

# Exit 83 I-29 & SD 38 Interchange Modification Justification Study

## Introduction

The purpose of this study is to examine the justification of modifying the interchange configuration at Exit 83, the intersection of I-29 and SD 38, near Sioux Falls. Figure 1 shows the location of the interchange. This interchange provides important access to the Sioux Falls Industrial Park and to the Sioux Falls Regional Airport. The existing interchange configuration cannot accommodate the current traffic demand. The predominate purpose for re-configuring the interchange is to increase the weaving distance from the ramps at Exit 83 to the I-90/I-29 interchange. Figure 2 shows the existing Exit 83 interchange configuration and the existing configuration of the I-90/I-29 Interchange.

Figure 3 depicts the proposed interchange modifications and the proposed interchange modifications to the I-90/I-29 interchange. The preferred option will replace the existing southbound off ramp in the northwest quadrant with a loop ramp in the southwest quadrant and replace the northbound on ramp in the northeast quadrant with an northbound on loop in the southeast quadrant. The figure shows that C-D roads will be added to I-29. C-D roads will also be added to I-90 though this is not shown on this figure.

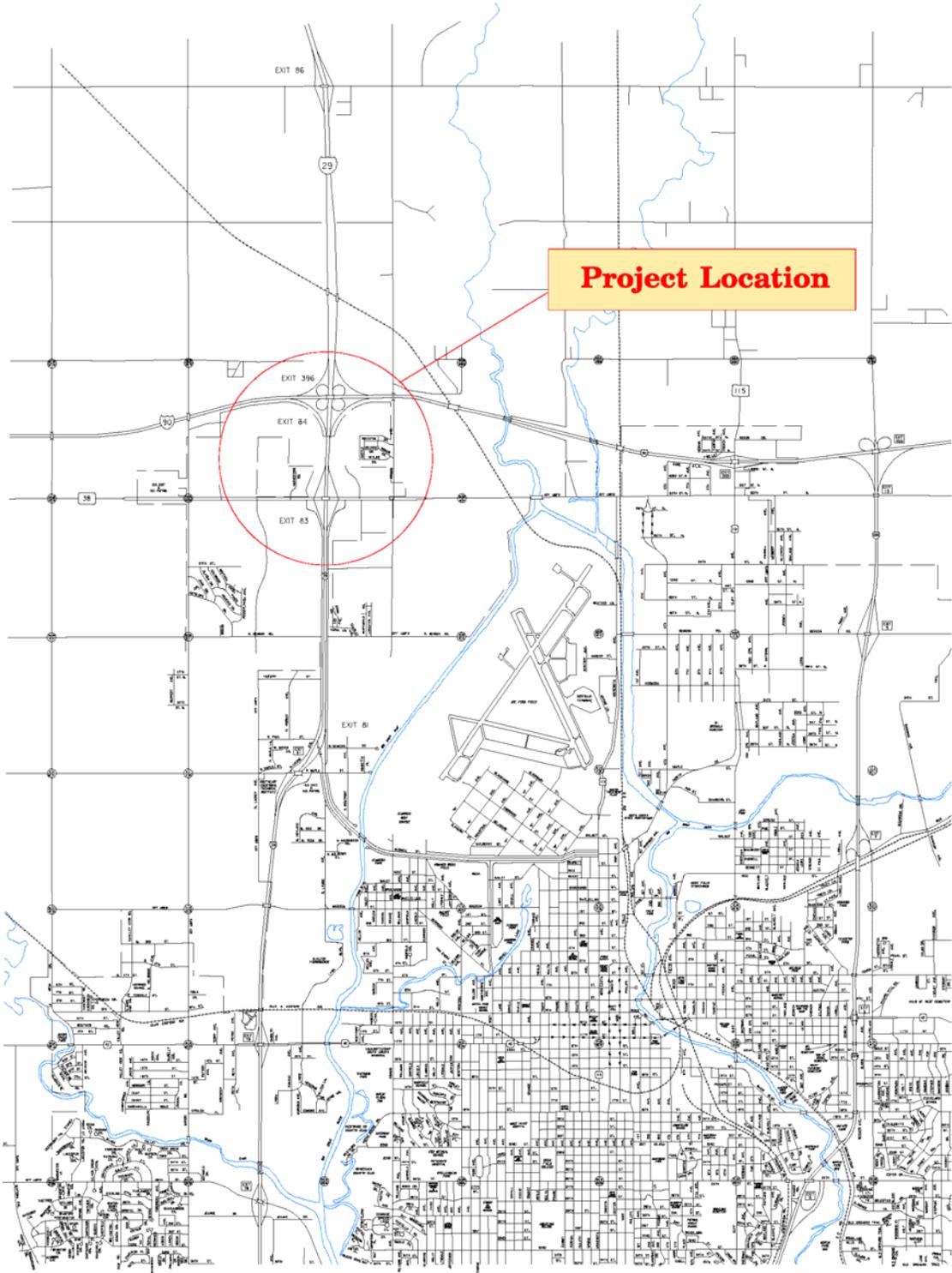
This study addresses the policy requirements for new or revised access points to the existing Interstate system published in the Federal Register Volume 63 Number 28 February 11, 1998.

- 1. The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design year traffic demands while at the same time providing the access intended by the proposal.**

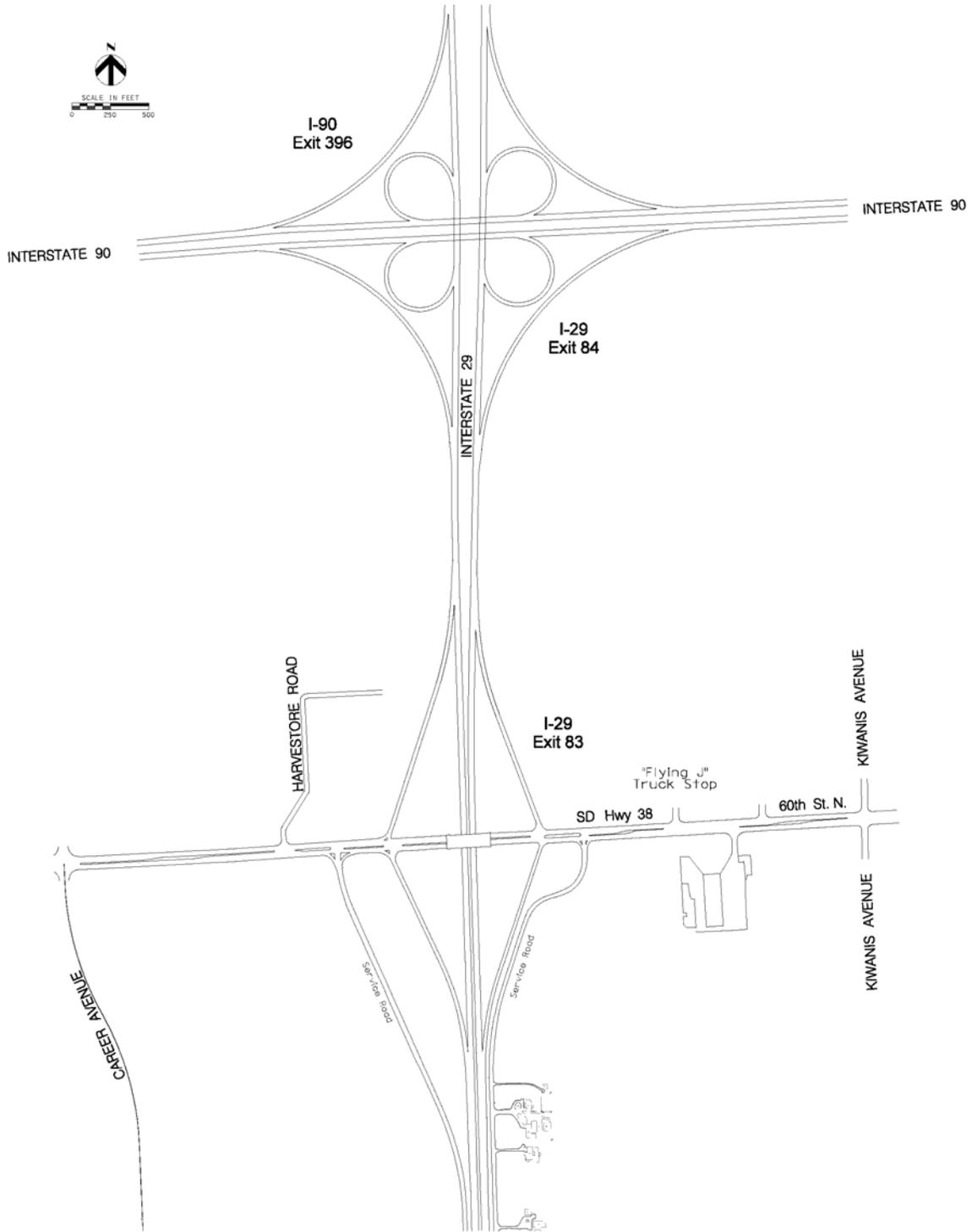
As stated earlier, traffic analysis indicates that the existing interchange can not be improved satisfactorily to accommodate the increase traffic demands. Concerns regarding the interchange relate to the proximity of the ramps on the north side of SD 38 interchange and ramps on the south side of I-29/I-90 interchange. As an example, the gore for the northbound on-ramp at SD 38 to the gore for northbound I-29 to eastbound I-90 is 1,300' with existing interchange configurations. (AASHTO Green Book recommends 1600' to 2000' between gore points.) The future configuration of the I-29/I-90 interchange will move the south ramps closer to the existing SD 38 ramps. With the proposed improvements to the SD 38 interchange and the I-29/I-90 interchange, the distance between the gore from northbound I-29 to the gore for the C-D road will be 1800'.

Figure 4 shows the current Average Daily Travel (ADT) and the existing Level of Service (LOS) for the I-29 mainline between the I-90/I-29 interchange and Exit 83.

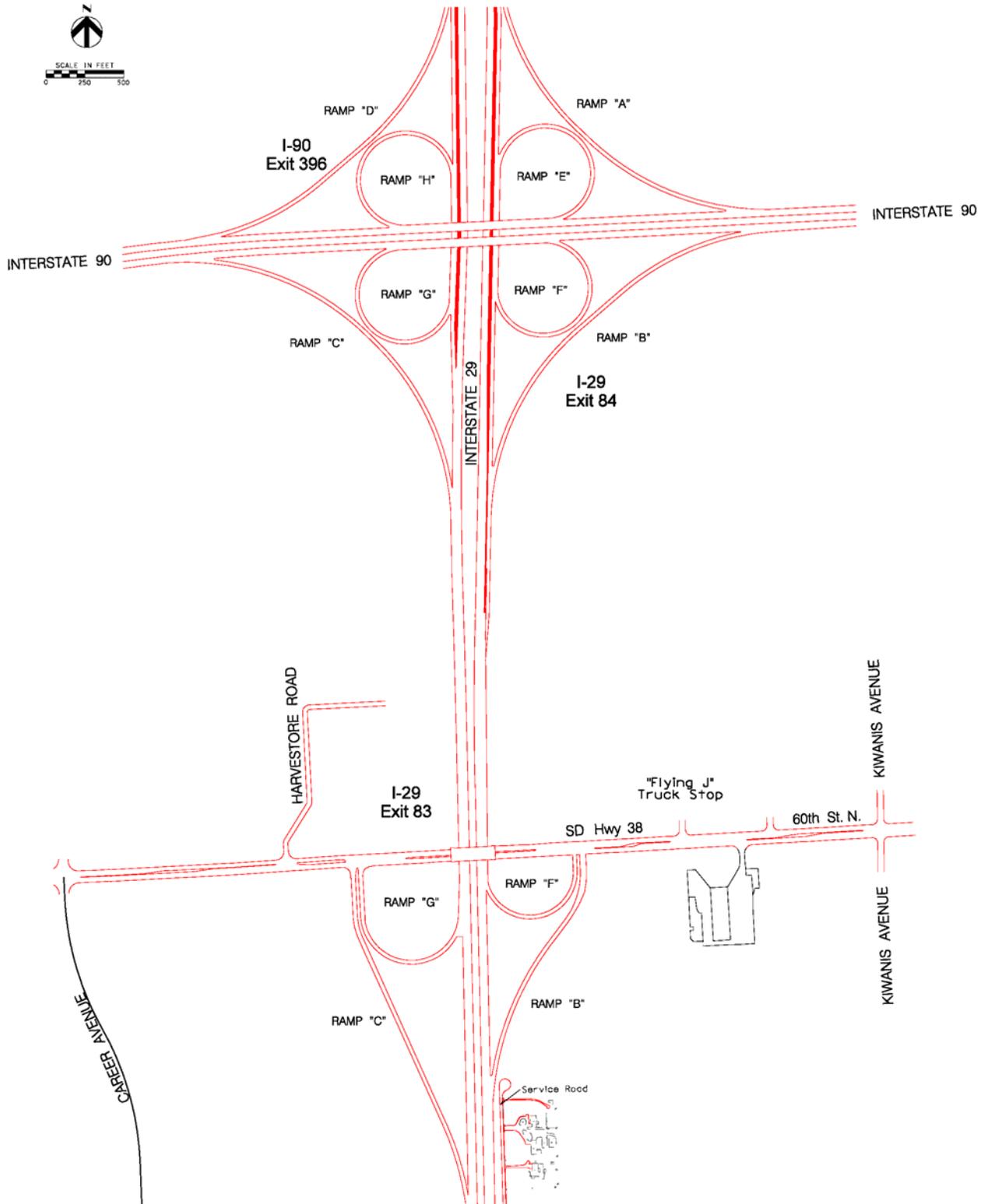
**FIGURE 1**  
**Map of Sioux Falls showing Project Location**



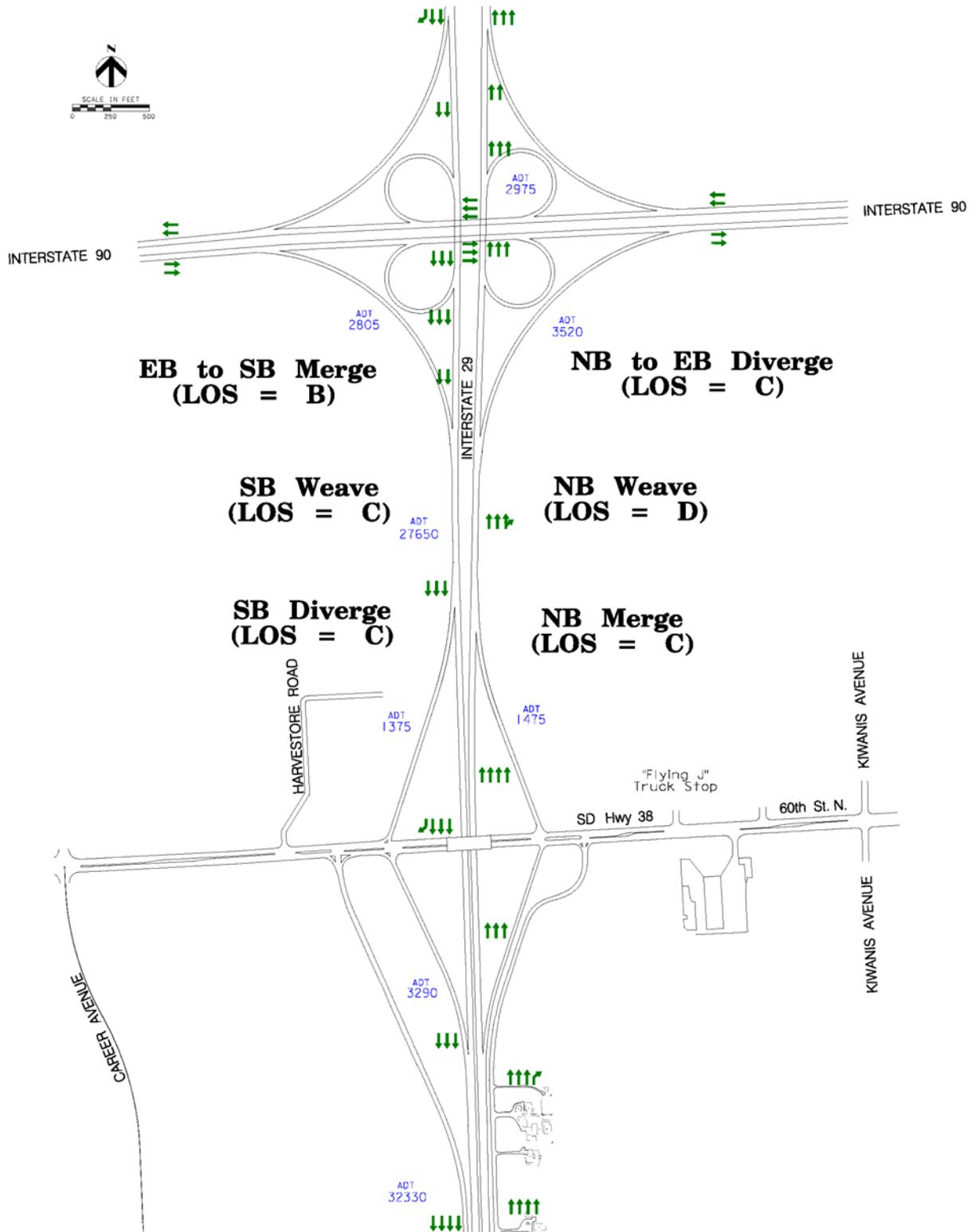
**FIGURE 2**  
**Existing I-29 Corridor from Junction of SD38**  
**to the Junction of I-29 and I-90 in Sioux Falls**



**FIGURE 3**  
**Proposed I-29 Corridor from Junction of SD38**  
**to the Junction of I-29 and I-90 in Sioux Falls**



**FIGURE 4**  
**Existing I-29 Corridor from Junction of SD38 to the**  
**Junction of I-29 and I-90 in Sioux Falls showing**  
**Existing Level of Service (LOS) and Existing Average Daily Traffic (ADT)**



The northbound weave movement is at level D. Figure 5 shows the projected 2021 LOS with the proposed improvements made to both interchanges. The northbound weave LOS improves from D to C and there will be no deterioration in the LOS for the other movements. Even though the LOS does not show large improvement, the relocation should improve driver comfort and safety due to the additional spacing between the ramps.

Traffic analysis for 2021 is based upon the future reconstruction of the I-29/I-90 interchange with 30 mph loops and 65 mph for Ramps A (WB to NB) & C (EB to SB) and 70 mph for Ramps B (NB to EB) & D (SB to WB). The I-29/I-90 Ramp C and Ramp B would move approximately 450' south from their present location.

Figure 6 shows the existing LOS for the intersections of the I-29 ramps and SD 38. The northbound to eastbound and northbound to westbound movements are both operating at a LOS D. The southbound to westbound and the westbound to southbound are also operating at LOS D.

Figure 7 depicts the traffic analysis for the intersections after the improvements are completed. The northbound movements improve from LOS D to LOS C. The northbound movement is the heaviest movement. Also the southbound to westbound movement improves from LOS D to LOS C.

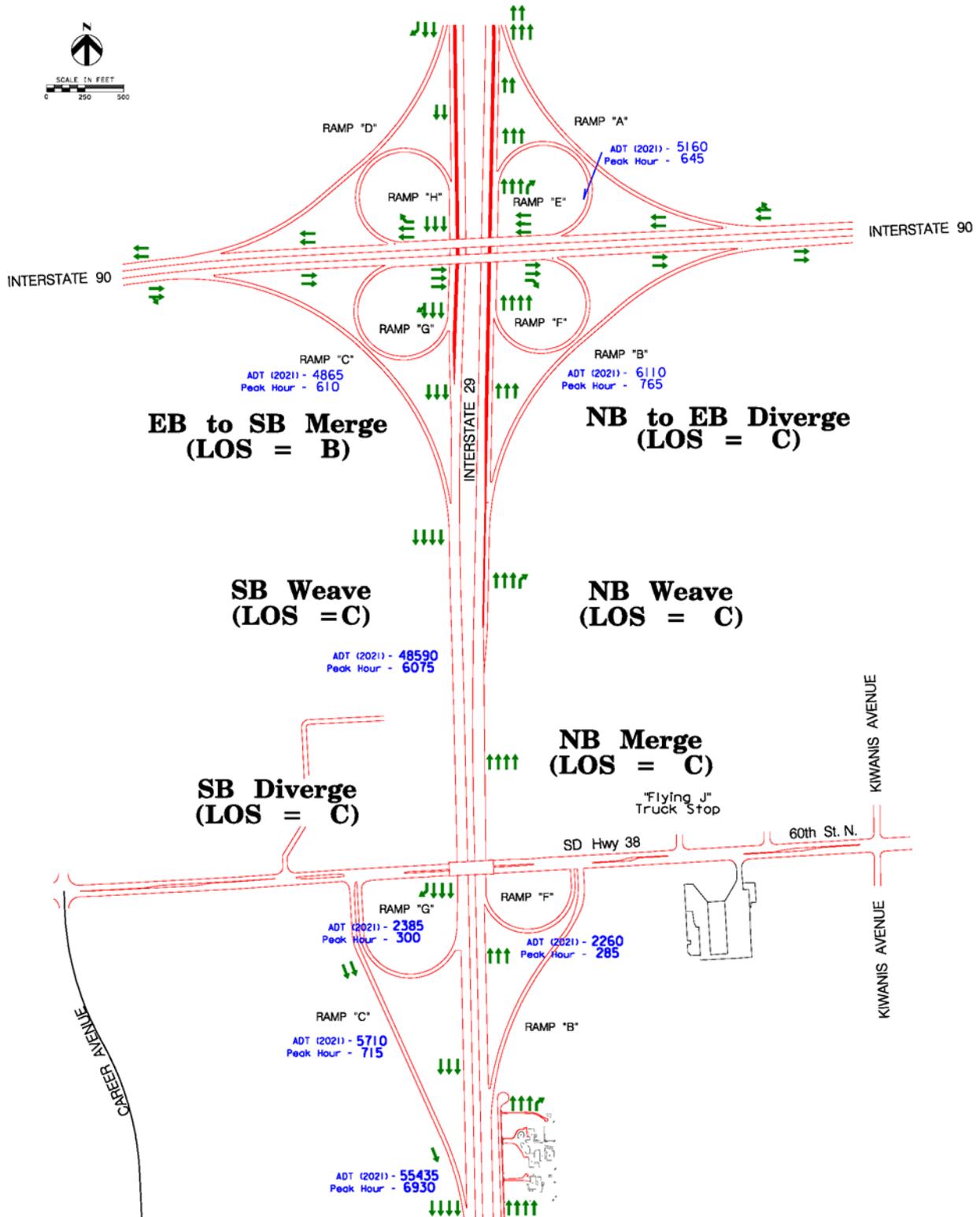
In summary, traffic analysis indicates that the improvements improve existing and future traffic operations of the mainline and the interchange. In addition, due to the lack of distance between Exit 83 and the I-90/I-29 interchange, the re-configuration of the southbound off ramp and the northbound on ramp accommodate the proposed improvements to the I-90/I-29 interchange.

**2. All reasonable alternatives for design options, location and transportation system management type improvements (such as ramp metering, mass transit, and HOV facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.**

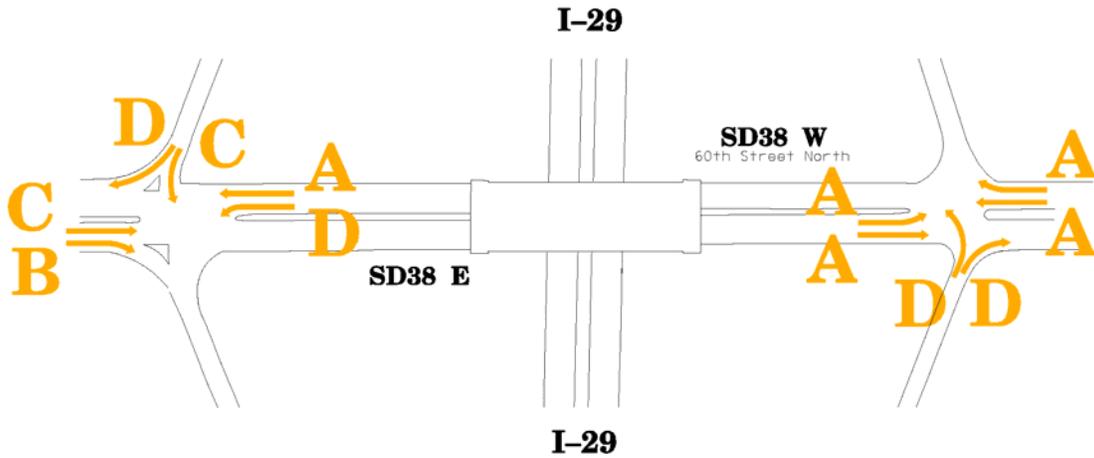
The following alternatives were considered:

- do nothing,
- lengthen the existing ramps,
- reconstruct the interchange.

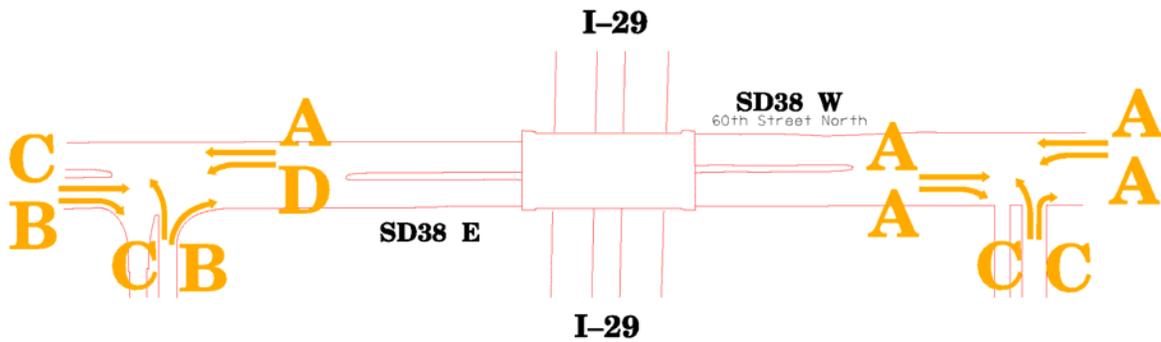
**FIGURE 5**  
**Proposed I-29 Corridor from Junction of SD38 to the Junction of I-29**  
**and I-90 in Sioux Falls showing Projected Level of Service (LOS)**  
**for year 2021 and Average Daily Traffic (ADT) for year 2021**



**FIGURE 6**  
**Existing Level of Service at the Junction of SD38**  
**and the Junction of I-29 in Sioux Falls (Exit 83)**



**FIGURE 7**  
**Proposed Level of Service at the Junction of SD38**  
**and the Junction of I-29 in Sioux Falls (Exit 83)**  
**in year 2021**



## **Do Nothing**

The inability of the existing configuration to address existing traffic operations or future traffic operations requires action to improve the operation of the interchange. Do nothing is not a viable option.

## **Lengthen the Existing Ramps**

Lengthening the existing ramps was considered. But as discussed in the previous section, the close proximity to the I-90/I-29 interchange, which will be improved in the future, makes the preferred option more attractive.

## **Reconstruct Interchange (Preferred Option)**

The preferred option consists of the following improvements listed below.

1. Construct a southbound off-loop (Loop G) in the southwest quadrant of the interchange.
2. Re-align existing southbound on-ramp (Ramp C) to the outside of Loop G.
3. Remove existing southbound off-ramp (Ramp D).
4. Construct a northbound on-loop (Loop F) in the southeast quadrant.
5. Re-align northbound off-ramp (Ramp B) outside of Loop F.
6. Extend auxiliary lane south to Loop F gore point.
7. Remove existing northbound on-ramp (Ramp A).

Construction of the interchange improvements for Exit 83 would be completed in two phases.

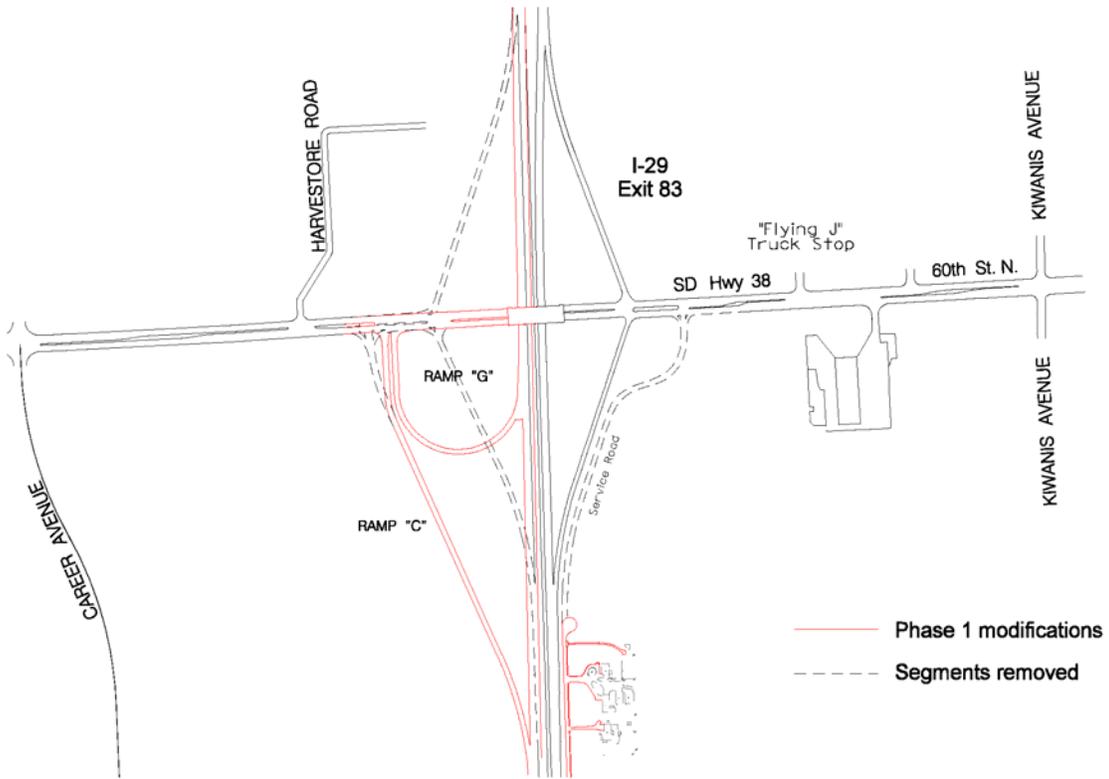
### **Phase 1**

Phase 1 would consist of the construction of the southbound off-loop in the southwest quadrant of the interchange, the re-alignment of the existing southbound on-ramp to the outside of the off-loop, and the removal of the existing southbound off-ramp. Figure 8 shows the configuration of the interchange upon completion of Phase 1. The changes would be a part of construction change order to project number IM 29-3(68)80 in order to minimize items that will be removed/rebuilt during Phase 2. Complete reconfiguration of the southeast quadrant of the Highway 38 interchange cannot be accomplished during the current construction project for two reasons. First, the reconstruction of Ramp B has begun utilizing existing construction plans. Second, proposed alignments of Loop F and Ramp B will require additional ROW and acquisition of required ROW cannot be accomplished during the time frame of this construction project.

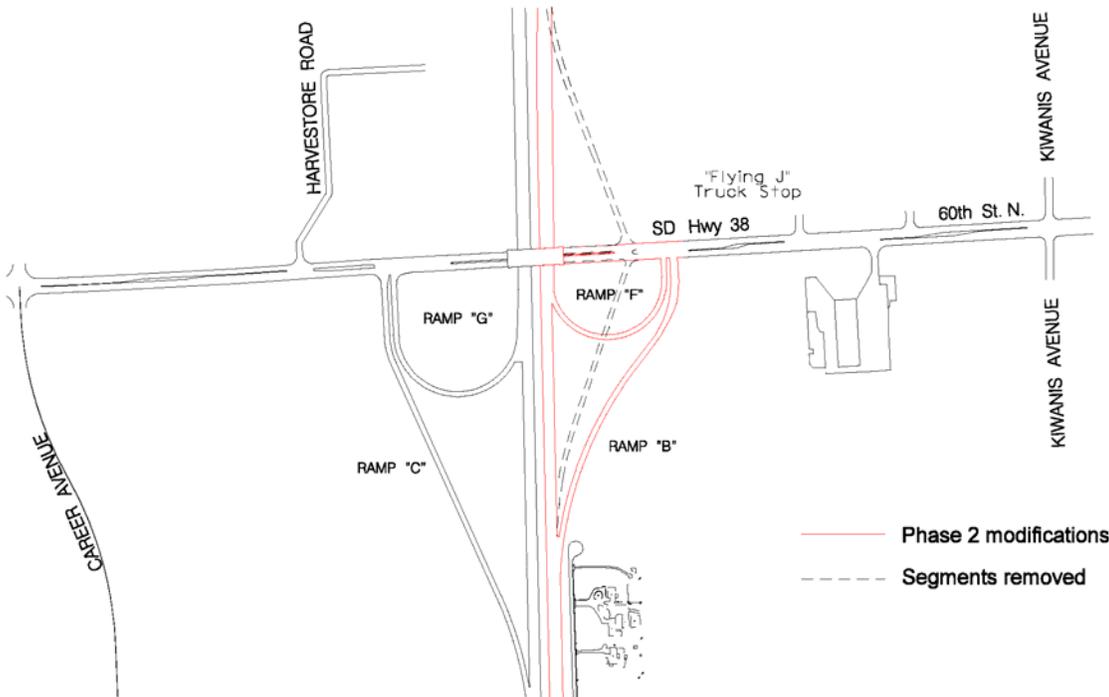
### **Phase 2**

Phase 2 will involve reconstructing the northbound ramps in the southeast quadrant of the interchange. A loop will be constructed to accommodate I-29

# FIGURE 8 Phase 1 Completed



# FIGURE 9 Phase 2 Completed



northbound on-traffic and the I-29 northbound off-ramp will relocate outside of the loop. Also, the existing Ramp A will be eliminated. Figure 9 shows the configuration of the interchange upon the completion of Phase 2. The timeframe for this reconstruction has not been set, but discussion has mentioned possibility of including with the I-90 resurfacing project scheduled for 2008 or as late as possible future reconfiguration of the I90/I29 interchange.

Future traffic volumes and patterns will aid in determining the appropriate timeframe to reconfigure the northbound lane ramps to improve the safety and operation of the Interstate by increasing the distance between the ramps from the I-90/I-29 Interchange and Exit 83.

The geometry in the proposed layout is based on design speeds of 30 mph the loop and 50 mph for the ramp. The typical section for both ramps will utilize the SDDOT standard 25' finished surface. Ramp B will be widened at the intersection with SD 38 accommodating storage and turning requirements.

Work required on SD 38 will be minimal. The combination center turn lane/mountable raised median will be removed and replaced with concrete pavement to accommodate a turning lane for westbound to northbound traffic movement. Removing and replacing of the center turn lane will begin at the east end of the bridge and extend east to the existing turning lane into the Flying J Truck Stop. Improving storage for the westbound to northbound traffic movement may require the relocation of the entrance to the Flying J further east or examine providing access to the Flying J from North Kiwanis. Additional possible work to SD 38 would be a deceleration lane/right turn lane for eastbound to northbound traffic movement.

On Interstate 29, the lane configuration will be similar to what is being constructed at the Russell Street Interchange for northbound movement. An auxiliary lane will be carried from Ramp A at Benson Road to Ramp B at SD38. Three lanes will then be carried to the gore point for Loop F. A parallel type acceleration lane will be utilized for traffic using Loop F. The taper for the acceleration will end prior to the northbound I-29 to eastbound I-90 ramp at Exit 84. The study recommends paving full width (the 10' inside shoulder + 3-12' traffic lanes + 12' acceleration lane and 10' outside shoulder) from the Loop F gore point to the end of the project. The taper can be accomplished with striping. Paving full width during Phase 2 may eliminate the reconstruction of concrete pavement when the I-90/I-29 interchange is reconstructed.

- 3. The proposed access point does not have a significant adverse impact on the safety and operation of the Interstate facility based on an analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urbanized areas, include an analysis of sections of Interstate to and including at least the first adjacent existing or proposed interchange on either side. Crossroads and other roads and streets shall be included in the analysis to the**

**extent necessary to assure their ability to collect and distribute traffic to and from the interchange with new or revised access points.**

As shown in the traffic analysis in Section 1, the proposed interchange modifications will improve the traffic flow on I-29 between Exit 83 and the I-90/I-29 interchange. There will be no significant impact on the operation of I-29 between Exit 83 and the interchange being constructed at Benson Road or the new interchange at Benson Road.

The intersection of North Harvestore Road and SD 38 is located approximately 320' west of the proposed intersection of Ramp C and SD 38. Due to the close proximity of Harvestore Road, options were discussed as to what (if anything) should be done to improve/maintain a safe interchange.

Options considered were as follows:

- 1.) Maintain current conditions at Harvestore Road.
- 2.) Maintain Harvestore Road in its current location and make the raised median continuous through the intersection. (Allow right-in/right-out only.) (Currently there is an opening in the median for Harvestore Road.
- 3.) Relocate Harvestore Road east to align with the proposed Ramp C.
- 4.) Relocate Harvestore Road west to create a larger gap. This option would maintain an opening in the raised median to allow for left-in/left-out movement.

Located directly east of Harvestore Rd. is a drainage channel and box culvert, which goes under SD 38. To relocate east, the box culvert would be required to be extended. Option 3 would become a very expensive alternative and was removed from further consideration. Without knowing future development plans for the area, Option 4 was also removed from consideration due to ROW required and acquisition could become expensive. Also, relocation of the entrance could result in future development utilizing Harvestore Rd. as their main entrance.

Due to low traffic volume created by the existing development, eliminating access for eastbound traffic does not appear to be necessary at this time. Installing the median should wait until future development extends west of the existing businesses. The Department will encourage the City of Sioux Falls to provide new access to this area from Career Avenue which would eliminate the need for the existing access at Harvestore Road. The Department does not have control over local land use decisions.

In conclusion, a safety concern is evident due to the high speeds, but in reviewing available information regarding raised medians, nothing from a traffic standpoint justifies closing the median.

An analysis was completed to determine if the proposed interchange improvements would have an impact on the operation of SD 38. Queue lengths for the year 2025 were developed using volume numbers from the justification study for the Benson Rd interchange and are shown below. Only the queue lengths that could possibly effect the adjacent intersections at Kiwanis Ave and Career Ave are shown.

<u>Intersection</u>	<u>Movement</u>	<u>Queue Length</u>
Career	WB	890'
I-29 SB ramp	EB	650'
I-29 NB ramp	WB	910'
Kiwanis	EB	910'

Existing distance between intersection are as follows:

Career to I90 SB ramp	2110'
I-29 NB ramps to Kiwanis	2116'

The distance between the intersection after the construction of the ramps are as follows:

Career to I-29 SB ramp	1820'
I-29 NB ramps to Kiwanis	1940'

Since the distance between the intersections is greater than the lengths of the queues, traffic will not back up into the other intersection before or after construction of the ramps. The new ramp construction will not effect the adjacent intersections due to queue build up. The existing spacing provides an estimate travel speed of 23 mph and with the ramps constructed it would provide a speed of 22 mph. Therefore, the construction of the new ramps will not cause any significant change in the flow of traffic on SD 38.

In summary, the proposed interchange modification will have no impact on the operation of I-29 or the adjacent interchanges. The interchange modifications will have no impact on the operation of SD 38. However, in the future there may be a need for a median through the intersection with Harvestore Road. The Department will encourage the City of Sioux Falls to provide alternative access from Career Avenue to the affected land owners to eliminate the need for this access point.

- 4. The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” for special purpose access for transit vehicles, or HOV’s or into park and ride lots may be considered on a case by case basis. The proposed access will be designated to meet or exceed current standards for Federal-aid projects on the Interstate system.**

The access improvement connects to a public road only and 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 final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR part 450 and the transportation conformity requirements of 40 CFR parts 51 and 93.**

The proposed interchange improvement is consistent with the MPO plan.

- 6. In areas where the potential exists for future multiple interchange additions, all requests for new or revised access are supported by a comprehensive Interstate network study with recommendations that address all proposed and desired access within in the context of a long-term plan.**

The South Dakota Interstate Corridor Study completed in February 2001, indicated that there is no potential for future interchange additions along this segment of Interstate.

- 7. The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements.**

This request for revised access is not the result of new development but is the result of the natural growth of the City of Sioux Falls and the transportation system improvements are coordinated with and consistent with this natural growth. The request is also made because of the proximity of the interchange to the I-90/I-29 interchange and the need to move the southbound off-ramp and the northbound on-ramp to improve safety and allow for future improvements of the I-90/I-29 interchange.

- 8. The request for new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal.**

The proposed revised access is included in the STIP and the status of the environmental processing is a separate part of this request for the revised access and will be provided later.