Appendix A: Raw Data used to calculate Benefits of the Project

Metric	No Build	Build	Net Change	Saving in $ over the 20 years post Construction
i. Safety – the Project is expected to foster a safe transportation system for the movement of goods and people by reducing accidents in the area related to delays due to the current closure of the routes				
Projected Accidents 2026-2045				
Collisions- Prop only	26.8	23.0	(3.7)	$ 17,979
Injury Accidents	34.1	29.3	(4.8)	$ 732,726
Fatalities	7.3	6.3	(1.0)	$ 12,054,320
Total Accidents	68.1	58.6	(9.5)	$ 12,805,025
ii. State of Good Repair				
Lane Miles	2 lanes	2 lanes		
Condition of Road / Road Rating	roadway in fair / poor condition	roadbed refurbished to good condition		
Maintence Cost of Direct Route	$ 8,865,600	$ 4,293,920		$ 4,571,680
Reduction of VMT due to reduction required detour	376,837,902	367,638,307	(9,199,595)	$ 1,103,951
iii. Economic Competitiveness - Reducing Transportation Cost / Travel Delays				
Travel Time Savings (VHT) 2026-2045				
Autos - VHT	123,809	0	(123,809)	$ 4,126,576
Trucks - VHT	25,358	0	(25,358)	$ 574,469
Total - VHT	149,167	0	(149,167)	$ 4,701,045
Vehicle Operating Costs (VMT) 2026-2045				
Autos - VMT	332,045,578	323,939,481	(8,106,098)	$ 3,728,805
Trucks - VMT	44,792,323	43,698,826	(1,093,497)	$ 1,104,432
Total - VMT	376,837,902	367,638,307	(9,199,595)	$ 4,833,237
Environmental Sustainability- Reduction of Energy Use- Gallons of Fuel Used				
Gallons of Fuel Saved				
Autos			328,182	$ 1,079,824
Trucks			182,250	$ 711,284
Total			510,432	$ 1,791,108
iv. Quality of Life				
2026-2045				
Number of Trips per vehicle per day	2.3	2.3	0	
VMT	376,837,902	367,638,307	(9,199,595)	$ 4,701,045
Average Trip Length	40.9	39.2	1.7	
Percent of trips requiring detour	3.0%	-	-3.0%	

Raw Data Assumptions

Project Costs: Project costs are in 2023 dollars

Crazy Horse Scenic Byway Pavement Resiliency and Restoration Project			
Year	Description	Funding Source	Project Cost
2025	Construction, Pavement Replacement and Restoration and Guardrail Installation	NSFLTP	$ 18,500,000
	Construction, Crack and Chip Seal and Byway Guide Signage	TTP	$ 1,700,000
	Construction, Interpretive Signage	National Park Service	$ 60,000
		Total	**$ 20,260,000**

The first full year of operation of the project will be 2026.

Project Area Length and Improvements:

For reference see www.inputcentral.com/oglalasiouxnsfltp for the National Tribal Transportation Facility Inventory (NTTFI) maps of BIA 2 and BIA 41. The total project length is 37.6 miles including 11.5 miles of asphalt pavement reconstruction, 12 miles of asphalt pavement restoration, and 14.1 miles of crack and chip seal surfacing. The project will also install a guardrail with chevrons, Crazy Horse Scenic Byway guide signage, and Badlands National Park Service interpretive signs.

BIA 2

NTTFI Section 20 is from the intersection of BIA 2 and BIA 41 to 1.8 miles east. The existing asphalt pavement surface will be spot asphalt repaired and crack and chip sealed. Work on this section would be funded with Tribal Transportation Program (TTP) dollars.

NTTFI Section 25 is from 1.8 miles east of BIA 41 to 12 miles east. The existing section has a double chip seal surface which is potholed and deteriorated. The project will spot dig out and recompact soft subgrade areas, spot repair potholes, install an asphalt leveling lift and final asphalt pavement lift to correct the road ride and cross-slope. Rumble strips will be added to this section. Work on this section would be funded with Nationally Significant Federal Lands and Tribal Projects (NSFLTP) dollars.

NTTFI Sections 30, 35, and 45 begin at the end of double chip seal surface, 7.5 miles west of BIA 27 and ends at BIA 27. This section has existing asphalt pavement which will be spot repaired followed by a crack and chip seal. Work on this section would be funded by Tribal Transportation Program (TTP) dollars.

NTTFI Section 30, approximately 5.5 miles west of BIA 27 is a 100-foot descent from Cuny Table to the Badlands National Park. Along this descent is a horizontal curve that does not have a guardrail to protect vehicles which could leave the roadway at a 100-foot drop-off, especially in slippery conditions. A guardrail with chevrons is proposed here and would be funded with NSFLTP dollars.

BIA 41

NTTFI Section 60 starts approximately 2.4 miles south of BIA 2 and ends approximately 2.4 miles north of the intersection of BIA 2 and BIA 41. The road was reconstructed in 2018 and completed in 2019. This road segment was constructed with the use of geotextiles incorporated into the asphalt pavement structure which has seen excellent results showing little to no cracking of the existing asphalt pavement surface. This project will install a crack and chip to maintain the asphalt surface and will be funded with Tribal Transportation Program (TTP) dollars.

NTTFI Sections 65 and 70 begin 2.4 miles north of BIA 41 and end at the north Pine Ridge Indian Reservation line. Section 65, a 0.5-mile segment has 12-foot lanes and 4-foot shoulders. Section 70, an 11-mile segment has 12-foot lanes and a graded grass shoulder. The existing asphalt is rutting and deteriorated in both segments. The project will reconstruct the asphalt pavement structure incorporating the geotextiles similar to the work completed in Section 60 and will add 2-foot shoulders to Section 70. Work on this section would be funded with NSFLTP dollars.

Additional improvements will include Crazy Horse Scenic Byway guide signs added to the routes which will be funded with TTP dollars and Badlands National Park interpretive signs along BIA 2 located in Section 30 and 35 and funded by the National Park Service.

Traffic Counts:

AADT – BIA 2: 130 average daily, with 17% trucks, higher percent due to landfill on west side of BIA 41

AADT – BIA 41: 750 average daily, with 11% trucks

Weight Average within the Project Area:

	AADT	Segment miles		av AADT
BIA 2 AADT times miles	130	14.1	1833	
BIA 41 AADT times miles	750	22.5	16875	
		36.6	18708	511

Description	Rates			
	BIA 2	BIA 41		Wt Average
ADT	**130**	**750**		**511**
Annual Traffic trips	**47,450**	**273,750**		**321,200**
Percent of Total Traffic	**15%**	**85%**		**100%**
Vehicle Traffic Growth				
AADT Percent				
Autos	83.0%	89.0%		88.1%
Trucks	17.0%	11.0%		11.9%

Annual estimated increase in traffic is 1% for population growth

Safety Benefits:

Crashes:

Crash History from 2013-2022

Route	Fatal	Injury	Property Damage Only
BIA 2	0	5	4
BIA 41	3	9	7
Total	3	14	11

A total of 28 crashes occurred in the project area from 2013-2022. A listing of the crash data can be found at www.inputcentral.com/oglalasiouxnsfltp.

	Crash Modification Factor Description	CMF	Project Area	% of Route	ADT	% of Traffic	Weighted CMF
BIA 2	Install Shoulder Rumble	0.68	12 miles	56.34%	130	15%	0.82
BIA 2	New Guardrail Along Embankment	0.93	0.3 miles	1.17%			
BIA 41	Resurface Pavement	0.787	11.5 miles	70.12%	750	85%	0.87
BIA 41	Provide 2-ft Paved Shoulder (both sides) - Tangent Sections	0.88	9.5 miles	57.93%			
BIA 41	Provide 2-ft Paved Shoulder (both sides) - Curves	0.66	1.5 mile	9.15%			
				Total Crash Modification (Weighted) Factor Benefits			**0.86**

Using the weighted Crash Modification Factor, crashes following construction completion will be reduced 14 percent equal to 9.5 total crashes over the 20 year analysis (2026-2045) which equates to an estimated Safety Benefits defined as a cost savings of $12.8 million based upon the monetized vale of reduction of crashes.

Annual Accident Closures on BIA2 / BIA 41	Average Annual	Hours Road Closed	Average AADT/ hour	Average vehicles Delays	Number of VHT in Delays per year
Serious	1.4	2	5.42	15.2	15
Fatal	0.3	4	5.42	6.5	7
				21.7	22

In addition to the assumption listed above, the following table lists project assumptions to be used to calculate the Safety Benefits of this project.

Description of Work	Resulting Safety Improvements
BIA 41 wider road top with additional width for 2-foot paved shoulders	Increased safety for all vehicles including trucks, transit, school, and tourism busses
BIA 41 shoulders added	Increased ability to recover vehicle to road lane
BIA 41 new, more resilient asphalt pavement structure	The new pavement structure will resist rutting which is dangerous during inclement weather filling with water, ice, or slush. The new surface will have a cross-slope that sheds water
BIA 2 new, more resilient asphalt surfacing on top of existing double chip seal	The new asphalt pavement surfacing will have cross-slope that sheds water. The new surfacing and repairs to subgrade soft spots will eliminate potholes
BIA 2 new, more resilient asphalt surfacing on top of existing double chip seal	Repairs to subgrade soft spots and new surfacing will eliminate potholes
BIA 2 rumble strips	The new asphalt pavement surfacing is thick enough to install rumble strips where none currently exist
BIA 2 new guardrail at crash risk location	A guardrail and chevrons added will prevent a fatal runoff road crash at a 100-foot drop-off area
BIA 2 and BIA 41 improved surface	Consistent surface and elimination of ruts and potholes causing vehicle movement
BIA 41 shoulders added	Safe space for emergency vehicles and maintenance personnel and equipment mowing and removing snow
BIA 41 rumble strips	Added shoulders allow more room for rumble strips
BIA 2 crack and chip seal	Chip seal will increase friction of pavement

State of Good Repair Benefits

In 2019, a federally declared disaster occurred across the Pine Ridge Indian Reservation causing widespread damage. BIA 2's double chip seal surfacing was badly damaged due to the heavy snow, flooding, and saturated subgrade. The OSTDOT has spent $775,000 of TTP and Emergency Relief for Federally Owned Roads (ERFO) since 2019 to repair the asphalt pavement and double chip seal surface of BIA 2 and BIA 41, with most of the damage and repairs in the double chip seal surface area.

BIA 41 Reconstruction Project from 2.4 miles south of BIA 2 to 2.4 miles north of BIA 2, which was completed in 2019, was needed due to severe heaving of the badlands geology fat clay expansion. The road's heaving areas had become so severe that vehicles would become airborne when driving over some of the bumps. The OSTDOT reduced the speed limit through the area and consulted with engineers to develop a plan to address and combat the badlands geological fat clay movement. The plan incorporated recompacting the subgrade, incorporating geotextile separation fabric between the soil and granular base to add strength and prevent intermixing of subgrade fines into the granular base, adding a layer of triaxial geogrid with strength to lock the

subbase layer and base course layer and topping with 4-inches of asphalt. This area of reconstruction has been very successful with minor movement in 5 years and minimal asphalt pavement cracking. The asphalt will receive a crack and chip seal with this project to preserve the pavement. This project has served to be a successful test of geotextiles incorporated into the pavement structure and will be used in future projects wherever possible to develop stronger, more resilient roads.

Also included with the BIA 41 Reconstruction Project was spot leveling of BIA 41 from the north end of reconstruction to the Reservation line. The 11.5-mile segment had severe ruts which needed to be patched and leveled for safety of traveling public. Even though the ruts in 2019 were filled with asphalt, this segment of BIA 41 has continued to rut and needs to be reconstructed with the geotextiles incorporated into the pavement structure for stability, strength, and resilience.

No Build Scenario:
The cost of maintaining BIA 2 and BIA 41 is the same as the costs incurred to repair the routes within this project area in the last 5 years. Assessing damages from the storm of 2019 and anticipation of disaster storms recurring every 5 years in addition to estimated costs to asphalt spot fill rutted areas is estimated at $750,000.

Continued annual maintenance will include:
Stripping done annually is estimated at $1,800 per mile equating to $67,680 for the entire project area.
Crack and chip seals are to be completed every 7 years starting in 2024 estimated at $40,000 per mile equating to $1,504,000 for the entire project area. Asphalt pavement repairs are estimated at $150,000 per year. BIA 2's double chip seal surfacing has had high maintenance and repair costs.

Estimated days of closure for damage of BIA 2's double chip seal surfacing – 30 days, every 5 years. Estimated days of closure due to crashes – 1 day, every year on BIA 2 or BIA 41.

Build Scenario:
Estimated annual maintenance cost for the 37.6 miles of completed project is estimated at:

Crack and Chip Seal is estimated at $40,000 per mile equating to $1,504,000 to be completed every 7 years beginning 2032.

Stripping is estimated to be $1,800 per mile equating to $67,680 to be completed every year starting 2027.

Summary of Assumptions used in the No Build versus Build Maintenance estimates.

Assumption for Maintenance of the Corridor						
No Build	Facility		Unit	Annual Maintenance	life	in service
				Cost per Year		
	Roadway		Annual	$ 67,680		2027
	Roadway	Chip and seal	Every 7 years	$ 1,504,000		2029
	Roadway	Storm Damage	Every 5 years	$ 750,000		2029
Build	Facility		Unit	Annual Maintenance	life	in service
				Cost per Year		
	Roadway		Annual	$ 67,680		2027
	Roadway	Chip and seal	Every 7 years	$ 1,504,000		

Maintenance costs savings

Calendar Year	Project Year	$2021 No Build	Build	Total Maintenance Savings
2019				
2020				
2021				
2022				
2023				
2024				
2025				
2026	1	$ 67,680	$ -	$ 67,680
2027	2	$ 67,680	$ 67,680	$ -
2028	3	$ 67,680	$ 67,680	$ -
2029	4	$ 817,680	$ 67,680	$ 750,000
2030	5	$ 67,680	$ 67,680	$ -
2031	6	$ 817,680	$ 67,680	$ 750,000
2032	7	$ 67,680	$ 67,680	$ -
2033	8	$ 67,680	$ 67,680	$ -
2034	9	$ 1,571,680	$ 1,571,680	$ -
2035	10	$ 67,680	$ 67,680	$ -
2036	11	$ 67,680	$ 67,680	$ -
2037	12	$ 67,680	$ 67,680	$ -
2038	13	$ 817,680	$ 67,680	$ 750,000
2039	14	$ 1,571,680	$ 67,680	$ 1,504,000
2040	15	$ 67,680	$ 67,680	$ -
2041	16	$ 67,680	$ 1,571,680	$ (1,504,000)
2042	17	$ 67,680	$ 67,680	$ -
2043	18	$ 67,680	$ 67,680	$ -
2044	19	$ 1,571,680	$ 67,680	$ 1,504,000
2045	20	$ 817,680	$ 67,680	$ 750,000
Total Benefits		$ 8,865,600	$ 4,293,920	$ 4,571,680

In addition to the estimated reduction of $4.8 million in maintenance in the Project area, the reduction of maintenance was calculated on the reduction of vehicle miles traveled on the detour route over th 20-year analysis period.

Assumption	Assumption Valu	Unit	Source:
Pavement Maintenance Cost	$0.12	per truck mile	WSDOT

This Tab measures the roadway maintenance and preservation costs saved by removing the need for a detour.

Description of Work	Resulting State of Good Repair
BIA 41 pavement reconstruction	Use of geotextiles along with base course and asphalt concrete will extend life span and provide stronger and more resilient pavement structure
BIA 41 pavement reconstruction	Reduces temporary repair costs and deferred maintenance to OSTDOT
BIA 2 pavement restoration	Repairing potholes and recompacting soft spots, covering the double chip seal with asphalt leveling lift and topping with 2-inch asphalt pavement will protect road from continued deterioration
BIA 2 pavement restoration	Restoring the surfacing will improve the ride and reestablishing the cross slope will shed water
BIA 2 crack and chip seal	Installing crack and chip seal will maintain and protect the existing asphalt pavement
BIA 2 crack and chip seal	Spot repairs to asphalt prior to the crack and chip seal will improve ride quality and repair vulnerable spots to prevent future asphalt breakups and potholes

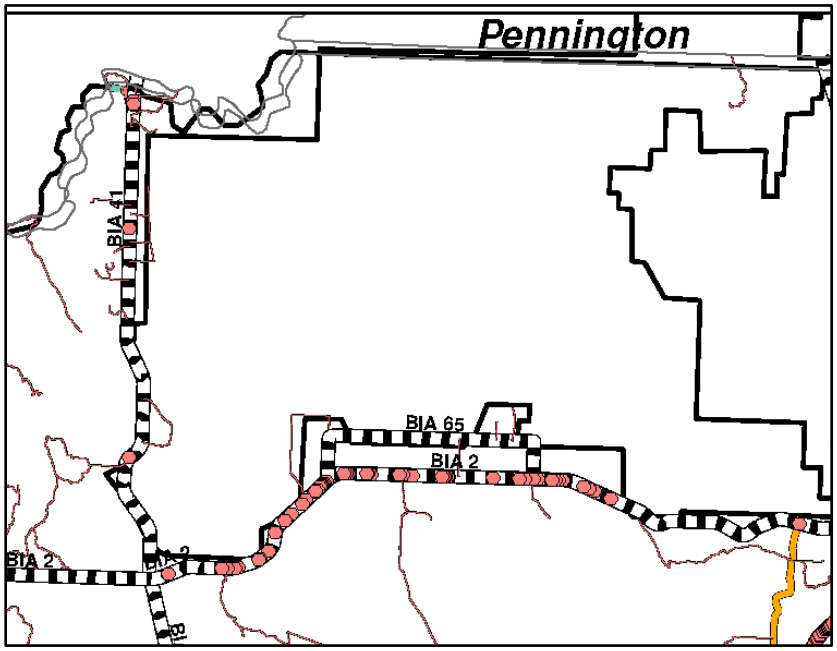
Economic Competitiveness Benefits:
Quantitative Benefits include:
Travel Time Savings of $4.7 million based upon the reduction of a 75-mile detour for one month every five year.

Travel Time Savings (VHT) 2026-2045				
Autos - VHT	123,809	0	(123,809)	$ 4,126,576
Trucks - VHT	25,358	0	(25,358)	$ 574,469
Total - VHT	149,167	0	(149,167)	$ 4,701,045

In 2019 storms severely impacted the region and BIA 2's double chip seal surfacing had a multitude of breakups. The map shows the repair areas on BIA 2 and BIA 41. Repair costs because of this declared disaster total $775,000 within the project area.

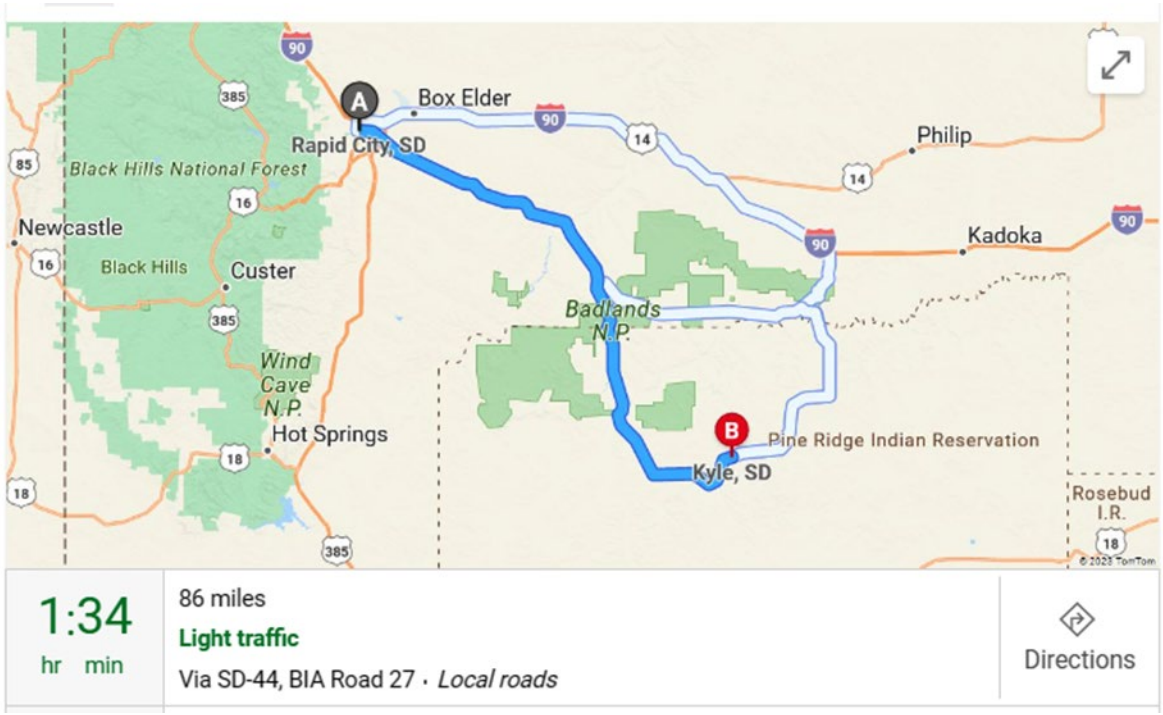
Estimated Detours:
BIA 2 – In 2019, severe damage occurred to BIA 2's double chip seal surfacing due to a federally declared storm event which blocked traffic and required a detour. The damage occurred in late March and early April, but asphalt was not available until May due to temperatures. For one month traffic avoided BIA 2 and detoured 43.6 miles.

BIA 41 – This section of BIA 41 has a high crash rate including several fatal crashes. Traffic is shut down for several hours during OST's Department of Public Safety investigation. A likely detour from Pine Ridge Village, SD to Rapid City, SD would increase travel by 43.6 miles.

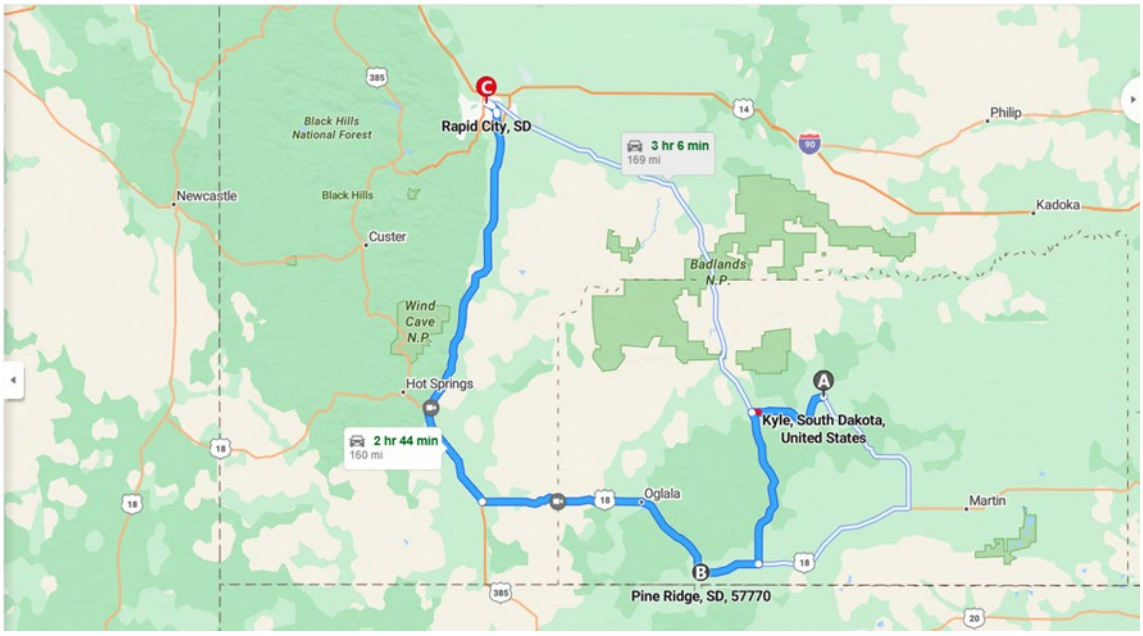


The normal route from Pine Ridge Village, SD to Rapid City, SD is 99.4 miles.
The detour route from Pine Ridge Village, SD to Rapid City, SD through Buffalo Gap, SD is 143 miles.

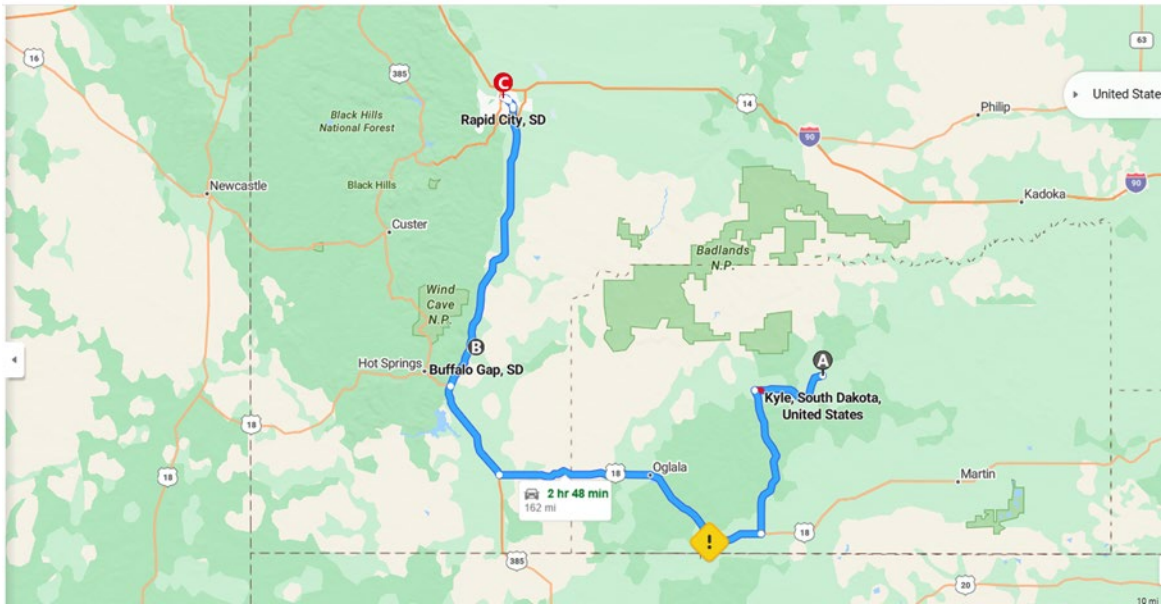
To make the calculations as straight forward as possible the route between Rapid City, SD and Kyle, SD was used as the example route for the calculation of benefits of the completion of this project that would save travelers time and costs during a closure of BIA 2 or BIA 41.
The direct route between these two cities is 86 miles which takes as estimated 1 hour and 34 minutes to travel.



If BIA 2 is closed, the detour between these two points is shown on the map below:



This detour route calculated by Google Maps is 160 miles and takes 2 hours and 44 minutes. If BIA 41 is closed, the shortest detour route shown by Google Maps is 162 miles and takes 2 hours and 48 minutes.



When averaged the detour route is 75 miles longer (taking an additional 72 minutes of driving time) than the direct route between Kyle, SD and Rapid City, SD.

Detour routes	Time in min	Miles	
Rapid City to Kyle, SD direct BIA 41 to BIA 2	94	86.00	
Rapid City to Kyle, SD detour through Pine Ridge if BIA 2 is closed	164	160.00	
Rapid City to Kyle, SD detour through Buffalo Gap if BIA 41 Closed	168	162.00	
Added time and miles (difference between direct and detour route)	72	75.00	added if detour required

Based upon historical closures, it is estimated that a detour can be anticipated to occur every 5 years for a length of 1 month.

Probablity of Road Close due to Flood/ slides		
Annual Probablity of Closure	0.20	
Length of Closure	1	months
Monthly Trips	26,767	
Estimate of Annual trips delayed	5,353	
Estimated Average annual hours of delay	6,424	

In addition to the assumption listed above, the following table list project assumptions to be used to calculate the Economic Competiveness Benefits of this project.

Emission Savings

Fuel saving is estimated based upon the reduction of VMT over the 20-year analysis period.

Calendar Year	Project Year	No-BUILD VMT	BUILD VMT	VMT Savings (annual)	Percent of VMT - All Purpose	Percent of VMT - Truck	Gasoline Savings - All Purpose	Diesel Savings - Trucks
		VMT			88%	12%	**Gallons** based upon 24.7 miles per gallon	**Gallons** based upon 6 miles per gallon
2026	1	17,114,212	16,696,409	417,803	368,141	49,662	14,904	8,277
2027	2	17,285,354	16,863,374	421,981	371,822	50,158	15,054	8,360
2028	3	17,458,208	17,032,007	426,200	375,541	50,660	15,204	8,443
2029	4	17,632,790	17,202,327	430,462	379,296	51,166	15,356	8,528
2030	5	17,809,118	17,374,351	434,767	383,089	51,678	15,510	8,613
2031	6	17,987,209	17,548,094	439,115	386,920	52,195	15,665	8,699
2032	7	18,167,081	17,723,575	443,506	390,789	52,717	15,821	8,786
2033	8	18,348,752	17,900,811	447,941	394,697	53,244	15,980	8,874
2034	9	18,532,239	18,079,819	452,420	398,644	53,776	16,139	8,963
2035	10	18,717,562	18,260,617	456,944	402,630	54,314	16,301	9,052
2036	11	18,904,737	18,443,223	461,514	406,657	54,857	16,464	9,143
2037	12	19,093,785	18,627,656	466,129	410,723	55,406	16,628	9,234
2038	13	19,284,722	18,813,932	470,790	414,830	55,960	16,795	9,327
2039	14	19,477,570	19,002,071	475,498	418,979	56,519	16,963	9,420
2040	15	19,672,345	19,192,092	480,253	423,169	57,085	17,132	9,514
2041	16	19,869,069	19,384,013	485,056	427,400	57,655	17,304	9,609
2042	17	20,067,759	19,577,853	489,906	431,674	58,232	17,477	9,705
2043	18	20,268,437	19,773,632	494,805	435,991	58,814	17,651	9,802
2044	19	20,471,121	19,971,368	499,753	440,351	59,403	17,828	9,900
2045	20	20,675,833	20,171,082	504,751	444,754	59,997	18,006	9,999
During 20 year Analysis Period		**359,723,690**	**350,941,897**	**8,781,793**	**7,737,957**	**1,093,497**	**328,182**	**182,250**
								510,432

Calendar Year	Project Year	SOX Savings	CO2 savings	NOx Savings	$PM_{2.5}$ Savings	VOC Savings	SOX Savings	NOx Savings	$PM_{2.5}$ Savings
		kg/mile	kg/mile	kg/mile	kg/mile	metric ton	metric ton	metric ton	metric ton
2026	1	1.0059	216,715	417	12	0.0	0.0010	0.417	0.011751
2027	2	1.0160	218,882	421	12	0.0	0.0010	0.421	0.011868
2028	3	1.0261	221,071	425	12	0.0	0.0010	0.425	0.011987
2029	4	1.0364	223,282	429	12	0.0	0.0010	0.429	0.012107
2030	5	0.8485	225,515	129	4	0.0	0.0008	0.129	0.004269
2031	6	0.8570	227,770	130	4	0.0	0.0009	0.130	0.004312
2032	7	0.8655	230,048	132	4	0.0	0.0009	0.132	0.004355
2033	8	0.8742	232,348	133	4	0.0	0.0009	0.133	0.004398
2034	9	0.8829	234,672	134	4	0.0	0.0009	0.134	0.004442
2035	10	0.8918	237,018	136	4	0.0	0.0009	0.136	0.004487
2036	11	0.9007	239,389	137	5	0.0	0.0009	0.137	0.004532
2037	12	0.9097	241,782	138	5	0.0	0.0009	0.138	0.004577
2038	13	0.9188	244,200	140	5	0.0	0.0009	0.140	0.004623
2039	14	0.9280	246,642	141	5	0.0	0.0009	0.141	0.004669
2040	15	0.6439	249,109	63	2	0.0	0.0006	0.063	0.002110
2041	16	0.6503	251,600	63	2	0.0	0.0007	0.063	0.002131
2042	17	0.6568	254,116	64	2	0.0	0.0007	0.064	0.002152
2043	18	0.6634	256,657	65	2	0.0	0.0007	0.065	0.002174
2044	19	0.6700	259,223	65	2	0.0	0.0007	0.065	0.002196
2045	20	0.6767	261,816	66	2	0.0	0.0007	0.066	0.002217
During 20 year Analysis Period		**17**	**4,555,139**	**3,013**	**105**	**0**	**0.016**	**3.01**	**0.105**

Calendar Year	Project Year	Monetized value of SOX savings	Monetized value of NOx savings	Monetized value of PMs savings	Total Savings Non-CO_2		Monetized value of CO2 savings	Total Savings CO_2
2026	1	$ 48	$ 7,292	$ 10,013	$ 17,353		$ 13,003	$ 13,003
2027	2	$ 49	$ 7,533	$ 10,437	$ 18,020		$ 13,352	$ 13,352
2028	3	$ 51	$ 7,736	$ 10,709	$ 18,496		$ 13,706	$ 13,706
2029	4	$ 52	$ 7,985	$ 10,988	$ 19,025		$ 14,067	$ 14,067
2030	5	$ 44	$ 2,441	$ 3,874	$ 6,359		$ 14,658	$ 14,658
2031	6	$ 44	$ 2,465	$ 3,913	$ 6,422		$ 15,033	$ 15,033
2032	7	$ 44	$ 2,490	$ 3,952	$ 6,487		$ 15,413	$ 15,413
2033	8	$ 45	$ 2,515	$ 3,992	$ 6,551		$ 15,800	$ 15,800
2034	9	$ 45	$ 2,540	$ 4,032	$ 6,617		$ 16,192	$ 16,192
2035	10	$ 46	$ 2,565	$ 4,072	$ 6,683		$ 16,591	$ 16,591
2036	11	$ 46	$ 2,591	$ 4,113	$ 6,750		$ 17,236	$ 17,236
2037	12	$ 47	$ 2,617	$ 4,154	$ 6,818		$ 17,650	$ 17,650
2038	13	$ 47	$ 2,643	$ 4,196	$ 6,886		$ 18,071	$ 18,071
2039	14	$ 48	$ 2,669	$ 4,237	$ 6,955		$ 18,498	$ 18,498
2040	15	$ 33	$ 1,188	$ 1,915	$ 3,136		$ 18,932	$ 18,932
2041	16	$ 33	$ 1,200	$ 1,934	$ 3,167		$ 19,625	$ 19,625
2042	17	$ 34	$ 1,212	$ 1,953	$ 3,199		$ 20,075	$ 20,075
2043	18	$ 34	$ 1,224	$ 1,973	$ 3,231		$ 20,533	$ 20,533
2044	19	$ 34	$ 1,236	$ 1,993	$ 3,263		$ 20,997	$ 20,997
2045	20	$ 35	$ 1,248	$ 2,013	$ 3,296		$ 21,469	$ 21,469
During 20 year Analysis Period		**$ 859**	**$ 56,098**	**$ 94,463**	**$ 141,359**		**$ 327,899**	**$ 327,899**
							$ 469,258	

The above tables estimate that a total Environmental Savings when monetized is $0.5 million over the 20-year analysis period.

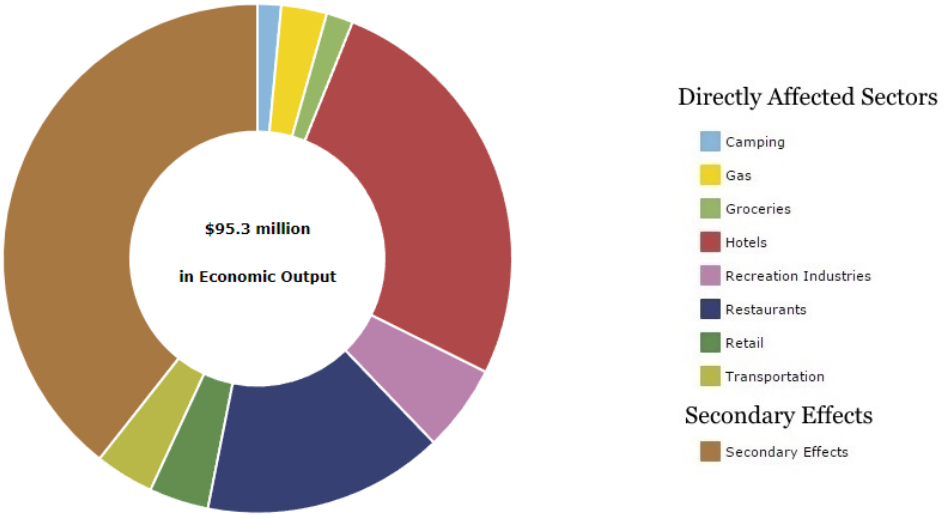
Description of Work	Resulting Economic Growth
BIA 2 and BIA 41 improved surface	Better access to tourists, residents, businesses, and trucking along the Crazy Horse Scenic Byway
BIA 2 and BIA 41 improved surface	Better access to the Badlands National Park South Unit
BIA 2 and BIA 41 improved surface and safety	Supports Oglala Sioux Tribe's plans to add Byway visitor centers at Red Shirt Table overlook and Cuny Table overlook
BIA 2 and BIA 41 improved surface and safety	Supports NPS General Management Plan to replace the current White River Visitor Center with a new facility, and add amenities to the South Unit including camping sites, trails, and lodging
BIA 41 wider road top with shoulders added	Support growth of trucking for industrial, commercial, mining and agricultural industries in the region
BIA 2 improvements support increased consumer spending	Reduce damage to personal and commercial vehicles, reduce consumer spending on vehicle repairs and allow residents to spend on essential needs or personal items
BIA 2 and BIA 41 construction	Job creation in the construction of the project will have significant short-term and probable long-term economic impact

Qualitative Benefits include:

Visitors to the Badlands National Park South Unit White River Visitor Center have increased 75% since 2013 after paving BIA 2 from BIA 41 to BIA 27. Prior to 2011, 19.5 miles was gravel surface and impassable during inclement weather. To support tourism growth along the Crazy Horse Scenic Byway, provide better access to the Badlands National Park South Unit, and encourage economic tourism related business growth, it is essential to improve road conditions of BIA 2 and BIA 41.

With the right transportation infrastructure in place, this Project will position the Oglala Sioux Tribe to continue to grow economically through the tourism industry. The tourism industry in western South Dakota is thriving with millions of visitors every year to the Black Hills Area, which is only 60 miles northwest of the Project area. Additionally, Badlands National Park has recorded an average of more than one million visitors annually. Of these visitors, only 16,500 visitors traveled to the South Unit in 2023. With a safe transportation network and the Scenic Byway designation, the tourism industry will grow with Project completion. Not only will the improvement of BIA 2 and BIA 41 positively influence the local and regional economies, it will also positively impact the nation's economy through increases in demand of goods for the park and surrounding businesses. Visitors will impact areas en route to the park by way of hotel stays, restaurants, and fuel costs.

In 2022, the NPS (Visitor Spending Effects - Economic Contributions of National Park Visitor Spending) reported receiving over 1 million visitors who generated $95.3 million in economic output. On average, each visitor then contributes $95.3 to the tourism industry. Paving BIA 2 ten years ago increased visitors to the South Unit by 75%. Improving BIA 2 and BIA 41 adjacent to the South Unit will at the very least maintain growth of visitors to the South Unit. A 75% increase of visitors in ten years would be 28,875 in year 2033, contributing $2,751,787 to the local economy. In another 10 years, in 2043, visitors would be 50,530 and contribute $4,815,628.



Historical Investment Last 20 Years:

Prior to 2013, BIA 2 from BIA 41 to BIA 27, located along the south edge of the Badlands National Park South Unit, was gravel surfacing except for the west 1.8 miles which was paved in 2001. The gravel surfacing was a deterrent to tourism traffic and visitors to the White River Visitor Center. The Tribe sought to completely pave this 21.3-mile stretch to grow their tourism economy and provide better connectivity to Tribal members and residents of Pine Ridge Indian Reservation. The BIA 2 – Cuny Table Road Project received $1.9 million in Public Lands Highway Discretionary Funds and the Tribe contributed another $800,000 of TTP funds to reconstruct and asphalt pave as much of BIA 2 as they could afford. The project completed the asphalt paved road in 2013 from BIA 27 to 2 miles west, giving better access to the White River Visitor Center and visitor numbers began to increase.

During the same time as the planning and construction of the 2-mile project, the Oglala Sioux Tribe Department of Transportation submitted TIGER grant applications to complete asphalt pavement construction across the remaining 17.5 miles of BIA 2. They requested $18 million of TIGER II funding in 2010, $18 million of TIGER III funding in 2011, and $6 million (5 miles) of TIGER IV funding in 2012. After three unsuccessful grant applications, OSTDOT had a debrief with USDOT TIGER team. The USDOT TIGER team suggested the project would need to complete the hard surface paving the entire between BIA 41 and BIA 27 to realize the benefits and $18 was too high of a grant request.

Year Complete	Project Name	Road Section	Project Cost	Funding Source
2013	BIA 2 – Cuny Table Rd (2 miles)	BIA 2, Sections 35 and 45	$ 2,704,500	Public Lands Highway Discretionary Funds / TTP
2016	BIA 2 – Gateway to the Badlands (17.5 miles)	BIA 2, Sections 25 and 30	$ 10,875,300	TIGER / TTP
2019	BIA 41 – Reconstruction and Spot Leveling (4.8 miles reconstruction and 11.5 miles spot leveling)	BIA 41, Sections 60, 65 and 70	$ 5,118,200	TTP
2019	Emergency Asphalt Repairs following Declared Storm Disaster	BIA 2, Section 25 and BIA 41, Section 70	$ 628,000	ERFO / TTP
2020	Asphalt Pavement Repairs	BIA 2, Sections 20, 25 and 35	$ 118,000	TTP
2021 - 2023	Asphalt Pavement Patch Repairs	BIA 2, Section 25	$ 29,000	TTP
		Total =	$ 19,473,000	

Since the Tribe did not have extra funding which could supplement the project, an alternative solution was proposed in their TIGER V grant application in 2103. The project was separated into two segments, a 5.5-mile 4-inch asphalt paved surface and a 12-mile double chip seal surface. In the TIGER V grant application, the OSTDOT identified the need for a follow-up project to apply a 4-inch-thick asphalt pavement overlay of the 12-mile double chip seal. Unfortunately, due to funding constraints compounded by a severe storm declared disaster across the Reservation, this follow-up asphalt overly project has been put on hold until grant funds or TTP funds are available.

It is estimate that 9.2 million miles between 2026 and 2045 will be reduced along the detour route when this project is completed for a total maintenance savings of $1.1 million.

Quality of Life Benefits:

As listed in the NOFO Quality of Life benefits include the reduction of Vehicle Miles Travel, and the associated cost for those miles.
As discussed above in Economic Competiveness, this Project is anticipated to remove the need of a closure on BIA 2 and / BIA 41. As previously calculated a one-month closure of either of these routes every 5 years, is estimated to account for an annual closure of 3% which over the 20-year periods adds up to 9.2 million miles equivalent to a time travel savings of $4.7 million. Other qualitative benefits are listed below:

Description of Work	Resulting Quality of Life Improvement
BIA 2 and BIA 41 improvements	Prevents blocked roads and creates safer and more efficient travel and time savings
BIA 41 add shoulder improvements	Improve safety by providing a safer route for emergency services and shoulders for emergency service parking
BIA 2 and 41 improvements	Safer and more efficient travel and time savings, residents' access to Tribal transit, schools, grocery, healthcare, financial institutions, businesses, other housing areas, and people with disabilities have more access to goods & services
BIA 2 and 41 shoulders, rumble strips and guardrail	Decrease potential for crashes from road condition and added safety updates
BIA 33 with safer & higher design speed	Emergency response time decreased
BIA 41 added shoulders, and snow storage	Ease for road maintenance crews to plow snow, safer, shoulders to plow snow onto
BIA 2 improved surface	Vehicle maintenance cost reduction for residents, schools, agriculture, mining, and transit
BIA 33 flattened side slopes	Reduced damage road maintenance mowers
BIA 2 and BIA 41 better access for tourism businesses	Tribe and local businesses grow and increase jobs for Tribal members
BIA 2 and BIA 41 construction	Job creation in the grading and paving construction phases of the project will have significant short-term and probable long-term economic impact