://www.ecfr.gov/current/title-23/chapter-I/subchapter-G/part-658/appendix-Appendix%20C%20to%20Part%20658>

<sup>33</sup> Ibid.

were sealed in 2015, 2017, and 2018. See the South Dakota DOT Interactive Needs Book for more details.<sup>34</sup>

Without completion of this project, the Hay Creek bridge will reach the end of its useful life and in four to eight years will need to close. This situation would threaten the livelihood of those living in Corson County and the Standing Rock Indian Reservation, by cutting residents off from employment opportunities, goods, and services.

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*In South Dakota's Cheyenne River Sioux Reservation, not far from Standing Rock, federal funding for the community's 310 miles of roads was just \$2.2 million in 2019, one tenth of the estimated minimum needed to bring the roads into good repair. Road plowing alone cost \$600,000 that same year, when a combination of failing infrastructure and extreme weather led to a state of emergency being issued by tribal authorities on two occasions.*<sup>35</sup>

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## Partnership and Collaboration

As mentioned previously, the US 12 project has dedicated support from the State of South Dakota, Corson County, the Standing Rock Sioux Tribe, both of South Dakota's Senators, and the state's lone member of the House of Representatives, all of which have submitted letters of support for the project.

The South Dakota DOT held landowner meetings during the winter of 2020 during. At the landowner meetings information was shared with landowners about the proposed project.

The Standing Rock Sioux Tribe has proved a letter in support of the project, stating that "the project advances the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant's goals of funding projects that will have a significant local or regional impact."

## Innovation

This project includes the installation of rumble strips, which is a relatively new innovative strategy to increase safety. Combining running rumble strips with wider shoulders will allow drivers to make corrections and avoid run off the road crashes. Per NCHRP 641, rumble strips have reduced single vehicle run off road fatalities an injury crashes by 29 percent.

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<sup>34</sup> Highway Needs and Project Analysis Report (Needs Book) 2020 – Interactive Map. South Dakota Department of Transportation. <https://apps.sd.gov/hr53needsbook/>

<sup>35</sup> Infrastructure on Reservations is Falling Apart. Stephen Starr. March 24, 2021. <https://talkpoverty.org/2021/03/24/failing-infrastructure-indigenous-reservations/>

## V. Project Readiness: Environmental Risk

There is very little risk the project will not proceed on schedule as environmental documentation, preliminary engineering, final design, and right-of-way acquisition has already occurred with SDDOT funding.

### Project Schedule

A project schedule identifying major project milestones is presented below. All planning, agreements, permitting, review periods, and approvals have been considered.

Figure 13 – Project Schedule



### Required Approvals

#### Environmental Permits and Reviews

Construction activities will result in earth disturbance and work in a waterway, which will require two permits including the Department of Agricultural & Natural Resources (DANR) General Permit for Storm Water Discharges Associated with Construction Activities, and the EPA 2017 Construction General Permit.

The DANR General Permit for Storm Water Discharges Associated with Construction Activities is required for construction activity disturbing one or more acres of earth and work in a waterway. The SDDOT has this permit and will submit the Notice of Intent (NOI) to DANR 15 days prior to project start in order to obtain coverage under the General Permit. Work can begin once the DANR letter of approval is received.

The Contractor must adhere to the “Special Provision Regarding Storm Water Discharges to Waters of the State.” The Contractor will complete the DANR Contractor Certification Form prior to the pre-construction meeting. The form certifies under penalty of law that the Contractor understands and will comply with the terms and conditions of the permit for this project. Work may not begin on this project until this form is signed and submitted to DANR.

The EPA 2017 Construction General Permit is required for this project. The SDDOT has this permit and will submit the NOI to EPA 15 days prior to project start in order to obtain coverage. Work can begin after authorization is received from the EPA. This permit provides coverage for construction and dewatering activities for this project. The Contractor must adhere to the “Special Provision Regarding Storm Water Discharge to Waters of the United States within Indian Reservations.”

The Storm Water Pollution Prevention Plan (SWPPP) will be developed prior to the submittal of the NOI and will be implemented for all construction activities for compliance with the permit. The SWPPP must be kept on-site and updated as site conditions change. Erosion control measures and best management practices will be implemented in accordance with the SWPPP. The Storm Water, Erosion, and Sediment Control Inspection Report Form DOT 298, will be used for site inspections and to document changes to the SWPPP. A copy of the completed inspection form will be filed with the SWPPP documents and retained for a minimum of three years.

The inspection will include disturbed areas of the construction site that have not been finally stabilized, areas used for storage materials, structural control measures, and locations where vehicles enter or exit the site. These areas will be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the SWPPP will be observed to ensure that they are operating correctly, and sediment is not tracked off of the site.

### Assessment of Project Risks and Mitigation Strategies

The US 12 project recognizes the possibility of unexpected delays due to funding, environmental review findings, permitting, real estate acquisition, and weather-related events. Due to the rural location of the project, increased bid costs in hauling material (asphalt, concrete, gravel, steel), is also another potential factor to consider.

## VI. Benefit Cost Analysis

The objective of a benefit-cost analysis (BCA) is to bring all the direct effects of a transportation investment into a common measure (dollars). Generally, costs of a transportation project, such as the US 12 project, are incurred in the initial years, while benefits accrue over an extended period of time. The primary elements that can be monetized are travel time, changes in vehicle operating costs, vehicle crashes, environmental impacts, remaining capital value, and maintenance costs. The results of the BCA are summarized below. A detailed [memorandum](#) of the analysis and the [BCA Workbook](#) is provided in section VII Supporting Documentation.

### No Build Alternative

The No Build Alternative includes leaving the US 12 corridor in its current geometric and operational state, as described in the above sections of this document. Maintenance activities to keep the corridor operational are expected to increase the future without this project.

### Build Alternative

The Build Alternative consists of reconstructing nine miles of US 12 pavement and subgrade to current standards and constructing various geometric and operational enhancements to increase safety. Specific design elements included in the Build Alternative are as follows:

- Entire nine miles of roadway reconstructed to new condition
- Expansion and paving of roadway shoulders from 2' to 6'
- Installation of edge-line rumble strips
- Replacement of one 143.5 foot bridge built in 1949 (fair condition)



- Replacement of three large pipe culverts with box culverts
- Replacement of 19 miles of right-of-way fencing
- Addresses 14 vertical curves with a design speed of 60 mph or less
- Evaluates access management, including driveway density and spacing
- Corrects roadway inslopes

## BCA Methodology

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

- Travel time/delay
- Vehicle operating costs
- Crashed by severity
- Environmental and air quality impacts
- Initial capital costs: capital costs are expected to be incurred in years 2023 and 2024
- Remaining capital value: the remaining capital value (value of improvement beyond the analysis period) was considered as a benefit and was added to other user benefits
- Operating and maintenance costs

Other analysis considerations included:

- It was assumed that the Build Alternative would be constructed over a two-year period in years 2023 through 2024. Therefore, 2025 was the first year that most benefits would begin accruing.
- The present value of all benefits and cost was calculated using 2020 as the year of current dollars.
- A benefit-cost analysis period of 20 years was used to determine net project costs and benefits.

## Project Costs

Year 2020 project cost for the RAISE Grant components of the overall project is expected to be about \$21.4 million. The current 2020 project costs discounted at a rate of seven percent is approximately \$16.7 million.

## BCA Results

The benefit-cost analysis provides an indication of the economic desirability of a scenario, but results must be weighed by decision-makers along with the assessment of other effects and impacts. Projects are considered cost-effective if the benefit-cost ratio is at least 1.0. The larger the ratio number, the greater the benefits per unit cost. Results of the benefit-cost analysis are shown in Table 5. See Attachment A for the complete benefit-cost analysis workbook.

*Table 5 – Benefit Cost Analysis Summary*

	Initial Capital Cost (2020 Dollars)	Project Benefits (2020 Dollars)	Benefit-Cost Ratio (7% Discount Rate)	Net Present Value (2020 Dollars)
<b>No Build vs. Build</b>	\$16.7 million	\$43.9 million	<b>2.6</b>	\$27.2 million

## VII. Supporting Documentation

Links to supporting documents are included in the footnotes throughout this narrative. Other supporting documents and the RAISE application narrative are available at the links below and following webpage:

<https://www.srfconsulting.com/sddot-us-12-raise/>

### 1 – Letters of Support

[Corson County](#)

[Representative Dusty Johnson](#)

[Senator M. Michael Rounds](#)

[Senator John Thune](#)

[Standing Rock Sioux Tribe](#)

### 2 – South Dakota Highway Needs and Project Analysis Report (Needs Book) 2020

[Interactive Map](#)

### 3 – Benefit Cost Analysis

[Memo](#)

[Workbook](#)

### 4 – Meeting Summaries

[Public Meeting Presentation, June 20, 2019](#)

[Landowner Meetings Summary, January 28, 2020](#)

### 5 – Project Budget

[PCN 05HW](#)

[PCN 05U5](#)

### 6 – Plan Sets

[ROW Plans](#)

[Section A](#)

[Section B](#)

[Section D](#)

[Section X](#)

[Section Z](#)