

South Dakota Department of Transportation
Interchange Modification Justification Report

Interstate 29 - Exit 62
(US18 - Canton)



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EXECUTIVE SUMMARY

The South Dakota Department of Transportation (SDDOT) has initiated an assessment of the existing interchange on Interstate 29 (I-29) at Exit 62 in Lincoln County, South Dakota. As both the existing pavement and structures of the ramps and crossroad are all approaching the end of their service life and/or functionality, it is appropriate to evaluate the existing interchange configuration and analyze its operation for the anticipated future traffic levels. This evaluation has demonstrated no need to reconfigure the existing diamond interchange, only a need to raise the crossroad over the Interstate mainline and bring the interchange up to current geometric standards.

Through the decades since the interchange's construction, five property access points have been developed within the SDDOT's control of access along the crossroad east of the interchange. A check of SDDOT records indicates that permits for the two access points along the north side of US18 east of the interchange were not submitted, and thus not approved. Permits for the three access points along the south side of US18 east of the interchange were submitted by the property owner and approved by the Mitchell Region and/or Sioux Falls Area Offices of the SDDOT. However, SDDOT records also indicate that the break in the control of access was not properly granted by the South Dakota Transportation Commission and the Federal Highway Administration for the two westernmost access locations of the three permitted access locations. This situation will be addressed by the SDDOT with the project that will reconstruct the interchange.

This interchange modification justification report (IMJR) is the culmination of several steps that have been completed to document the benefits and impacts associated with a range of modification alternatives for the existing interchange. This document was completed following the outline provided in the Federal Highway Administration's (FHWA) August 2010 *Interstate System Access Informational Guide* and meets the requirements of the *Access to the Interstate System* policy printed in the Federal Register on August 27, 2009.

FHWA REQUIREMENTS

FHWA policy has developed requirements that need to be addressed when evaluating changes to access points on interstate facilities (Federal Register, Volume 74, Number 165, August 27, 2009). The requirements are part of a policy that was put in place to maintain high levels of safety and mobility on the Interstate System. The policy consists of eight requirements that new access locations should meet. As this modification request is to modify the existing Exit 62 interchange by raising the elevation of the crossroad, the following is the summarized response to each requirement. The full response to each requirement can be found in Chapter 9: Recommendations.

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1. *The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).*

This modification request is to maintain the existing diamond configuration, but with some crossroad and ramp improvements to meet current design standards. No additional access to the Interstate System is being requested. The reconfiguration of the existing interchange will have a negligible effect on the Interstate's traffic operations when compared with the existing interchange's configuration. Most of the Interstate System benefit will be seen in the anticipated reduction in over height strikes of the interchange's crossroad structure. A secondary benefit is that the interchange's geometrics will be brought up to current standards.

2. *The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).*

This modification request is to maintain the existing diamond configuration, but with some crossroad and ramp improvements to meet current design standards. No additional access to the Interstate System is being requested. Existing and future traffic operations do not warrant a need for additional capacity at this location.

There are no areas within the State of South Dakota that will consistently experience congestion levels extreme enough to make ramp metering or HOV facilities economically feasible in the foreseeable future.

3. *An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in*

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access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)).

Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

This modification request is to maintain the existing diamond configuration, but with some crossroad and ramp improvements to meet current design standards. Existing and future traffic operations do not warrant a need for additional capacity. This led to one alternative, maintaining the diamond configuration, being analyzed.

4. The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).

The access improvement will maintain a connection to a public road (US18 / Lincoln County 128 / 282nd Street) and will continue to be a full access interchange. The interchange will continue to provide for all traffic movements. The improvement will meet or exceed current standards for Federal-aid projects on the Interstate system.

5. The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.

The proposed interchange improvement is consistent with local land use plans, the STIP, and local transportation plans.

6. In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range

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system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).

Neither the South Dakota Interstate Corridor Study completed in February 2001 nor the 2010 South Dakota Decennial Interstate Corridor Study indicated that there is a potential for future interchange additions along the segments of Interstate 29 between Exit 62 and the adjacent exits.

7. When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).

The proposed interchange modification is not the result of any new or expanded development. The interchange is being reconstructed to address the aging, functionally obsolete structures of the existing interchange while improving safety by reducing the risk of an over height vehicle strike. The US18 / Lincoln County Highway 128 crossroad will be reconstructed along with the interchange from 900' east of 470th Avenue west of the interchange to 471st Avenue east of the interchange.

8. The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).

The proposed revised access is included in the STIP and the status of the environmental process is tracking consistent as other projects believed to be a type II categorical exclusion programmed for the same year.

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Chapter 1: INTRODUCTION

The South Dakota Department of Transportation (SDDOT) has initiated an assessment of the existing interchange on Interstate 29 (I-29) at Exit 62 in Lincoln County, South Dakota.

This interchange modification justification report (IMJR) is the culmination of several steps that have been completed to document the benefits and impacts associated with a range of modification alternatives for the existing interchange. This document was completed following the outline provided in the Federal Highway Administration's (FHWA) August 2010 *Interstate System Access Informational Guide* and meets the requirements of the *Access to the Interstate System* policy printed in the Federal Register on August 27, 2009.

Background

The existing Exit 62 interchange was first identified as having some structural needs for replacement by the 2000 Statewide Interstate Corridor Study. The existing twin crossroad structures are listed as functionally obsolete for insufficient vertical clearance above mainline I-29. The structures are routinely hit by over height vehicles. This has demonstrated the need to replace the twin structures in order to improve safety and function by providing the minimum clearance. Along with raising the elevation of the US18 crossroad over I-29, the twin structures will be consolidated into one structure.

Purpose

The existing structures of the Exit 62 crossroad over Interstate 29 mainline are consistently being hit by over height vehicles, and they lack the minimum vertical clearance for structures over the Interstate. Raising the elevation of the crossroad to obtain the standard vertical clearance results in the need for some vertical realignment of the ramps and the interchange crossroad. The ramps will be redesigned to meet current AASHTO standards.

Project Location

Exit 62 is an existing connection between I-29 and US Highway 18 (US18) / 282nd Street. Exit 62 is located on I-29 approximately 62 miles north of the Iowa state line and 13 miles south of the I-29/I-229 System Interchange. The interchange is in Lincoln County, approximately 2 miles south and 1 ½ miles west of the City of Worthing, South Dakota. Figure 1 shows the location of Exit 62. US18 extends east from the interchange to Canton, SD (approximately 8 ½ miles) and then into Iowa. US18 joins I-29 at Exit 62 and heads south along I-29 to Exit 59 before leaving I-29 and heading west to Wyoming. Exit 62 is currently the only service interchange serving Canton, which is the Lincoln County Seat.

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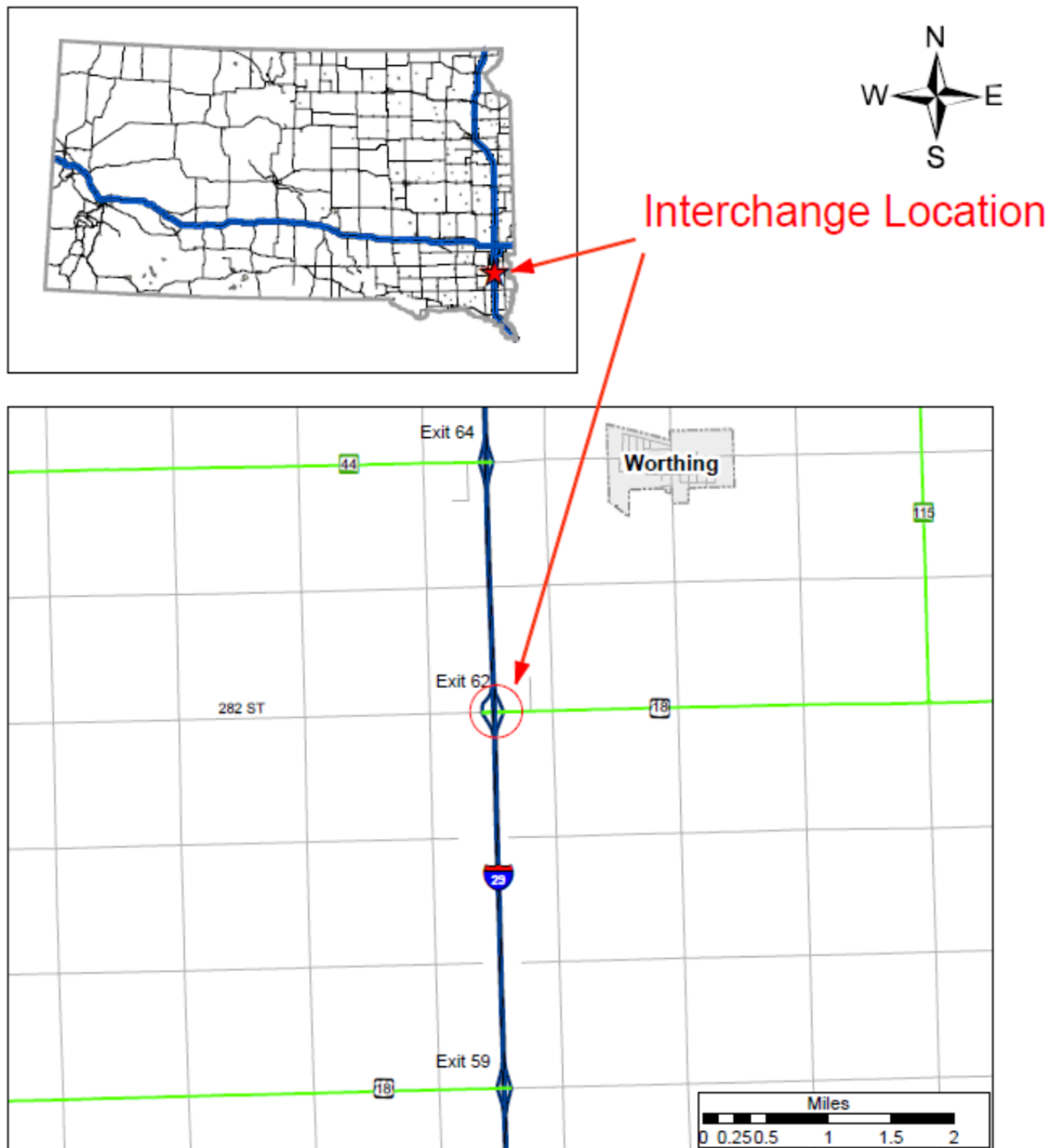


Figure 1: Project Location

Exit 62 was originally constructed as a partial cloverleaf with a loop ramp in the northwest quadrant for the US18 westbound to I-29 southbound movement. The loop ramp was removed with a mainline paving project in 2001, leaving the current configuration for Exit 62 as a typical diamond interchange, as shown in Figure 2. The proposed interchange modification would retain the diamond configuration at Exit 62, as the modification is primarily a change in vertical alignments due to raising the elevation of the crossroad.

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Figure 2: Existing Configuration

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Chapter 2: METHODOLOGY

This interchange modification justification report (IMJR) demonstrates that the action associated with implementing the proposed project does not have any fatal flaws. Demonstrating that no fatal flaws exist does not endorse the action, but rather allows for the conclusion that the identified access alternatives are not flawed from the perspective of traffic operations and safety, as required by the Federal Highway Administration (FHWA). Fatal flaws would include a proposed interchange modification that:

- Does not provide full access to public roads.
- Would negatively impact interstate facility traffic operations and cannot be reasonably mitigated.
- Would negatively impact interstate facility/cross street safety and cannot be reasonably mitigated.
- Conflicts with or is inconsistent with local and regional plans.
- Would create the potential for environmental consequences which could not be mitigated.

This IMJR was developed through the following steps:

- Establishing an appropriate study area: The study area is documented in Figure 1.
- Reviewing available current traffic volume data and existing and future land use information for the study area.
- Addressing the FHWA requirements for interstate access modifications. This step includes completion of the necessary analyses and evaluations that document the benefits and impacts of the access modification as it relates to the FHWA requirements. These analyses include:
 - Preparing horizon year traffic forecasts. Daily and peak hour traffic forecasts for 2032 were prepared for the study area interstate segments, interchanges, interstate ramp intersections and adjacent rural street intersections based on the typical SDDOT rural forecasting methodology.
 - Analyzing current and future traffic operations along study area roadway links. The traffic analyses were completed using the procedures and methodologies found in the *2010 Highway Capacity Manual*. In addressing the FHWA requirements, this report includes documentation of predicted traffic operations with and without the interchange modification. Most traffic operations analyses were completed using HCS+T7F software. The HCS+T7F software package use analysis procedures defined in the Highway Capacity Manual. HCS+T7F output reports of this analysis are included in Appendix A.
 - Evaluating the access modification and its benefits/impacts to adjacent development associated with the access modification.

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This IMJR document is organized in accordance with section 3.5.3 of FHWA's *Interstate System Access Information Guide*, August 2010.

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Chapter 3: EXISTING CONDITIONS

Demographics

The existing Exit 62 interchange primarily provides the connection between US highway 18 eastward and I-29. As shown in Figure 3 below, the interchange currently serves primarily an agricultural area with some limited commercial and industrial development immediately around the interchange.

Existing Land Use

Land use surrounding the Exit 62 interchange is primarily commercial immediately adjacent to Exit 62, with some industrial zoned areas off northeast of the US18 commercial strip east of I-29. The majority of the area within the interchange's area of influence is zoned agricultural. The current Lincoln County zoning map shows the land use in Figure 3 below.

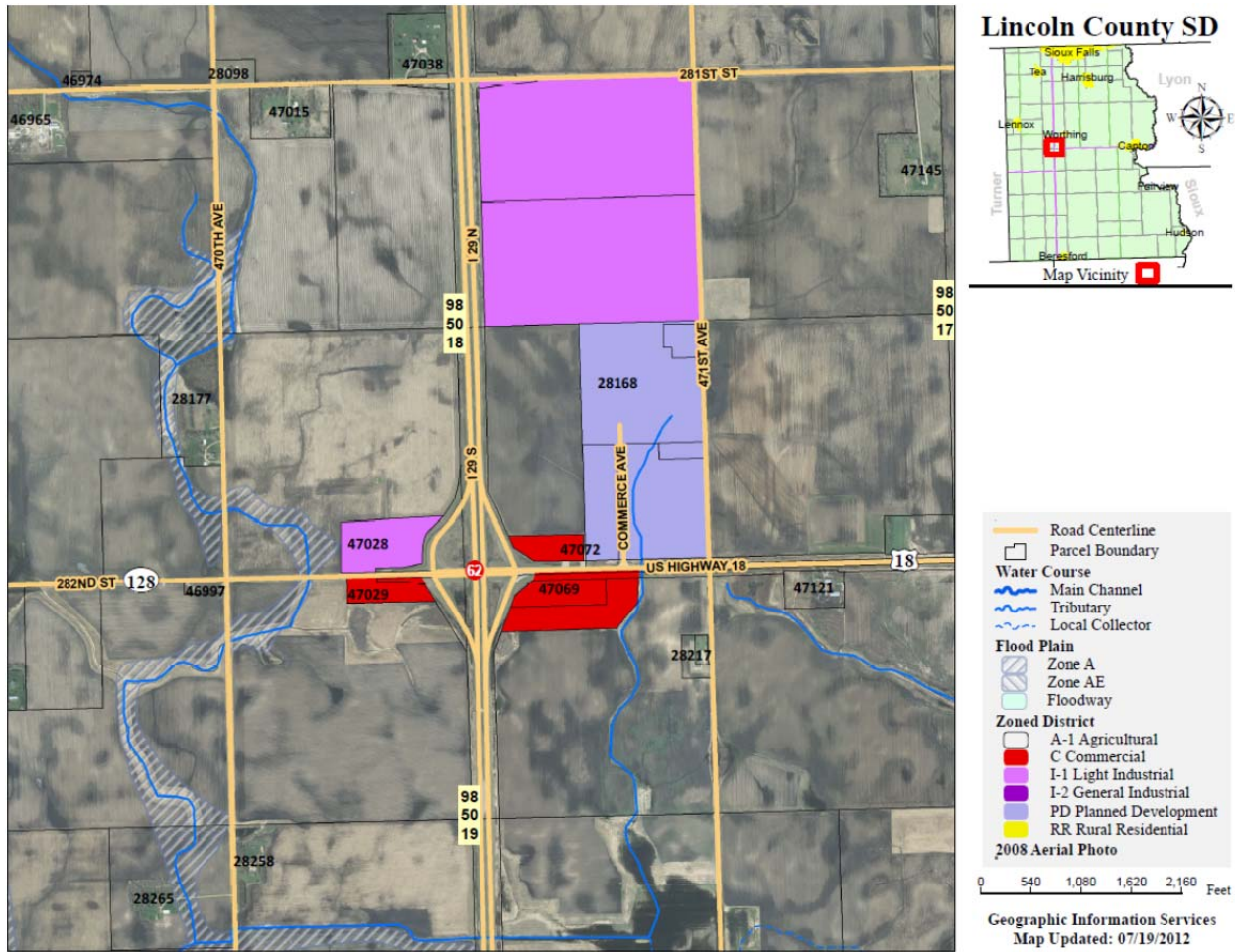


Figure 3: Current Land Use

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Alternative Travel Modes

Given the rural nature of the area surrounding Exit 62, there is currently no routine transit stops to the interchange area. Jefferson Bus Lines runs daily service between Sioux Falls, SD and Sioux City, IA along I-29 through the interchange, but does not routinely stop at the interchange.

The Canton Municipal Airport is located about 11 ½ miles east of the interchange along US18 and the Marv Skie-Lincoln County Airport is located approximately 11 miles north of the interchange along I-29. Both airports provide general aviation services to Lincoln County South Dakota, and northwestern Iowa. The nearest airport providing commercial passenger and freight services is the Sioux Falls Regional Airport, located approximately 20 miles north and 3 ½ miles east of the interchange.

Given the rural nature of the area surrounding Exit 62, there are currently no designated bicycle routes in the interchange area.

Interchanges

I-29 Exit 62: US18 (Canton) / Lincoln County 128

The existing interchange for I-29 and Exit 62 is a diamond configuration, with a spacing of approximately 940' between the interchange ramp terminal intersections along US18. Both intersections are presently stop sign controlled. Originally, there was also loop ramp for the US18 westbound to I-29 southbound movement in the northwest quadrant of the interchange, but that ramp was removed in 2001 with a mainline paving project. All ramps are single lane ramps. The US18 crossroad of Exit 62 was initially a four lane section with a center median. However, the roadway has since been restriped to provide for only one lane in each direction with shoulders and a striped median. This is primarily to accommodate the crossroad's twin structures (one for each direction). A left turn lane is provided for the westbound to southbound movement at the southbound ramp terminal to accommodate the continuity of US18, which runs coincident with I-29 from the interchange south. The aerial photo in Figure 5 shows the configuration of the existing Exit 62 interchange.

On the east side of the interchange, US18 is a two lane section with a striped median and occasional left turn lane until the intersection with Commerce Avenue, the nearest intersection to the interchange, approximately 1,000 feet east of the northbound ramp terminal. The closest driveways to properties located on the east side of Exit 62 are approximately 375 feet east of the northbound ramp terminal intersection.

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Figure 5: Existing I-29 Exit 62 Interchange Configuration

West of the interchange, the crossroad becomes Lincoln County Highway 128, which is a typical rural 2 lane paved county highway. The closest intersection is 470th Avenue, approximately 2,200 feet west of the southbound ramp terminal intersection. The closest property access driveway located on the west side of Exit 62 is approximately 600 feet west of the southbound ramp terminal intersection.

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I-29 Exit 59: US18 (Davis) / Lincoln County 134

The adjacent interchange south of the I-29/Exit 62 interchange is the I-29/Exit 59 service interchange, located approximately 3 miles south. The Exit 59 interchange is also a typical diamond configuration and is shown in Figure 6.

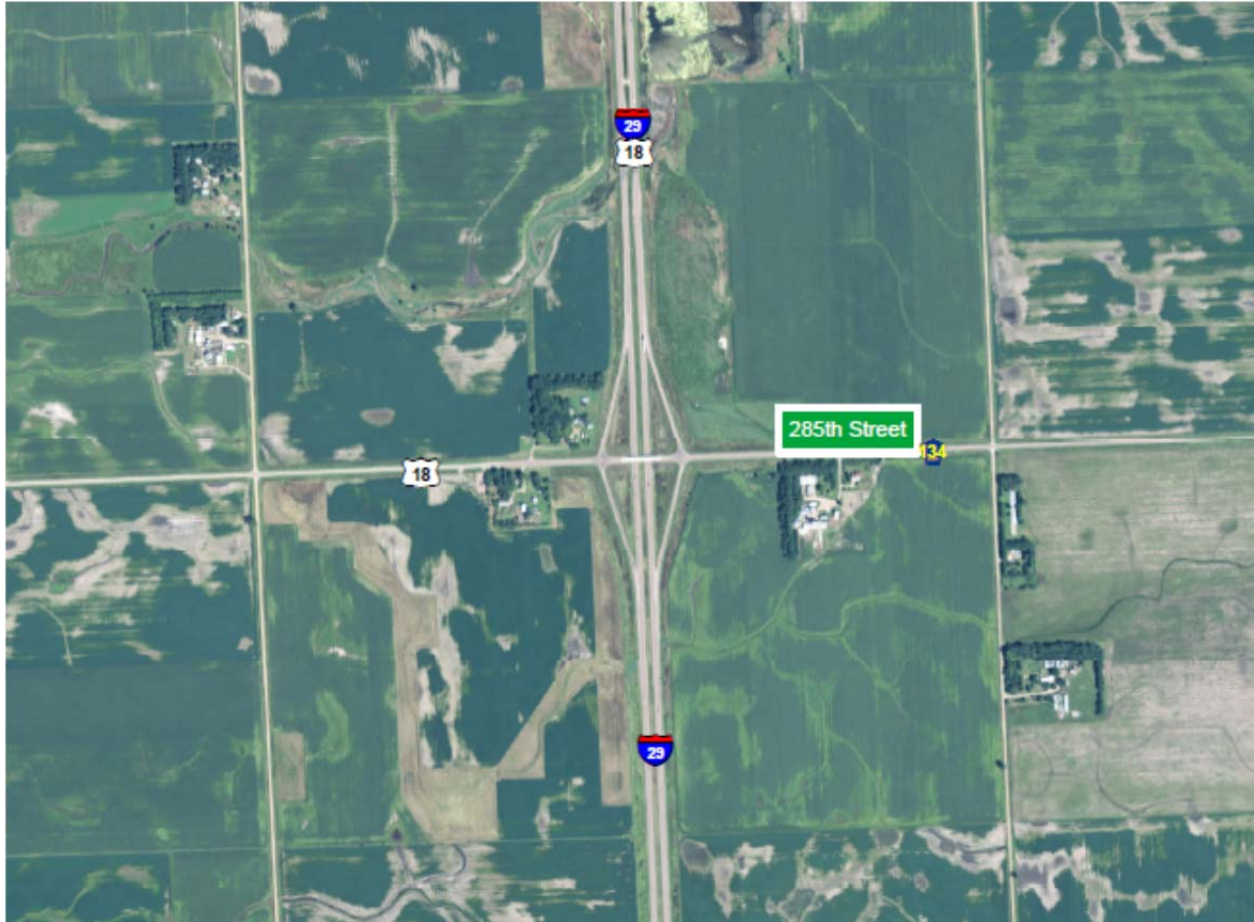


Figure 6: Existing I-29 Exit 59 Interchange Configuration

Traffic estimates indicate the need for reconfiguration of the Exit 59 interchange to be well beyond the 20 year planning horizon. It is not anticipated that any future modification to Exit 59 will affect operations at Exit 62.

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I-29 Exit 64: SD44 (Lennox/Worthing) / Lincoln County 124

The adjacent interchange north of the I-29/Exit 62 interchange is the I-29/Exit 64 service interchange, located approximately 2 miles north. The Exit 64 interchange is also a typical diamond configuration and is shown in Figure 7.

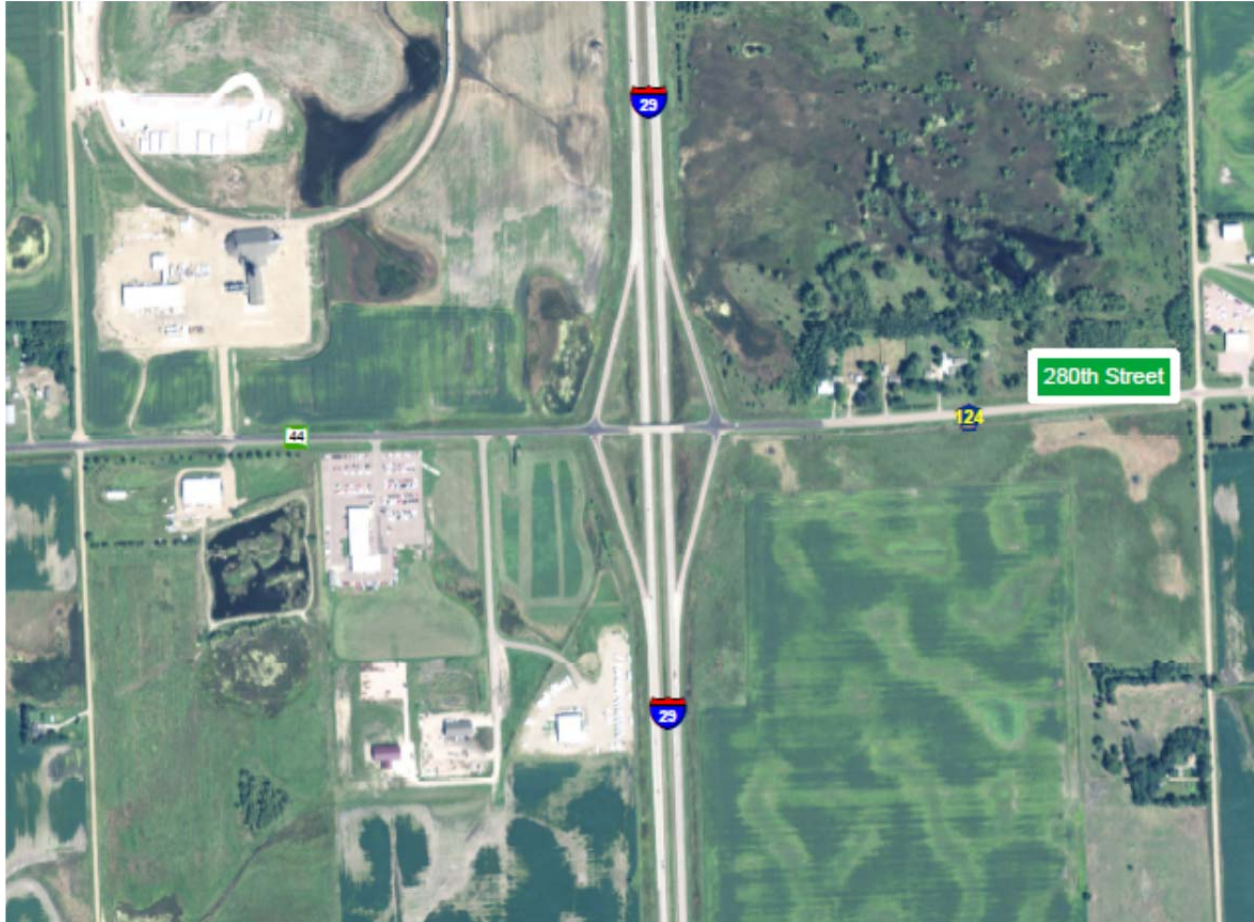


Figure 7: Existing I-29 Exit 64 Interchange Configuration

Traffic estimates indicate the need for reconfiguration of the Exit 64 interchange to be well beyond the 20 year planning horizon. It is not anticipated that any future modification to Exit 64 will affect operations at Exit 62.

Potential Adjacent Interchanges

The SDDOT has no expectation for any new interchanges that would affect the traffic operations at Exit 62 within the planning horizon.

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Existing Data

The data used to create this document came from a combination of data sources belonging to the South Dakota Department of Transportation, the City of Lincoln County, or the South Dakota Department of Public Safety. The most recent data available was used.

Operational Performance

A traffic operations study was conducted for Exit 62 in November, 2011. As capacity was not the driving force behind the interchange modification for Exit 62, a limited traffic operations study was completed. The east limit of the study was the intersection of US18 and 471st Avenue. The western limit was the southbound ramp terminal intersection. Intersections analyzed were the I-29 southbound ramp terminal and the I-29 northbound ramp terminal. An evaluation was done to evaluate the ramp merge/diverge areas along I-29 associated with the Exit 62 interchange.

Level of Service (LOS) for unsignalized intersections according to the Highway Capacity Manual was used to measure traffic operation at each of the intersection. Each lane of traffic has delay associated with it and therefore a correlating LOS. The weighted average delay for each of these lanes of traffic for a signalized intersection is the intersection LOS. LOS categories range from LOS "A" (best) to "F" (worst) as shown in the Table 1.

Table 1: Level of Service Criteria

Control Delay (s / vehicle)	LOS by Volume to Capacity Ratio		LOS Description
	v/c ≤ 1	v/c > 1	
0 – 10	A	F	Free flow, insignificant delays
>10 – 15	B	F	Stable operation, minimal delays
>15 – 25	C	F	Stable operation, acceptable delays
>25 – 35	D	F	Restricted flow, noticeable delays
>35 – 50	E	F	Maximum capacity, extended delays, long queues form upstream from intersection
>50	F	F	Forced flow, excessive delays, queues may block upstream intersections

Source: HCM2010, Exhibit 19-1 and 20-2

The SDDOT typically triggers capacity improvements when the LOS level is below a LOS of C on mainline highway corridors and a LOS of D at intersections and ramp junctions.

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The interchange crossroad of US18 is currently operating at a LOS of A for both the AM & PM peak hours in both the eastbound and westbound directions along the segment from I-29 Southbound Ramp Terminal to 471st Avenue.

As congestion is more often dictated by actions at intersections and ramp junctions, analysis on those movements were done independently. Table 2 summarizes the results of the existing traffic analysis on the crossroad intersections and Table 3 summarizes the operations at the ramp junctions at each of the I-29 interchanges analyzed.

Table 2: US18 Intersections Existing Level of Service

Intersection / Movement	AM Peak LOS*	PM Peak LOS*
US18 / I-29 Southbound Ramp**	A	A
US18 / I-29 Westbound Ramp**	A	A

Note: *Average Intersection LOS shown, individual movements may be different.

**Unsignalized, Minor Road Stop Only Intersection. US18 has zero delay, LOS = A.

Table 3: I-29 Ramp Junctions Existing Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
Exit 62	29 SB to Off-ramp	Diverge	A	A
Exit 62	29 NB to Off-ramp	Diverge	A	A
Exit 62	On-ramp to 29 SB	Merge	A	A
Exit 62	On-ramp to 29 NB	Merge	A	A

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Existing Safety Conditions

Eleven (11) crashes (reported for calendar years 2009, 2010, & 2011) were determined to be within the Exit 62 interchange influence area. None of the crashes were classified as an Injury/Fatality crash. Eight (8) of the reported crashes were determined to be speed related. Five (5) were associated with winter weather conditions. Two (2) of the reported crashes involved strikes of the crossroad structure by over height vehicles. Two (2) of the reported accidents were found to be related to the ramp terminal intersections with US18. One (1) of the reported crashes associated to mainline I-29 was classified as an animal hit. This data is shown in Table 4.

Table 4: Crash Classification* for Reported Crashes 2009-2011

Classification	Mainline	Ramps	Ramp Terminal Intersections	Crossroad	Total
Fixed Object	5	1	0	0	6
Animal	1	0	0	0	1
Pedestrian	0	0	0	0	0
Bicycle	0	0	0	0	0
Parked Car	0	0	0	0	0
Over Turn	0	0	1	0	1
Other Single Vehicle	1	0	0	0	1
Rear End	0	0	1	0	1
Head On	1	0	0	0	1
Angle	0	0	0	0	0
Sideswipe, same direction	0	0	0	0	0
Sideswipe, opposite direction	0	0	0	0	0
Other Multiple Vehicle	0	0	0	0	0
Total	8	1	2	0	11

(I//F) = Number Classified as an Injury/Fatality Accident

* Classification based upon Interchange Safety Analysis Tool (ISAT) methodology.

Figure 8 shows the location of all reported crashes for calendar years 2009, 2010, & 2011, including those outside of the Exit 62 interchange's influence area.

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Figure 8: Crash Location & Severity 2009-2011

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Existing Environmental Constraints

A quick perusal of the area surrounding the existing Exit 62 interchange shows that the most potential environmental constraint could be an impact to existing wetlands or possibly encountering contaminated soils caused by a leaking storage tank from any of the underground storage tanks from the gas station in the southeast quadrant. Figure 9 shows the location of the known environmental constraints within ½ mile of the Exit 62 interchange.

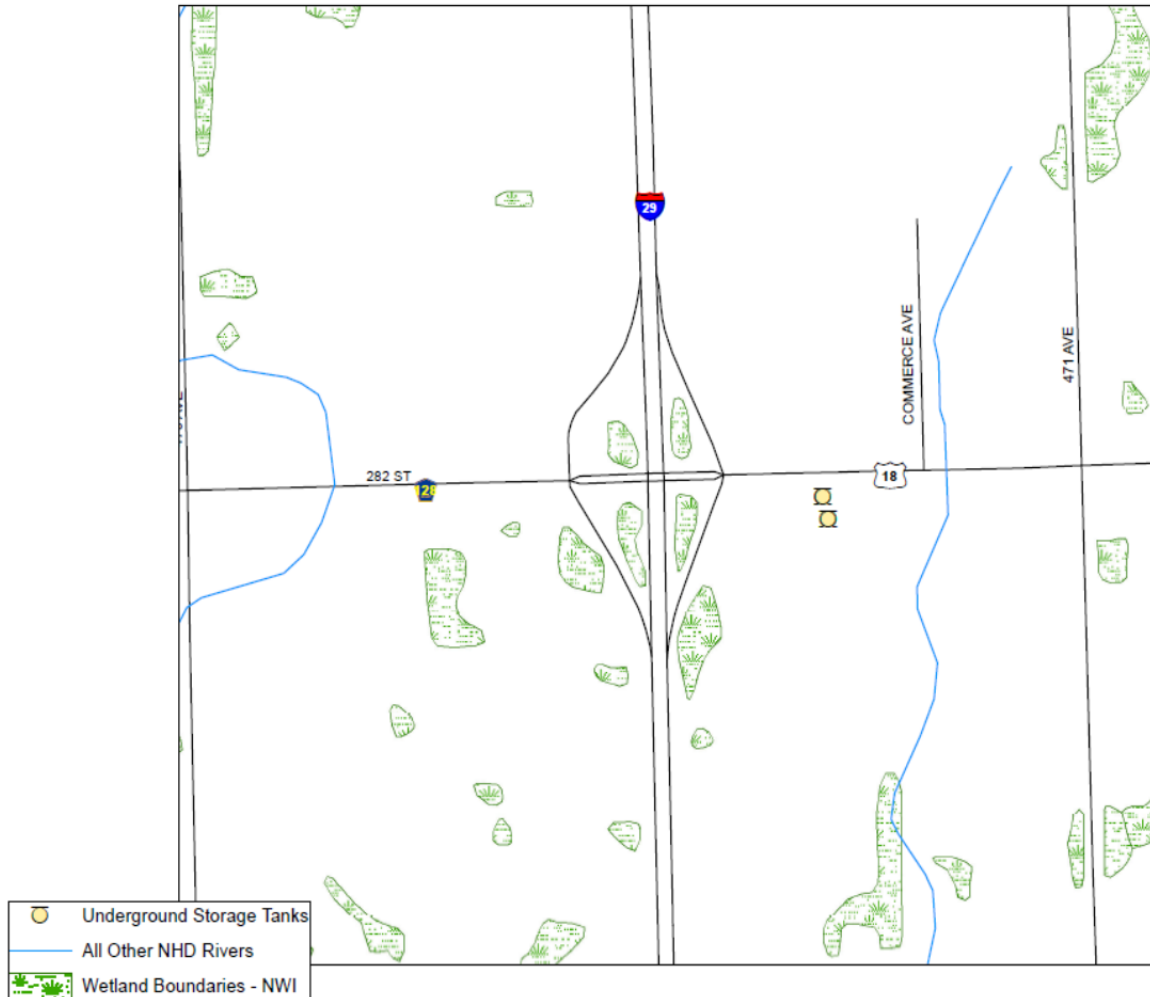


Figure 9: Known Potential Environmental Constraints

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Chapter 4: NEED

While the need to reconfigure an existing interchange is primarily for geometric, safety and traffic capacity reasons, the timing of such projects in South Dakota typically is controlled by the need to replace the existing pavement and/or structure(s). A combination of these five base need types defines the overall need for an interchange reconfiguration.

Geometric

Since the interchange's construction in 1962, geometric design standards have changed. As a result, though built to meet or exceed standards of the day, some geometric characteristics of the existing interchange no longer meet today's standards. Some of the geometric deficiencies found during the 2010 Decennial Interstate Corridor Study for the existing interchange include:

- The superelevation rate for the southbound off ramp is 8.0%.
- The superelevation rate for the northbound off ramp is 7.6%.
- The inslopes for all of the ramps are 4:1.
- The taper for both on ramps is 29:1.
- Minimum stopping sight distance on the northbound off ramp is 375 feet.
- Minimum stopping sight distance on the northbound on ramp is 366 feet.
- Minimum stopping sight distance on the southbound off ramp is 371 feet.
- Minimum sag vertical curve K value on the northbound off ramp is 77.
- Minimum sag vertical curve K value on the southbound off ramp is 82.
- Minimum right shoulder width on the northbound off ramp is 6.0 feet.
- Minimum right shoulder width on the northbound on ramp is 3.5 feet.
- Minimum right shoulder width on the southbound off ramp is 5.0 feet.
- Minimum right shoulder width on the southbound on ramp is 4.0 feet.

Pavement

The need to replace or rehabilitate the pavement is often the driving force behind the timing of when the majority of construction projects on the state highway system occur. The pavements of the existing Exit 62 interchange ramps are Portland Cement Concrete (PCC) built in 1962 and have numerous joint and spall patches throughout the surface. The crossroad is PCC pavement constructed in 1960 and overlaid with asphalt in 2008 in response to a deteriorating PCC pavement surface. The mainline I-29 pavement was reconstructed as Continuously Reinforced Concrete (CRC) in 2001. As the crossroad and ramp pavements will be replaced, it is appropriate to evaluate existing and future traffic operations of the existing interchange configuration before placing a new pavement surface with the expectations for a 40 to 50 year pavement service life.

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Safety

The Exit 62 interchange ranked 35th out of the 62 interchanges evaluated in Phase 1 of the 2000 Interstate Corridor Study. The Exit 62 interchange did not make the list of the high crash interchanges in the 2010 Decennial Update to the Interstate Corridor Study. As described in Chapter 3: Existing Conditions, it is believed that the primary safety need is more preventative by reducing the risk of strikes of the crossroad structures by over height vehicles since the structures lack the minimum vertical clearance over I-29.

Currently there is no existing interchange lighting, but warrants are met for partial interchange lighting.

Structural

The need to replace or rehabilitate a structure is the second most critical consideration behind the timing of construction projects on South Dakota's state highway system. For the Exit 62 interchange, the structural need is the primary need for the interchange reconstruction project. The two structures at the existing Exit 62 interchange currently have a Federal Sufficiency Rating of 73.3 and 74.3 and are classified as functionally obsolete primarily due to an inadequate vertical clearance of less than the 16 feet standard.

Structurally, the two bridges are currently in fair condition. They are both standard concrete box girder bridges built in 1958 with a deck overlay and rail replacement done in 1985. Deck overlays typically have a service life of 20 to 25 years, therefore the current deck overlay is approaching the end of its service life and the structure will soon be due for rehabilitation or replacement. The westbound structure has also had a project to repair an over height strike done in 2010. As it has been determined that replacement of the structures with a single structure with a greater vertical clearance over I-29 would be prudent, it is appropriate to evaluate the existing and future traffic operations of the existing interchange configuration before placing the new structure with the expectations for a 75 year structure service life.

Traffic

The existing traffic operations evaluation showed that none of the interchange or crossroad intersections are experiencing any traffic operational issues. Details pertaining to the existing traffic operations evaluation can be found in Chapter 3: Existing Conditions of this report.

When the existing (No Build) configuration is evaluated for the 20 year planning horizon, the existing configuration still meets the criteria for adequate traffic operations. Details pertaining to the future traffic operational evaluations on the existing configuration can be found in Chapter 6: Future Year Traffic.

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Chapter 5: ALTERNATIVES

Given the existing development surrounding the existing Exit 62 interchange, the SDDOT decided early in the alternative discussion to try to avoid expensive right-of way and building purchases to control the overall cost of the project. Many interchange configurations that would require a large footprint were quickly found to be cost prohibited and dismissed. After SDDOT held scoping meetings for the project, considering that future traffic operations are not anticipated to be an issue, it was determined to pursue only one option in addition to the No Build Alternative.

Alternative 0: No Build

This alternative does not alter the current configuration of the existing Exit 62 interchange or apply any improvements along Exit 62 or mainline I-29 and results in strictly removing and replacing the pavement and structures.

Alternative 1: Diamond Interchange with Crossroad Elevation Change.

This alternative does little modification to the existing interchange's configuration or overall footprint, but does raise the elevation of the crossroad to achieve minimum vertical clearance over I-29. This configuration will also narrow the footprint of the crossroad over I-29 to accommodate using only one crossroad structure versus the existing two. The horizontal alignment of the US18 crossroad will also be shifted to the north to accommodate traffic control during construction. These changes to the elevation and footprint of the crossroad results in the need to regrade each ramp as it approaches the crossroad.

This alternative will not affect the mainline lanes of I-29. Extending the ramp tapers to current standards at the ramp junctions will add some improvement to the merge and diverge movements at the ramp junctions.

Currently there is no existing interchange lighting, but warrants are met for partial interchange lighting, so partial interchange lighting will be added. Additional improvements will be made along the US18 corridor that will enhance traffic operations along the corridor outside of the interchange area as well.

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Figure 10: Alternative 1 – Diamond Interchange Configuration

Further details on the above alternatives can be found in Chapter 7: Alternatives Analysis.

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Chapter 6: FUTURE YEAR TRAFFIC

Alternative 0: No Build

The interchange crossroad of US18 is anticipated to be operating at a LOS B for the planning horizon.

As congestion is more often dictated by actions at intersections and ramp junctions, analysis on those movements were done independently. Table 5 summarizes the results of the future (2032) traffic analysis on the Exit 62 intersections and Table 6 summarizes the operations at the ramp junctions at each of the I-29 interchanges analyzed.

As the project is not anticipated to affect mainline operations, no analysis of mainline was conducted.

Table 5: Exit 62 Intersections Future No Build Level of Service

Intersection / Movement	AM Peak LOS*	PM Peak LOS*
US18 / I-29 Southbound Ramp	A	A
US18 / I-29 Northbound Ramp	A	A

Note: *Average Intersection LOS shown, individual movements may be different.

**Unsignalized, Minor Road Stop Only Intersection, US18 has zero delay, LOS = A.

Table 6: I-29 Ramp Junctions Future No Build Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
Exit 62	29 SB to Off-ramp	Diverge	A	A
Exit 62	29 NB to Off-ramp	Diverge	A	A
Exit 62	On-ramp to 29 SB	Merge	A	A
Exit 62	On-ramp to 29 NB	Merge	A	A

Since there are no traffic operations issues with the ramp terminals or junctions under the No Build alternative and the proposed Diamond alternative is a very similar configuration as the No Build alternative, traffic operations of the I-29 mainline were not analyzed as no change due to the project is anticipated.

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Alternative 1: Diamond

The configuration of the proposed interchange improvement is similar enough to the No Build configuration that there is not believed to be a difference in traffic operations from the No Build alternative. No separate traffic level of service analysis for the ramp movements or the intersections of this alternative has been conducted.

Along the US18 crossroad from the I-29 Southbound ramp terminal intersection to the intersection with 471st Avenue, a through lane and left turn warrant analysis was conducted. As a result of that analysis, it is recommended that one lane in each direction with a continuous left turn lane be provided from the I-29 Southbound ramp terminal intersection to the 471st Avenue intersection in lieu of the one lane in each direction with separate left turns lanes currently provided. Providing for the three lane section is anticipated to provide a corridor level of service of B similar to the current configuration. Additional information regarding the US18 crossroad's traffic analysis can be found in Appendix D.

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Chapter 7: ALTERNATIVES ANALYSIS

Conformance with Transportation Plans

The build alternative evaluated conforms with current local and state transportation plans.

The existing Exit 62 interchange was first identified as having some geometric needs by the 2000 Statewide Interstate Corridor Study. An interchange improvement project for the Exit 62 interchange has been in the Statewide Transportation Improvement Program (STIP) in some form since 2012, and is in the current 2012-2016 STIP for Federal fiscal year 2014 and in the tentative 2013-2017 STIP for Federal fiscal year 2015.

Compliance with Policies and Engineering Standards

Alternative 0 (No Build) by its definition will not address the known geometric needs of the existing interchange. As such, if Alternative 0 (No Build) is followed, the interchange will not comply with the current South Dakota design standards for ramp superelevation (8.0% and 7.6% versus 4.0% standard), inslopes (4:1 versus 6:1 standard), on-ramp taper rate (29:1 versus 50:1 standard), minimum stopping sight distance on the ramps (366, 371 and 375 feet versus 425 feet standard), minimum sag vertical curve K value (77 and 82 versus 96 standard), minimum ramp right shoulder width (3.5, 4.0, 5.0, and 6.0 feet versus 8.0 feet standard), and minimum vertical clearance over I-29 (14.9 and 15.1 feet versus 17.0 feet standard). Alternative 1 (Diamond) will correct these existing geometric issues.

On the west side of the interchange, the first full access driveway opening is anticipated to continue to be provided at the existing access location, located approximately 650' centerline to centerline (565' ramp radius to driveway radius) west of the Southbound Ramp Terminal intersection. On the east side of the interchange, the first full access driveway opening is anticipated to continue to be provided at the existing access location, located approximately 500' centerline to centerline (420' ramp terminal radius to driveway radius) east of the Northbound Ramp Terminal intersection. The SDDOT purchased control of access rights for a minimum of 500 feet or more beyond the ramp terminals along the crossroad at the time of the interchange's initial construction. A more in depth discussion on the US18 crossroad control of access is included in Appendix B. Two access points that have been built since the initial interchange construction are proposed to be eliminated.

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Environmental Impacts

Considering that minimal additional right-of-way is anticipated to be acquired, it is anticipated that the environmental impacts specific to any interchange modification compared to Alternative 0 (No Build) will be negligible. It is believed to be a type II, categorical exclusion project with a wetland impact analysis regardless of the alternative chosen.

Safety

Upon reviewing the reported crash data shown in Table 4, the majority (73%) of all the crashes within the interchange's influence area during the reporting period (2009, 2010, & 2011) were classified as speed related, with 5 crashes being attributed to overdriving winter conditions. Although you cannot correct driver behavior with bringing the roadway up to standards, one can assume that bringing the interchange up to current standards would provide for at least a minimal reduction in speed related crashes.

Out of the 3 reported crashes not determined to be speed related within the interchange's influence area, 2 (67%) were classified as strikes to the crossroad structure. It can be anticipated that with the new crossroad structure providing more clearance over the mainline, that those likelihood of those types of crashes would be greatly reduced.

Currently there is no existing interchange lighting, but warrants are met for partial interchange lighting, so partial interchange lighting will be added. The addition of lights at the interchange should improve both safety and security.

Two property access points are proposed to be removed along the US18 crossroad east of the interchange. This will theoretically improve safety along the crossroad by removing the conflict points associated with a full property access point.

Improving the interchange's geometrics (inslopes, ramp width, stopping sight distance, etc.) up to current design standards, should theoretically improve safety within the interchange's area of influence. However, since the two overheight structure crashes appear to have been the only geometric related of the crashes analyzed, the improvement for those items appears to be minimal.

Operational Performance

As shown in Table 6, the existing interchange will still have a level of service of A during both the AM and PM peak hours at all Exit 62 ramp junctions if no improvements to the interchange are made. The improvements made to Exit 62 by either the no build alternative or the build alternative will have nil effect on traffic operations on the Interstate system.

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The build alternatives show also show little improvement on traffic operations is along the crossroad corridor. If the existing configuration remain as today (Alternative 0: No Build), the US18 corridor is expected to operate at a LOS of B in 2030. Improvements anticipated to be made along US18 with this interchange modification will do little to affect the calculated level of service along the US18 corridor, anticipated to remain at LOS of B.

Evaluation Matrix

Table 7: Alternative Evaluation Matrix

	Alternative 0 No Build	Alternative 1 Diamond
Meets all SDDOT Design Criteria	No	Yes
Meets SDDOT Access Criteria	No	Yes
Lowest Exit 62 Ramp Merge Level of Service, 2032	A	A
Lowest Exit 62 Ramp Diverge Level of Service, 2032	A	A
Lowest Exit 62 Ramp Terminal Intersection Level of Service, 2032	A	A
US18 Corridor Level of Service, 2031	B	B
ROW Impacts	None	Minimal
Environmental Impacts	None	Minimal
Safety Improvement	None	Fair

Coordination

The SDDOT has a long history of public involvement in the development of transportation plans and projects. The 2005 passage of the Safe, Accountable, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) requires a public involvement process. Meetings with the landowners adjacent to the project were held on February 12, 2013. The summary document from those meetings can be made available. A general public meeting is not anticipated to be necessary for the Exit 62 Interchange / US18 project per FHWA's guidance given during the preliminary design inspection. As the project development process continues, future public meetings will be held if deemed necessary.

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Chapter 8: FUNDING PLAN

The planned project to replace the existing Exit 62 Interchange (IM 0292(74)62 PCN 035A) is currently estimated to cost \$6.031 million (in 2013 dollars). The SDDOT is currently anticipating funding the project with the combination of funding sources as shown in Table 8.

Table 8 : Anticipated Funding Allocation Breakdown				
State Funding Category	Federal Funding Category	Federal Funds	State Funds	Total Funds
Interstate	National Highway Performance Program	\$5.486 Million	\$0.845 Million	\$6.031 Million
Total		\$5.486 Million	\$0.845 Million	\$6.031 Million

Note: As funding is fluid, category breakdown may be different at time of project authorization.

As the project is anticipated to be let to contract in Federal fiscal year 2015, the inflated estimated cost for the overall project is \$6.587 Million.

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Chapter 9: RECOMMENDATIONS

This modification request is to maintain the existing Exit 62 interchange as a diamond configuration, as shown in Figure 10 in Chapter 5, but with some crossroad and ramp improvements to meet current design standards.

This recommendation addresses the eight policy requirements for new or revised access points to the existing Interstate system published in the Federal Register Volume 74 Number 165; August 27, 2009.

1. The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design year traffic demands (23 CFR 625.2(a)).

This modification request is to maintain the existing diamond configuration, but with some crossroad and ramp improvements to meet current design standards. No additional access to the Interstate System is being requested. The reconfiguration of the existing interchange will have a negligible effect on the Interstate's traffic operations when compared with the existing interchange's configuration. Most of the Interstate System benefit will be seen in the anticipated reduction in over height strikes of the interchange's crossroad structure. A secondary benefit is that the interchange's geometrics will be brought up to current standards.

Figure 2 shows the existing configuration of Exit 62. Both the 2001 *Interstate Corridor Study* and the 2010 *South Dakota Decennial Interstate Corridor Study* reviewed the existing interchange characteristics. Existing geometric features were reviewed using the as-built plans for this interchange. Some of the geometric deficiencies for the interchange include:

- The superelevation rate for the northbound off ramp being 7.6% and the southbound off ramp being 8.0%.
- The inslopes for the on the ramps being 4:1.
- The taper for both on ramps are 29:1 and should be lengthened.
- The minimum stopping sight distance on the northbound on ramp is 366 feet, on the northbound off ramp is 375 feet, and on the southbound off ramp is 371 feet
- The minimum sag vertical curve K value is 77 on the northbound off ramp and 82 for the southbound off ramp.
- The minimum right ramp should width is 3.5 feet on the northbound on ramp, 6.0 feet on the northbound off ramp, 4.0 feet on the southbound on ramp, and 5.0 feet on the southbound off ramp.

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- Probably the most critical feature at this interchange is the minimum vertical clearance of the twin crossroad bridges over I-29 being 14.9 feet under the westbound bridge and 15.1 feet under the eastbound bridge.

Structurally, the two bridges over the Interstate are currently in fair condition. They are both standard concrete box girder bridges built in 1958 with a deck overlay done in 1985. Deck overlays typically have a service life of 20 to 25 years, so the current deck overlay is approaching the end of its service life and the structure will soon be due for rehabilitation or replacement. As both structures do not provide the minimum clearance over the Interstate and the US18 westbound structure has been struck before by over height vehicles, it is prudent to replace those structures.

2. The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23CFR 625.2(a)).

This modification request is to maintain the existing diamond configuration, but with some crossroad and ramp improvements to meet current design standards. No additional access to the Interstate System is being requested. Existing and future traffic operations do not warrant a need for additional capacity at this location.

There are no areas within the State of South Dakota that are anticipated to consistently experience congestion levels extreme enough to make ramp metering or HOV facilities economically feasible in the foreseeable future.

3. An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)).

Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of

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the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

This modification request is to maintain the existing diamond configuration, but with some crossroad and ramp improvements to meet current design standards. Existing and future traffic operations do not warrant a need for additional capacity. This led to one alternative, maintaining the diamond configuration, being analyzed.

Diamond Interchange Alternative

Figure 10 shows the diamond configuration alternative considered. The US18 crossroad structures will be replaced by a single structure, elevated to make minimal vertical clearance over the mainline interstate and with the alignment shifted slightly to the north. All of the existing ramps will be regraded and have the pavement replaced to match the new crossroad elevation and alignment, but the basic interchange configuration remains the same as the existing.

Projected Year 2030 capacity analysis of the diamond interchange design were performed using HCS+ software tools. The analyzed roadway network for this alternative included the ramp terminal intersection improvements. Tables 5 & 6 show the LOS for 2032.

Currently there is no existing interchange lighting, but warrants are met for partial interchange lighting, so partial interchange lighting will be added.

One of the key factors that can affect the safety and operations of an interchange is the permanent signing associated with the interchange. As the proposal is for replacement of the existing interchange with very little configuration change, the only change in permanent signing anticipated is to be the removal of the over height warning signs approaching the interchange. The preliminary signing plan for the immediate interchange area is shown in Figure 11. The full preliminary signing plan showing the approach signing along the Interstate mainline is shown in Appendix C.

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Figure 11: Preliminary Signing Plan

4. The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a) (2), and 655.603(d)).

The access improvement will maintain a connection to a public road (US18 / Lincoln County 128 / 282nd Street) and will replace the current full access interchange with a full access interchange. The interchange will continue to provide for all traffic movements. The improvement will meet or exceed current standards for Federal-aid projects on the Interstate system.

5. The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.

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The proposed interchange improvement is consistent with local land use plans, the STIP, and local transportation plans.

6. In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).

Neither the *South Dakota Interstate Corridor Study* completed in February 2001 nor the 2010 *South Dakota Decennial Interstate Corridor Study* indicated that there is a potential for future interchange additions along the segments of Interstate 29 between Exit 62 and the adjacent exits.

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7. When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).

The proposed interchange modification is not the result of any new or expanded development. The interchange is being reconstructed to address the aging, functionally obsolete structures of the existing interchange while improving safety by reducing the risk of an over height vehicle strike. US18 / Lincoln County Highway 128 crossroad will be reconstructed along with the interchange from 900' east of the 470th Avenue intersection west of the interchange to the 471st Avenue intersection east of the interchange.

8. The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).

Considering that minimal additional right-of-way is anticipated to be acquired, it is anticipated that the environmental impacts specific to this interchange modification compared to the Do-Nothing Scenario will be negligible. The proposed revised access is included in the Tentative 2013-2017 STIP and programmed for 2015. The status of the environmental process is tracking consistent as other projects believed to be a categorical exclusion programmed for the same year.