South Dakota Department of Transportation

Interchange Modification Justification Report

Interstate 29 Exit 75
Interstate 229 Exit 1A & 1B

January 10, 2014
Revised February 5, 2014

Prepared By:
SDDOT Office of Project Development
700 E. Broadway Avenue
Pierre, SD

The preparation of this report has been financed in part through grant(s) from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

I-29 / I-229 System Interchange
Interchange Modification Justification Report

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

I-29 / I-229 System Interchange
Interchange Modification Justification Report

EXECUTIVE SUMMARY

The South Dakota Department of Transportation (SDDOT), in cooperation with the City of Sioux Falls, completed an assessment of the existing System Interchange on Interstate 29 (I-29) at Interstate 229 (I-229) in Sioux Falls, South Dakota as part of the I-29 Corridor Study in 2010. As the existing pavement of the two mainlines and ramps are all approaching the end of their service life, it is appropriate to evaluate the existing interchange configuration and analyze its operation for the anticipated future traffic levels. This evaluation has demonstrated the need to slightly reconfigure the existing trumpet interchange to improve safety and traffic operations through the interchange area.

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 slightly reconfigure the existing I-29 / I-229 system interchange, the following is the summarized response to each requirement. The full response to each requirement can be found in Chapter 9: Recommendations.

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 reconfigure an existing System Interchange. No additional access to the Interstate System is being requested. The reconfiguration of the existing System Interchange will have a negligible, yet positive effect on the Interstate's traffic operations

when compared with the existing System Interchange's configuration. Most of the Interstate System benefit from the project will be seen by the addition of auxiliary lanes along the mainline between the System Interchange and the adjacent service interchanges.

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 reconfigure the geometrics of an existing System Interchange. No additional access to the Interstate System is being requested.

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 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)).

An analysis of the impact of the proposed interchange modification at the I-29 / I-229 system interchange on the Interstate's operations revealed that the interchange modification will have a negligible, yet positive effect on traffic operations along mainline I-29 or I-229 and would not adversely impact the adjacent interchanges along I-29 or I-229. The modification to

the I-29 Southbound to I-229 Northbound ramp is being done for constructability and to improve aggregate travel time.

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 for the I-29 / I-229 system interchange will maintain the current separation between the Interstate System and the local road network. The reconfigured interchange will continue to provide for all traffic movements of Interstate travel. The improvement will meet or exceed current design and operational 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, the MPO's TIP, local transportation planning and the MPO's Long Range 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).*

The corridor surrounding the I-29 / I-229 system interchange was the focus of the I-29 Corridor Study completed in 2010. Alternative options to reconfigure the I-29 /I-229 System interchange were developed as part of the I-29 Corridor Study. The I-29 Corridor Study identified the potential for a new interchange at I-29 and 85th Street to the south of the I-29 / I-229 system interchange.

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 interchange is being reconstructed to address the deteriorating pavement that has surpassed its design life and the aging, functionally obsolete structures of the existing interchange while improving safety. The modification to the I-29 Southbound to I-229 Northbound ramp is being done for constructability and to improve aggregate travel time.

Mainline I-29 will be reconstructed along with the I-29 / I-229 system interchange from approximately the ramp junctions of the I-29 Exit 73 (Tea) interchange south of the I-29 / I-229 system interchange to approximately the 57th Street overpass north of the I-29 / I-229 system interchange. Mainline I-229 will be reconstructed along with the interchange from the I-29 / I-229 system interchange east to near the ramp junctions of the I-229 Exit 1C (Louise Avenue) interchange. As part of the mainline reconstruction, auxiliary lanes are being added to the mainline Interstate segments to handle the forecasted increase in future traffic volumes due to regional traffic growth.

New development in the immediate area of the I-29 / I-229 System Interchange will require improvements in the local street arterial network. As part of this Interstate project, a new I-29 crossing of the City of Sioux Falls arterial street network will be constructed at 85th Street to the south of the I-29 / I-229 System Interchange.

As this project involves the reconfiguration of a system interchange, there will be no changes to access points between the Interstate system and the local road system with this project.

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 for Fiscal Year 2015 and the NEPA process is tracking consistent as other projects believed to need an environmental assessment (EA) programmed for that same year. The EA is anticipated to be completed in the Fall of 2013.

Chapter 1: INTRODUCTION

The South Dakota Department of Transportation (SDDOT), in cooperation with the City of Sioux Falls, completed an assessment of the existing system interchange connecting Interstate 29 (I-29) to Interstate 229 (I-229) in Sioux Falls, South Dakota as part of the I-29 Corridor Study in 2010.

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 I-29 / I-229 System Interchange was first identified as having potential for replacement by the 2000 Statewide Interstate Corridor Study. As the existing pavement of the two mainlines and ramps are all approaching the end of their service life, it is appropriate to evaluate the existing interchange configuration and analyze its operation for the anticipated future traffic levels. This evaluation has demonstrated the need to slightly reconfigure the existing trumpet interchange to improve safety and traffic operations through the interchange area.

Purpose

The existing pavement of the Interstate 29 mainline, Interstate 229 mainline, and the connecting ramps are all approaching the end of their service life. It is appropriate to evaluate the existing interchange configuration and analyze its operation for the anticipated future traffic levels.

Project Location

The I-29 / I-229 system interchange is an existing connection between I-29 and I-229 in Sioux Falls, South Dakota. The I-29 / I-229 System Interchange is located approximately 9 miles south of the I-90/I-29 System Interchange and 75 miles north of the Iowa state line. The I-29 / I-229 System Interchange is the southwest terminal point for I-229 in South Dakota. Figure 1 shows the location of the I-29 / I-229 System Interchange.

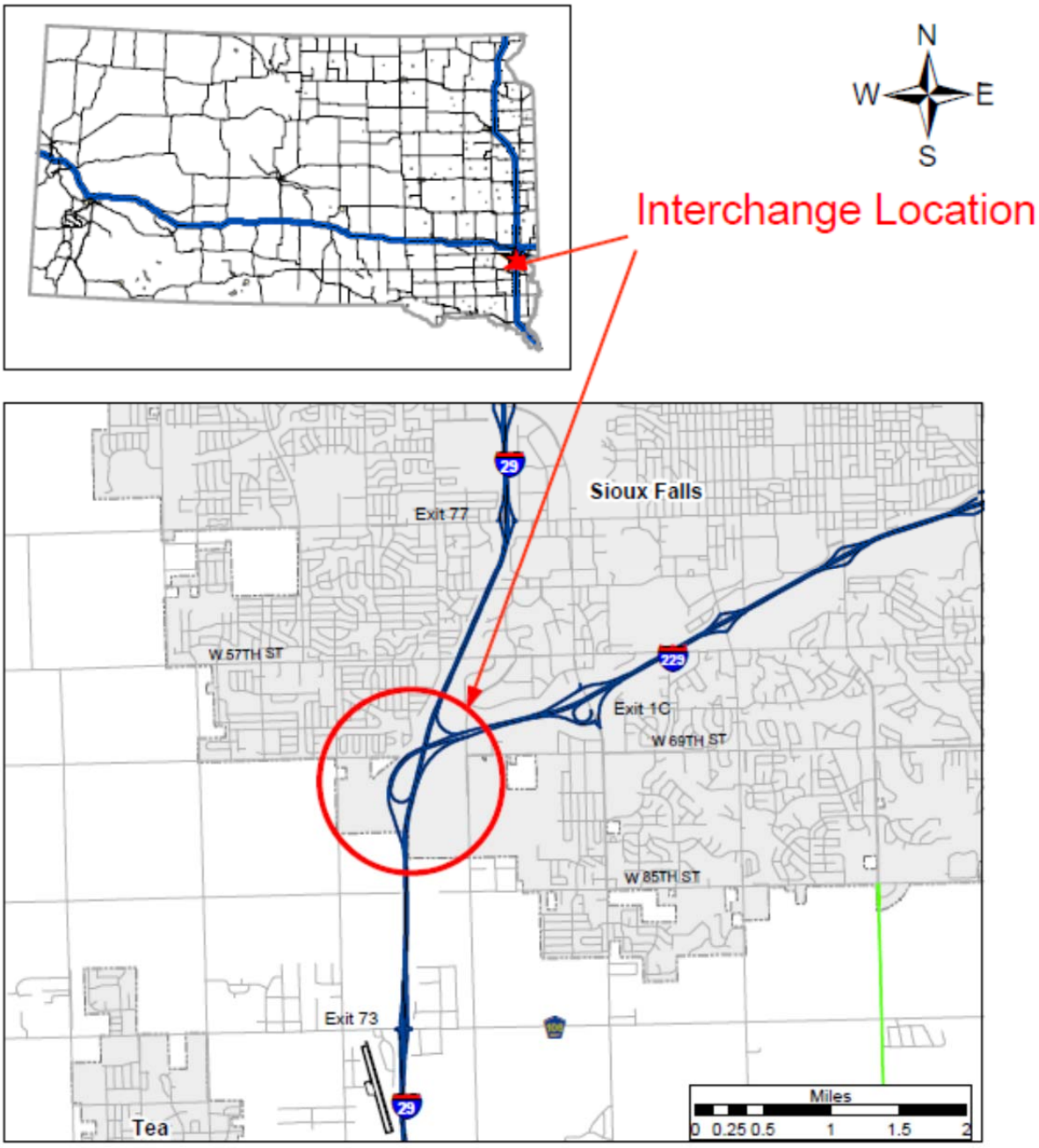

Figure 1: Project Location Map

The current configuration for I-29 / I-229 System Interchange is a trumpet interchange as shown in Figure 2. The proposed interchange modification would slightly modify the trumpet interchange at the I-29 / I-229 System Interchange by moving the loop ramp to the north of its existing location. The result would be a reduction in travel time between southbound I-29 and northbound I-229 traffic by reducing the distance needed to make that maneuver through the interchange.

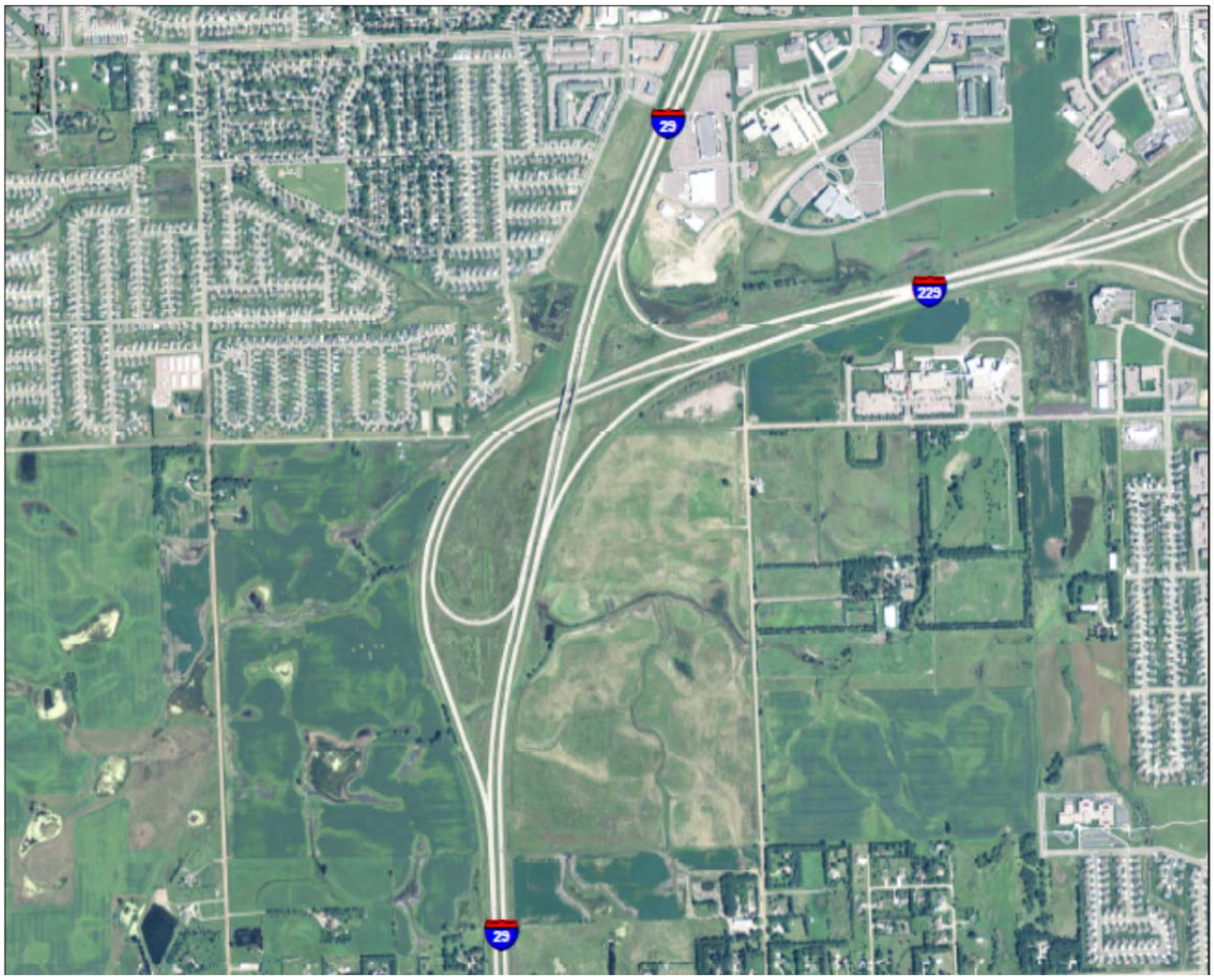

Figure 2: Existing Configuration

THIS PAGE INTENTIONALLY BLANK

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.

As the Interstate corridor containing the I-29 / I-229 System Interchange was analyzed as part of the I-29 Corridor Study, this IMJR was developed using data previously collected and analyzed as part of the I-29 Corridor Study. The use of data from the I-29 Corridor Study was agreed upon with the South Dakota Division of FHWA on October 30, 2012. As the I-29 Corridor Study was completed prior to the release of HCM2010, traffic analysis is based upon HCM2000. Considering that the I-29 Corridor Study was completed under the impression of higher density retail and office development in the southeast quadrant of the interchange than is currently anticipated, the resulting analysis is believed to be “worst case scenario”. To repeat the analysis under the current, less intense land use plan and HCM2010 was agreed to be of very little gain for what it would financially cost to have completed, as it would most likely show the same or better LOS than the analysis done as part of the I-29 Corridor Study.

Traffic Analysis output reports from the I-29 Corridor Study’s *Traffic Operations Report* were used as the analyses in this IMJR report and are included in Appendix B.

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

THIS PAGE INTENTIONALLY BLANK

Chapter 3: EXISTING CONDITIONS

Demographics

The existing I-29 / I-229 System Interchange provides the connection between I-29 and I-229. As shown in Figures 3 & 4 below, the interchange currently is located in an area on the urban fringe of Sioux Falls. The area is transitioning from agricultural to urban. The northeast quadrant is primarily a commercial-office employment area and northwest quadrant is primarily a residential area. The southeast and southwest quadrants are primarily agricultural pending future development.

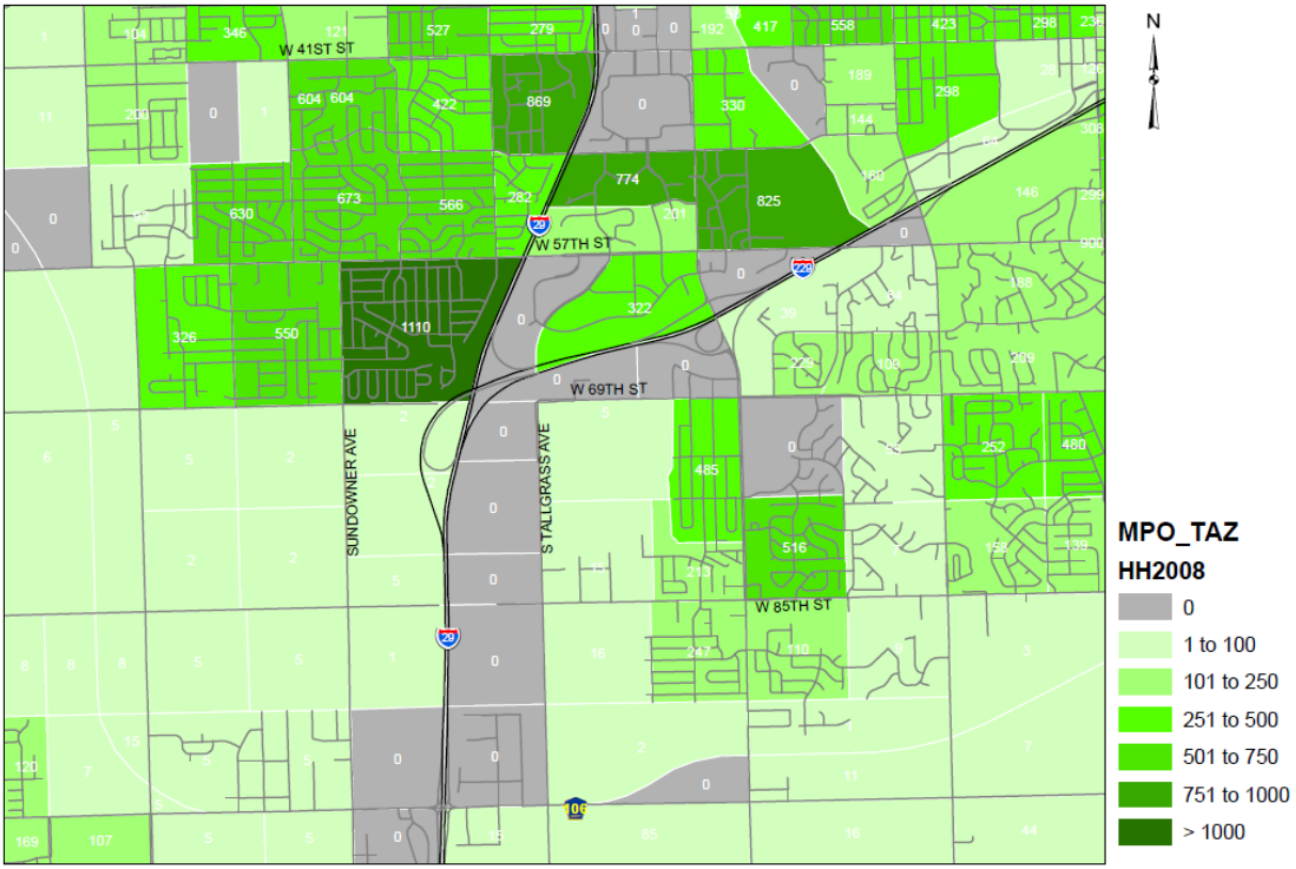

Figure 3: Current Number of Households by TAZ

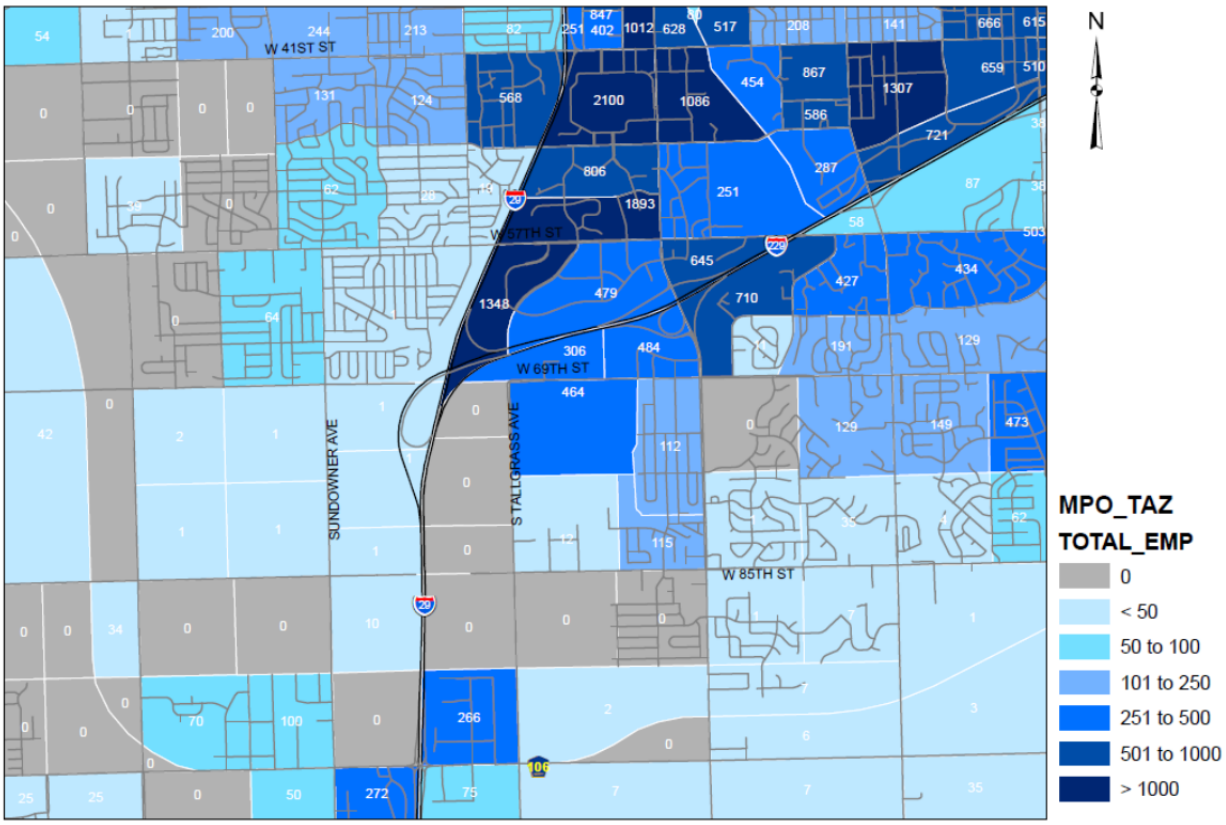

Figure 4: Current Employment by TAZ

Existing Land Use

Within the Sioux Falls city limits, land use surrounding the I-29/I-229 System Interchange is primarily commercial-office in the northeast quadrant, agricultural and a research park planned development (which is currently undeveloped and in agricultural production) in the southeast quadrant, residential planned developments northwest of the interchange, and agricultural southwest of the interchange. The current City of Sioux Falls zoning map showing the land use in Figure 5 below.

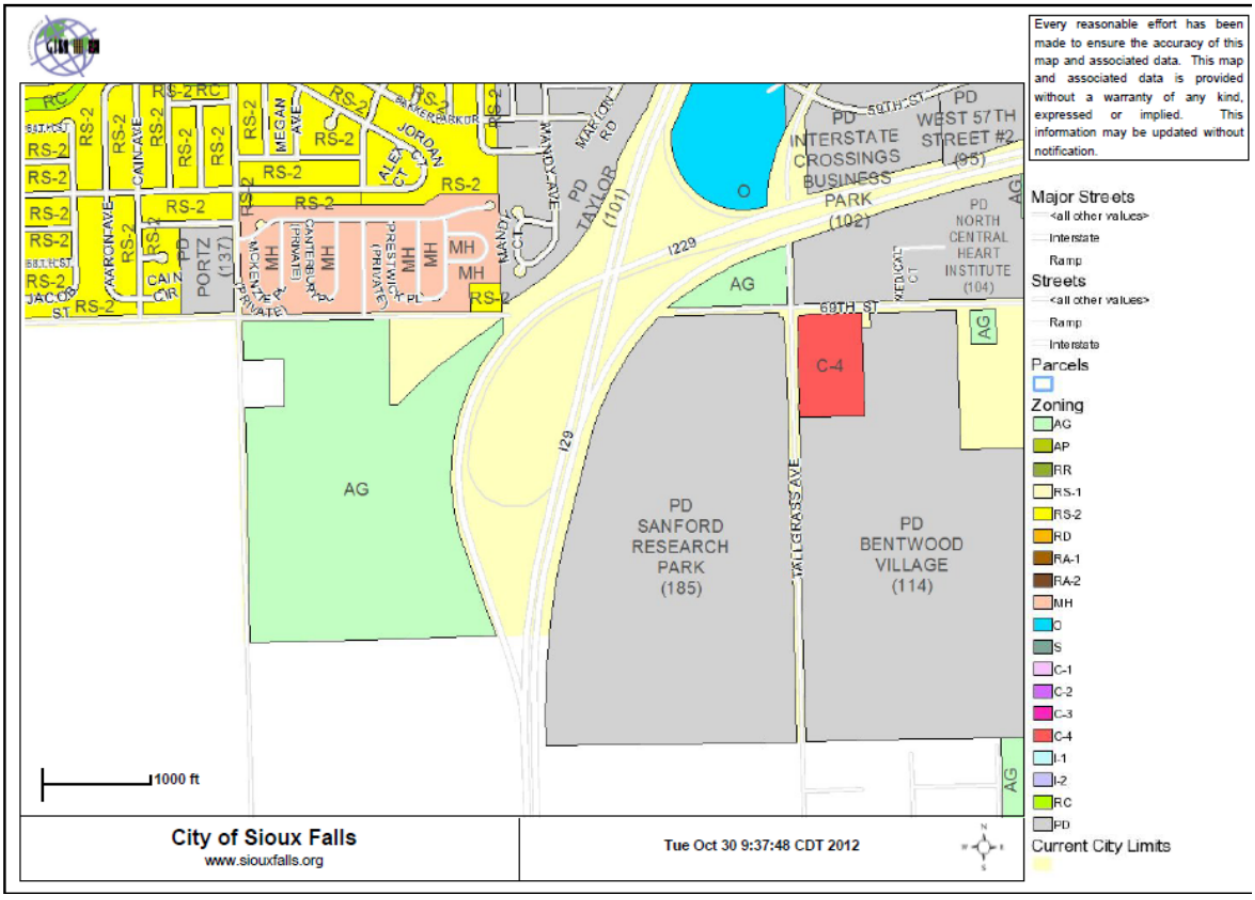

Figure 5: Current Zoning

Existing Roadway Network

I-29 is the primary north-south Interstate route and I-229 is the auxiliary loop Interstate route for the Sioux Falls metropolitan area. Local arterial support for I-29 in the area of the I-29 / I-229 System Interchange is provided by Louise Avenue and Lincoln County 111 (Tea-Ellis Road / 469th Avenue). Additional support is provided by the Solberg Avenue – Tallgrass Avenue corridor with the completion of the connecting structure over I-229. Local arterial support for I-229 in the area is provided by 57th Street and supplemented by 69th Street east of Louise Avenue. The existing roadway network surrounding the I-29 / I-229 System Interchange is shown along with the Federal functional classification map in Figure 6.

I-29 and I-229 currently have 2 lanes in each direction through the interchange area. A third lane in each direction begins on I-29 north of the I-29/I-229 System Interchange at approximately the 57th Street overpass and continues north to I-90.

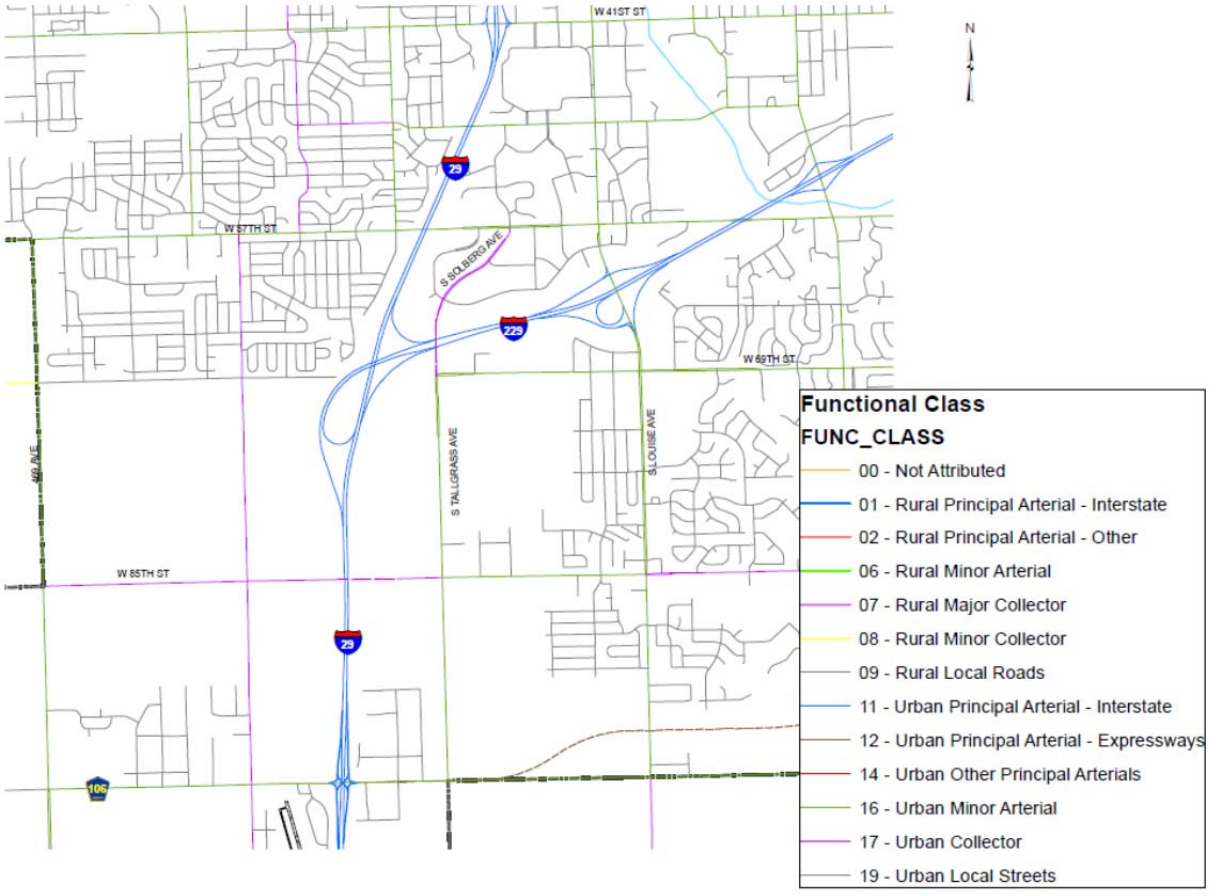

Figure 6: Federal Functional Classification

Alternative Travel Modes

As a system interchange, the only alternative travel mode provided for through the interchange area is by means of Jefferson Lines, an interstate bus service that runs daily routes between Sioux Falls and Sioux City, Iowa. Sioux Area Metro (SAM) serves the area surrounding the I-29 / I-229 System Interchange, but does not run buses through the interchange. SAM's Route Number 12, shown in purple in Figure 7, serves the northeast and southeast quadrants near the interchange, with connections to Route Numbers 1, 10, and 11 at the Southwest Transfer Facility located on Louise Avenue approximately ½ miles north of I-229. SAM Paratransit's curb-to-curb shared ride transportation service is for persons who are, due to their functional limitation(s), unable to use accessible fixed route bus service. SAM Paratransit is available within the area designated by the dark blue line in Figure 7. SAM Paratransit vehicles may occasionally travel through the interchange, but not on a routine basis.

The Sioux Falls Regional Airport is located about 7 miles northeast of the interchange, providing both commercial and general aviation passenger and air freight services to southeastern South Dakota, southwestern Minnesota and northwestern Iowa. The Lincoln County Airport is located approximately 2 miles south of the interchange and provides general aviation services for Minnehaha and Lincoln Counties. The Lincoln County Airport also appears in Figure 7 in gunmetal blue (labeled as the Great Planes Airport).

Although state law does allow for bicycle travel through the interchange along the Interstate mainline shoulders, it does not routinely occur. The Sioux Falls MPO has designated on-street bicycle routes throughout the MPO into three categories, Primary, Secondary, and Urban. A review of those designated routes shows no designated Primary Bicycle Route within the interchange's influence area. A designated Secondary Bicycle Route parallels I-29 along the Lincoln County Highway 111 (Tea-Ellis Road) to the west of the interchange. There are numerous designated Urban Bicycle Routes within the interchange's area of influence, most notably on the 57th Street crossroad north of the interchange and along the Solberg Avenue / Tallgrass Avenue crossroad to the east of the interchange. The Sioux Falls Bike & Recreation Trail also runs along the Big Sioux River approximately 1 ½ miles northeast of the interchange. The designated bicycle routes and bicycle trail are also shown in Figure 7. There are bicycle lanes proposed for the typical section of 85th Street that will cross I-29 once that crossing is completed.

Alternative Modes

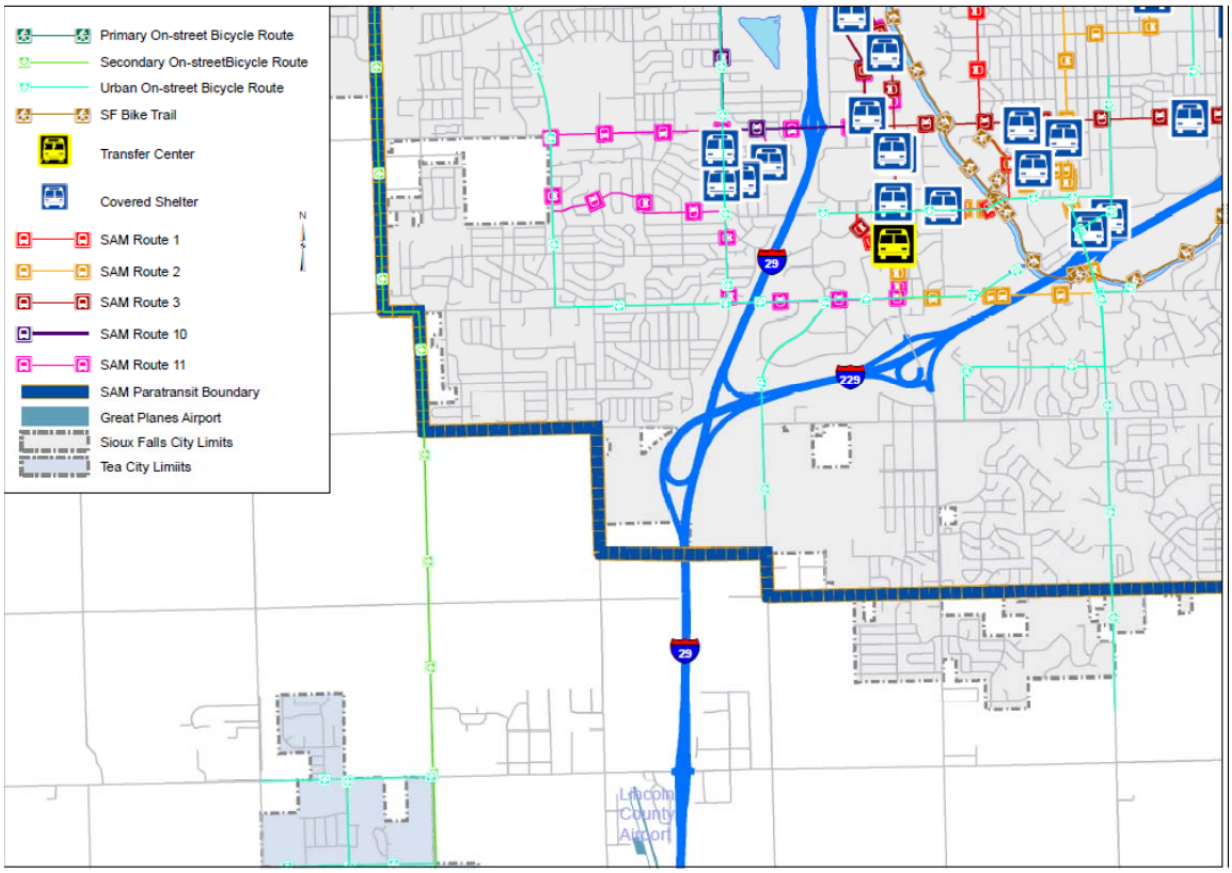

Figure 7

Interchanges

I-29 / I-229 System Interchange

The existing interchange for I-29 and I-229 is a trumpet configuration and shown below in Figure 8. All ramps are currently single lane ramps at the merge/diverge with I-29.

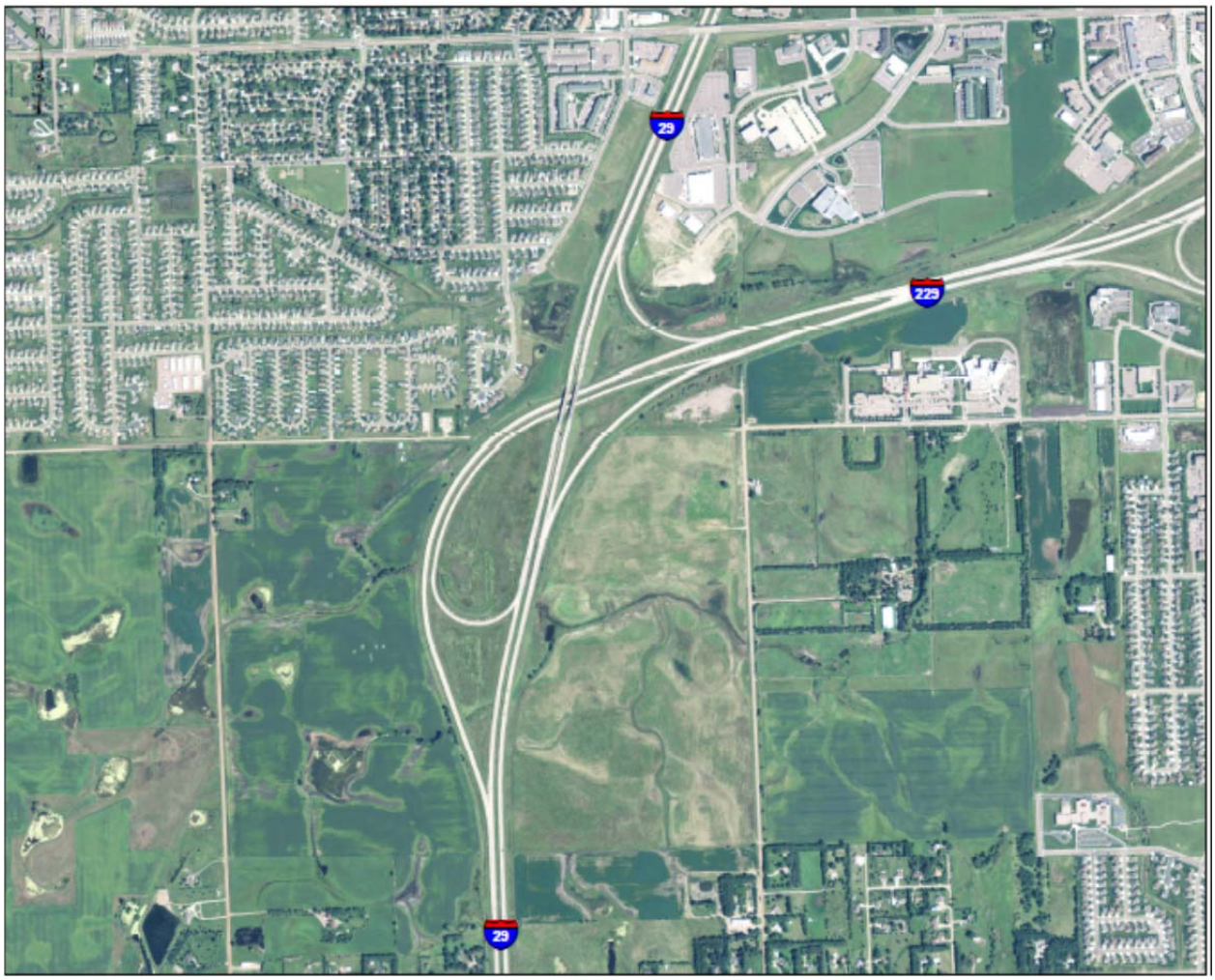

Figure 8: Existing I-29 / I-229 System Interchange Configuration

I-29 Exit 73: Tea

The adjacent interchange south of the I-29/I-229 System Interchange is the service interchange of Exit 73. The interchange provides access to Lincoln County Highway 106 and is commonly referred to as the Tea interchange as it provides access to the City of Tea, located 1 ½ miles west of the interchange along Lincoln County Highway 106. The interchange is also intended to provide the connection point for I-29 to the Sioux Falls MPO's proposed Eastside and Westside arterial corridors as connecting segments are constructed. The Exit 73 interchange is a single-point configuration and is shown in Figure 9 below.

Figure 9: Existing Exit 73 Interchange Configuration

I-29 Exit 77: 41st Street (Sioux Falls)

The adjacent interchange north of the I-29 / I-229 System Interchange is the service interchange for 41st Street in Sioux Falls. The Exit 77 interchange is a typical diamond configuration that also allows for full access to the local roadway network. The aerial photo in Figure 10 shows the configuration of the existing Exit 77 interchange.

Figure 10: Existing Exit 77 Interchange Configuration

A corridor study of the 41st Street crossroad completed in 2012 evaluated the future needs of the interchange. The study determined that the existing diamond interchange will eventually limit the ability to accommodate the projected traffic growth. The study developed and analyzed options to reconfigure the interchange, determining potential improvement configurations of either a diverging diamond or a single point to be feasible alternatives. Figures 11 and

12 show a schematic for these technically feasible options from the corridor preservation study.

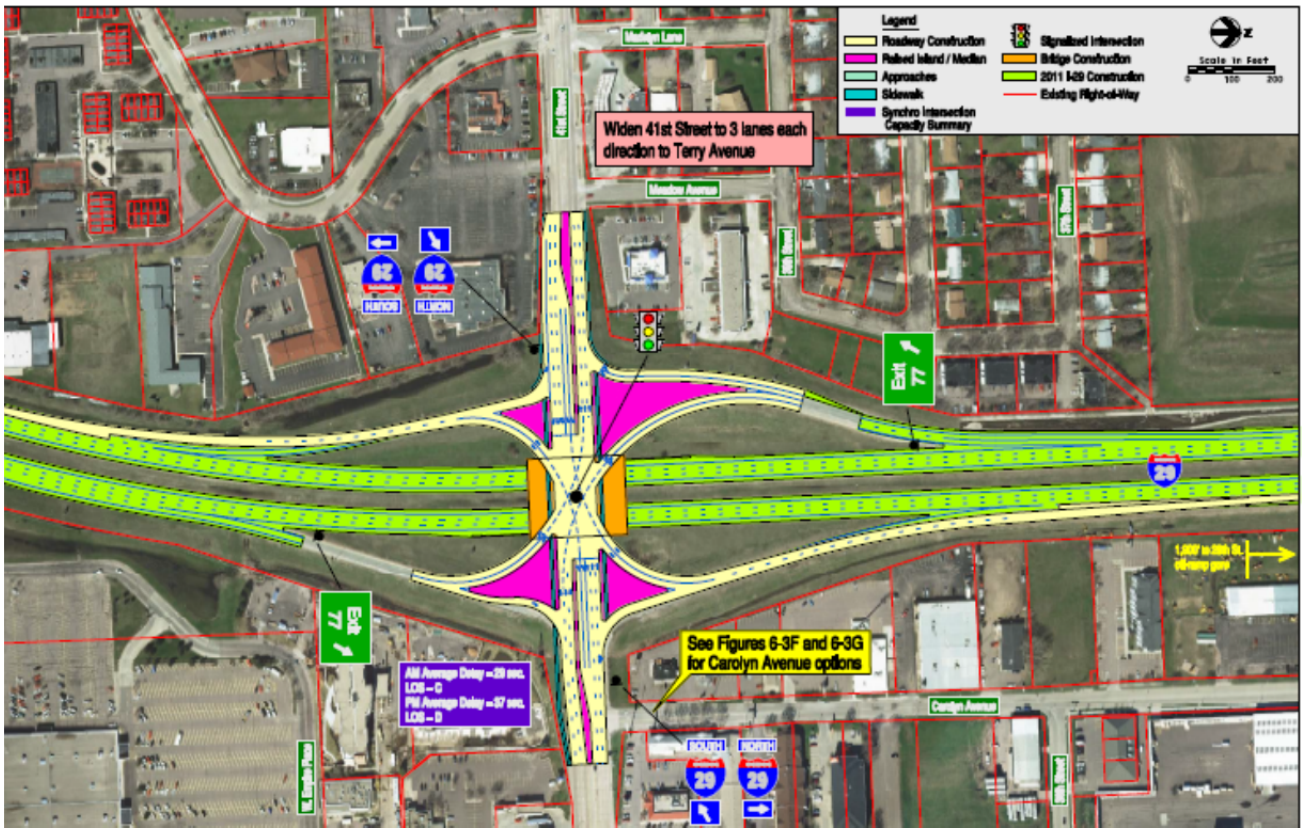

Figure 11: Potential Single Point Interchange Configuration for Exit 77

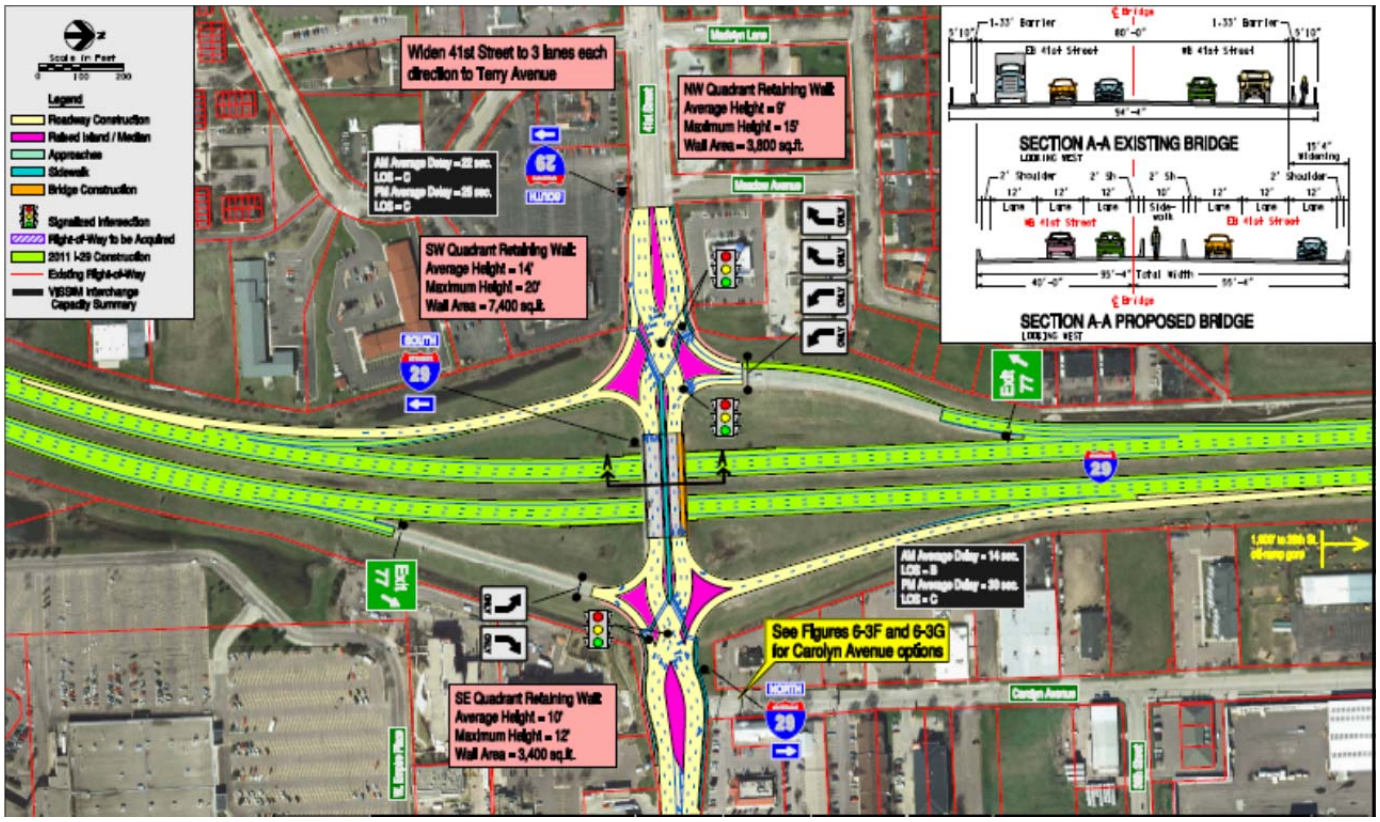

Figure 12: Potential Diverging Diamond Interchange Configuration for Exit 77

All of the technically feasible configuration options for the Exit 77 interchange will have a negligible effect on the I-29 / I-229 System Interchange given the distance between the two interchanges.

I-229 Exit 1C: Louise Avenue (Sioux Falls)

The adjacent interchange east of the I-29 / I-229 System Interchange is the service interchange for Louise Avenue in Sioux Falls. The Exit 1C interchange is a partial cloverleaf configuration, with a Louise Avenue southbound to I-229 northbound loop ramp in the southwest quadrant of the interchange. The aerial photo in Figure 13 shows the configuration of the existing Exit 1C interchange.

Figure 13: Existing Exit 1C Interchange Configuration

Potential Adjacent Interchanges

The I-29 Corridor Study investigated numerous ideas for additional I-29 service interchanges both at the I-29 / I-229 System Interchange and between the I-29 / I-229 System interchange and both I-29 service interchanges at Exit 73 and 77.

Providing a service interchange located in conjunction with the I-29 / I-229 System Interchange to provide access to the local street network via either 69th Street or 72nd Street was investigated and dismissed as the negative effect on driver expectation and the overall cost, due to the complexity of such an interchange, was considered too great. As a result, the SDDOT does not anticipate additional access to the local street network via 69th Street or 72nd Street at the I-29 / I-229 System Interchange being established within the planning horizon.

A service interchange at the 57th Street overpass between Exit 77 and the I-29 / I-229 System Interchange was investigated. The options developed were dismissed as they either had right-of-way impacts to adjacent properties that were considered too great and / or resulted in poorer traffic operations than the no build alternative that could not be mitigated. As a result, the SDDOT does not anticipate an additional interchange being constructed between I-29 / I-229 System Interchange and Exit 77 within the planning horizon.

A service interchange at what would be a connection to 85th Street between Exit 73 and the I-29 / I-229 System Interchange was investigated. It was determined that although options for an interchange at 85th Street would be feasible, only a grade-separated crossing of the Interstate is necessary at this time to facilitate local arterial needs. The viability and impacts of a service interchange at this location will be reevaluated at such a time if the need appears to be warranted. The SDDOT does not anticipate modification of the I-29 / I-229 System Interchange will be necessary to accommodate a service interchange at the 85th Street location.

Existing Data

The majority of the data used to create this document came from the I-29 Corridor Study completed in December 2010. Additional data (such as the location of transit and bicycle routes) was obtained from the SDDOT and the City of Sioux Falls.

Operational Performance

A traffic operations study was conducted as part of the I-29 Corridor Study in July, 2009. Twenty-four intersections and eighteen ramp junctions were analyzed within the I-29 Corridor Study's study area.

Level of Service (LOS) for signalized and unsignalized intersections according to the Highway Capacity Manual was used to measure traffic operation at each of the intersections analyzed. 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 Description

Level of Service	SIGNALIZED Intersection Control Delay (sec)	Intersection LOS Description
A	≤ 10.0	Free flow, insignificant delays.
B	10.1-20.0	Stable operation, minimal delays.
C	20.1-35.0	Stable operation, acceptable delays.
D	35.1-55.0	Restricted flow, regular delays.
E	55.1-80.0	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	> 80.0	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Source: *Highway Capacity Manual*, Transportation Research Board, 2000

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

The summation of the traffic operations analyses show that mainline I-29 currently operates at a LOS of A or B at all times under average conditions. Results for the individual segments of mainline I-29 and I-229 are shown in Table 2.

Table 2: Mainline Interstates 29 & 229 segments Existing Level of Service

Mainline Link	AM Peak LOS	PM Peak LOS
I-29 Northbound – South of Exit 73	B	A
I-29 Southbound - South of Exit 73	A	B
I-29 Northbound – Exit 73 to I-29/I-229	B	A
I-29 Southbound – Exit 73 to I-29/I-229	A	B
I-29 Northbound – I-29/I-229 to Exit 77	B	B
I-29 Southbound – I-29/I-229 to Exit 77	A	B
I-29 Northbound – North of Exit 77	B	A
I-29 Southbound – North of Exit 77	A	B
I-229 Northbound – I-29/I-229 to Exit 1C	B	A
I-229 Southbound – I-29/I-229 to Exit 1C	A	B
I-229 Northbound – East of Exit 1C	B	A
I-229 Southbound – East of Exit 1C	B	B

As congestion is often dictated more by actions at intersections and ramp junctions, analysis of movements at those locations was done independently. These analyses were completed not only at the I-29 / I-229 System Interchange, but also at the adjacent service interchanges upstream and downstream of the I-29 / I-229 System Interchange. Table 3 summarizes the operations at the ramp junctions at each of the I-29 and I-229 interchanges analyzed.

Table 3: Ramp Junctions Existing Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
I-29 Exit 73	I-29 NB to Off-Ramp	Diverge	B	A
I-29 Exit 73	I-29 SB to Off-Ramp	Diverge	A	B
I-29 Exit 73	On-ramp to I-29 NB	Merge	B	B
I-29 Exit 73	On-ramp to I-29 SB	Merge	A	B
I-29 / I-229 System Int.	I-29 NB to I-229 NB	Diverge	B	B
I-29 / I-229 System Int.	I-29 SB to I-229 NB	Diverge	B	B
I-29 / I-229 System Int.	I-229 SB to I-29 NB / I-229 SB to I-29 SB	Diverge	B	B
I-29 / I-229 System Int.	I-29 NB to I-229 NB / I-29 SB to I-229 NB	Merge	B	B
I-29 / I-229 System Int.	I-229 SB to I-29 NB	Merge	B	B
I-29 / I-229 System Int.	I-229 SB to I-29 SB	Merge	B	C
I-29 Exit 77	I-29 NB to Off-Ramp*	Diverge	B	B
I-29 Exit 77	I-29 SB to Off-Ramp	Diverge	A	A
I-29 Exit 77	On-Ramp to I-29 NB	Merge	B	B
I-29 Exit 77	On-Ramp to I-29 SB*	Merge	B	B
I-229 Exit 1C	I-229 NB to Off-Ramp	Diverge	B	B
I-229 Exit 1C	I-229 SB to Off-Ramp	Diverge	A	B
I-229 Exit 1C	On-Ramp1 to I-229 NB	Merge	B	B
I-229 Exit 1C	On-Ramp2 to I-229 NB	Merge	B	B
I-229 Exit 1C	On-Ramp to I-229 SB	Merge	B	B

* Improvements to add an auxiliary lane have been completed since analysis was done.

As there is no local street crossroad at the I-29 / I-229 System Interchange, there was no crossroad corridor or intersection analysis completed at the I-29 / I-229 System Interchange. Table 4 summarizes the results of the existing traffic analyses for the ramp terminal and adjacent major intersections of the three service interchanges contiguous to the I-29 / I-229 System Interchange.

Table 4: Intersections Existing Level of Service

Interchange	Intersection / Movement	AM Peak LOS*	PM Peak LOS*
I-29: Exit 73	L.C. 106 & Sundowner Ave.**	C	B
I-29: Exit 73	L.C. 106 & I-29 Ramp Terminal	B	B
I-29: Exit 73	L.C. 106 & Tallgrass Ave.**	A	A
I-29: Exit 77	41st Street & Marion Road.	**F**	**D**
I-29: Exit 77	41st Street & I-29 SB Ramp Terminal	B	**F**
I-29: Exit 77	41st Street & I-29 NB Ramp Terminal	**F**	**F**
I-29: Exit 77	41st Street & Shirley Ave.	A	B
I-229: Exit 1C	Louise Ave. & 69th Street	C	B
I-229: Exit 1C	Louise Ave. & I-229 NB Ramp Terminal	B	A
I-229: Exit 1C	Louise Ave. & I-229 SB Ramp Terminal	**E**	**F**
I-229: Exit 1C	Louise Ave. & 59th Street	B	C
I-229: Exit 1C	Louise Ave. & 57th Street	**D**	**D**

Note: *Average Intersection LOS shown, individual movements may be different.
**Unsignalized, Minor Road Stop Only Intersection, Lincoln County 106 has zero delay, LOS = A.

Existing Safety Conditions

Twenty-six (26) crashes (reported for calendar years 2009, 2010, & 2011) were determined to be within the I-29 / I-229 System Interchange influence area. Six (6) accidents were classified as an Injury/Fatality accident. Six (6) of the reported crashes were found to be related to following too closely for the conditions, including 4 of the 6 Injury/Fatality classified crashes. Five (5) of the reported crashes associated to mainline I-29 or I-229 were classified as animal hits. This data is shown in Table 5.

Table 5: Accident Classification* for Reported Accidents 2009-2011

Classification	Mainline	Ramps	Ramp Terminal Intersections**	Crossroad**	Total
Fixed Object	2 (1 I/F)	2	0	0	4 (1 I/F)
Animal	5	0	0	0	5
Pedestrian	0	0	0	0	0
Bicycle	0	0	0	0	0
Parked Car	1	0	0	0	1
Over Turn	2	0	0	0	2
Other Single Vehicle	1	0	0	0	1
Rear End	2 (1 I/F)	4 (3 I/F)	0	0	6 (4 I/F)
Head On	0	0	0	0	0
Angle	1 (1 I/F)	3	0	0	4 (1 I/F)
Sideswipe, same direction	2	1	0	0	3
Sideswipe, opposite direction	0	0	0	0	0
Other Multiple Vehicle	0	0	0	0	0
Total	16 (3 I/F)	10 (3 I/F)	0	0	26 (6 I/F)

(I//F) = Number Classified as an Injury/Fatality Accident
* Classification based upon Interchange Safety Analysis Tool (ISAT) methodology.
** There are crossroads or ramp terminal intersections at the I-29 / I-229 System Interchange

Figure 14 shows the location of all reported crashes for calendar years 2009, 2010, & 2011, including those outside of the I-29 / I-229 System Interchange's influence area as defined by the Interchange Safety Analysis Tool (ISAT).

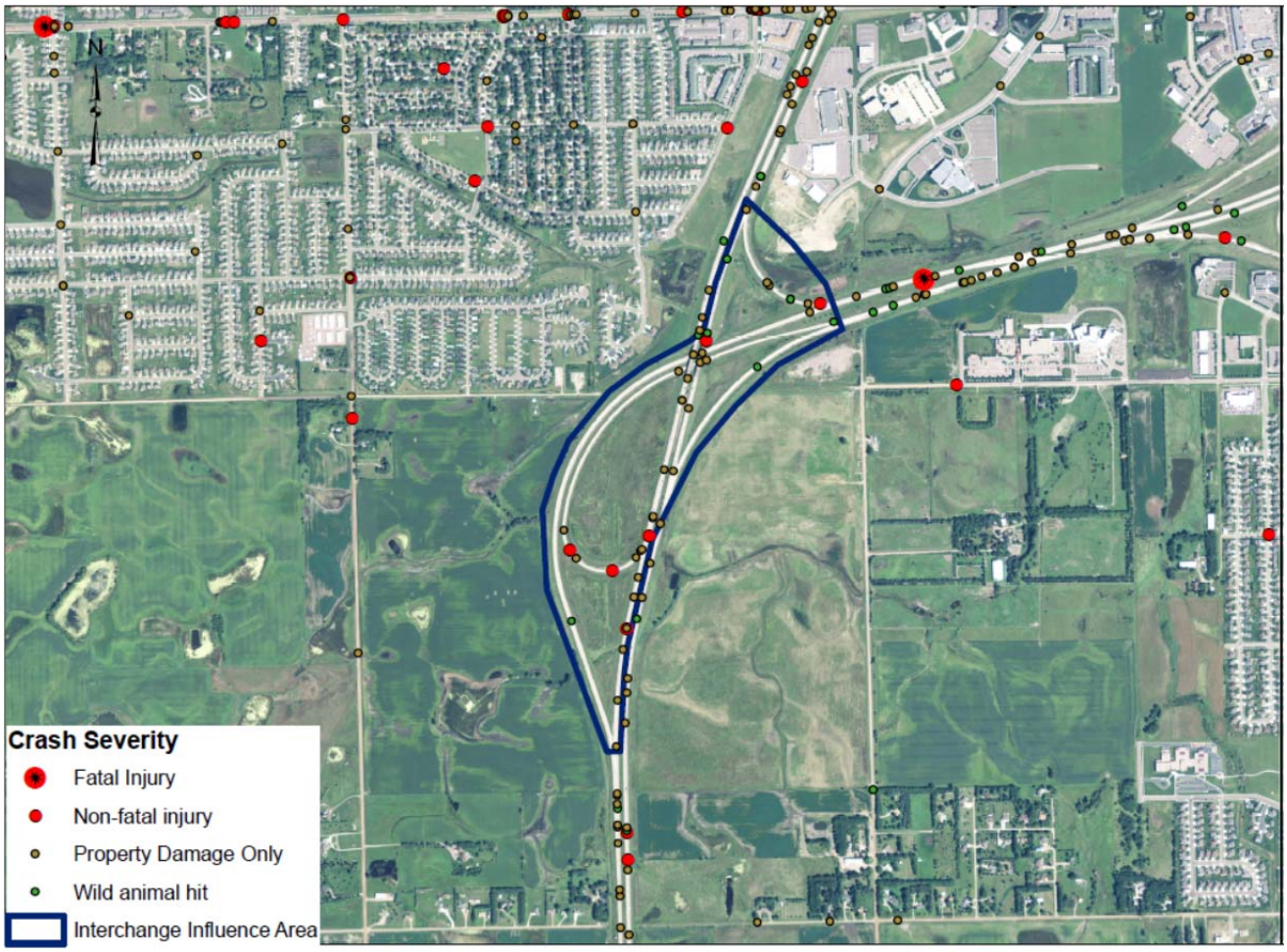

Figure 14

Upon review of the crash data on the I-29 SB to I-229 NB loop ramp, most of the crashes on this ramp were attributed to either alcohol influence or over driving for weather conditions (snow).

Existing Environmental Constraints

A quick perusal of the area surrounding the existing I-29 / I-229 System Interchange shows that the most potential environmental constraint could be caused by the known wetlands surrounding the interchange. Figure 15 shows the location of the known environmental constraints within ½ mile of the I-29 / I-229 System Interchange.

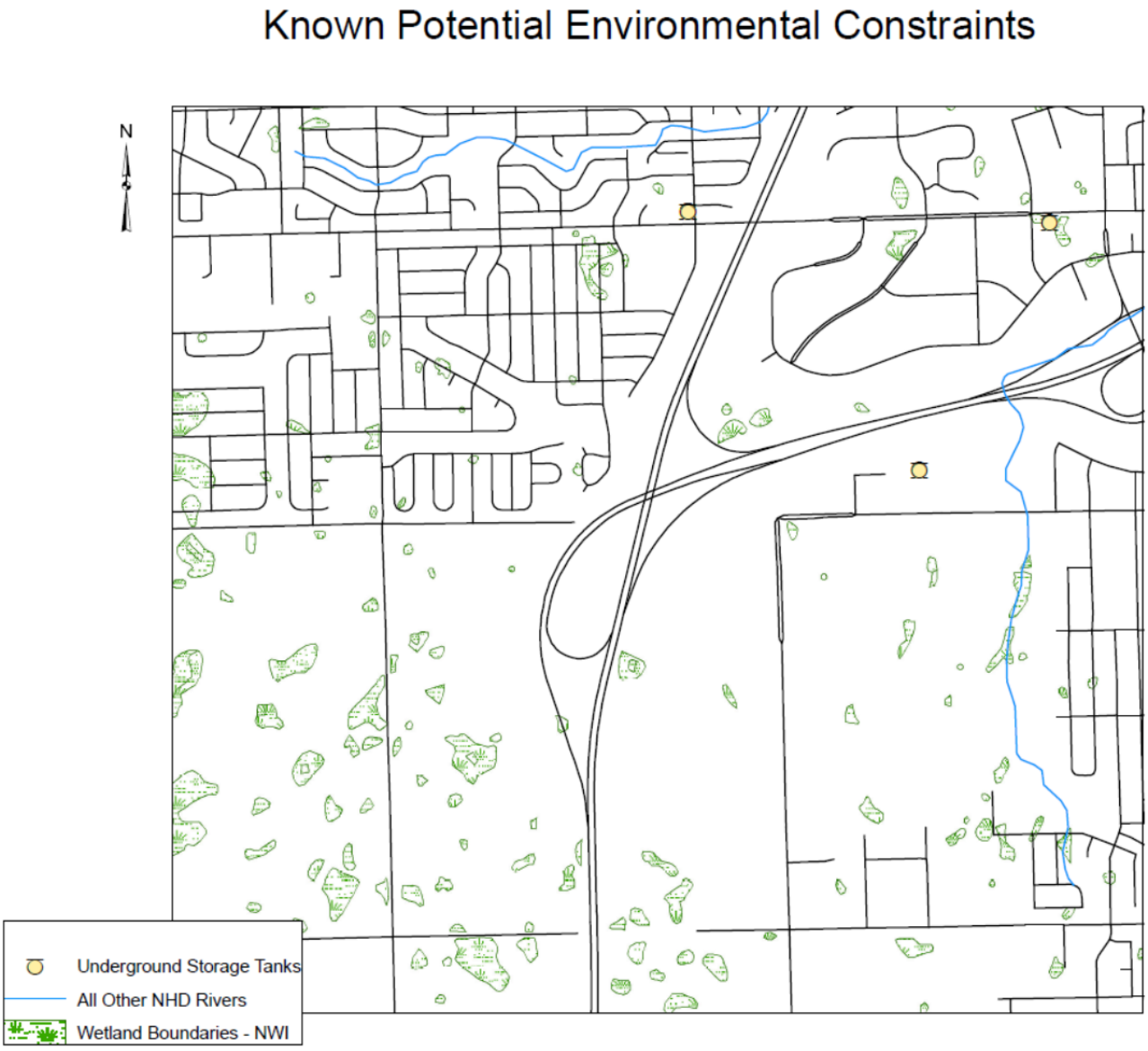

Figure 15

THIS PAGE INTENTIONALLY BLANK

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 1961, 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.

When originally constructed, the interchange only provided for access to I-29 south of the interchange and also accommodated an overpass of the Great Northern Railway crossing for I-29 at the same location. This can be seen in the original plan sheet shown in Figure 16.

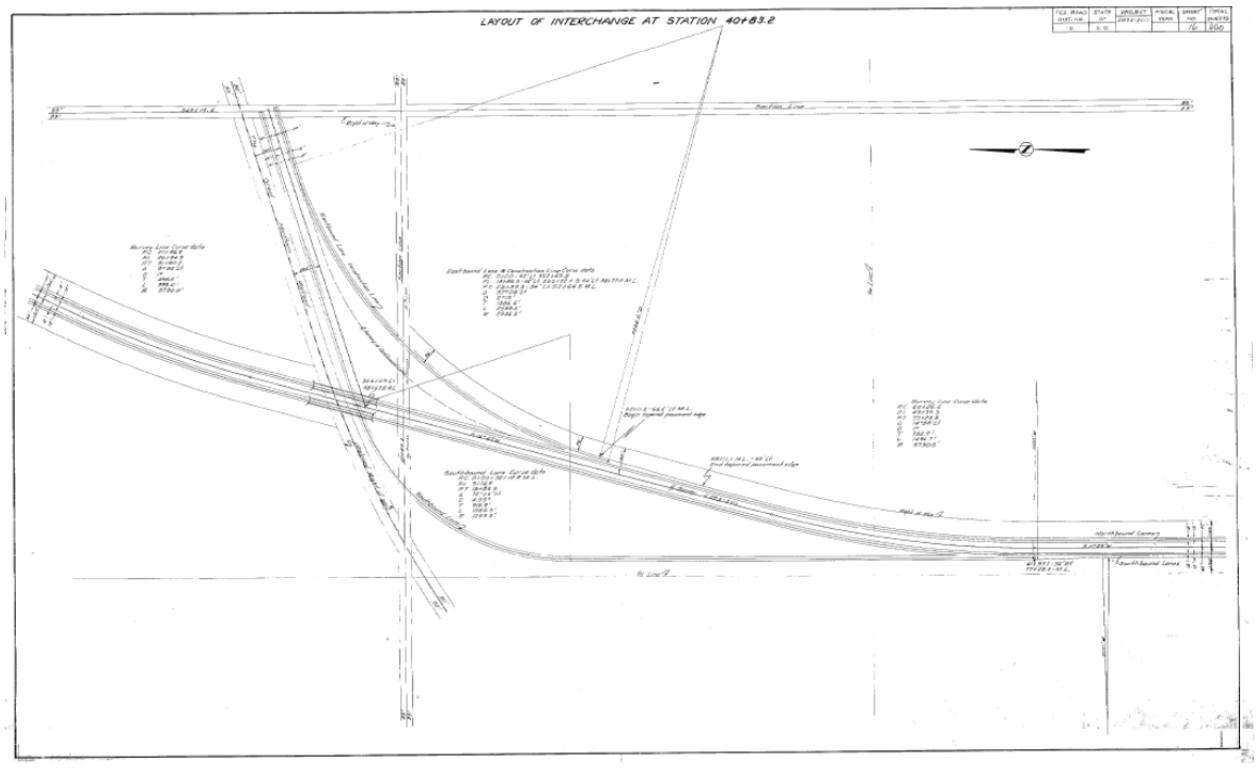

Figure 16: Original I-29 / I-229 System Interchange Configuration

After the railroad was abandoned, the interchange was modified in 1984 to its current configuration in order to provide full system to system access.

Some of the geometric deficiencies found during the 2000 Interstate Corridor Study for the existing interchange include:

- The superelevation rate for the I-29 Northbound to I-229 Northbound ramp is 6.3%.
- The roadway width for mainline I-29 on the structures over I-229 is 30 feet.
- The inslopes for all of the ramps are 4:1.
- The off-ramp taper for the I-29 Northbound to I-229 Northbound ramp is 48:l.

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. For the I-29 / I-229 System Interchange, the pavement condition is the primary need for the interchange reconstruction project. The pavements of the mainline I-29 and portions of the mainline I-229 at the existing I-29/ I-229 System Interchange ramps are Portland Cement Concrete (PCC) built in 1962, have numerous joint and spall patches throughout the surface, and have been recently overlaid with asphalt in 2012. The remaining pavement is PCC, built with the interchange's modification in 1984, and has also been overlaid with asphalt in 2012. As the mainline and ramp pavements are overdue to 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.

Safety

The I-29 / I-229 System Interchange ranked 18th out of the 62 interchanges evaluated in Phase 1 of the 2000 Interstate Corridor Study. The I-29 / I-229 System Interchange was not evaluated in the 2010 Decennial Update to the Interstate Corridor Study as it was under study independently at the time. As described in Chapter 3: Existing Conditions, it is believed that the primary safety need occurs by drivers following too closely as the Interstate traffic transitions from rural to urban conditions or by over driving for inclement weather conditions.

Currently there is no existing interchange lighting, but warrants are met for full interchange lighting. It has also been a general strategy of the SDDOT over the past ten years to provide interchange lighting at all interchanges in the City of Sioux Falls as they come due for reconstruction or major rehabilitation.

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. Each of the two structures at the existing I-29 / I-229 System Interchange currently have a Federal Sufficiency Rating of 67.0 and are classified as structurally deficient primarily due to concrete deck surface conditions and have a substandard width of 30 feet.

Aside from concrete deck overlay surface conditions, the two structures are currently in fair condition. They are both standard concrete box girder bridges built in 1958 with a latex modified concrete (LMC) deck overlay and rail replacement done in 1982, and an asphalt overlay done in 2012. LMC Deck overlays typically have a service life of 20 to 25 years, therefore the current deck overlays are at the end of their service life and the structures will soon be due for rehabilitation or replacement. As it has been determined that replacement of the structures 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 100 year structure service life.

Traffic

The existing traffic operations evaluation showed that none of the interchange or ramp junctions are currently 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.

THIS PAGE INTENTIONALLY BLANK

Chapter 5: ALTERNATIVES

As part of the I-29 Corridor Study, numerous options were investigated for possible reconfiguration of the I-29 / I-229 System Interchange. After SDDOT held scoping meetings for the project, considering the anticipated future traffic operations, it was determined to pursue only one option in addition to the No Build Alternative. Details on the dismissed options can be found in Appendix A of the I-29 Corridor Study.

Alternative 0: No Build

This alternative does not alter the current configuration of the existing I-29 / I-229 System Interchange or apply any improvements along mainline I-29 or I-229 and results in strictly removing and replacing the pavement and having another deck overlay applied to the existing structures.

Alternative 1: Shifted I-29 SB to I-229 NB ramp.

This alternative does little modification to the existing interchange's configuration other than shifting the I-29 SB ramp junction between the ramp that connects I-29 SB to I-229 NB to the north from its current location. This shift results in reducing the length of the ramp by approximately 1200 feet. This reduction in ramp length reduces the travel time for each vehicle using the ramp by an estimated 18 seconds. Although this may not seem like much too each individual vehicle, it amounts to an improvement in aggregate travel time of over 16,000 hours annually. The shift will also aid in the constructability in the I-29 / I-229 System Interchange's reconstruction, as it will allow for the I-29 Southbound to I-229 Northbound movement to occur with minimal interruption throughout the construction period. The shifted ramp is shown in pink in Figure 17 below.

Although the alignment won't change, the I-29 NB to I-229 NB ramps will be built to accommodate a two lane ramp, but will initially only be striped for one lane until traffic levels warrant a two lane ramp. The I-229 SB to I-29 SB ramp will remain as two lanes until tapering to one lane prior to merging with I-29 as currently configured.

The mainline improvement to add auxiliary lanes to both directions of I-29 and I-229 will add some improvement to the merge and diverge movements at the ramp junctions. The typical section for the mainline Interstate away from the interchange is shown in Figure 18 and a map showing the proposed lane layout is in Appendix C.

The I-29 structures over I-229 will be replaced with this alternative.

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

Figure 17: Alternative 1

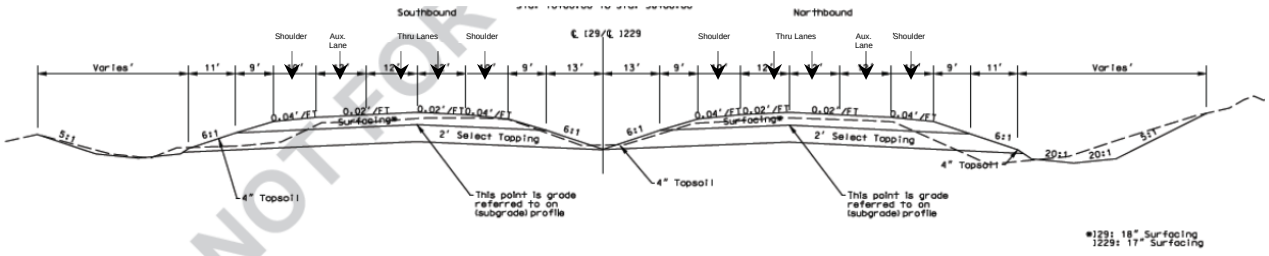

Figure 18: Mainline Typical Section

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

Chapter 6: FUTURE YEAR TRAFFIC

Alternative 0: No Build

The summation of the traffic operations analyses show that in the future analysis year of 2033, the majority of mainline I-29 and I-229 will continue to operate within the SDDOT standard of mainline LOS C or better at all times. However, due to increase traffic volumes, the mainline segments between Exit 73 and the I-29 / I-229 System Interchange will operate at LOS E in the directional peak without any improvements. Three mainline segments will deteriorate to a LOS D in the directional peak as well, although two of those segments are outside of the project area. Table 6 shows the future traffic operations analysis determined AM and PM LOS for the mainline segments.

Table 6: Mainline Interstates 29 & 229 segments Future No Build Level of Service

Mainline Link	AM Peak LOS	PM Peak LOS
I-29 Northbound – South of Exit 73	C	B
I-29 Southbound - South of Exit 73	B	**D**
I-29 Northbound – Exit 73 to I-29/I-229	**E**	C
I-29 Southbound – Exit 73 to I-29/I-229	B	**E**
I-29 Northbound – I-29/I-229 to Exit 77	**D**	C
I-29 Southbound – I-29/I-229 to Exit 77	B	D
I-29 Northbound – North of Exit 77	C	B
I-29 Southbound – North of Exit 77	B	**D**
I-229 Northbound – I-29/I-229 to Exit 1C	C	B
I-229 Southbound – I-29/I-229 to Exit 1C	B	C
I-229 Northbound – East of Exit 1C	C	C
I-229 Southbound – East of Exit 1C	B	C

As congestion is often dictated more by actions at intersections and ramp junctions, analysis of movements at those locations were done independently. These analyses were completed not only at the I-29 / I-229 System Interchange, but also at the adjacent service interchanges upstream and downstream of the I-29 / I-229 System Interchange. Table 7 summarizes the future operations at the ramp junctions at each of the I-29 and I-229 interchanges analyzed.

Table 7: Ramp Junctions Future No Build Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
I-29 Exit 73	I-29 NB to Off-Ramp	Diverge	**D**	B
I-29 Exit 73	I-29 SB to Off-Ramp	Diverge	B	**F**
I-29 Exit 73	On-ramp to I-29 NB	Merge	**E**	C
I-29 Exit 73	On-ramp to I-29 SB	Merge	B	**D**
I-29 / I-229 System Int.	I-29 NB to I-229 NB	Diverge	**E**	C
I-29 / I-229 System Int.	I-29 SB to I-229 NB	Diverge	C	**D**
I-29 / I-229 System Int.	I-229 SB to I-29 NB / I-229 SB to I-29 SB	Diverge	B	C
I-29 / I-229 System Int.	I-29 NB to I-229 NB / I-29 SB to I-229 NB	Merge	C	C
I-29 / I-229 System Int.	I-229 SB to I-29 NB	Merge	**D**	C
I-29 / I-229 System Int.	I-229 SB to I-29 SB	Merge	B	**E**
I-29 Exit 77	I-29 NB to Off-Ramp	Diverge	**D**	C
I-29 Exit 77	I-29 SB to Off-Ramp	Diverge	A	B
I-29 Exit 77	On-Ramp to I-29 NB	Merge	**D**	C
I-29 Exit 77	On-Ramp to I-29 SB	Merge	C	**D**
I-229 Exit 1C	I-229 NB to Off-Ramp	Diverge	C	B
I-229 Exit 1C	I-229 SB to Off-Ramp	Diverge	A	B
I-229 Exit 1C	On-Ramp1 to I-229 NB	Merge	C	C
I-229 Exit 1C	On-Ramp2 to I-229 NB	Merge	C	C
I-229 Exit 1C	On-Ramp to I-229 SB	Merge	C	D

As there is no local street crossroad at the I-29 / I-229 System Interchange, there was no crossroad corridor or intersection analysis completed at the I-29 / I-229 System Interchange. Table 8 summarizes the results of the traffic analysis of the future, no build traffic through the ramp terminal and adjacent major intersections of the three service interchanges contiguous to the I-29 / I-229 System Interchange

Table 8: Intersections Future No Build Level of Service

Interchange	Intersection / Movement	AM Peak LOS*	PM Peak LOS*
I-29: Exit 73	L.C. 106 & Sundowner Ave.**	F	F
I-29: Exit 73	L.C. 106 & I-29 Ramp Terminal	F	F
I-29: Exit 73	L.C. 106 & Tallgrass Ave.**	F	F
I-29: Exit 77	41st Street & Marion Road.	F	F
I-29: Exit 77	41st Street & I-29 SB Ramp Terminal	E	F
I-29: Exit 77	41st Street & I-29 NB Ramp Terminal	F	F
I-29: Exit 77	41st Street & Shirley Ave.	A	B
I-229: Exit 1C	Louise Ave. & 69th Street	F	F
I-229: Exit 1C	Louise Ave. & I-229 NB Ramp Terminal	C	D
I-229: Exit 1C	Louise Ave. & I-229 SB Ramp Terminal	F	F
I-229: Exit 1C	Louise Ave. & 59th Street	F	F
I-229: Exit 1C	Louise Ave. & 57th Street	F	F

Note: *Average Intersection LOS shown, individual movements may be different.
**Unsignalized, Minor Road Stop Only Intersection, Lincoln County 106 has zero delay, LOS = A.

Alternative 1: Shifted I-29 SB to I-229 NB Ramp

The summation of the traffic operations analyses show that for the proposed improvements, in the future analysis year of 2033, shows an improvement in the LOS for the segments directly impacted by the project. However, the segments outside of the project area continue to operate at a LOS of D. Table 9 shows the traffic operations analysis determined AM and PM LOS for the mainline segments under the build condition of Alternative 1.

Table 9: Mainline Interstates 29 & 229 segments Future Alternate 1 Level of Service

Mainline Link	AM Peak LOS	PM Peak LOS
I-29 Northbound – South of Exit 73	C	B
I-29 Southbound - South of Exit 73	B	**D**
I-29 Northbound – Exit 73 to I-29/I-229	C	B
I-29 Southbound – Exit 73 to I-29/I-229	A	C
I-29 Northbound – I-29/I-229 to Exit 77	B	B
I-29 Southbound – I-29/I-229 to Exit 77	B	C
I-29 Northbound – North of Exit 77	C	B
I-29 Southbound – North of Exit 77	B	**D**
I-229 Northbound – I-29/I-229 to Exit 1C	C	B
I-229 Southbound – I-29/I-229 to Exit 1C	B	C
I-229 Northbound – East of Exit 1C	C	C
I-229 Southbound – East of Exit 1C	B	C

As congestion is often dictated more by actions at intersections and ramp junctions, analysis of movements at those locations were done independently. These analyses were completed not only at the I-29 / I-229 System Interchange, but also at the adjacent service interchanges upstream and downstream of the I-29 / I-229 System Interchange. Table 10 summarizes the operations at the ramp junctions at each of the I-29 and I-229 interchanges analyzed under the build conditions of Alternative 1.

Table 10: Ramp Junctions Future Alternate 1 Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
I-29 Exit 73	I-29 NB to Off-Ramp	Diverge	**D**	B
I-29 Exit 73	I-29 SB to Off-Ramp	Diverge	B	C
I-29 Exit 73	On-ramp to I-29 NB	Merge	**D**	C
I-29 Exit 73	On-ramp to I-29 SB	Merge	B	**D**
I-29 / I-229 System Int.	I-29 NB to I-229 NB	Diverge	C	B
I-29 / I-229 System Int.	I-29 SB to I-229 NB	Diverge	B	C
I-29 / I-229 System Int.	I-229 SB to I-29 NB / I-229 SB to I-29 SB	Diverge	B	C
I-29 / I-229 System Int.	I-29 NB to I-229 NB / I-29 SB to I-229 NB	Merge	C	B
I-29 / I-229 System Int.	I-229 SB to I-29 NB	Merge	C	C
I-29 / I-229 System Int.	I-229 SB to I-29 SB	Merge	B	**D**
I-29 Exit 77	I-29 NB to Off-Ramp	Diverge	B	B
I-29 Exit 77	I-29 SB to Off-Ramp	Diverge	A	B
I-29 Exit 77	On-Ramp to I-29 NB	Merge	**D**	C
I-29 Exit 77	On-Ramp to I-29 SB	Merge	B	**D**
I-229 Exit 1C	I-229 NB to Off-Ramp	Diverge	C	B
I-229 Exit 1C	I-229 SB to Off-Ramp	Diverge	A	B
I-229 Exit 1C	On-Ramp1 to I-229 NB	Merge	C	C
I-229 Exit 1C	On-Ramp2 to I-229 NB	Merge	C	C
I-229 Exit 1C	On-Ramp to I-229 SB	Merge	B	C

As there is no local street crossroad at the I-29 / I-229 System Interchange, there was no crossroad corridor or intersection analysis completed at the I-29 / I-229 System Interchange. Table 11 summarizes the results of the traffic analysis of the future traffic through the ramp terminal and adjacent signalized intersections of the three service interchanges adjacent to the I-29 / I-229 System Interchange under the build conditions of Alternative 1.

Table 11: Intersections Future Alternative 1 Level of Service

Interchange	Intersection / Movement	AM Peak LOS*	PM Peak LOS*
I-29: Exit 73	L.C. 106 & Sundowner Ave.**	F	F
I-29: Exit 73	L.C. 106 & I-29 Ramp Terminal	F	F
I-29: Exit 73	L.C. 106 & Tallgrass Ave.**	F	F
I-29: Exit 77	41st Street & Marion Road.	F	F
I-29: Exit 77	41st Street & I-29 SB Ramp Terminal	E	F
I-29: Exit 77	41st Street & I-29 NB Ramp Terminal	F	F
I-29: Exit 77	41st Street & Shirley Ave.	A	B
I-229: Exit 1C	Louise Ave. & 69th Street	F	F
I-229: Exit 1C	Louise Ave. & I-229 NB Ramp Terminal	C	D
I-229: Exit 1C	Louise Ave. & I-229 SB Ramp Terminal	F	F
I-229: Exit 1C	Louise Ave. & 59th Street	F	F
I-229: Exit 1C	Louise Ave. & 57th Street	F	F

Note: *Average Intersection LOS shown, individual movements may be different.
**Unsignalized, Minor Road Stop Only Intersection, Lincoln County 106 has zero delay, LOS = A.

Chapter 7: ALTERNATIVES ANALYSIS

Conformance with Transportation Plans

The build alternative (Alternative 1) conforms with current local and state transportation plans.

The existing I-29 / I-229 System Interchange was studied by the *I-29 Corridor Study*. An interchange improvement project for the I-29 / I-229 System Interchange has been in the Statewide Transportation Improvement Program (STIP) in some form since 2006, and is in the current 2014-2017 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 (0.063% versus 0.04% standard), inslopes (4:1 versus 6:1 standard), or on-ramp taper rate (48:1 versus 50:1 standard). The mainline I-29 structures over I-229 will also still lack minimum shoulders (30 foot roadway width versus 40 foot standard). Alternative 1 will correct these existing issues.

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. However, the overall project will also include a new crossing of I-29 at 85th Street south of the I-29 / I-229 System Interchange. Because of this new crossing, an environmental assessment is being conducted.

Safety

Considering the volumes of traffic through the interchange, upon reviewing the reported accident data shown in Table 5, one can easily ascertain that safety is not a major concern at the interchange under present conditions. However, the majority of the injury classified crashes were attributed to rear-end crashes. Considering that there are no intersections as part of the I-29 / I-229 interchange, one can assume that those crashes can be attributed to following too closely for conditions. As traffic levels increase, the number of these types of crashes can be anticipated to increase. Since the traffic analysis indicates that Alternative 0 (No Build) will result in an increase in congestion, the likelihood of these types of crashes may also increase. The auxiliary lanes proposed as part of the

Alternative 1 will result in a mainline traffic LOS of C or better for the mainline links directly affected by the project. Out of the 26 reported crashes within the interchange's influence area, 5 (19%) were classified as animal hits which would occur regardless of interchange configuration.

Operational Performance

As shown in Table 8, the existing I-29 / I-229 System Interchange will have a ramp merge level of service of E during the AM peak hour on the I-29 NB to I-229 NB ramp and a ramp merge level of service of E during the PM peak on the I-229 SB to I-29 SB ramp if no improvements to the interchange are made. The mainline link between Exit 73 and the I-29 / I-229 System Interchange will also experience a mainline LOS of E during the directional peak (NB during the AM peak and SB during the PM peak). To alleviate this, the build option Alternative 1 calls for the addition of auxiliary lanes for both directions on I-29 between Exit 73 and the I-29 / I-229 System Interchange, between Exit 77 and the I-29 / I-229 System Interchange, and for the southbound lanes on I-229 between Exit 1 C and the I-29 / I-229 System Interchange. The I-29 segment links that show an improvement in mainline level of service by the addition of the auxiliary lanes are shown in Table 12.

Table 12: Alternative 1 Mainline Interstate 29 segments Future Level of Service Improvement

Mainline Link	AM Peak LOS	PM Peak LOS
I-29 Northbound – Exit 73 to I-29/I-229	**E** ⟶ C	C ⟶ B
I-29 Southbound – Exit 73 to I-29/I-229	B ⟶ A	**E** ⟶ C
I-29 Northbound – I-29/I-229 to Exit 77	**D** ⟶ B	C ⟶ B
I-29 Southbound – I-29/I-229 to Exit 77	No Change (B)	D ⟶ C

Within the interchange influence area, the addition of the auxiliary lanes improves the merge and diverge LOS for the I-29 / I-229 System Interchange as shown in Table 13,

Table 13: Alternative 1 I-29 / I-229 System Interchange Ramp Junctions Level of Service Improvement

Ramp	Movement	AM Peak LOS	PM Peak LOS
I-29 NB to I-229 NB	Diverge	E ⟶ C	C ⟶ B
I-29 SB to I-229 NB	Diverge	C → B	**D** ⟶ C
I-229 SB to I-29 NB / I-229 SB to I-29 SB	Diverge	No Change (B)	No Change (C)
I-29 NB to I-229 NB / I-29 SB to I-229 NB	Merge	No Change (C)	C ⟶ B
229 SB to 29 NB	Merge	**D** ⟶ C	No Change (C)
229 SB to 29 SB	Merge	No Change (B)	E ⟶ **D**

The addition of auxiliary lanes also improves the merge and diverge LOS for some of the ramps of the interchanges adjacent to the I-29 / I-229 System Interchange, as shown in Table 14.

Table 14: Alternative 1 Adjacent Interchange Ramp Junctions Future Level of Service Improvement

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
I-29 Exit 73	29 SB to Off-Ramp	Diverge	No Change (B)	F ⟶ C
I-29 Exit 73	On-ramp to 29 NB	Merge	E ⟶ **D**	No Change (C)
I-29 Exit 77	29 NB to Off-Ramp	Diverge	**D** → C	C⟶ B
I-29 Exit 77	On-Ramp to 29 SB	Merge	C ⟶ B	No Change (**D**)
I-229 Exit 1C	On-Ramp to 229 SB	Merge	C ⟶ B	**D**⟶ C

The improvements made to the I-29 / I-229 System Interchange by Alternative 1 has negligible effect on traffic operations on the Interstate system beyond those noted above.

The shifting of the I-29 SB to I-229 NB ramp to the north for Alternative 1 reduces the length of the ramp, which also reduces the travel time for vehicles using the ramp.

Evaluation Matrix

A matrix comparing Alternative 0 to Alternative 1 is shown in Table 15.

Table 15: Evaluation Matrix

	Alternative 0 No Build	Alternative 1 Shifted Ramp
Meets all SDDOT Design Criteria	No	Yes
Meets SDDOT Access Criteria	Yes	Yes
Lowest I-29 / I-229 System Interchange Ramp Merge Level of Service, 2033	E	D
Lowest I-29 / I-229 System Interchange Ramp Diverge Level of Service, 2033	E	C
ROW Impacts	None	Minimal / None*
Environmental Impacts	None	Minimal
Safety Improvement	None	Minimal

* 85th Street crossroad may have some ROW impacts, but those are not related to the improvements proposed for the I-29 / I-229 System Interchange.

Coordination

The SDDOT has a long history of public involvement in the development of transportation plans and projects. The 2012 passage of the Moving Ahead for Progress in the 21st Century Act (MAP-21) requires a public involvement process. A public meeting was held as part of the environmental assessment on May 2, 2013 specific to the project that will include the modification the I-29/I-229 System Interchange. An additional public meeting will be held in the late Winter / early Spring of 2014 at the conclusion of the environmental assessment. A webpage was set up specific for the project at www.sddot.com/dot/publicmeetings/pubmeet_I29I229.aspx

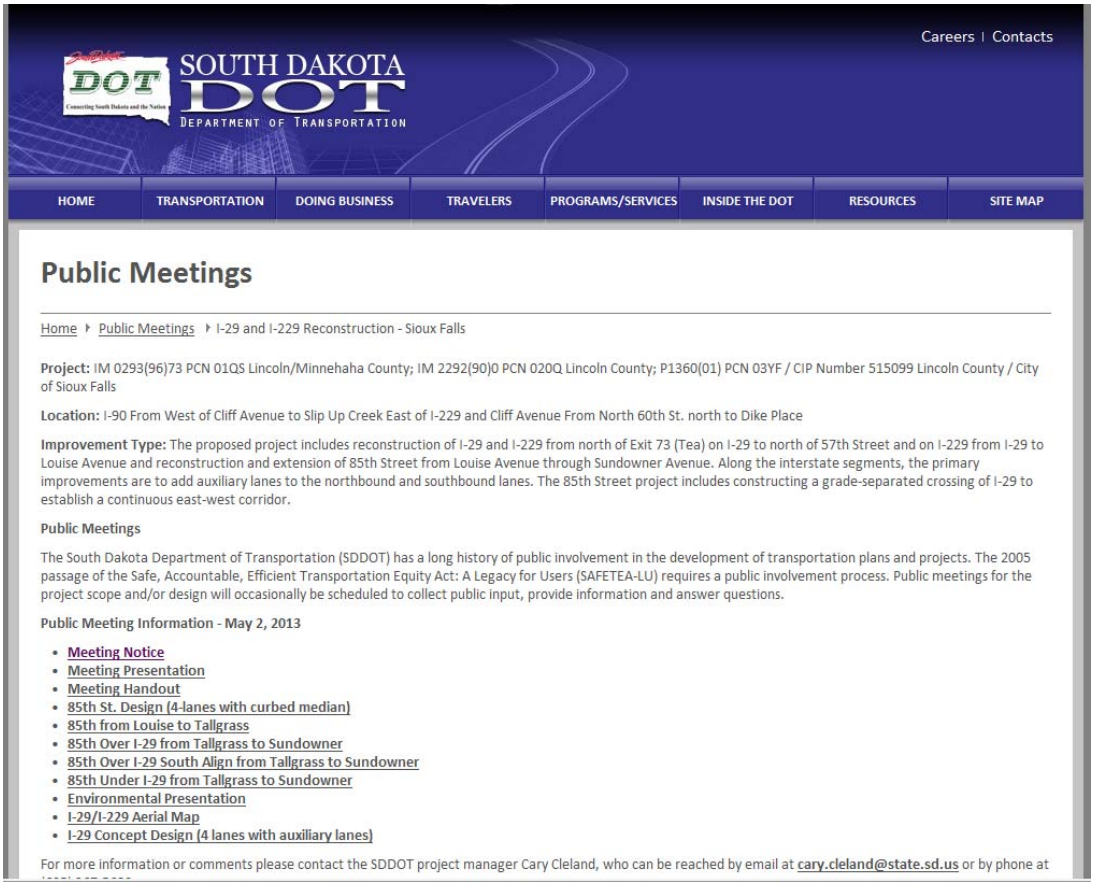

Figure 19: Screenshot of Project Webpage

The *I-29 Corridor Study* also had a study webpage, an e-newsletter, and numerous public meetings held while the study was active. The *I-29 Corridor Study*'s final report is available at http://www.sddot.com/transportation/highways/planning/specialstudies/docs/I29Exit73FinalCorridorStudyReportNoAppendices.pdf.

THIS PAGE INTENTIONALLY BLANK

Chapter 8: FUNDING PLAN

The planned project to modify the existing I-29 / I-229 System Interchange is currently estimated to cost $27.327 million (in 2013 dollars). The City of Sioux Falls has an associated project to build a crossing of I-29 at 85th Street for $2.980 million (in 2013 dollars). The SDDOT is currently anticipating the funding for both projects with the combination of funding sources as shown in Table 16.

Table 16 : Anticipated Funding Allocation Breakdown

State Funding Category	Federal Funding Category	Federal Funds	State Funds	City Funds	Total Funds
Interstate (PCN 01QS)	National Highway Performance Program	$24.859 Million	$2.468 Million	$ 0	$27.327 Million
Local Urban (PCN 03YF)	Surface Transportation Program	$2.363 Million	$0.521 Million	$0.096 Million	$2.980 Million
Total		$27.222 Million	$2.989 Million	$0.094 Million	$30.307 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 $31.531 Million.

THIS PAGE INTENTIONALLY BLANK

Chapter 9: RECOMMENDATIONS

This modification request is to maintain the existing I-29 / I-229 System Interchange as a trumpet configuration, as shown in Figure 16 in Chapter 5, but with a shift in the loop ramp and some structure and ramp improvements to the other ramps 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 reconfigure an existing System Interchange. No additional access to the Interstate System is being requested. The reconfiguration of the existing System 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 from the project will be seen by the addition of auxiliary lanes along the mainline between the System Interchange and the adjacent service interchanges.

Figure 2 shows the existing configuration of Exit 75. The 2001 *Interstate Corridor Study* reviewed the existing interchange characteristics. Existing geometric features were reviewed using the original and modification plans for this interchange. Some of the geometric deficiencies for the interchange include the superelevation rate for the I-29 Northbound to I-229 Northbound ramp being 6.3% and the inslopes for all the of the ramps being 4:1. The taper for I-29 Northbound to I-229 Northbound on ramp is 48:l and should be lengthened. Probably the most critical geometric feature at this interchange is the lack of shoulder width on the I-29 mainline structures over I-229. Both structures for Interstate 29 that cross I-229 are classified as structurally deficient due to concrete deck overlay conditions and have a substandard width of 30'.

Aside from concrete deck overlay surface conditions, the two structures over I-229 are currently in fair condition. They are both concrete box girder bridges built in 1958 with a LMC deck overlay done in 1982, and an asphalt overlay done in 2012. LMC deck overlays typically have a service life of 20 to 25 years, so the current deck overlays are at the end of their service lives and the structures will soon be due for

rehabilitation or replacement. As both structures do not provide the minimum roadway width for mainline Interstate, 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 trumpet configuration, but with some geometric improvements. The I-29 Southbound to I-229 Northbound ramp will be shifted to the north. Some improvements to meet current design standards will also be done on the other existing ramps. While existing traffic operations do not warrant a need for additional capacity, future traffic operations indicate that the mainline segments of Interstate will warrant improvements that provide for additional capacity. 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 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 trumpet configuration, but with some ramp modification and improvements to meet current design standards, in addition to mainline Interstate improvements to add an auxiliary lane between the I-29 / I-229 System Interchange and adjacent interchanges. While existing traffic operations do not warrant a need for additional capacity, future traffic operations

indicate that the mainline segments of Interstate will warrant improvements that provide for additional capacity. The I-29 Corridor Study analyzed numerous improvement scenarios. This study led to one alternative for the I-29 / I-229 System Interchange being pursued. The alternative maintains the trumpet configuration with a modification in the location of the I-29 Southbound to I-229 Northbound ramp to the north, resulting in the ramp length being shortened. The modification to the I-29 Southbound to I-229 Northbound ramp is being done for constructability and to improve aggregate travel time.

Currently there is no existing interchange lighting, but warrants are met for full interchange lighting, so full 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 an existing interchange with minimal geometric modification, not much change in permanent signing is anticipated from the permanent signing that is currently in place. The proposed signing plan is shown in Figure 20. A zoomed in , more readable view of the proposed signing plan is available in Appendix B.

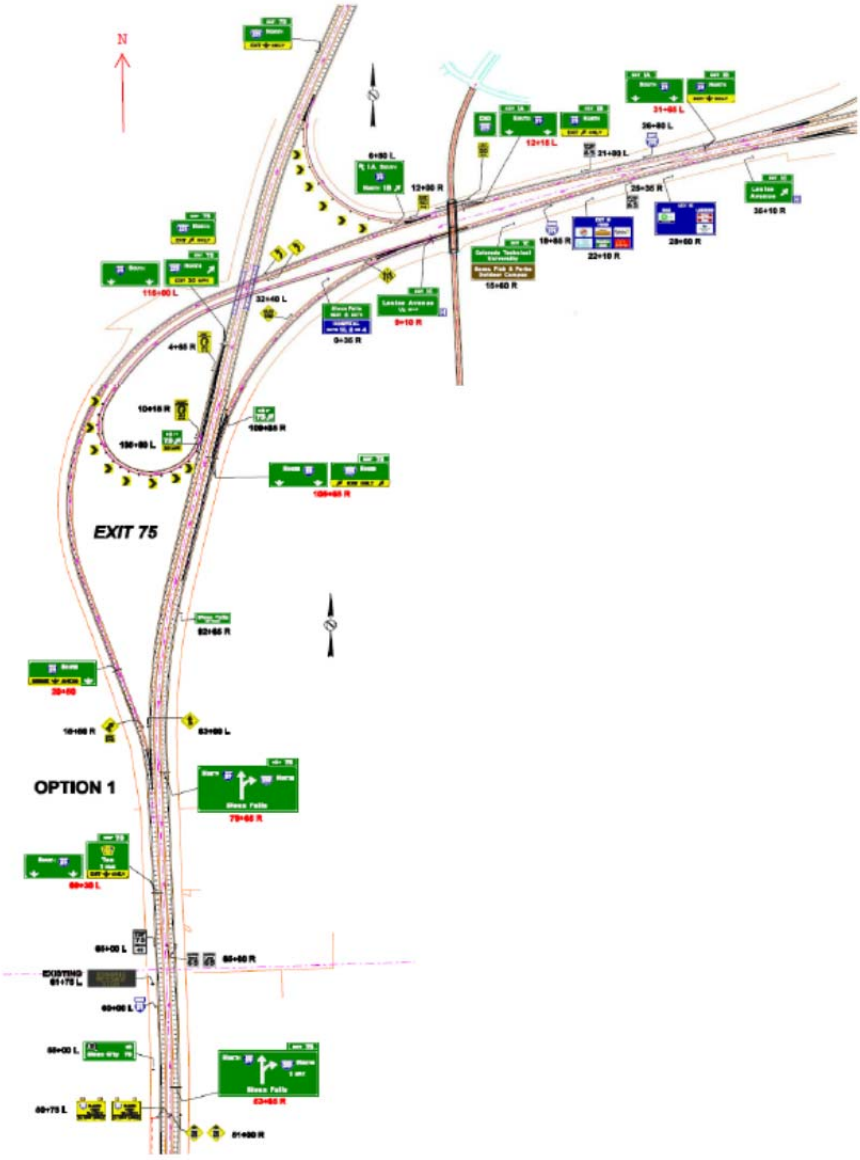

Figure 20: Proposed Signing Plan

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 for the I-29 / I-229 system interchange will maintain the current separation between the Interstate System and the local road network. The reconfigured interchange will continue to provide for all traffic movements of Interstate travel. The improvement will meet or exceed current design and operational 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, the MPO’s TIP, local transportation planning and the MPO’s Long Range 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).***

The corridor surrounding the I-29 / I-229 system interchange was the focus of the I-29 Corridor Study completed in 2010. Alternative options to reconfigure the I-29 /I-229 System interchange were developed as part of the I-29 Corridor Study. The I-29 Corridor Study identified the potential for a new interchange at I-29 and 85th Street to the south of the I-29 / I-229 system interchange.

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 interchange is being reconstructed to address the deteriorating pavement that has surpassed its design life and the aging, structurally deficient structures of the existing interchange while improving safety. The modification to the I-29 Southbound to I-229 Northbound ramp is being done for constructability and to improve aggregate travel time.

Mainline I-29 will be reconstructed along with the I-29 / I-229 system interchange from approximately the ramp junctions of the I-29 Exit 73 (Tea) interchange south of the I-29 / I-229 system interchange to approximately the 57th Street overpass north of the I-29 / I-229 system interchange. Mainline I-229 will be reconstructed along with the interchange from the I-29 / I-229 system interchange east to near the ramp junctions of the I-229 Exit 1C (Louise Avenue) interchange. As part of the mainline reconstruction, auxiliary lanes are being added to the mainline Interstate segments between the ramp junctions to handle the forecasted increase in future traffic volumes due to regional traffic growth.

New development in the immediate area of the I-29 / I-229 System Interchange will require improvements in the local street arterial network. As part of this Interstate project, a new I-29 crossing of the City of Sioux Falls arterial street network will be constructed at 85th Street to the south of the I-29 / I-229 System Interchange.

A new crossing of I-229 for the City of Sioux Falls' arterial street network has recently been completed to the east of the I-29 / I-229 System Interchange at Solberg Avenue.

As this project involves the reconfiguration of a system interchange, there will be no changes to access points between the Interstate System and the local road system with this project.

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 2014-2017 STIP for FY2015 and the NEPA process is tracking consistent as other projects believed to need an environmental assessment (EA) programmed for the same year and is anticipated to be completed in the Spring of 2014.