South Dakota Department of Transportation

Interchange Modification Justification Report

Interstate 90 Exit 399
(Cliff Avenue)

February 25, 2011

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-90 Exit 399 – Interchange Modification Justification Report

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EXECUTIVE SUMMARY

The South Dakota Department of Transportation (SDDOT), in cooperation with the City of Sioux Falls, has initiated an assessment of the existing interchange on Interstate 90 (I-90) at Cliff Avenue in Sioux Falls, South Dakota. As both the existing pavement and structures of the mainline, ramps and crossroad 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 reconfigure the existing diamond interchange to a single point interchange (SPI) to improve safety and traffic operations along Cliff Avenue.

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 reconfigure the existing Cliff Avenue interchange from a diamond interchange to a SPI, 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 interchange. No additional access to the Interstate System is being requested. The reconfiguration of the existing interchange will have a negligible, yet positive 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 crashes at the interchange's ramp terminal intersection.

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 interchange. No additional access to the Interstate System is being requested. Existing characteristics and development in the vicinity of the existing interchange limited the cost feasible options for interchange reconfiguration.

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.

Based on right-of-way constraints within a developed urban area, only interchange alternatives that could fit within the existing right-of-way were developed to replace the existing interchange configuration. This led to two alternatives, a tight diamond configuration similar to the existing and a single-point urban interchange.

The single point interchange concept was selected primarily to improve traffic operations along North Cliff Avenue by consolidating the two intersections of the existing diamond design into one intersection. Also the space between the ramp intersection and the existing intersections along North Cliff Avenue are greater than the other designs. The increase in distance between the intersections improves the operation of both intersections.

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 Exit 399 on the Interstate's operations revealed that the interchange will improve traffic operations along Cliff Avenue and would not adversely impact the adjacent interchanges along I-90.

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 an existing connection to a public road and will replace the current full access interchange with a reconfigured full access interchange. The reconfigured 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, 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 South Dakota Interstate Corridor Study completed in February 2001 indicated that there is no potential for future interchange additions along the segments of Interstate 90 between Exit 399 and the adjacent exits. The recently completed 2010 South Dakota Decennial Interstate Corridor Study, which did not evaluate Exit 399, looked at a potential interchange on I-90 for Minnesota Avenue approximately 1 mile west of Exit 399, but found it to not be feasible due to significant geometric, operational, and environmental impacts necessary to avoid impacting the Big Sioux River floodway and the D&I Railroad while maintaining minimum distance from I-90, Exit 399 and the I-90/I-29 System interchange.

Options to reconfigure the I-90/I-229 System interchange were developed as part of a corridor preservation study in 2007-8. With an actual improvement at that interchange currently beyond the 20 year planning horizon, all feasible options from that corridor preservation study for that interchange are accounted for as possible while maintaining functionality with the existing configuration.

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 deteriorating pavement that has surpassed its design life and the aging, functionally obsolete structures of the existing interchange while improving safety and helping to alleviate existing traffic congestion related to the access spacing along Cliff Avenue. Cliff Avenue will be reconstructed along with the interchange from East 60th Street North south of the interchange to Dike Place north of the interchange.

The reconfiguration of the interchange is being proposed to address future traffic growth relative to the anticipated future population growth of the entire Sioux Falls Metropolitan Planning Area. The City of Sioux Falls plans to reconstruct an adjacent section of the Cliff Avenue corridor from Benson Road to East 60th Street North in either the same year or the following year (depending upon construction sequencing) as the interchange's reconstruction.

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), in cooperation with the City of Sioux Falls, has initiated an assessment of the existing interchange on Interstate 90 (I-90) at Cliff Avenue in Sioux Falls, 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 Cliff Avenue interchange was first identified as having some geometric needs for replacement by the 2000 Statewide Interstate Corridor Study. As both the existing pavement and structures of the mainline, ramps and crossroad 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 reconfigure the existing diamond interchange to a single point interchange (SPI) to improve safety and traffic operations along Cliff Avenue.

Purpose

Both the existing pavement and structures of the Interstate 90 mainline, ramps and Cliff Avenue crossroad 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

Exit 399 is an existing connection between I-90 and North Cliff Avenue in Sioux Falls, South Dakota. Exit 399 is located approximately 3 miles east of the I-90/I-29 System Interchange and 1 mile west of the I-90/I-229 System Interchange. Figure 1 shows the location of Exit 399. Exit 399 is currently the only I-90 service interchange serving the Sioux Falls Regional Airport (Joe Foss Field). Cliff Avenue becomes South Dakota Highway 115 upon leaving the Sioux Falls City Limits north of I-90, which connects to Dell Rapids, South Dakota 15 miles to the north of I-90.

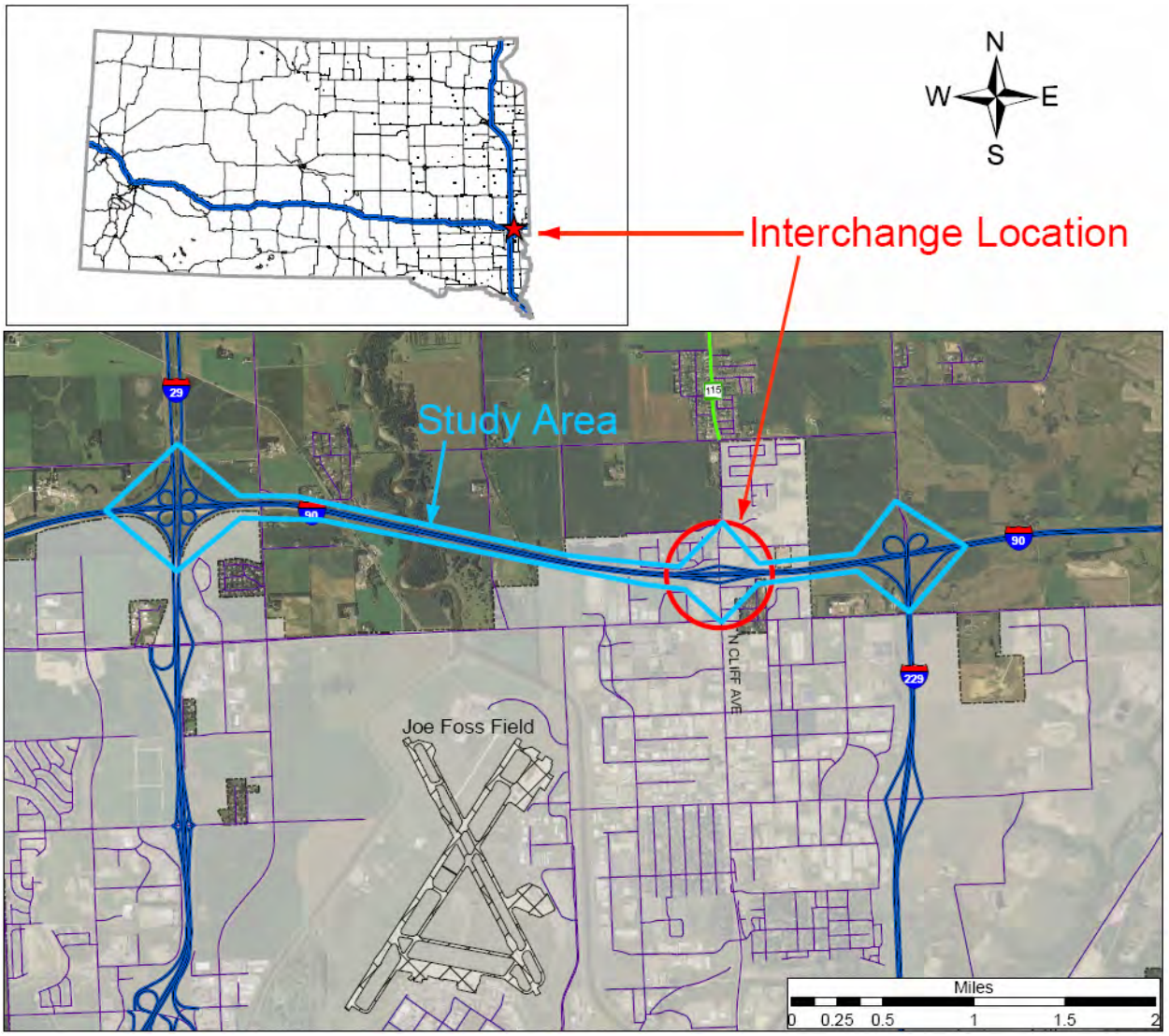

Figure 1: Project Location and Study Area Map

The current configuration for Exit 399 is a typical diamond interchange as shown in Figure 2. The proposed interchange modification would replace the diamond interchange at Exit 399 with a SPI. The result would be a more efficient interchange that dramatically improves the operational service of North Cliff Avenue while slightly improving the operational service of the Interstate.

Figure 2: Existing Configuration

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Chapter 2: METHODOLOGY

This interchange modification justification report (IMJR) provides a detailed review of the alternatives considered and 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. The study area extends from the Cliff Avenue/Dike Place intersection on the north to the Cliff Avenue/60th Street North intersection on the south and from the I-90/I-29 interchange on the west to the I-90/I-229 interchange on the east.
- 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 2035 were prepared for the study area interstate segments, interchanges, interstate ramp intersections and adjacent arterial street intersections based on the Sioux Falls regional travel demand model for 2035.
    - Analyzing current and future traffic operations along study area roadway links. The traffic analyses were completed using the procedures and methodologies found in the *2000 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. However, the HCS+T7F software isn't the best for certain intersection types. For these intersections, SIDRA Intersection software

was used. Both the HCS+T7F and SIDRA Intersection software packages use analysis procedures defined in the Highway Capacity Manual. HCS+T7F and SIDRA Intersection output reports of this analysis are included in Appendix B.

- Evaluating the access modification and its benefits/impacts to adjacent development associated with the access modification.
- Evaluating the anticipated safety impacts of the access modification was intended to be done with the use of FHWA's Interchange Safety Analysis Tool (ISAT), but that was tool was found to not apply to the SPI configuration. In lieu of that tool, a before and after accident comparison of other diamond interchanges converted to SPI's within South Dakota was done.

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

Chapter 3: EXISTING CONDITIONS

Demographics

The existing Cliff Avenue interchange primarily provides the northern industrial area of Sioux Falls access to the Interstate system. As shown in Figures 3 & 4 below, the interchange currently serves an area of large employment areas south of I-90 and some small residential neighborhoods, primarily north of I-90.

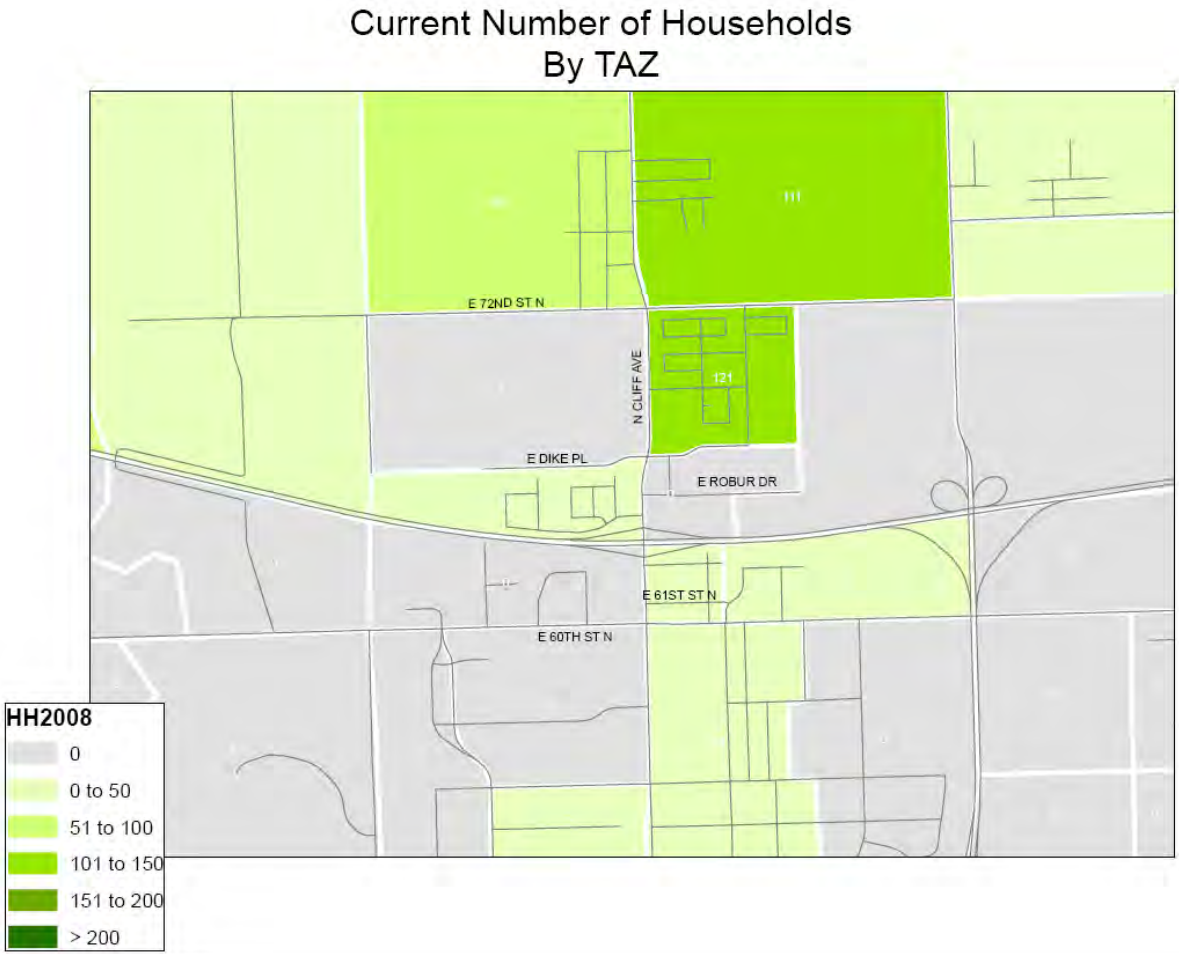

Figure 3

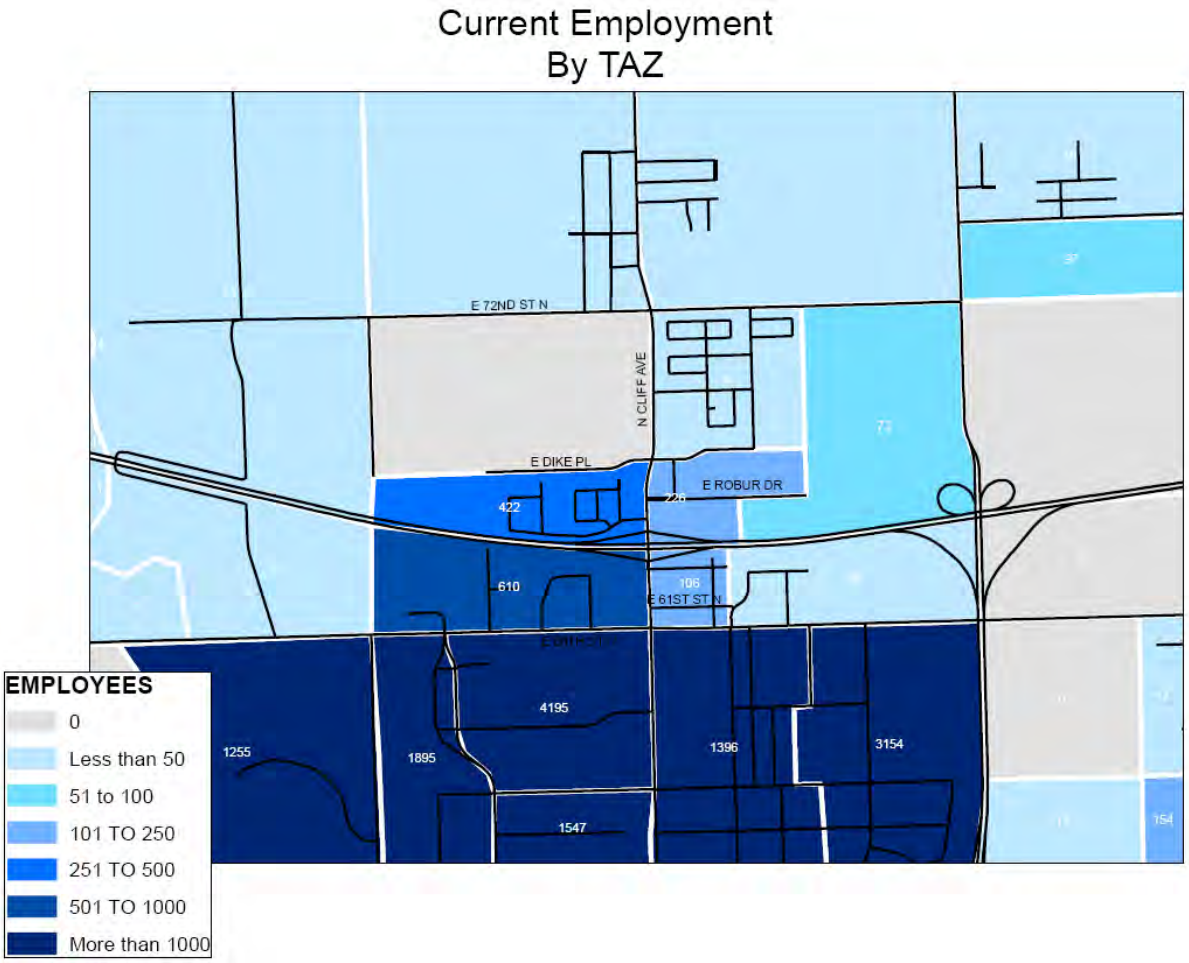
Current Employment
By TAZ
E 72ND ST N
N CLIFF AVE
E DIKE PL
E ROBUR DR
422
610
106
E 61ST ST N
4195
1255
1895
1396
3154
1547
EMPLOYEES
0
Less than 50
51 to 100
101 TO 250
251 TO 500
501 TO 1000
More than 1000

Figure 4

Existing Land Use

Within the Sioux Falls city limits, land use surrounding the Cliff Avenue interchange is primarily commercial immediately adjacent to Cliff Avenue, with industrial zoned areas off of the Cliff Avenue commercial strip south of I-90 and residential planned developments north of I-90. The current City of Sioux Falls zoning map showing the land use in Figure 5 below.

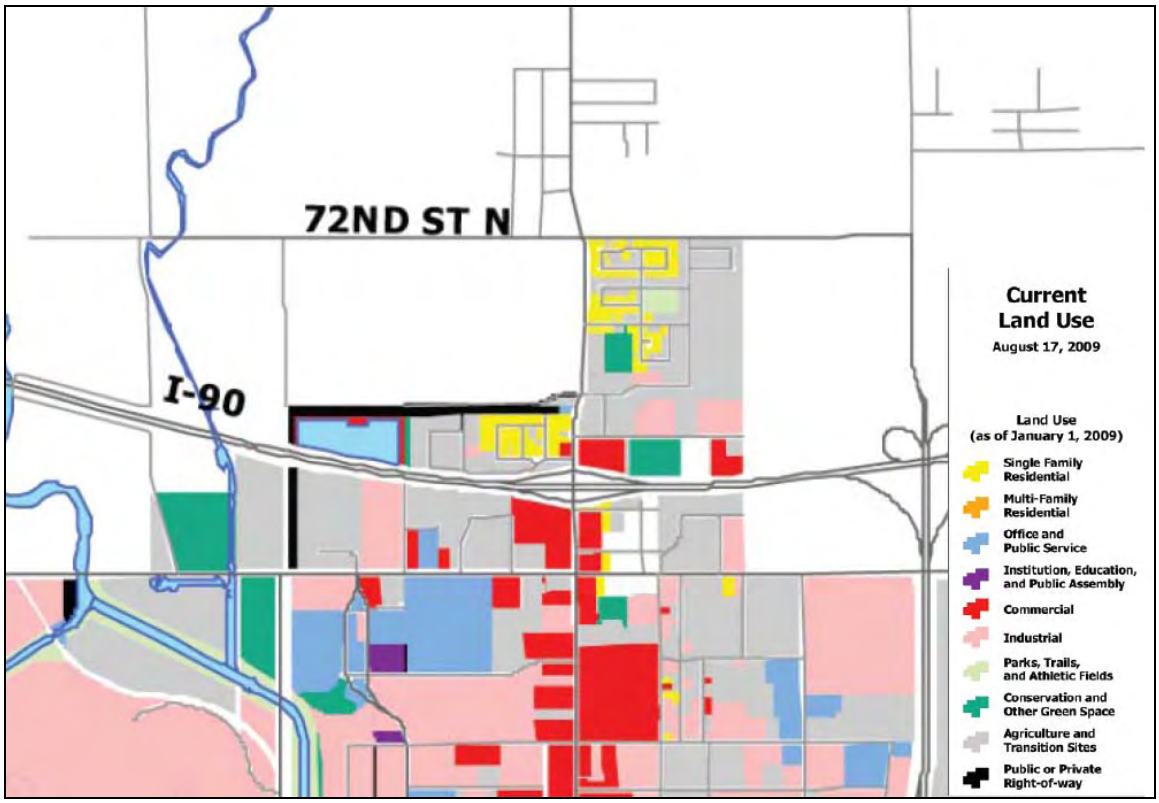

Figure 5 Current Land Use

Existing Roadway Network

I-90 is the primary east-west route and Cliff Avenue is the primary north-south route through the study area. While 60th Street North provides additional east-west support to I-90, Cliff Avenue currently has no supporting arterial routes north of I-90 in the study area. The existing roadway network is shown along with the Federal functional classification map in Figure 6.

I-90 currently has 2 lanes in each direction through the study area. Cliff Avenue currently has one lane in each direction from Dike Place north to beyond the study area and two lanes in each direction from Dike Place south to beyond the study area, with a center turn lane both north and south of the interchange. A raised median divides the directions between the existing ramps, with left turn lanes provided at each terminal intersection. All other roadways in the study area are currently one lane in each direction.

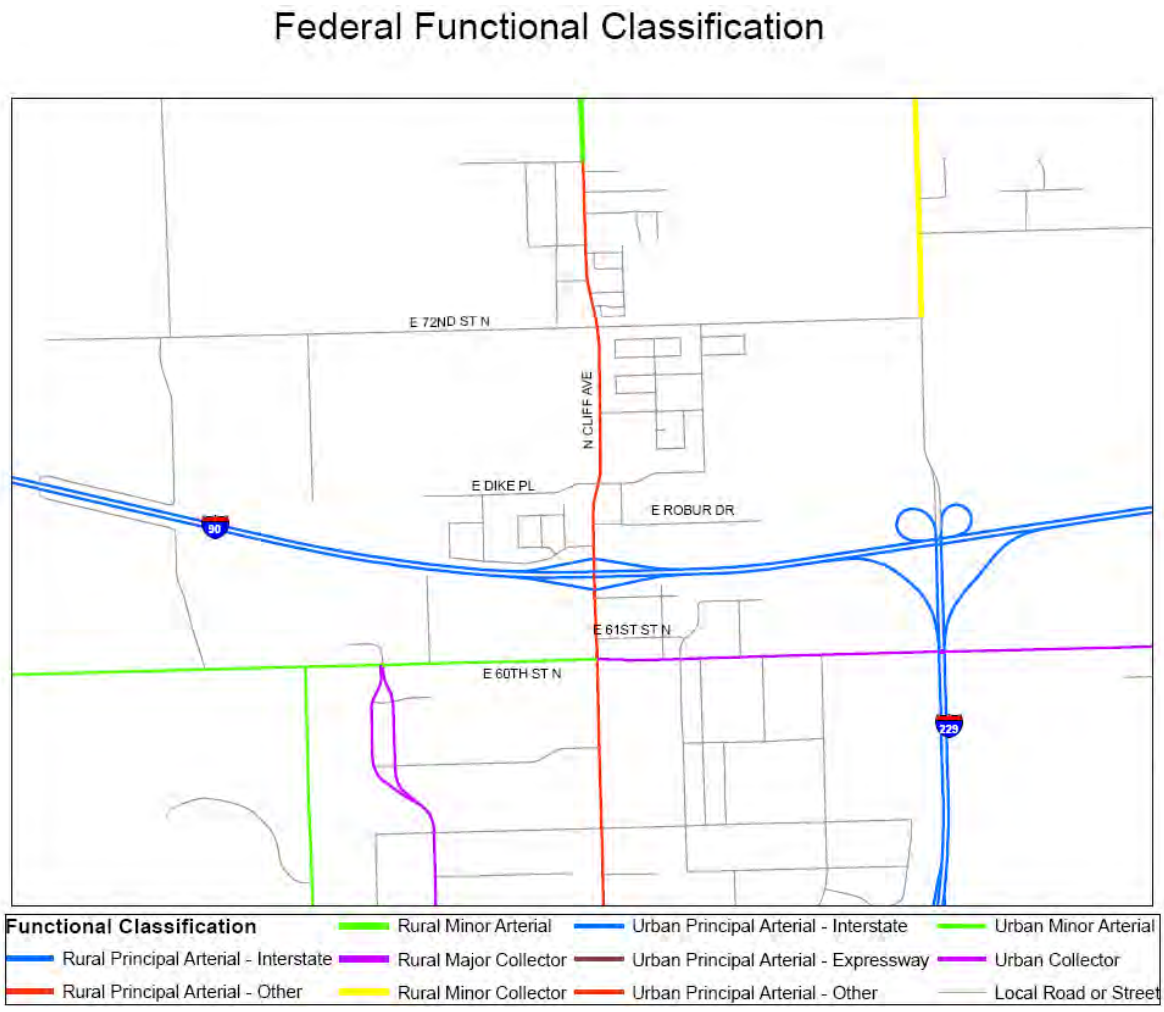

Figure 6

Alternative Travel Modes

The southwest quadrant of the interchange's influence area is currently served by Sioux Area Metro (SAM) Bus Route Number 8. The roadways served by Route Number 8 are shown in red in Figure 7. 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.

The Sioux Falls Regional Airport is located about 1 ½ miles southwest of the interchange, providing both commercial and general aviation passenger and air freight services to southeastern South Dakota, southwestern Minnesota and northwestern Iowa. The location of the airport's runways are shown in gunmetal blue in Figure 7.

The Sioux Falls MPO has designated Cliff Avenue as a Primary Bicycle Route through the interchange area. At present, a bicycle sidepath is planned to eventually run along 60th Street North south of the interchange. The Sioux Falls Bike & Recreation Trail also bisects the southwestern portion of the study area. The designated bicycle routes are also shown in Figure 7.

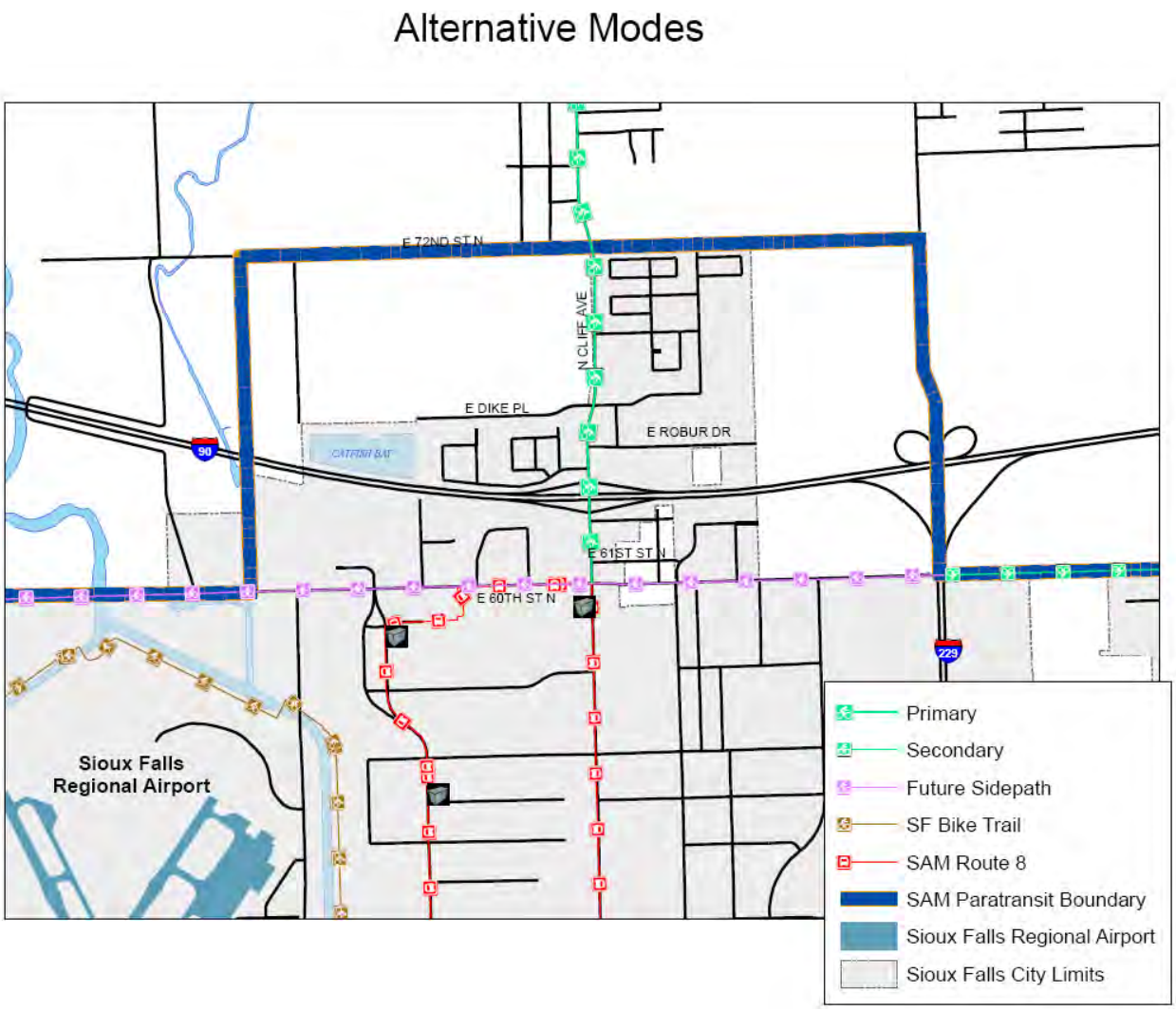
Alternative Modes
E 72ND ST N
N CLIFF AVE
E DIKE PL
E ROBUR DR
E 61ST ST N
E 60TH ST N
90
229
Sioux Falls
Regional Airport
Primary
Secondary
Future Sidepath
SF Bike Trail
SAM Route 8
SAM Paratransit Boundary
Sioux Falls Regional Airport
Sioux Falls City Limits

Figure 7

Interchanges

I-90 Exit 399: Cliff Avenue

The existing interchange for I-90 and Cliff Avenue is a diamond configuration, with a spacing of approximately 500' between the interchange ramp intersections along Cliff Avenue. Both intersections are presently signalized. All ramps were originally designed as single lane ramps, but both off-ramps have since been re-striped for two lanes near the Cliff Avenue intersection by reducing the shoulder width to less than standard. The westbound off-ramp was re-striped to have the inside lane provide for exclusive left turns and the outside lane provide for left, straight and right turn movements. The eastbound off-ramp has been re-striped to have the outside lane provide for exclusive right turns and the inside lane provide for left, straight and right turn movements. The cross section of Cliff Avenue was initially a four lane section with a center median. However, the median has been filled both north and south of the interchange to provide for a two-way center left turn lane. The median still divides Cliff Avenue through the interchange between the ramp intersections to protect the I-90 bridge pier. The aerial photo in Figure 8 shows the configuration of the existing Cliff Avenue interchange.

Figure 8: Existing I-90 / Cliff Avenue Interchange Configuration

On the north side of the interchange, Cliff Avenue is a five lane section with a center two way left turn lane. The unsignalized intersection of East 64th Street North and Cliff Avenue is located only 200' north of the westbound ramp intersection. In addition, driveways to the property located on the east side of Cliff Avenue are only 150' north of the westbound ramp intersection.

South of the interchange, Cliff Avenue is a five lane section with a center two way left turn lane. The unsignalized intersection of East 63rd Street North and Cliff Avenue is located about 140' south of the eastbound ramp intersection and there are many ingress/egress points for the adjacent properties along Cliff Avenue from the eastbound ramp intersection to East 60th Street North.

I-90 Exit 396: I-29

The adjacent interchange west of the I-90/Cliff Avenue interchange is the System Interchange for I-90 and I-29. The System Interchange is a full cloverleaf configuration and is shown in Figure 9 below.

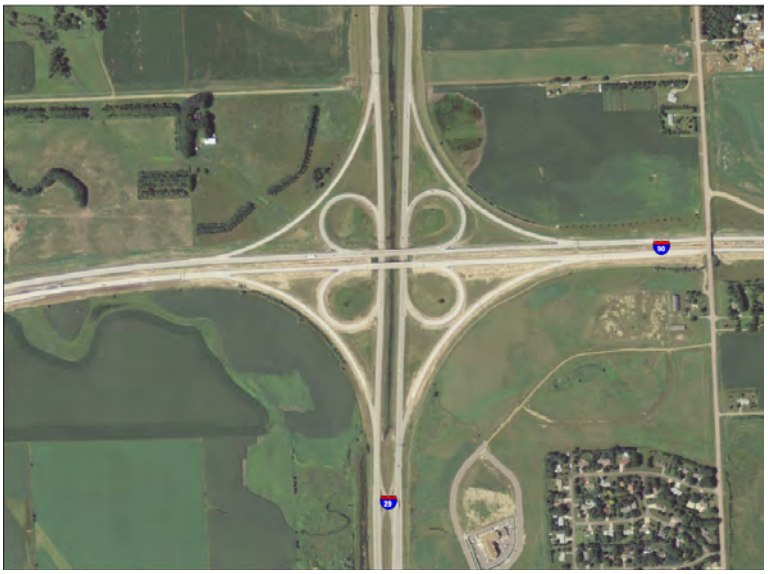

Figure 9: Existing I-90/ I-29 System Interchange Configuration

A corridor preservation study completed in 2006 evaluated the future needs of the interchange. The study determined that the system-to-system full clover interchange will eventually limit the ability to accommodate the projected traffic growth due to the small radius loops in all quadrants. The study developed and analyzed options to reconfigure the interchange, determining a most technically feasible future configuration of a semi-directional, partial cloverleaf, shown in Figure 10.

Figure 10: Most Technically Feasible I-90 / I-29 System Interchange Configuration

Traffic estimates indicate the need for reconfiguration to be well beyond the 20 year planning horizon. All of the feasible configuration options for the I-29/I-90 interchange will be accommodated by the Cliff Avenue interchange's reconfiguration as much as practicable while accommodating the existing configuration.

I-90 Exit 400: I-229

The adjacent interchange east of the I-90/Cliff Avenue interchange is the System Interchange for I-90 and I-229. The System Interchange is a partial cloverleaf configuration that also allows for partial access (I-229 only) to the local roadway network. The aerial photo in Figure 11 shows the configuration of the existing I-90/I-229 System interchange.

Figure 11: Existing I-90 / I-229 System Interchange Configuration

A corridor preservation study completed in 2008 evaluated the future needs of the interchange. The study determined that the existing system-to-system partial clover interchange will eventually limit the ability to accommodate the projected traffic growth due to the small radius loop ramp in the northeast quadrant. The study developed and analyzed options to reconfigure the interchange, determining a most technically feasible future configuration of a semi-directional, partial cloverleaf. Figure 12 shows a schematic for the most technically feasible option of the corridor preservation study. Schematics of the other technically feasible options can be found in Appendix E.

The two other technically feasible I-90 / I-229 System Interchange options resulting from the corridor preservation study are variations of the most technically feasible option. One alternative replaces the westbound to southbound loop ramp with a semi-directional fly under ramp. The other alternative completely severs the connection to 476th Avenue from the Interstate System by not incorporating the half diamond service interchange at East 60th Street North. For all three technically feasible options, the largest (though insignificant) affect on the Cliff Avenue interchange's operations is the replacement of the northbound to westbound loop ramp with the semi-directional flyover ramp. This will eliminate the existing 675' weave on I-90 westbound, but brings the merge (into the auxiliary lane) 1900' closer to the diverge (from the auxiliary lane) of the westbound Cliff Avenue off-ramp. This creates a perceived 2600' weave section. Technically, a weave section is less than 2500' by

definition. This situation is the same for all three technically feasible options from the corridor preservation study.

Figure 12: Most Technically Feasible I-90 / I-229 System Interchange Configuration

Traffic estimates indicate the need for reconfiguration to be well beyond the 20 year planning horizon. All of the technically feasible configuration options for the I-90 / I-229 interchange will be accommodated by the Cliff Avenue interchange's reconfiguration as much as practicable while accommodating the existing configuration.

Potential Adjacent Interchanges

A land developer has investigated an idea for an additional I-90 interchange between the I-29 System interchange and the Cliff Avenue interchange at either Kiwanis Avenue or Minnesota Avenue. As part of the 2010 Decennial Update to the Interstate Corridor Study, the SDDOT had the I-90: Minnesota Avenue interchange idea further investigated. The results of that investigation found an interchange at that location to be infeasible due to constraints imposed by such features as the floodway of the Big Sioux River, the D&I Railroad, existing development and the proximity of both the I-90/I-29 System interchange and the Cliff Avenue interchange. As a result, the SDDOT does not anticipate an additional interchange being constructed between I-29 and Cliff Avenue.

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 Sioux Falls, or the South Dakota Department of Public Safety. The most recent data available was used.

Operational Performance

A traffic operations study was conducted for North Cliff Avenue in February, 2010. The south limit of the study was the intersection of North Cliff Avenue and East 60th Street North. The northern limit is the intersection of North Cliff Avenue and East Dike Place. Intersections analyzed were North Cliff Avenue and East 60th Street North, North Cliff Avenue and the I-90 eastbound ramp terminals, North Cliff Avenue and the I-90 westbound ramp terminals, North Cliff Avenue and East 64th Street North, and North Cliff Avenue and East Dike Place. An independent evaluation was done to evaluate the ramp merge/diverge and weave areas along I-90 associated with the Cliff Avenue interchange.

Level of Service (LOS) for signalized 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 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 level is below a LOS of C on mainline highway corridors and a LOS of D at intersections and ramp junctions.

The summation of the traffic operations analyses show that mainline I-90 currently operates as a LOS A at all times under average conditions. Results for the individual segments of I-90 are shown in Table 2.

Table 2: Mainline Interstate 90 segments Existing Level of Service

Intersection / Movement	AM Peak LOS	PM Peak LOS
Eastbound - West of I-29	A	A
Westbound - West of I-29	A	A
Eastbound – I-29 to Cliff Avenue	A	A
Westbound – I-29 to Cliff Avenue	A	A
Eastbound – Cliff Avenue to I-229	A	A
Westbound – Cliff Avenue to I-229	A	A
Eastbound – East of I-229	A	A
Westbound – East of I-229	A	A

The interchange crossroad of Cliff Avenue is currently operating at a LOS of B or C at the AM & PM peak hours in both the northbound and southbound directions along the segment from 60th Street North to Dike Place.

As congestion is more often dictated by actions at intersections and ramp junctions, analysis on those movements were done independently. Table 3 summarizes the results of the existing traffic analysis on the Cliff Avenue intersections and Table 4 summarizes the operations at the ramp junctions at each of the I-90 interchanges analyzed.

Table 3: Cliff Avenue Intersections Existing Level of Service

Intersection / Movement	AM Peak LOS*	PM Peak LOS*
Cliff Avenue / 60th Street North	B	C
Cliff Avenue / I-90 Eastbound Ramp	C	B
Cliff Avenue / I-90 Westbound Ramp	C	A
Cliff Avenue / 64th Street North**	B**	B**
Cliff Avenue / Dike Place**	A**	C**

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

Table 4: I-90 Ramp Junctions Existing Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
Exit 396	29 NB to 90 EB	Diverge	A	B
Exit 396	29 NB to 90 WB	Diverge	See 29 NB Weave	
Exit 396	29 SB to 90 EB	Diverge	See 29 SB Weave	
Exit 396	29 SB to 90 WB	Diverge	B	B
Exit 396	90 EB to 29 NB	Diverge	See 90 EB Weave	
Exit 396	90 EB to 29 SB	Diverge	A	A
Exit 396	90 WB to 29 NB	Diverge	A	B
Exit 396	90 WB to 29 SB	Diverge	See 90 WB Weave	
Exit 396	29 NB to 90 EB	Merge	A	B
Exit 396	29 SB to 90 EB	Merge	See 90 EB Weave	
Exit 396	29 SB to 90 WB	Merge	A	A
Exit 396	90 EB to 29 NB	Merge	See 29 NB Weave	
Exit 396	90 EB to 29 SB	Merge (Separate Lane)	A	A
Exit 396	90 WB to 29 NB	Merge	A	B
Exit 396	90 WB to 29 SB	Merge	See 29 SB Weave	
Exit 396	29 NB to 90 WB	Merge	See 90 WB Weave	
Exit 396	29 SB @ 90	Weave	A	A
Exit 396	90 EB @ 29	Weave	A	A
Exit 396	90 WB @ 29	Weave	A	A
Exit 396	29 NB @ 90	Weave	A	A
Exit 399	90 EB to Off-ramp	Diverge	B	B
Exit 399	90 WB to Off-ramp	Diverge	B	B
Exit 399	On-ramp to 90 EB	Merge	A	B
Exit 399	On-ramp to 90 WB	Merge	A	B
Exit 400	229 NB to 90 EB	Diverge	A	A
Exit 400	229 NB to 90 WB	Diverge (Separate Lane)	A	A
Exit 400	90 EB to 229 SB	Diverge	A	B
Exit 400	90 WB to 229 SB	Diverge	See 90 WB Weave	
Exit 400	229 NB to 476th Ave.	Diverge (Separate Lane)	A	A
Exit 400	90 EB to 229 SB	Merge	A	A
Exit 400	229 NB to 90 EB	Merge	B	B
Exit 400	229 NB to 90 WB	Merge	See 90 WB Weave	
Exit 400	90 WB to 229 SB	Merge (Separate Lane)	A	A
Exit 400	476th Ave. to 229 SB	Merge (Separate Lane)	A	A
Exit 400	90 WB @ 229	Weave	A	A

Existing Safety Conditions

Forty-two (42) accidents (reported for calendar years 2007, 2008, & 2009) were determined to be within the Cliff Avenue interchange influence area. Twelve (12) accidents were classified as an Injury/Fatality accident. Twenty-nine (29) of the reported accidents were found to be related to the ramp terminal intersections with Cliff Avenue, including all 12 Injury/Fatality classified accidents. Five (5) of the reported accidents associated to mainline I-90 were classified as animal hits. This data is shown in Table 5.

Table 5: Accident Classification* for Reported Accidents 2007-2009

Classification	Mainline	Ramps	Ramp Terminal Intersections	Crossroad	Total
Fixed Object	2	0	2 (1 I/F)	1	5 (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	0	1	0	0	1
Other Single Vehicle	0	0	0	0	0
Rear End	0	0	10 (3 I/F)	0	10 (3 I/F)
Head ON	0	0	0	0	0
Angle	1	0	15 (7 I/F)	0	16 (7 I/F)
Sideswipe, same direction	0	0	1	0	1
Sideswipe, opposite direction	0	0	0	0	0
Other Multiple Vehicle	0	0	1 (1 I/F)	2	3 (1 I/F)
Total	9	1	29 (12 I/F)	3	42 (12 I/F)

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

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

Figure 13 shows the location of all reported accidents for calendar years 2007, 2008, & 2009, including those outside of the Cliff Avenue interchange's influence area.

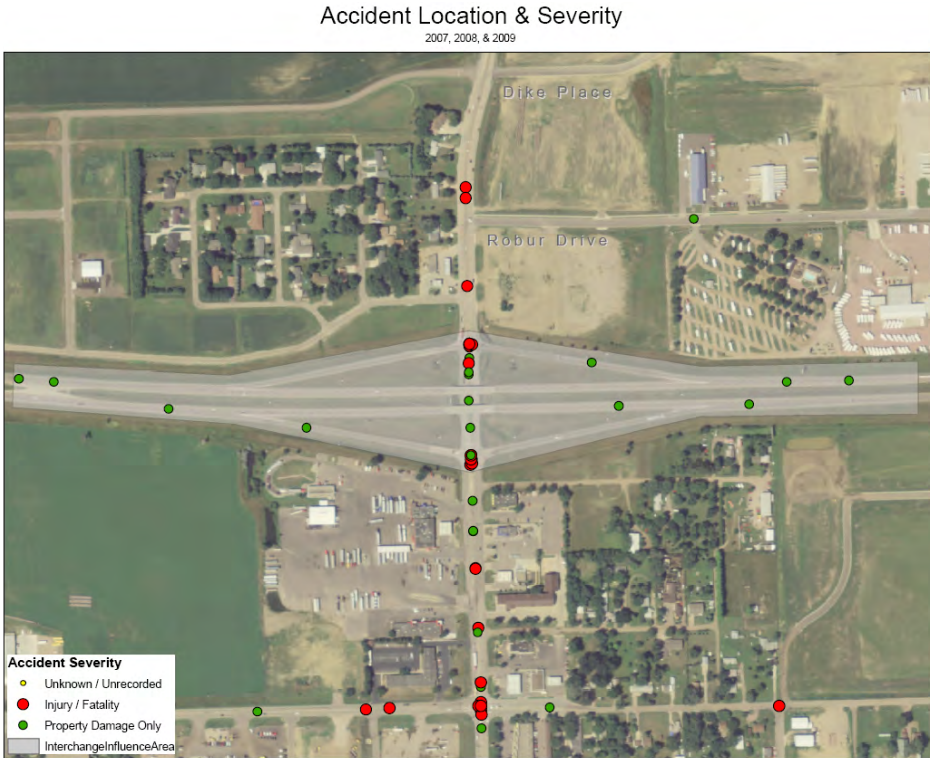

Figure 13

Existing Environmental Constraints

A quick perusal of the area surrounding the existing Cliff Avenue interchange shows that the most potential environmental constraint could be contaminated soils caused by a leaking storage tank from any of the numerous gas stations or truck stops that have surrounded the interchange since its initial construction in 1961. Figure 14 shows the location of the known environmental constraints within ½ mile of the Cliff Avenue interchange.

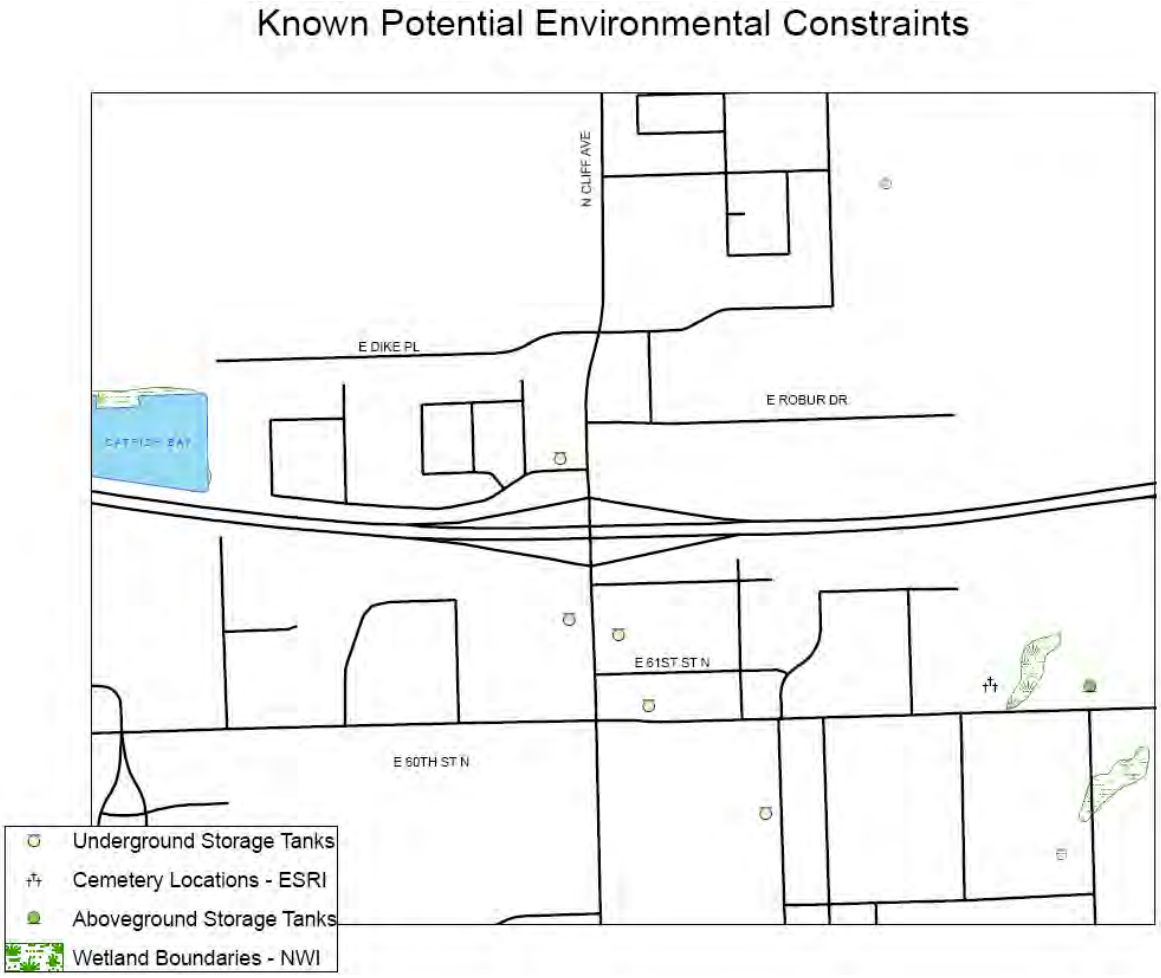

Figure 14

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. Some of the geometric deficiencies for the interchange include:

- The superelevation rate for the westbound off ramp is 6.2%.
- The inslopes for all of the ramps are 4:1.
- The taper for both on ramps are 37:l.
- Proximity of adjacent intersections to the ramp intersections are less than desirable. The ramp terminal intersections are located only 130' north of East 63rd Street North and 200' to the south of East 64th Street North.

Pavement

The need to replace or rehabilitate the pavement is the driving force behind the timing of when the majority of construction projects on the state highway system occur. The pavements of the existing Cliff Avenue interchange (ramps and crossroad), along with mainline I-90, are Portland Cement Concrete (PCC) built in 1961. The pavement on the ramps and mainline I-90 was overlaid with asphalt in 2000 in response to a deteriorating PCC pavement surface. After ten years of remarkable service, the existing asphalt surface is approaching the end of its service life. As the entire pavement structure is now in need of replacement, 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 Cliff Avenue interchange ranked 16th out of the 62 interchanges evaluated in Phase 1 of the 2000 Interstate Corridor Study. (The Cliff Avenue interchange was omitted from the 2010 Decennial Update to the Interstate Corridor Study as it was already programmed in the STIP when that study started.) As described in Chapter 3: Existing Conditions, it is believed that the safety need is to attempt to reduce the number crashes by reducing the number of potential conflict points caused by accesses along the Cliff Avenue corridor.

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. The two structures at the existing Cliff Avenue interchange currently have a Federal Sufficiency Rating of 75 and are classified as functionally obsolete mainly due to an inadequate roadway width of 30 feet (38 feet standard).

Structurally, the two structures are currently in fair condition. They are umbrella type concrete slab bridges built in 1960 with a deck overlay done in 1986. 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. As umbrella type structures have given the SDDOT problems in the past, it is current SDDOT practice to replace our existing umbrella type structures when the deck approaches the end of its service life. It is therefore appropriate to evaluate the existing and future traffic operations of the existing interchange configuration before placing new structures with the expectations for a 75 year structure service life.

Traffic

The existing traffic operations evaluation showed that the North Cliff Avenue and East 60th Street North intersection is routinely experiencing a LOS of D during the AM Peak Hour. All other signalized intersections along North Cliff Avenue within the study area have been determined to be routinely operating at a LOS of C in the AM peak. 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, additional intersections begin to experience a LOS of D. In addition, the merge from the Cliff Avenue on-ramp to I-90 Eastbound is routinely experiencing a LOS of D during the PM peak hour. Details pertaining to the future traffic operational evaluations on the existing configuration can be found in Chapter 6: Future Year Traffic.

Chapter 5: ALTERNATIVES

Given the existing development surrounding the existing Cliff Avenue 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, it was determined to pursue two options in addition to the No Build Alternative.

Alternative 0: No Build

This alternative does not alter the current configuration of the existing Cliff Avenue interchange or apply any improvements along Cliff Avenue or mainline I-90 and results in strictly removing and replacing the pavement.

Alternative 1: Tight Diamond Interchange

This alternative does little modification to the existing interchange configuration, but does increase the length of the ramp tapers along mainline I-90 to bring those junctions up to current standards. This design configuration also modifies the traffic signal timing at both ramp terminal intersections to force queuing of vehicles outside the ramp terminal intersections and minimize queuing of vehicles between the ramp terminal intersections.

This alternative will add auxiliary lanes along I-90 between Exit 399 and Exit 400 in both the eastbound and westbound directions, adding to some improvement to the merge and diverge movements between the two interchanges.

Additional improvements will be made along the Cliff Avenue corridor that will enhance traffic operations along the corridor outside of the interchange area as well.

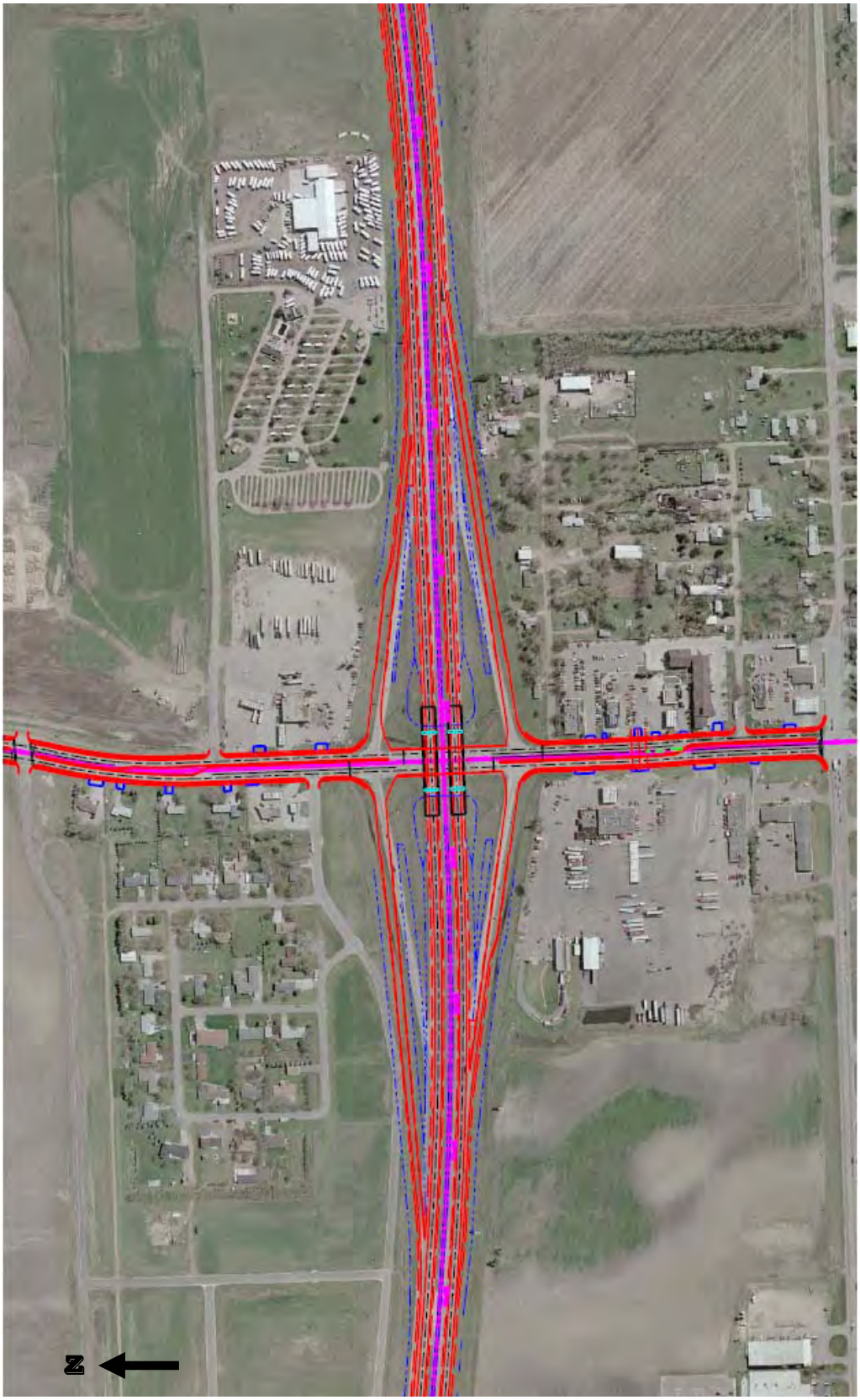

Figure 15

Alternative 2: Single Point Interchange (SPI)

This alternative reconfigures the existing interchange configuration to align the left turn movements of the exit ramps opposite one another to form a single intersection at the center of the interchange, thus eliminating one intersection and one set of traffic signals along Cliff Avenue. The single point interchange design also requires the installation of a raised median along Cliff Avenue. The raised median causes many of the full access locations to private businesses along Cliff Avenue to be converted to a right in / right out only access. This includes the intersection of Cliff Avenue and East 64th Street North. The installation of a right turn lane for the Cliff Avenue northbound to I-90 eastbound movement forces the severing of the connection between Cliff Avenue and East 63rd Street North, so this intersection will be removed by this option.

This alternative will add auxiliary lanes along I-90 between Exit 399 and Exit 400 in both the eastbound and westbound directions, adding to some improvement to the merge and diverge movements between the two interchanges.

Additional improvements will be made along the Cliff Avenue corridor that will enhance traffic operations along the corridor outside of the interchange area as well.

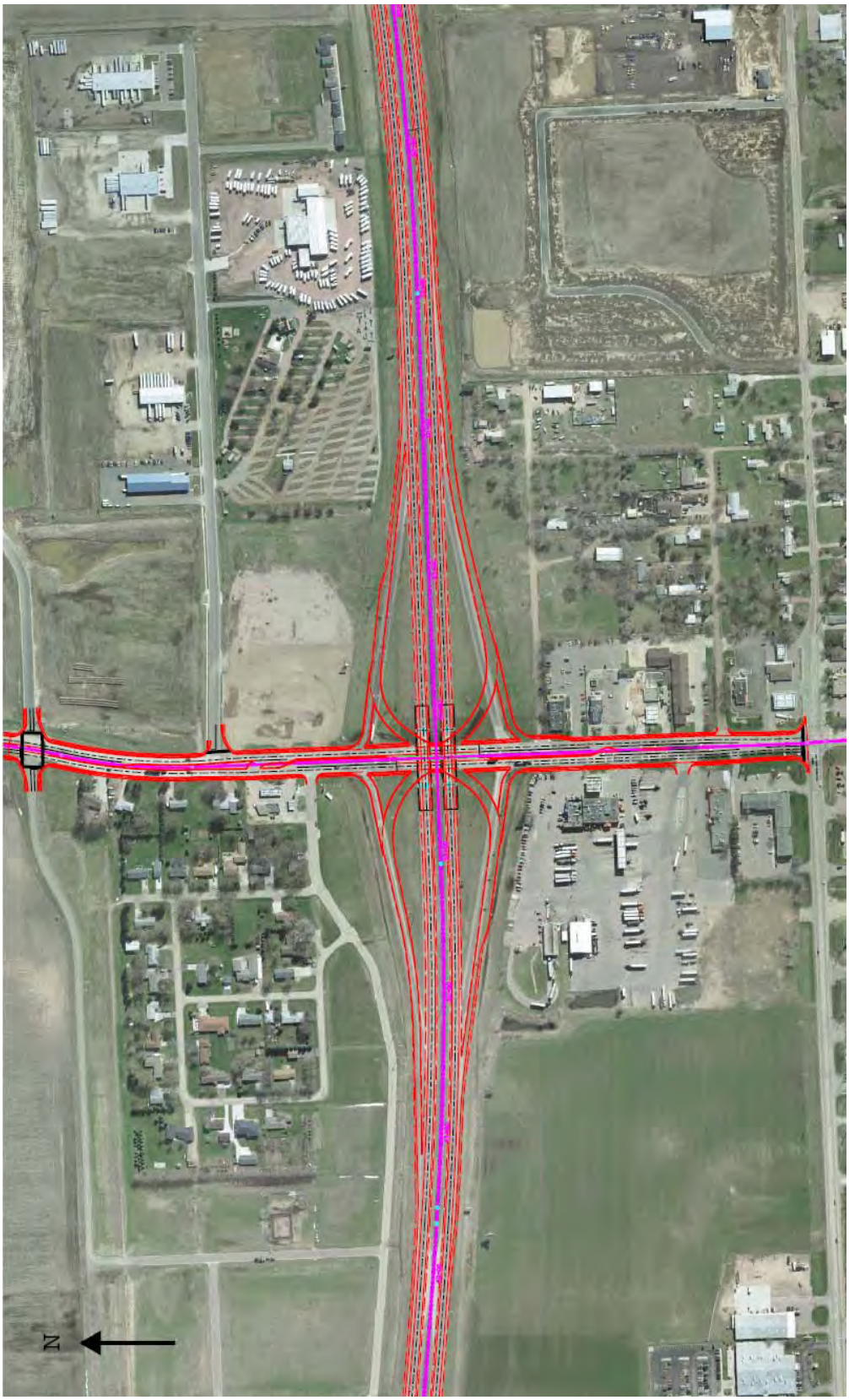

Figure 16

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 summation of the traffic operations analyses show that in the future analysis year of 2035, the majority of mainline I-90 will continue to operate within the SDDOT standard of LOS C or better at all times. However, due to increase traffic volumes, some mainline segments will operate at LOS B in the AM peak and some will operate at a LOS C in the PM peak. Table 6 shows the traffic operations analysis determined AM and PM LOS for the mainline segments.

Table 6: Mainline Interstate 90 segments Future No Build Level of Service

Intersection / Movement	AM Peak LOS	PM Peak LOS
Eastbound - West of I-29	A	B
Westbound - West of I-29	A	B
Eastbound – I-29 to Cliff Avenue	A	C
Westbound – I-29 to Cliff Avenue	B	B
Eastbound – Cliff Avenue to I-229	A	C
Westbound – Cliff Avenue to I-229	B	B
Eastbound – East of I-229	A	C
Westbound – East of I-229	C	B

The interchange crossroad of Cliff Avenue is anticipated to be operating at a LOS of C for the northbound direction during the average future (2035) AM peak hour and deteriorate to a LOS of F for the southbound direction during the average future (2035) AM peak hour along the segment from 60th Street North to Dike Place. During the average PM peak hour, traffic operations along the corridor is anticipated to be at a LOS of C in the southbound direction and deteriorate to a LOS of F in the northbound direction if no improvements to the corridor are implemented.

As congestion is more often dictated by actions at intersections and ramp junctions, analysis on those movements were done independently. Table 7 summarizes the results of the future (2035) traffic analysis on the Cliff Avenue intersections and Table 8 summarizes the operations at the ramp junctions at each of the I-90 interchanges analyzed.

Table 7: Cliff Avenue Intersections Future No Build Level of Service

Intersection / Movement	AM Peak LOS*	PM Peak LOS*
Cliff Avenue / 60th Street North	F	F
Cliff Avenue / I-90 Eastbound Ramp	D	F
Cliff Avenue / I-90 Westbound Ramp	E	A
Cliff Avenue / 64th Street North**	C**	B**
Cliff Avenue / Dike Place	E**	C**

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

Table 8: I-90 Ramp Junctions Future No Build Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
Exit 396	29 NB to 90 EB	Diverge	B	C
Exit 396	29 NB to 90 WB	Diverge	See 29 NB Weave	
Exit 396	29 SB to 90 EB	Diverge	See 29 SB Weave	
Exit 396	29 SB to 90 WB	Diverge	B	B
Exit 396	90 EB to 29 NB	Diverge	See 90 EB Weave	
Exit 396	90 EB to 29 SB	Diverge	B	C
Exit 396	90 WB to 29 NB	Diverge	B	C
Exit 396	90 WB to 29 SB	Diverge	See 90 WB Weave	
Exit 396	29 NB to 90 EB	Merge	B	C
Exit 396	29 SB to 90 EB	Merge	See 90 EB Weave	
Exit 396	29 SB to 90 WB	Merge	B	B
Exit 396	90 EB to 29 NB	Merge	See 29 NB Weave	
Exit 396	90 EB to 29 SB	Merge (Separate Lane)	A	A
Exit 396	90 WB to 29 NB	Merge	B	B
Exit 396	90 WB to 29 SB	Merge	See 29 SB Weave	
Exit 396	29 NB to 90 WB	Merge	See 90 WB Weave	
Exit 396	29 SB @ 90	Weave	B	B
Exit 396	90 EB @ 29	Weave	A	B
Exit 396	90 WB @ 29	Weave	A	B
Exit 396	29 NB @ 90	Weave	B	B
Exit 399	90 EB to Off-ramp	Diverge	B	C
Exit 399	90 WB to Off-ramp	Diverge	C	C
Exit 399	On-ramp to 90 EB	Merge	B	**D**
Exit 399	On-ramp to 90 WB	Merge	B	C
Exit 400	229 NB to 90 EB	Diverge	B	B
Exit 400	229 NB to 90 WB	Diverge (Separate Lane)	A	A
Exit 400	90 EB to 229 SB	Diverge	B	**D**
Exit 400	90 WB to 229 SB	Diverge	See 90 WB Weave	
Exit 400	229 NB to 476th Ave.	Diverge (Separate Lane)	A	A
Exit 400	90 EB to 229 SB	Merge	B	B
Exit 400	229 NB to 90 EB	Merge	B	**D**
Exit 400	229 NB to 90 WB	Merge	See 90 WB Weave	
Exit 400	90 WB to 229 SB	Merge (Separate Lane)	A	A
Exit 400	476th Ave. to 229 SB	Merge (Separate Lane)	A	A
Exit 400	90 WB @ 229	Weave	**D**	**D**

Alternative 1: Tight Diamond

The summation of the traffic operations analyses show that in the future analysis year of 2035, the majority of mainline I-90 will operate within the SDDOT standard of LOS C or better at all times. However, due to increase traffic volumes, some mainline segments will operate at LOS B in the AM peak and some will operate at a LOS C in the PM peak. Table 9 shows the traffic operations analysis determined AM and PM LOS for the mainline segments.

Table 9: Mainline Interstate 90 segments Future Tight Diamond Level of Service

Intersection / Movement	AM Peak LOS	PM Peak LOS
Eastbound - West of I-29	A	B
Westbound - West of I-29	A	B
Eastbound – I-29 to Cliff Avenue	A	C
Westbound – I-29 to Cliff Avenue	B	B
Eastbound – Cliff Avenue to I-229	A	B
Westbound – Cliff Avenue to I-229	B	A
Eastbound – East of I-229	A	C
Westbound – East of I-229	C	B

With the implementation of a tight diamond interchange configuration, the interchange crossroad of the Cliff Avenue is anticipated to operate at a LOS of C for the northbound direction during the average future (2035) AM peak hour and deteriorate only to a LOS of D (versus LOS F for the No Build alternative) for the southbound direction during the average future (2035) AM peak hour along the segment from 60th Street North to Dike Place. During the average PM peak hour, traffic operations along the corridor is anticipated to operate at a LOS of D in both the southbound and northbound directions (versus LOS C for southbound and LOS F for northbound for the No Build alternative) if the tight diamond interchange configuration is put into service.

As congestion is more often dictated by actions at intersections and ramp junctions, analysis on those movements were done independently. Table 10 summarizes the results of the future (2035) traffic analysis on the Cliff Avenue intersections and Table 11 summarizes the operations at the ramp junctions at each of the I-90 interchanges analyzed.

Table 10: Cliff Avenue Intersections Future Tight Diamond Level of Service

Intersection / Movement	AM Peak LOS*	PM Peak LOS*
Cliff Avenue / 60th Street North	C	**F**
Cliff Avenue / I-90 Eastbound Ramp	B	C
Cliff Avenue / I-90 Westbound Ramp	**D**	B
Cliff Avenue / 64th Street North**	C**	B**
Cliff Avenue / Dike Place	B	B

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

Table 11: I-90 Ramp Junctions Future Tight Diamond Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
Exit 396	29 NB to 90 EB	Diverge	B	C
Exit 396	29 NB to 90 WB	Diverge	See 29 NB Weave	
Exit 396	29 SB to 90 EB	Diverge	See 29 SB Weave	
Exit 396	29 SB to 90 WB	Diverge	B	B
Exit 396	90 EB to 29 NB	Diverge	See 90 EB Weave	
Exit 396	90 EB to 29 SB	Diverge	B	C
Exit 396	90 WB to 29 NB	Diverge	B	C
Exit 396	90 WB to 29 SB	Diverge	See 90 WB Weave	
Exit 396	29 NB to 90 EB	Merge	B	C
Exit 396	29 SB to 90 EB	Merge	See 90 EB Weave	
Exit 396	29 SB to 90 WB	Merge	B	B
Exit 396	90 EB to 29 NB	Merge	See 29 NB Weave	
Exit 396	90 EB to 29 SB	Merge (Separate Lane)	A	A
Exit 396	90 WB to 29 NB	Merge	B	B
Exit 396	90 WB to 29 SB	Merge	See 29 SB Weave	
Exit 396	29 NB to 90 WB	Merge	See 90 WB Weave	
Exit 396	29 SB @ 90	Weave	B	B
Exit 396	90 EB @ 29	Weave	A	B
Exit 396	90 WB @ 29	Weave	A	B
Exit 396	29 NB @ 90	Weave	B	B
Exit 399	90 EB to Off-ramp	Diverge	B	C
Exit 399	90 WB to Off-ramp	Diverge (Separate Lane)	A	A
Exit 399	On-ramp to 90 EB	Merge (Separate Lane)	A	A
Exit 399	On-ramp to 90 WB	Merge	B	C
Exit 400	229 NB to 90 EB	Diverge	B	B
Exit 400	229 NB to 90 WB	Diverge (Separate Lane)	A	A
Exit 400	90 EB to 229 SB	Diverge (Separate Lane)	A	A
Exit 400	90 WB to 229 SB	Diverge	See 90 WB Weave	
Exit 400	229 NB to 476th Ave.	Diverge (Separate Lane)	A	A
Exit 400	90 EB to 229 SB	Merge	B	B
Exit 400	229 NB to 90 EB	Merge	B	**D**
Exit 400	229 NB to 90 WB	Merge	See 90 WB Weave	
Exit 400	90 WB to 229 SB	Merge (Separate Lane)	A	A
Exit 400	476th Ave. to 229 SB	Merge (Separate Lane)	A	A
Exit 400	90 WB @ 229	Weave	**D**	**D**

Alternative 2: Single Point Interchange

The summation of the traffic operations analyses show that in the future analysis year of 2035, the majority of mainline I-90 will operate within the SDDOT standard of LOS C or better at all times. However, due to increase traffic volumes, some mainline segments will operate at LOS B in the AM peak and some will operate at a LOS C in the PM peak. Table 12 shows the traffic operations analysis determined AM and PM LOS for the mainline segments.

Table 12: Mainline Interstate 90 segments Future SPI Level of Service

Intersection / Movement	AM Peak LOS	PM Peak LOS
Eastbound - West of I-29	A	B
Westbound - West of I-29	A	B
Eastbound – I-29 to Cliff Avenue	A	C
Westbound – I-29 to Cliff Avenue	B	B
Eastbound – Cliff Avenue to I-229	A	B
Westbound – Cliff Avenue to I-229	B	A
Eastbound – East of I-229	A	C
Westbound – East of I-229	C	B

With the implementation of the single point interchange configuration, the interchange crossroad of the Cliff Avenue is anticipated to operate at a LOS of C for the northbound direction and at a LOS of D (versus LOS F for the No Build alternative) for the southbound direction during the average future (2035) AM peak hour. During the average future (2035) PM peak hour, traffic operations along the corridor is anticipated to operate at a LOS of D both directions (versus LOS C for southbound and LOS F for northbound for the No Build alternative) if the single point interchange configuration is put into service.

As congestion is more often dictated by actions at intersections and ramp junctions, analysis on those movements were done independently. Table 13 summarizes the results of the future (2035) traffic analysis on the Cliff Avenue intersections and Table 14 summarizes the operations at the ramp junctions at each of the I-90 interchanges analyzed.

Table 13: Cliff Avenue Intersections Future SPI Level of Service

Intersection / Movement	AM Peak LOS*	PM Peak LOS*
Cliff Avenue / 60th Street North	C	**F**
Cliff Avenue / I-90 Ramps	C	A
Cliff Avenue / 64th Street North**	C**	B**
Cliff Avenue / Dike Place	B	B

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

Table 14: I-90 Ramp Junctions Future SPI Level of Service

Interchange	Ramp	Movement	AM Peak LOS	PM Peak LOS
Exit 396	29 NB to 90 EB	Diverge	B	C
Exit 396	29 NB to 90 WB	Diverge	See 29 NB Weave	
Exit 396	29 SB to 90 EB	Diverge	See 29 SB Weave	
Exit 396	29 SB to 90 WB	Diverge	B	B
Exit 396	90 EB to 29 NB	Diverge	See 90 EB Weave	
Exit 396	90 EB to 29 SB	Diverge	B	C
Exit 396	90 WB to 29 NB	Diverge	B	C
Exit 396	90 WB to 29 SB	Diverge	See 90 WB Weave	
Exit 396	29 NB to 90 EB	Merge	B	C
Exit 396	29 SB to 90 EB	Merge	See 90 EB Weave	
Exit 396	29 SB to 90 WB	Merge	B	B
Exit 396	90 EB to 29 NB	Merge	See 29 NB Weave	
Exit 396	90 EB to 29 SB	Merge (Separate Lane)	A	A
Exit 396	90 WB to 29 NB	Merge	B	B
Exit 396	90 WB to 29 SB	Merge	See 29 SB Weave	
Exit 396	29 NB to 90 WB	Merge	See 90 WB Weave	
Exit 396	29 SB @ 90	Weave	B	B
Exit 396	90 EB @ 29	Weave	A	B
Exit 396	90 WB @ 29	Weave	A	B
Exit 396	29 NB @ 90	Weave	B	B
Exit 399	90 EB to Off-ramp	Diverge	B	C
Exit 399	90 WB to Off-ramp	Diverge (Separate Lane)	A	A
Exit 399	On-ramp to 90 EB	Merge (Separate Lane)	A	A
Exit 399	On-ramp to 90 WB	Merge	B	C
Exit 400	229 NB to 90 EB	Diverge	B	B
Exit 400	229 NB to 90 WB	Diverge (Separate Lane)	A	A
Exit 400	90 EB to 229 SB	Diverge (Separate Lane)	A	A
Exit 400	90 WB to 229 SB	Diverge	See 90 WB Weave	
Exit 400	229 NB to 476th Ave.	Diverge (Separate Lane)	A	A
Exit 400	90 EB to 229 SB	Merge	B	B
Exit 400	229 NB to 90 EB	Merge	B	**D**
Exit 400	229 NB to 90 WB	Merge	See 90 WB Weave	
Exit 400	90 WB to 229 SB	Merge (Separate Lane)	A	A
Exit 400	476th Ave. to 229 SB	Merge (Separate Lane)	A	A
Exit 400	90 WB @ 229	Weave	**D**	**D**

Future I-90/I-229 System Interchange Configurations Potential Effects on Future Traffic Operations

The 2008 corridor preservation study on the System Interchange at I-90 and I-229 came up with three feasible configuration alternatives. For all three configurations, the change that has the greatest potential affect on the Cliff Avenue interchange is along I-90 westbound and is the same. All three configurations call for modifying the existing I-229 NB to I-90 WB loop ramp into a semi-directional flyover ramp that merges to I-90 WB west of the weave area of the existing System Interchange. This will eliminate the existing 675' weave section existing on I-90 westbound, but brings the merge (into the westbound auxiliary lane) approximately 1900' closer to the diverge (from the auxiliary lane) of the westbound Cliff Avenue off-ramp. This creates a perceived weave section of approximately 2600 feet; although technically, a weave section is less than 2500' by definition. The merge into its own separate lane (the westbound auxiliary lane) has a LOS of A. However, as there is a perception of a weave, a weave analysis was performed for the 2035 future analysis year. This weave analysis was done assuming a 2500' weaving section (the maximum allowed by the analysis software used) even though the actual distance will be closer to 2600'. This analysis shows a 2500' weave section to be operating at a LOS of B during the AM peak and at a LOS of A during the PM peak, which is better than the LOS of D anticipated for the existing 675' weave section. The modification of the I-229 northbound to I-90 westbound ramp creates a new diverge situation for I-90 westbound to I-229 southbound with the elimination of the weave section. Although this movement has no affect on the Cliff Avenue interchange, the LOS for this diverge was analyzed and found to be operating at a LOS of C in the AM peak and B in the PM peak.

In the eastbound direction of I-90, the greatest affect on the Cliff Avenue interchange can also be assumed to be the nearest movement, which is the diverge movement of I-90 eastbound to I-229 southbound. As all three feasible configuration alternatives call for no change in the I-90 eastbound to I-229 southbound movement from the existing configuration, the change in affect any of the reconfiguration alternatives for the System Interchange have on the Cliff Avenue interchange is nil for the eastbound direction compared to the existing configuration.

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Chapter 7: ALTERNATIVES ANALSYIS

Conformance with Transportation Plans

All three alternatives evaluated conform with current local and state transportation plans.

The existing Cliff Avenue interchange was first identified as having some geometric needs by the 2000 Statewide Interstate Corridor Study. An interchange improvement project for the Cliff Avenue interchange has been in the Statewide Transportation Improvement Program (STIP) in some form since 2006, and is in the current 2011-2015 STIP for Federal fiscal year 2012. The interchange improvement project is also listed in the 2010-2035 Sioux Falls MPO Long Range Plan.

The Sioux Falls MPO is recognized as being in attainment for PM 10, PM 2.5, and all other national air quality standards. It is not anticipated that any interchange modification changes at the Cliff Avenue interchange will have an affect on the MPO's air quality attainment status.

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 (0.062% versus 0.04% standard), inslopes (4:1 versus 6:1 standard), or on-ramp taper rate (37:1 versus 50:1 standard). Both Alternative 1 (Tight Diamond) and Alternative 2 (Single Point) will correct these existing geometric issues.

All three alternatives will fail to meet the City of Sioux Falls' criteria for access management on an arterial roadway, which calls for ¼ mile (1,320') spacing between full access intersections. As this is an existing, fully developed urban corridor, the expectation to meet this criterion is unrealistic. Alternative 2 (Single Point) does the best in trying to meet this criteria.

Both Alternative 0 (No Build) and Alternative 1 (Tight Diamond) have the Ramp Terminal intersections of the interchange approximately 500' apart. Alternative 0 (No Build) maintains the full access spacing of approximately 130' spacing between East 63rd Street North intersection and the Eastbound Ramp Terminal intersection and approximately 200' spacing between East 64th Street North intersection and the Westbound Ramp Terminal intersection as well.

The installation of a raised center median along Cliff Avenue for Alternative 1 (Tight Diamond) will improve the full access spacing along Cliff Avenue away

from the interchange's ramp terminals. Full access median openings are anticipated to be provided approximately 425' south of the Eastbound Ramp Terminal intersection at the center entrance to the Pilot Truck Stop / south entrance to the Burger King Restaurant and approximately 1,200' north of the Westbound Ramp Terminal intersection at the intersection with East Dike Place. The installation of the median will convert four private driveways and the Cliff Avenue intersections with East 64th Street North and East Robur Drive to right in – right out access only and one private driveway to a full in – right out only access. The SDDOT is planning on purchasing control of access rights for a minimum of 100 feet beyond the ramp terminals along Cliff Avenue. The purchasing of control of access is anticipated to eliminate the existing Cliff Avenue intersection with East 63rd Street North and seven private driveways.

Alternative 2 (Single Point) combines the two signalized ramp terminal intersections into a single signalized intersection in the middle of the interchange area. This along with the installation of a raised median further helps to improve the full access spacing along Cliff Avenue. Full access median openings are anticipated to be provided approximately 675' south of the signalized Ramp Terminal intersection at the center entrance to the Pilot Truck Stop / south entrance to the Burger King Restaurant and approximately 1,430' north of the signalized Ramp Terminal intersection at the intersection with East Dike Place. The installation of the median will convert four private driveways and the Cliff Avenue intersections with East 64th Street North and East Robur Drive to right in – right out access only and one private driveway to a full in – right out only access. The SDDOT is planning on purchasing control of access rights for a minimum of 100 feet beyond the single point's right turn ramp terminals along Cliff Avenue. The extents of the anticipated control of access purchase along Cliff Avenue can be found in Appendix F. The purchasing of control of access is anticipated to eliminate the existing Cliff Avenue intersection with East 63rd Street North and six private driveways.

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 regardless of the alternative chosen.

Safety

Upon reviewing the reported accident data shown in Table 4, one can easily ascertain that the majority (69%) of all the crashes within the interchange's influence area and 100% of the injury/fatality classified crashes during the reporting period (2007, 2008, & 2009) are intersection related. Since Alternative 0 (No Build) and Alternative 1 (Tight Diamond) do not reduce the number of

intersections along Cliff Avenue, one can presuppose that either alternative will have minimal affect on the intersection related accidents. Out of the remaining 13 reported crashes within the interchange's influence area, 5 (38%) were classified as animal hits which would occur regardless of interchange configuration.

Alternative 2 (Single Point) will reduce the number of signalized intersections along Cliff Avenue and within the interchange's influence area by 1. A comparison of four interchanges previously reconfigured in South Dakota from a diamond configuration to a single point configuration indicates a 37.4% reduction in the number of crashes that occur within the interchange influence area when comparing the 3 years prior to conversion with the 3 years after conversion. It is anticipated that a conversion from the existing diamond to a single point configuration at the Cliff Avenue interchange will result in a similar reduction in the total number of crashes occurring within the Cliff Avenue interchange's influence area.

In addition, the single point configuration requires a center median be installed along Cliff Avenue leading into the interchange's ramp terminal intersection. The installation of the center median further reduces the number of full access intersections and access points along Cliff Avenue. A crash prediction analysis for the Cliff Avenue corridor indicates that the installation of the center median will lead to a reduction in the projected crash rate caused by accesses from 1.676/year to 1.1038/year.

Operational Performance

As shown in Table 8, the existing interchange will have an average ramp merge level of service of D during the PM peak hour on the Cliff Avenue on-ramp to the eastbound lanes of I-90 if no improvements to the interchange are made. Both build options call for the addition of auxiliary lanes between Exit 399 and Exit 400. Within the interchange influence area, the addition of the auxiliary lanes improves the merge LOS for the Cliff Avenue on-ramp to I-90 eastbound, the diverge LOS for the Cliff Avenue off-ramp for I-90 westbound and the freeway LOS for mainline I-90 between Exit 399 and Exit 400 for the both the AM and PM peak hours. As an supplementary bonus, the addition of the auxiliary lane to I-90 eastbound between Exits 399 and 400 improves the ramp diverge LOS for the I-90 eastbound to I-229 southbound ramp at Exit 400. The improvements made to Exit 399 by either build alternative have nil affect on traffic operations on the Interstate system beyond those noted above.

Where the build alternatives show a real improvement on traffic operations is along the Cliff Avenue crossroad corridor. If the existing configuration and signal timings remain as today (Alternative 0: No Build), all of the signalized intersections along Cliff Avenue are expected to operate at a LOS of D or worse in the AM Peak and both the 60th Street North and the I-90 Eastbound

intersections are anticipated to operate at LOS F in the PM peak in the future (2035) analysis year. Improvements anticipated to be made along Cliff Avenue with this interchange modification project will improve the traffic operations at each major intersection along Cliff Avenue. Although improved when compared to Alternative 0 (No Build), the Cliff Avenue / 60th Street North intersection is anticipated to continue to operate at LOS F during the average PM peak in the future (2035) analysis year regardless of which build alternative is followed due to the large volume of right turning vehicles anticipated from the east leg of 60th Street North. The planned future lane configuration of both the east and west (60th Street North) legs of the intersection will need to be further improved to obtain a LOS of D or better given the anticipated traffic volumes. However, to do so is outside of the jurisdiction of the SDDOT and thus, beyond the scope of this interchange modification project. The City of Sioux Falls is currently undertaking a planning corridor study of the 60th Street North corridor from I-29 to I-229 that includes this intersection. It is anticipated that the study will recommend improvements to the 60th Street North legs of the intersection that the city will implement on a future project that will improve the intersection LOS to D or better.

Alternative 2 (Single Point) does show better future operational performance at the lone I-90 ramp terminal intersection than Alternative 1 (Tight Diamond) shows for the two I-90 ramp terminal intersections necessary for that configuration.

Evaluation Matrix

Table 15: Alternative Evaluation Matrix

	Alternative 0 No Build	Alternative 1 Tight Diamond	Alternative 2 Single Point
Meets all SDDOT Design Criteria	No	Yes	Yes
Meets City of Sioux Falls Access Criteria	No	No	No
Lowest Exit 399 Ramp Merge Level of Service, 2035	D	C	C
Lowest Exit 399 Ramp Diverge Level of Service, 2035	C	C	C
Lowest Exit 399 Ramp Terminal Intersection Level of Service, 2035	F	D	C
ROW Impacts	None	Minimal	Minimal
Environmental Impacts	None	Minimal	Minimal
Safety Improvement	None	Minimal	Good

Coordination

The Cliff Avenue interchange project is being done in conjunction with a City of Sioux Falls project to reconstruct the Cliff Avenue corridor between Benson Road and 60th Street North. As such, coordination between City and SDDOT staff has been ongoing and will continue through the construction phase of both projects.

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. Land owner meetings were held on May 18 & 19, 2010 with 13 landowners directly affected by the Cliff Avenue Interchange / Cliff Avenue corridor project. A public open house meeting was held for the Cliff Avenue Interchange / Cliff Avenue corridor project on July 13, 2010. The summary document from that meeting can be found in Appendix A. After the open house was held, a webpage was established that provided access to the presentation and displays shown at the July 13, 2010, public open house. As the project development process continues, future public meetings will be held as necessary.

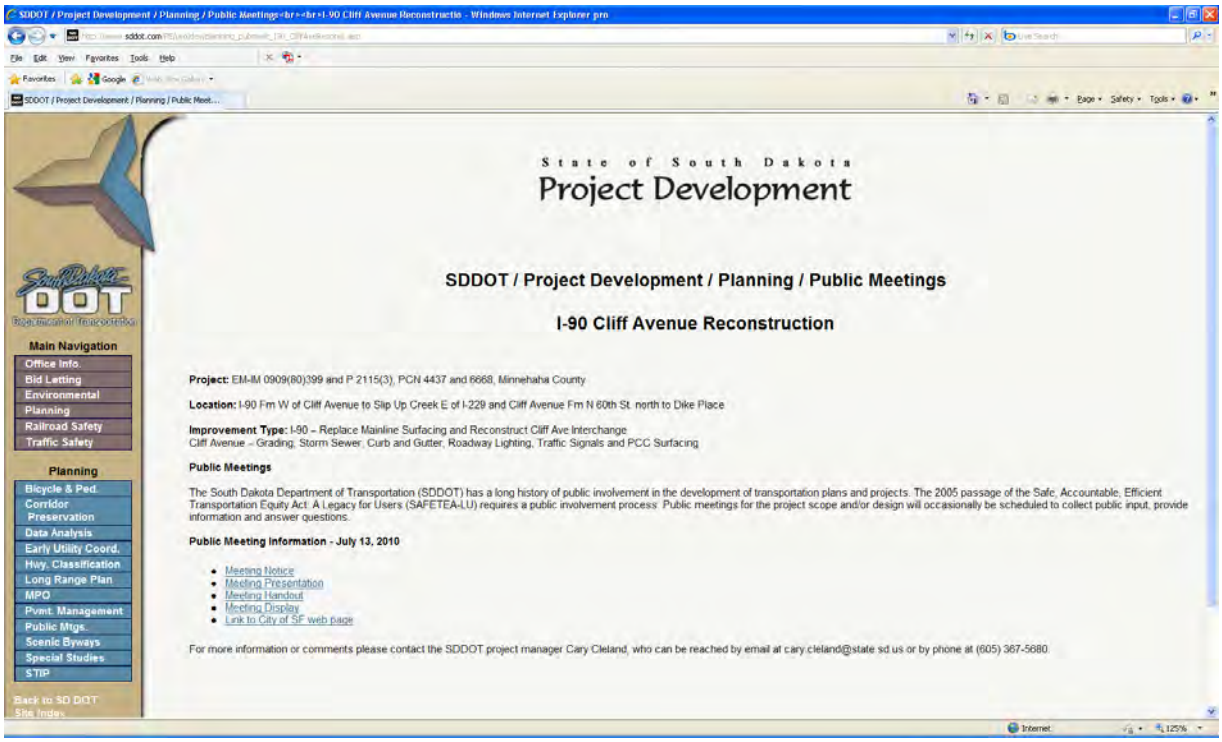

Figure 17: Screenshot of Public Meeting Webpage

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Chapter 8: FUNDING PLAN

The planned project to replace the existing Cliff Avenue Interchange is currently estimated to cost $18.220 million (in 2010 dollars), with the interchange itself estimated to cost $12.366 Million. The SDDOT is currently anticipating funding the project 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	Total Funds
Interstate	Interstate Maintenance	$5.881 Million	$1.295 Million	$7.176 Million
State Highway Urban	Surface Transportation Program	$4.412 Million	$1.442 Million	$5.854 Million
Special Projects	High Priority Projects Program HY20/LY20 Demo ID SD165	$4.072 Million	$0.404 Million	$4.476 Million
Special Projects	High Priority Projects Program Demo ID SD177	$0.714 Million	$0	$0.714 Million
Total		$15.079 Million	$3.141 Million	$18.220 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 2012, the inflated estimated cost for the overall project is $18.957 Million.

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Chapter 9: RECOMMENDATIONS

This modification request is to reconfigure the existing Cliff Avenue interchange from a diamond configuration to a single point urban configuration, as shown in Figure 16 in Chapter 5.

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 interchange. No additional access to the Interstate System is being requested. The reconfiguration of the existing interchange will have a negligible, slightly positive 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 crashes at the interchange's ramp terminal intersection.

Figure 2 shows the existing configuration of Exit 399. The 2001 *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 westbound off ramp being 6.2% and the inslopes for the on the ramps being 4:1. The taper for both on ramps are 37:l and should be lengthened. Probably the most critical feature at this interchange is the proximity of adjacent access points to the ramp intersections. Intersections are located only 130' south of the interchange for East 63rd Street North and 200'to the north for East 64th Street North. Both structures for Interstate 90 that cross Cliff Avenue are classified as functionally obsolete with a substandard width of 30'.

Structurally, the two structures are currently in fair condition. They are both umbrella type concrete slab bridges built in 1960 with a deck overlay done in 1986. 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 umbrella type structures have given the SDDOT problems in the past, it is current SDDOT practice to replace our existing umbrella type structures when the deck approaches the end of its service life.

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 reconfigure the geometrics of an existing interchange. No additional access to the Interstate System is being requested. Existing characteristics and development in the vicinity of the existing interchange limit the cost feasible options to interchange reconfiguration alternatives that can fit within the existing right-of-way. This led to two build alternatives to progress to analysis, a tight diamond configuration similar to the existing and a single-point urban interchange.

The single point interchange concept was selected primarily to improve traffic operations along North Cliff Avenue by consolidating the two intersections of the existing diamond design into one intersection. Also the space between the ramp intersection and the existing intersections along North Cliff Avenue are greater than the other designs. The increase in distance between the intersections improves the operation of both intersections.

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)).

Based on right-of-way constraints within a developed urban area, only interchange alternatives that can fit within the existing right-of-way were developed enough to perform a traffic operations analysis. This led to two alternatives, a tight diamond configuration and a single-point urban interchange, being analyzed.

Tight Diamond Interchange Alternative

Figure 15 shows the tight diamond configuration alternative considered. All of the existing ramps would be removed and replaced, but the basic configuration remains the same as the existing. The south ramp terminal intersection is only 130 feet from the intersection between North Cliff Avenue and East 63rd Street North. The north ramp terminal is only 200' from the intersection between North Cliff Avenue and East 64th Street North. This is a concern with this design.

Projected Year 2035 capacity analysis of the tight diamond interchange design were preformed using HCS+ and Sidra Intersection software tools. The analyzed roadway network for this alternative included the ramp terminal intersections and the proposed I-90 auxiliary lane and Cliff Avenue improvements. Tables 9, 10, & 11 shows the LOS for 2035.

Single Point Design Alternative (Most Technically Feasible)

Figure 16 shows the most technically feasible design of a single point interchange. The interstate mainline would be over the interchange. The single point interchange concept consolidates all interchange turning movements into a single intersection, as shown on Figure 16. The installation of a single point interchange at Exit 399 would represent a departure from the typical I-90 interchange. As there are other single point interchanges already in the Sioux Falls area along I-29 at Exits 73, 79, 80 and 82 and along I-229 at Exit 6, it is anticipated that the time necessary for local drivers to adjust to the new configuration will be short.

An analysis of the impact of the proposed interchange modification at Exit 399 on the Interstate's operations revealed that the interchange will improve traffic operations along Cliff Avenue and would not adversely impact the adjacent interchanges along I-90. The ramp intersections at I-90 at Exit 396 (I-90 & I-29) are currently operating at LOS B or better. In 2035, regardless of the interchange configuration at Exit 399, they will still be operating at LOS C or better. The Exit 400 interchange (I-90 & I-229) is currently operating at a LOS of B or better. It is projected that some ramp movements at this interchange will degrade to operate at LOS D by 2035, regardless of the interchange configuration at Exit 399. The intersection LOS results along the Cliff Avenue corridor north and south of the interchange are shown for the year 2035 in Table 13

A before and after comparison of the three year crash history at other interchanges in South Dakota that have been reconfigured from a diamond to a SPI shows a reduction in total crashes of 37.4% and a reduction in those crashes classified as fatal or injury of 33.8%. Although there may be an initial increase in crashes due to driver unfamiliarity, it can be anticipated that a similar reduction in crashes will occur at the Cliff Avenue interchange upon its conversion from a diamond to a SPI configuration. As there are other SPI's already in the Sioux Falls area along I-29 at Exits 73, 79, 80 and 82 and along I-229 at Exit 6, it is anticipated that the time necessary for local drivers to adjust to the new configuration will be short.

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, not much change in permanent signing is anticipated from the permanent signing that is currently in place. The permanent signing plan for the recommended SPI interchange can be shown in Figure 18.

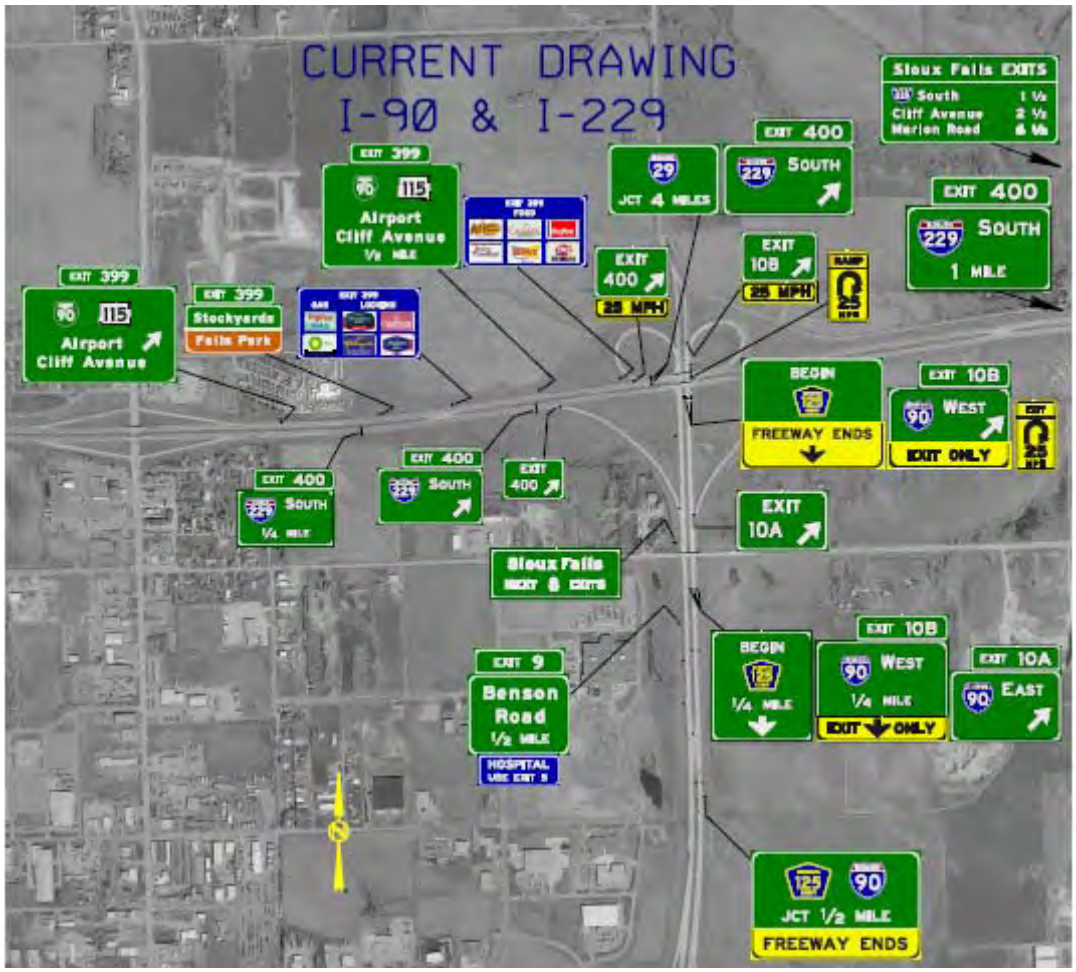

Figure 18: Permanent Signing Plan

This signing plan is anticipated to remain in place until the reconfiguration of the I-29/I-229 System Interchange sometime beyond the planning horizon. The South

Dakota Division Office of FHWA has raised concern over how the permanent signing plan would look after the System Interchange's reconfiguration. Diagrams showing those proposed signing plans can be found in Appendix E.

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 (Cliff Avenue) and will replace the current full access interchange with a reconfigured full access interchange. The reconfigured 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, 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 *South Dakota Interstate Corridor Study* completed in February 2001 indicated that there is no potential for future interchange additions along the segments of Interstate 90 between Exit 399 and the adjacent exits. The recently completed 2010 South Dakota Decennial Interstate Corridor Study, which did not evaluate Exit 399, looked at a developer proposed potential interchange on I-90 for Minnesota Avenue approximately 1 mile west of Exit 399, but found it to not be feasible due to significant geometric, operational, and environmental impacts necessary to avoid

impacting the Big Sioux River floodway and the D&I Railroad while maintaining minimum distance from I-90, Exit 399 and the I-90/I-29 System interchange.

Options to reconfigure the I-90/I-229 System interchange were developed as part of a corridor preservation study in 2007-8. With an actual improvement at that interchange currently beyond the 20 year planning horizon, all feasible options from that corridor preservation study for that interchange are accounted for as possible in the design of the reconfigured Cliff Avenue interchange while maintaining functionality with the existing system interchange's configuration.

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 pavement and the aging, functionally obsolete structures of the existing interchange while improving safety and helping to alleviate existing traffic congestion related to the access spacing along Cliff Avenue. Cliff Avenue will be reconstructed along with the interchange from East 60th Street North south of the interchange to Dike Place north of the interchange.

The reconfiguration of the interchange is being proposed to address future traffic growth relative to the anticipated future population growth of the entire Sioux Falls Metropolitan Planning Area. The City of Sioux Falls plans to reconstruct an adjacent section of the Cliff Avenue corridor from Benson Road to East 60th Street North in either the same year or the following year (depending upon construction sequencing) as the interchange's reconstruction.

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 any interchange modification compared to the Do-Nothing Scenario will be negligible. The proposed revised access is included in the 2011-2015 STIP and programmed for 2012. 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.