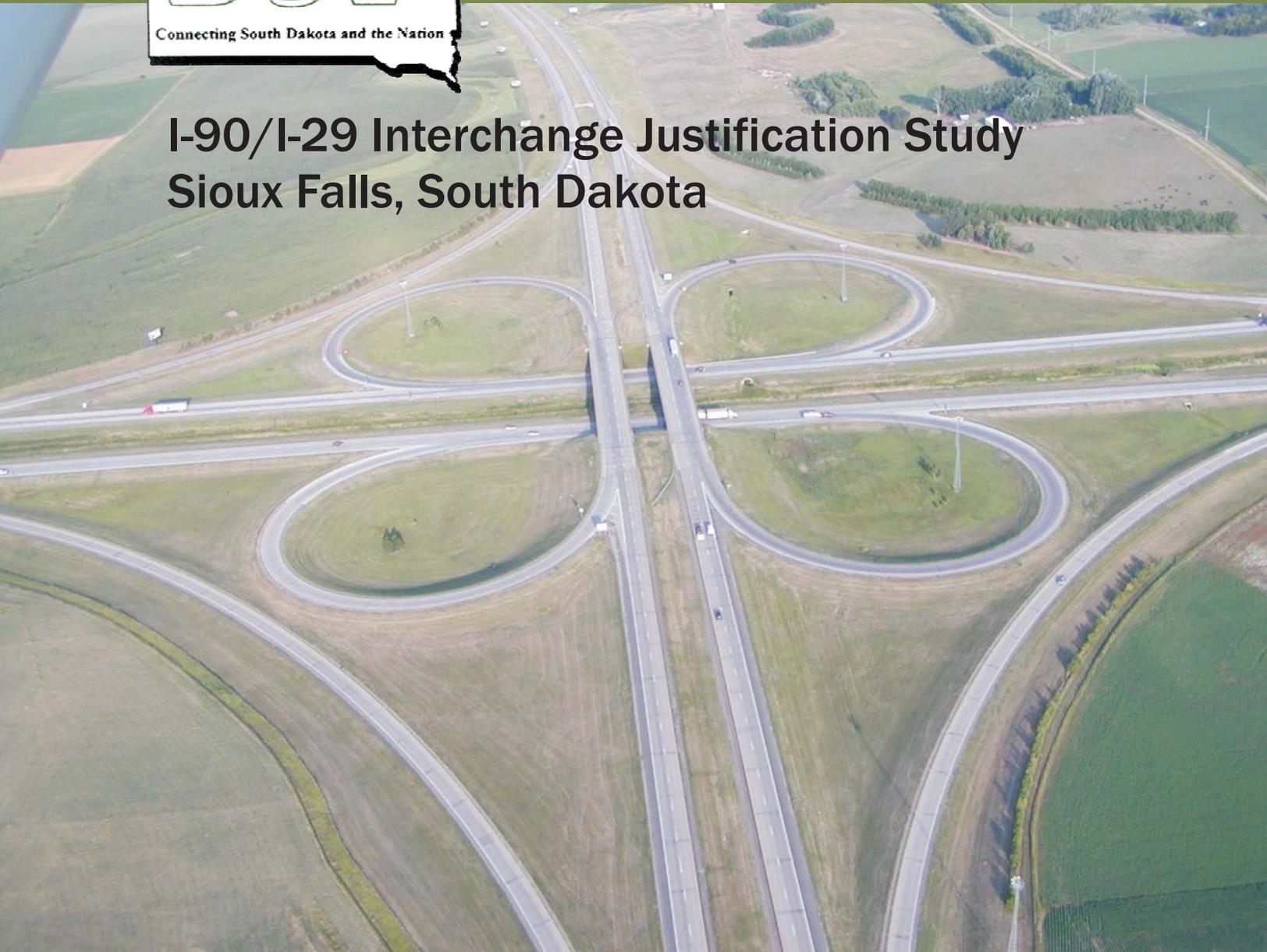




I-90/I-29 Interchange Justification Study Sioux Falls, South Dakota



March 2006

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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.

ITEM 2 6-17
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.

ITEM 3 18-21
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.

ITEM 4 22
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.

ITEM 5 22
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.

ITEM 6 22
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.

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Interstate 90 (Exit 396)/Interstate 29 (Exit 84) Interchange Modification Justification Study

Introduction

The South Dakota Department of Transportation (SDDOT) is studying the need for the future reconstruction of the Interstate 90 (I-90)/Interstate 29 (I-29) interchange (Project). The general location of the Project is southern Minnehaha County, South Dakota. Areas south of I-90 are within the corporate city limits of the City of Sioux Falls (City), while areas north of I-90 are within the City's planning jurisdiction (see Figure 1, Project Location). This system to system interchange located in northwest Sioux Falls serves as an important commuter route for the business community in and around Sioux Falls, and due to limited access to I-90 for the citizens of Sioux Falls, the Project is and will continue to be an important interchange for the growth and development of not only Sioux Falls, but also for smaller communities surrounding Sioux Falls as well as the state of South Dakota.

The regional importance of I-90 and I-29 as well as the I-90/I-29 interchange to the citizens of South Dakota is apparent to all who utilize the interstates and interchange on a daily basis, but few local citizens realize the importance I-90, I-29, and the interchange is to the United States and North America. The North American Free Trade Agreement (NAFTA) was signed 10 years ago, and since the signing the traffic and cargo moving from Canada south to Mexico has steadily increased. One of the main routes taken out of Canada is Interstate 29, which continues from Canada south to Kansas City where trucks access I-35 and continue south to Mexico. The importance of Interstate 90 is not linked to international trade, but is equally important in that I-90 serves as the northern east-west route across the United States. I-90 begins at the west coast in Seattle and carries cargo and travelers east across the country through Chicago and ending its long journey at the east coast in Boston. The importance of the interstates independently is evident. As the two interstates become utilized more in the future, the need increases to reconstruct the interchange to improve capacity and safety far into the future.

The reconstruction would serve to improve the traffic flow and operations of the interchange, resulting in increased capacity and safety. The cloverleaf interchange configuration creates safety concerns that must be considered when deciding whether to modify an existing interchange (see Figure 2, Existing Interchange). As is so prevalent with cloverleaf interchanges, weaving on the interstate mainline create unwanted conflicts and as traffic increases within the interchange, hazards will also increase. The AASHTO Green Book states that a *main disadvantage of a cloverleaf interchange is the weaving maneuver generated along with a very short weaving length.* The Green book continues to state that *when the sum of traffic on two adjoining loops approaches 1,000 vph, the weaving section should be moved from the mainline to a collector-distributor (C-D) road.*

For the Project, seven build alternatives and a No-Build Alternative were evaluated in detail. The criteria used to evaluate the alternatives were cost of the ROW potentially needed as well as construction costs, design criteria, traffic volumes, and environmental issues. The preferred alternative (See Figure 3, Proposed Interchange) will remove weaving from within the interchange and also improve the operation of the two ramps with the heaviest projected traffic.

An interchange proposed to be located one mile west of the I-90/I-29 interchange is currently in the planning stages and was incorporated into the evaluation of the alternatives. Due to the spacing of the proposed interchange at Marion Road and the existing I-90/I-29 interchange, ramp layouts directly impacted each

interchange configuration and therefore imperative that both interchanges were included in the interchange evaluation.

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.**

The system-to-system full clover interchange limits the ability to accommodate projected traffic growth due to the small radius loops in all quadrants. In addition to limits for increased capacity, the adjacent loops in all quadrants of the interchange create 500' weave sections along the mainline lanes of both interstates. Removing weaving from the mainline of interstates is recommended by both the Federal Highway Administration (FHWA) and American Association of State Highway and Transportation Officials (AASHTO).



SCALE IN FEET
0 500 1000

SOURCE:
AERIAL MAPPING OBTAINED FROM
THE CITY OF SIOUX FALLS, SOUTH
DAKOTA (2002)



**EXISTING INTERCHANGE
I-90/I-29 INTERCHANGE**

MINNEHAHA COUNTY, SOUTH DAKOTA
I-90/I-29 INTERCHANGE JUSTIFICATION REPORT

DATE

MAR. 2006

FIGURE

FIGURE 2



PROPOSED INTERCHANGE

MINNEHAHA COUNTY, SOUTH DAKOTA
 I-90/I-29 INTERCHANGE JUSTIFICATION REPORT

DATE
 MAR. 2006

FIGURE
 FIGURE 3

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.

As discussed previously, seven preliminary build alternatives as well as No-Build were evaluated for this project. Initially, six preliminary build alternatives were presented to FHWA and SDDOT in a brainstorming meeting and as a result of that meeting, a seventh preliminary build alternative was developed. The seven build alternatives and a No-Build Alternative were evaluated in detail. Criteria used to evaluate the alternatives were cost of the ROW potentially needed as well as construction costs, design criteria, traffic volumes, and environmental issues. A summary of each alternative follows.

No-Build Alternative

A No-Build alternative would maintain the current interchange geometrics, thus requiring no additional ROW. The results of the traffic analysis indicate that a sufficient LOS can be maintained through year 2050. However, several deficiencies affecting safety exist with the current configuration.

Projected traffic counts for the year 2025 indicate that a collector-distributor (C-D) road should be used in conjunction with this cloverleaf interchange. A C-D road would separate weaving of the double exit loop ramps from the mainline. In addition to weaving, sub-standard acceleration lengths are inherent with the compact interchange configuration which presently exists.

Although the I-90/I-29 interchange is not scheduled for reconstruction until after year 2025, a no-build alternative is evaluated as a comparison with the build alternatives.

High Occupancy Vehicles (HOV) Lanes

Another alternative would be to provide HOV lanes along I-90 in the study area. HOV lanes encourage car-pooling by giving an exclusive lane to vehicles with multiple passengers, thus reducing travel time and delay compared to travel in congested lanes. Currently no congestion exists in the state of South Dakota to require HOV lanes, and there are no traffic projections for the time period covered by this study that would require the SDDOT provide HOV lanes within the study area. The provision of HOV lanes would also require additional lanes in this corridor and is therefore deemed to be inappropriate.

Preliminary Build Alternatives

The general design criteria used to develop the seven Alternatives are as follows:

- Eliminate weaving movements on interstate mainlines.
- Provide adequate spacing to adjacent interchanges.
- Provide adequate gore spacing within the interchange.
- Utilize acceptable design speeds for all interchange roadways.

Year 2025 and 2050 traffic volume projections were utilized to conduct the traffic analysis on each interchange concept.

Alternative 1

This Alternative features a full cloverleaf interchange utilizing C-D roads along both I-90 and I-29. A design speed of 30 mph is achieved with the 300-foot radius loops. Due mostly to the 300-foot radius loops, Alternative 1 requires the most ROW of all Alternatives. In addition, this expanded configuration limits the proposed Marion Road interchange, one-mile west of I-29, to a folded diamond configuration.

Alternative 2

Similar to Alternative 1, Alternative 2 features a full cloverleaf interchange with C-D roads on both I-90 and I-29. The primary difference is that 250-foot radius loops were used in an effort to minimize required ROW while still getting full benefits from this configuration. A design speed of 25 mph on the loops would be considered adequate by AASHTO standards since all loops utilize the C-D roads for weaving movements. The C-D road configuration would also allow for a further reduction in size on one or more of the loops if ROW constraints become apparent. Alternative 2 has the lowest construction costs of the seven build Alternatives.

Alternative 3

Alternative 3 features a C-D road along the east side of I-29 in conjunction with two 300-foot radius loop ramps. Loops along the west side of I-29 were replaced with semi-directional ramps, coinciding with projected high traffic volumes. Alternative 3 maximizes separation with the proposed Marion Road interchange, but requires a significant amount of right-of-way in the northeast and southeast quadrants.

Alternative 4

This Alternative has semi-directional ramps in all quadrants, accommodating a 40 mph design speed. Along with minimal ROW required, Alternative 4 provides for a long weaving distance between South Dakota Highway 38 (SD 38) and I-90. Drawbacks to this Alternative are the high construction and maintenance costs of structures and the intricacies associated with the maintenance of traffic during construction.

Alternative 5

Alternative 5 has loops in the northeast and southwest quadrants and directional “fly-over” ramps in the northwest and southeast quadrants. This Alternative resolves many of the drawbacks of the other Alternatives. It requires the least ROW of all of the build Alternatives with takings from the northeast and southwest quadrants only. Alternative 5 maximizes the spacing between the existing SD 38 and the proposed Marion Road interchanges. Directional ramps accommodate the two highest traffic volume movements: I-29 northbound to I-90 eastbound and I-90 westbound to I-29 southbound. Both loops have a 300-foot radius and merge onto the interstate without any weaving concerns while eliminating the need for C-D roads. Alternative 5 has the lowest ROW and construction costs combined.

Alternative 6

This Alternative is a fully directional interchange featuring 50 mph “fly-over” ramps accommodating all turn movements. Although this Alternative has the greatest interchange capacity of all reviewed Alternatives, the larger footprint of the interchange creates lower capacity between SD 38 and the interchange as well as between a future Marion Road interchange and the I-90/I-29 interchange. This is the most expensive Alternative due to the combination of high structure costs and the large amount of land required for ROW purposes.

Alternative 7

Alternative 7 was developed as an alternative to Alternative 5 with the intent of reducing the structure costs associated with the low traffic volume for westbound I-90 to northbound I-29 traffic. Instead of a “fly-over” ramp, a loop ramp similar to that in Alternative 2 was placed in the southeast quadrant. As a result, C-D roads would be required on both westbound I-90 and northbound I-29. The cost savings in structures with this Alternative do not out-weight the additional ROW costs and C-D road costs as compared to Alternative 5.

DETERMINATION OF ALTERNATIVES

Each of the Preliminary Build Alternatives along with the No-Build Alternative was presented at a Public Open House on November 22, 2004. Comments from the Open House and “Brainstorming” Session were evaluated (See comments in Appendix A) and as a result, several of the alternatives were eliminated from further consideration. The following sections describe reasons for eliminating alternatives as well as the selection of the preferred alternative.

Build Alternatives

Based on criteria developed during the Project, State and Federal Officials along with public comment narrowed the alternatives down to two. Alternatives 2 and 5 were chosen for further review. As compared to the other alternatives, these two Alternatives minimize overall construction costs, lessen the impact to adjacent land and maximize spacing with adjacent interchanges. The key advantages of these two alternatives are as follows:

- Alternative 2 – flexibility in size of ramp loop radii, lowest construction costs, and ease of construction.
- Alternative 5 - least impact on ROW, geometrics that provide the desired functionality and design speed, least combined ROW and construction costs, and maximized spacing between the I-90/I-29 interchange and adjacent interchanges.

While each alternative was specifically designed to meet the Project goals, usually only one or two drawbacks made Alternatives 1, 3, 4, 6, and 7 prohibitive to construct. Alternatives 1 and 3 served future capacity needs, but required an extensive amount of ROW. Alternatives 4 and 6 maximized traffic capacity while maintaining higher design speeds but did so through the use of structures that generated high construction costs and complex constructability. Alternative 7 was developed to provide the advantages of Alternatives 2 and 5, while attempting to further eliminate any drawbacks of these alternatives; however, Alternative 7 required additional ROW, making it cost prohibitive. Therefore, Alternatives 1, 3, 4, 6 and 7 were eliminated from further consideration.

The comparison matrix (see Table 1) further explains the positives and negatives of each alternative. Figures 4, 5, 6, & 7 show layouts of alternative interchanges originally considered.

Comparison Matrix

Right-of-Way

For the purpose of determining costs of ROW for each option, HDR assigned a value of \$2/ft² for undeveloped land, \$8/ft² for developed land designated as industrial, and \$10/ft² for developed land designated as office/commercial. According to the City of Sioux Falls 2025 Growth Management Plan, the four quadrants of the I-90/I-29 interchange are projected to be developed. This eliminates any question of whether the land will be developed. Also, according to the Growth Management Plan, only the southeast quadrant of the interchange is designated as office/commercial while the other quadrants are designated as industrial. A development plan has been turned in to the City of Sioux Falls and has subsequently been approved for the southeast quadrant and construction has begun. This is the reason that the \$10/ft² value was assigned to the southeast quadrant for both the “now” and “post-development” conditions.

Project Costs

In order to aid in the determination of a preferred alternative for this interchange, cost comparisons were made for each of the alternatives. The costs are an estimate for construction costs only. Maintenance costs over the life of the pavement and structures were not included.

I-90/I-29 Interchange Corridor Preservation
COMPARISON MATRIX

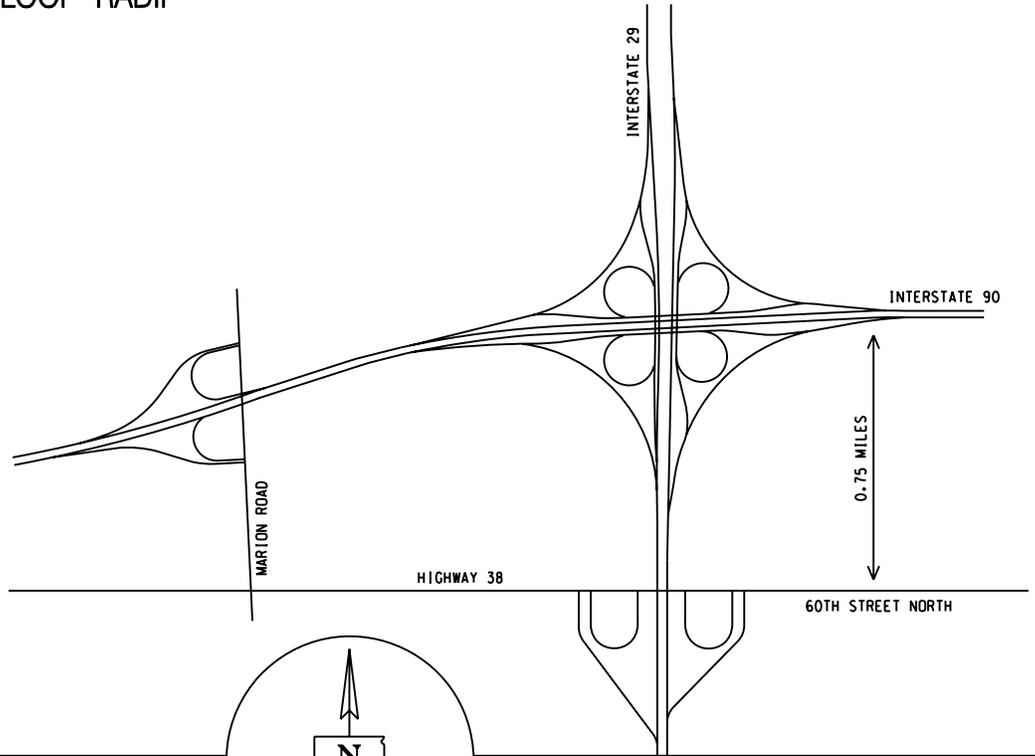
Table 1

Criteria ^{1,2}	OPTION #1 Full cloverleaf with I-29 and I-90 C-D roads and 300' loop radii		OPTION #2 Full cloverleaf with I-29 and I-90 C-D roads and 250' loop radii		OPTION #3 Partial turbine with east side C-D roads and loops		OPTION #4 Semi-directional ramps in all quadrants (turbine)		OPTION #5 Partial cloverleaf with northeast and southwest quadrant loops		OPTION #6 Fully directional interchange		OPTION #7 3-loop interchange with 1 fly-over ramp	
	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)
Right-of-way (million \$)	8.8	17.9	5.5	10.8	7.5	13.6	3.6	8.4	1.5	5.8	5.5	10.7	5.4	10.4
Roadway Cost (million \$)	16.9		16.0		17.2		16.3		13.2		17.2		16.6	
Structure Cost (million \$) \$75/sq ft for straight bridge \$100/sq ft for curved bridge \$150/sq ft for 3 rd level bridge	6.7		6.7		5.2 straight + 4.8 curved 10.0 total		7.7 straight + 9.1 curved \$16.8 total		3.7 straight + 6.4 curved \$10.1 total		3.1 straight + 6.5 curved +10.2 3 rd level \$19.8 total		5.1 straight + 3.7 curved \$ 8.8 total	
Total construction cost (million \$)	23.6		22.7		27.2		33.1		23.3		37.0		25.4	
Total right-of-way and construction cost now (million \$)	32.4		28.2		34.7		36.7		24.8		42.5		30.8	
Total right-of-way and construction cost after development (million \$)	41.5		33.5		40.8		41.5		29.1		47.7		35.8	
Meets all AASHTO design criteria	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Lowest Level of Service of ramp junctions and weaving sections for years 2025, 2050	B, C		B, C		B, C		B, C		B, B		B, C		B,C	
Spacing to adjacent interchanges (comparative rank)	7		6		4		2		1		3		5	
Environmental Impacts	Minimal		Minimal		Minimal		Minimal		Minimal		Minimal		Minimal	
Constructability	Simple		Simple		Moderately complex		Complex		Moderately complex		Complex		Moderately complex	

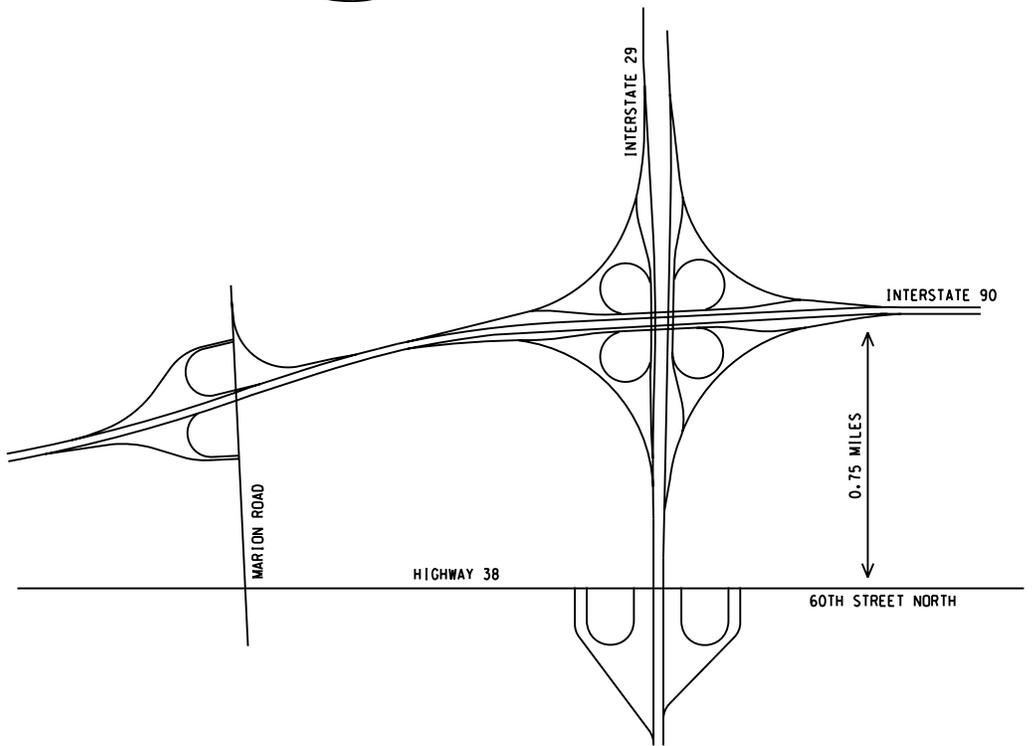
¹ All right-of-way and construction costs are in 2004 \$.

² Right-of-way “pre-development” costs; right-of-way “post-development” costs.

CONCEPT ALTERNATIVE 1
 FULL CLOVERLEAF WITH I-29 AND I-90
 C-D ROADS AND 300' LOOP RADII



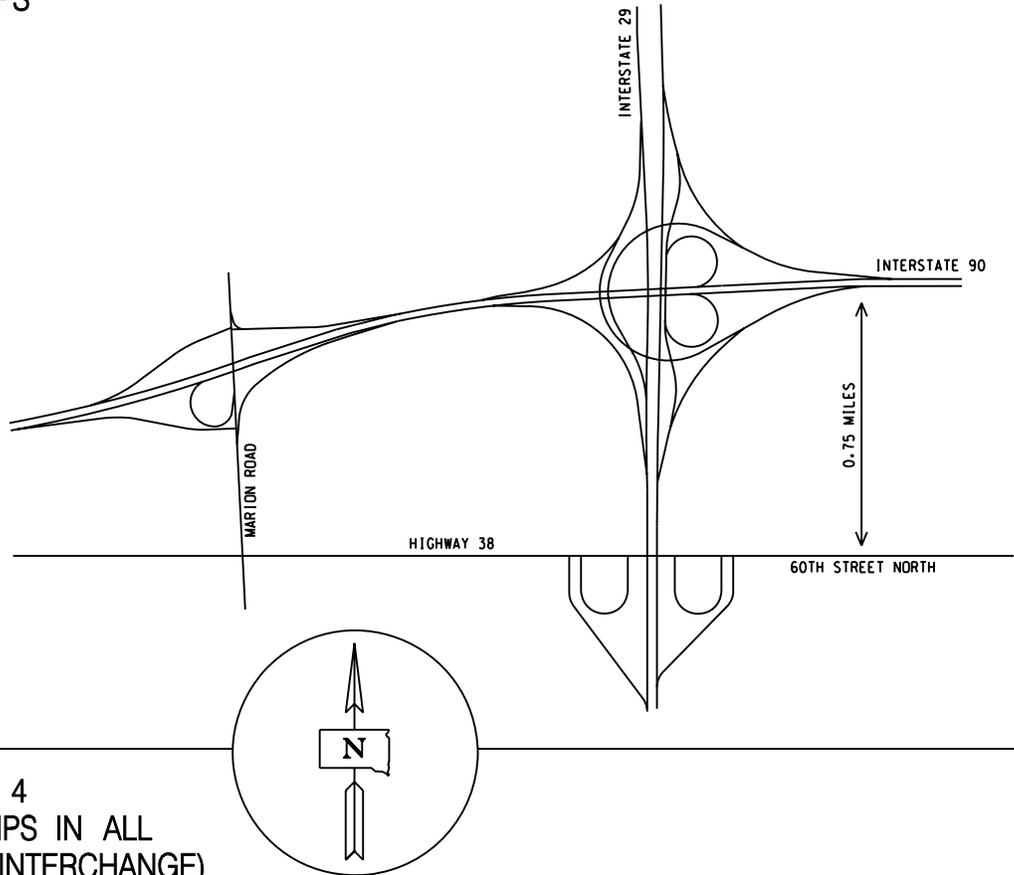
CONCEPT ALTERNATIVE 2
 FULL CLOVERLEAF WITH I-29 AND I-90
 C-D ROADS AND 250' LOOP RADII



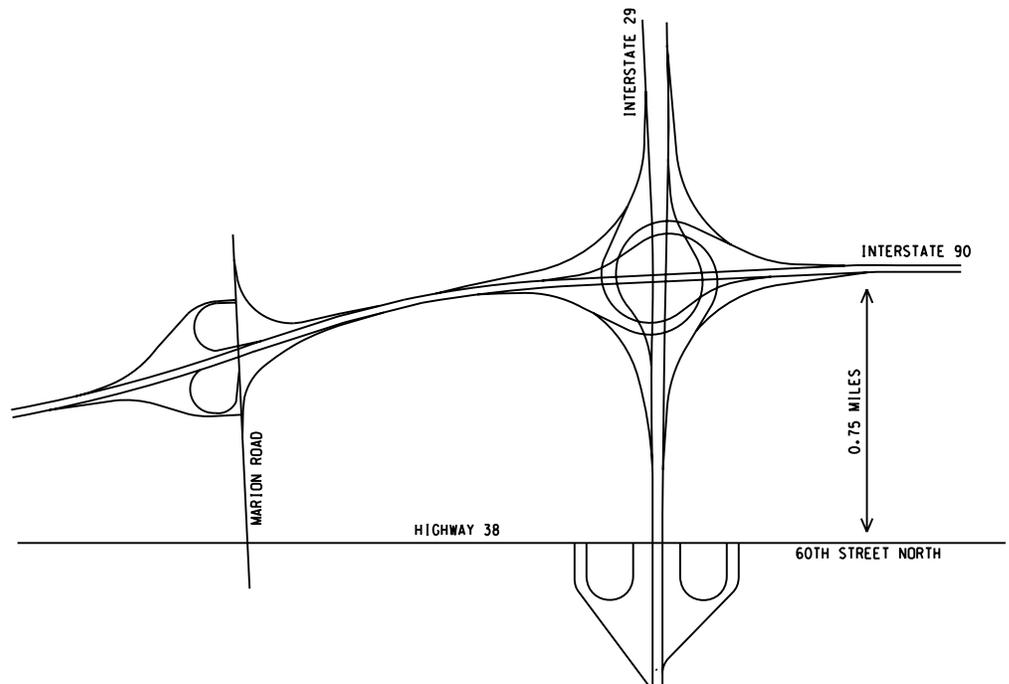
INTERCHANGE CONCEPT ALTERNATIVES
 I-90/I-29 INTERCHANGE
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FIGURE	FIGURE 4

CONCEPT ALTERNATIVE 3
 PARTIAL TURBINE WITH EAST SIDE
 C-D ROAD AND LOOPS



CONCEPT ALTERNATIVE 4
 SEMI-DIRECTIONAL RAMPS IN ALL
 QUADRANTS (TURBINE INTERCHANGE)



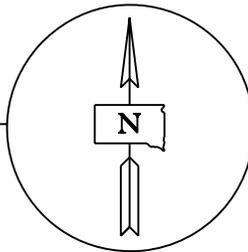
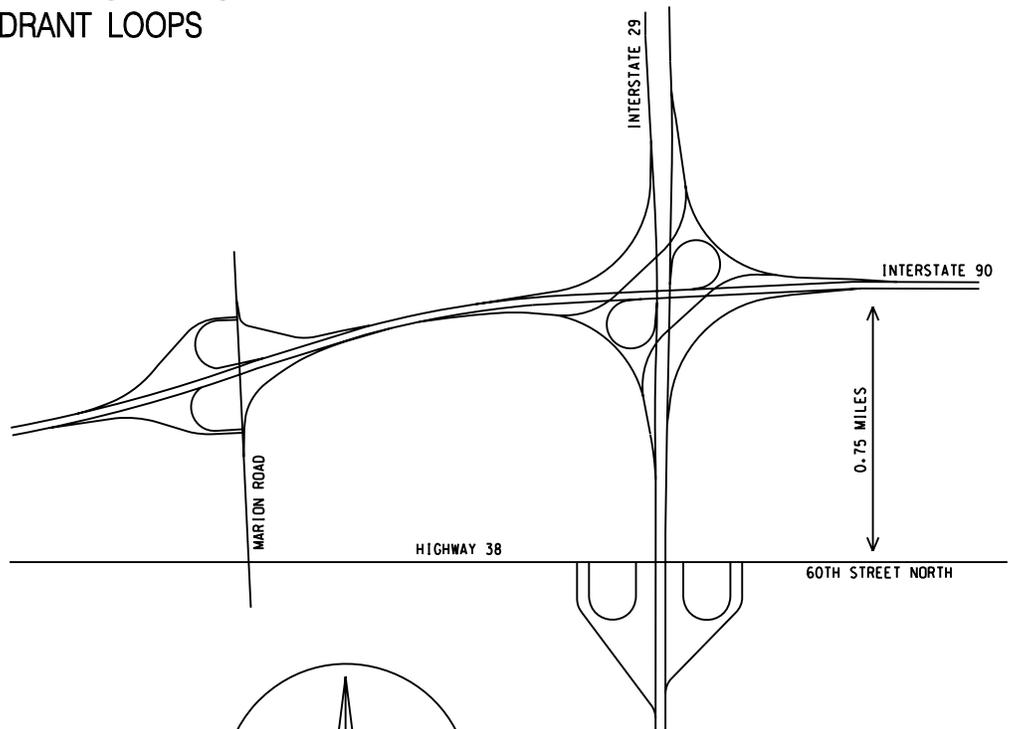
INTERCHANGE CONCEPT ALTERNATIVES
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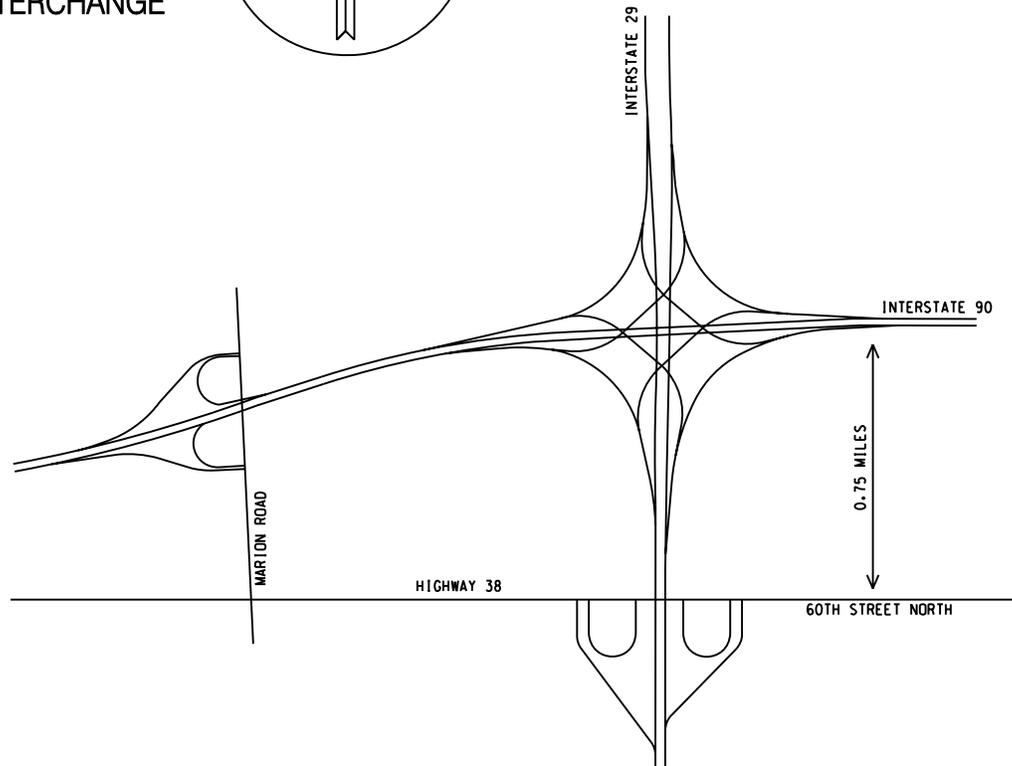
DATE
 MAR. 2006

FIGURE
 FIGURE 5

CONCEPT ALTERNATIVE 5
 PARTIAL CLOVERLEAF WITH NORTHEAST
 AND SOUTHWEST QUADRANT LOOPS



CONCEPT ALTERNATIVE 6
 FULLY DIRECTIONAL INTERCHANGE
 (TRI-LEVEL)

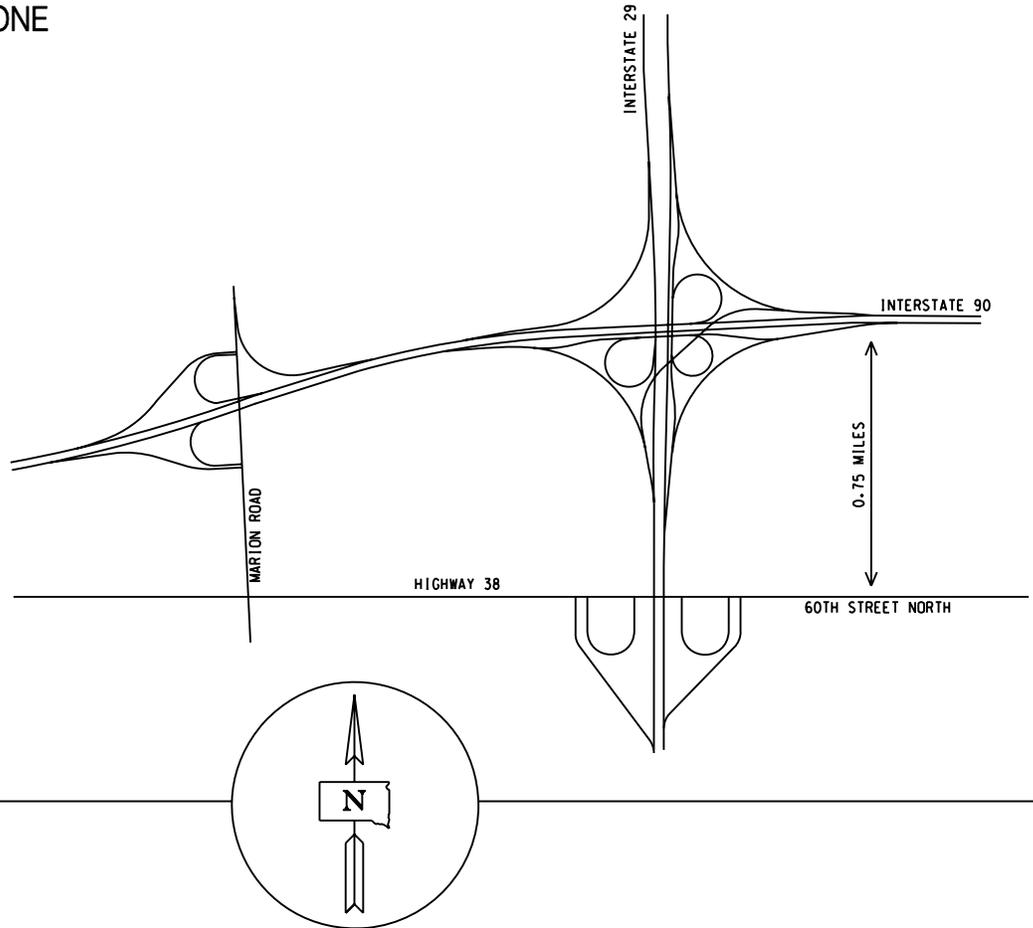


INTERCHANGE CONCEPT ALTERNATIVES
 I-90/I-29 INTERCHANGE

MINNEHAHA COUNTY, SOUTH DAKOTA
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FIGURE	FIGURE 6

CONCEPT ALTERNATIVE 7
THREE LOOPS WITH ONE
FLY-OVER RAMP



INTERCHANGE CONCEPT ALTERNATIVES
I-90/I-29 INTERCHANGE

MINNEHAHA COUNTY, SOUTH DAKOTA
I-90/I-29 INTERCHANGE JUSTIFICATION REPORT

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FIGURE	FIGURE 7

Following additional review of direct comparisons between Alternates 2 and 5, SDDOT identified Alternative 5 as the technically favored alternative. A direct comparison between the two alternatives which better clarifies the basis for selecting Alternative 5 as the technically favored alternative is shown below:

Alternative 2:

- Requires additional ROW over Alternative 5 including ROW in the southeast quadrant. ROW required in the southeast quadrant would severely impact existing and planned future development at that location.
- Traffic projections for year 2025 show the highest movement in the p.m. peak hour as the I-90 westbound to I-29 southbound. Alternative 2 would impact capacity by utilizing a 30 mph loop whereas Alternative 5 provides for a 50 mph ramp.

Alternative 5:

- Requires the least amount of ROW and has no impact to current development plans in the southeast quadrant of the interchange.
- Accommodates the high traffic counts for the westbound to southbound movement through the use of a 50 mph ramp.
- Allows for the best spacing between ramp gores for the I-29 northbound on-ramp at SD 38 and the I-29 north to I-90 eastbound ramp.

Following selection of the technically preferred alternative, all alternatives were presented to the following committees of Metro Planning Organization (MPO); (See MPO meeting notes in Appendix.)

- Citizens Advisory Committee
- Technical Advisory Committee
- Urbanized Development Council

Each committee unanimously voted in favor of Alternative 5 as the technically favored alternative. Therefore, based on recommendations by SDDOT and MPO, Alternative 5 is the preferred alternative for the Project. Following is a more detailed description of Alternative 5:

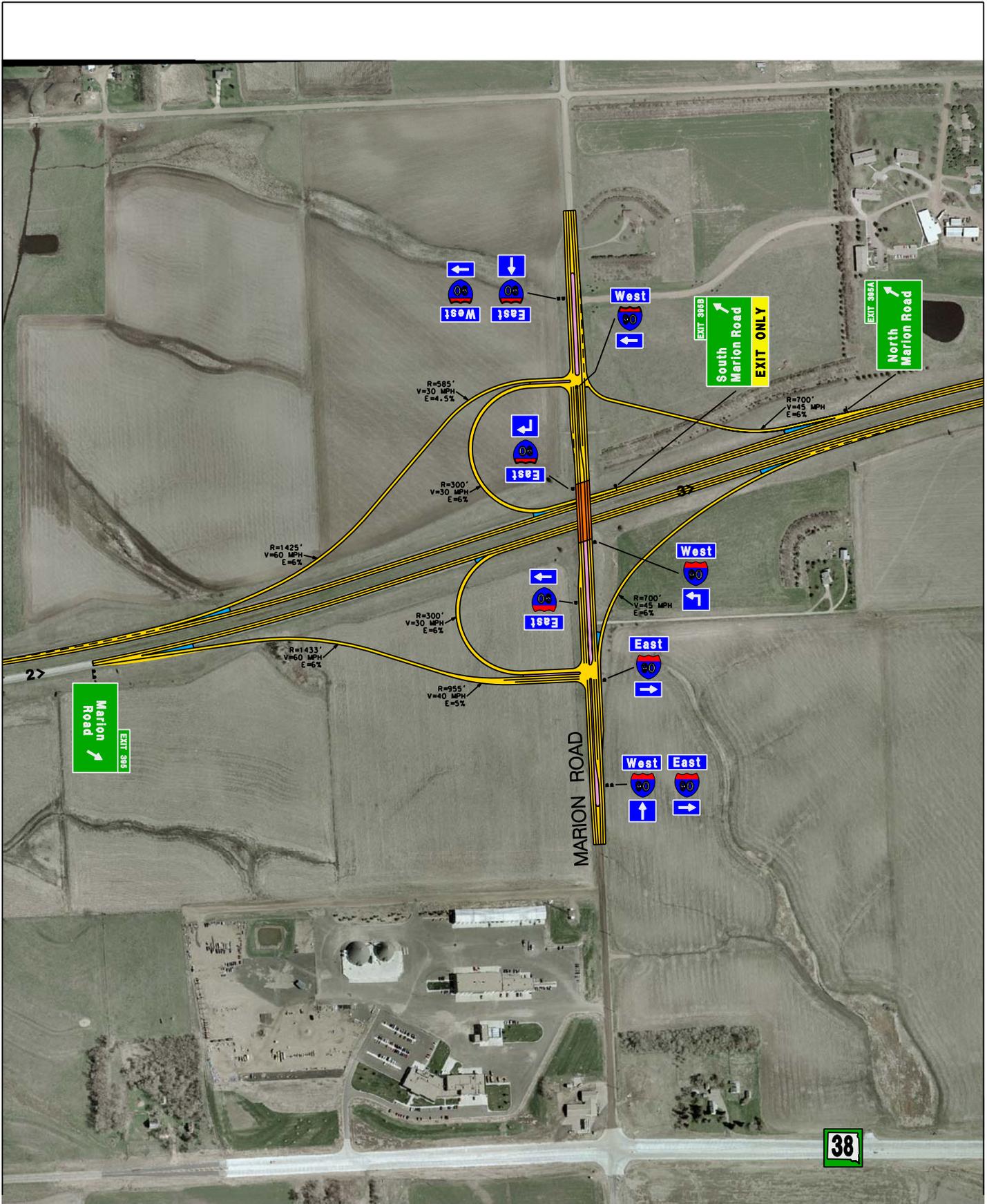
Alternative 5

Alternative 5 has loops in the northeast and southwest quadrants of the interchange and directional “fly-over” ramps in the northwest and southeast quadrants.

Benefits of this Alternative include:

- Right-of-way is required from only the northeast and southwest quadrants.
- The spacing between SD 38 and the I-90 off-ramp (Ramp B) is maximized.
- With the northeast quadrant loop (Loop E) coming directly off of I-29, there is no need for a 2-lane ramp from I-29 northbound to I-90.
- C-D roads are not needed; yet there is no weaving on the interstate mainline lanes within the interchange.
- The high volume turning movements (I-29 northbound to I-90 eastbound and I-90 westbound to I-29 southbound) are accommodated by directional ramps B and H with design speeds of 60 mph and 50 mph, respectively.
- Loops E and G each have a 300-foot radius, which provides for a 30 mph design speed. The layout of Ramps A and C determine the size of the loops.
- Loops E and G are both “upgrade” loops which is especially beneficial for trucks. (Typically, a disproportionate share of accidents within an interchange is from truck rollovers occurring on a “downgrade” loop.)
- Only one ramp merge condition is necessary, that being between Ramps A and F.
- An adequate layout of the Marion Road/I-90 interchange is allowed as shown in Figure 8.
- Total estimated cost for Alternative 5 which includes ROW and construction costs are \$29.1 million.

Other aspects of Alternative 5 are listed on the Comparison Matrix.



PARTIAL CLOVERLEAF WITH NE AND SW QUADRANT LOOPS AT MARION ROAD

MINNEHAHA COUNTY, SOUTH DAKOTA
 I-90/I-29 INTERCHANGE JUSTIFICATION REPORT

DATE	MAR. 2006
FIGURE	FIGURE 8

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.**

The proposed interchange will improve safety and operation when constructed in the future. The goal of the proposed interchange is to eliminate the short weaving distance between loops consistent with all “Full Cloverleaf” interchanges without C-D lanes. The “No-Build” scenario for 2050 for weaving between loops H & G operates at a LOS D and weaving between loops E & H operates at a LOS E. The proposed interchange will eliminate weaving concerns within the interchange as back-to-back loops are eliminated. Weaving analysis on I-90 and I-29 was also conducted. Weaving on I-29 northbound between SD 38 and the I-29 off-ramp, I-29 southbound between the I-29 on-ramp and SD 38, I-90 eastbound between Marion Road and the I-90 off-ramp, and I-90 westbound between the I-90 on-ramp and Marion Road all operate at a LOS B in 2050. Table 2 shows the 2025 and 2050 Level of Service projected for weaving movements between adjacent interchanges and the I-90/I-29 interchange as well as the projected year the movement will operate at a LOS E. (See Figure 9 for 2025 No Build LOS and Figure 10 for 2025 Alternative 5 LOS.)

Table 2

Option #5		Traffic Projections		Analysis	Year of LOS E
		Level of Service			
Roadway		2025	2050	Type	
NB I-29	SD 38 on-loop to I-29 off-ramp	2,590	3,758	Weave	2081
		B	B		
SB I-29	I-29 on-ramp to SD 38 off-loop	2,110	3,062	Weave	2088
		B	B		
EB I-90	Marion Rd on-ramp to I-90 off-ramp	1,640	2,380	Weave	2094
		B	B		
WB I-90	I-90 on-ramp to Marion Rd off-ramp	1,650	2,394	Weave	2100+
		A	B		

The proposed interchange will be located in the same location as the present interchange with the footprint of the interchange expanding. The distance to the interchange to the north (Renner/Crooks) is 2.5 miles and the proposed interchange reconfiguration will have no impact to this interchange’s operation. The distance to the interchange to the east (Cliff Avenue) is 3.5 miles and the proposed interchange reconfiguration will have no impact to this interchange’s operation.

The I-29/SD 38 interchange was originally constructed as a standard diamond interchange. SD 38 runs parallel to I-90 and is only 0.75 miles south of I-90. In 2003, an I-29 southbound off-loop was constructed at SD 38 to increase the length of the auxiliary lane between I-90 and SD 38. An on-loop from SD 38 to I-29 northbound is proposed to be constructed in the future and SDDOT is currently in the process of securing the right-of-way needed to construct this loop. For analysis purposes, LOS was calculated assuming a “folded diamond”

configuration at the SD 38 interchange. This “folded diamond” configuration at SD 38 is necessary to provide adequate weaving lengths on I-29 between SD 38 and I-90.

During the development of I-90/I-29 interchange alternatives, a corresponding Marion Road interchange was reviewed. By approaching the interchange alternative review in this way, impacts to an I-90/Marion Road were reviewed and resulted in a corresponding “optimal” interchange configuration at the I-90/Marion Road interchange. (Figures 4, 5, 6, & 7)

An analysis of the proposed I-90/I-29 interchange, including merge, diverge, and weaving movements on the mainline of I-90 and I-29 before and after the interchange modification indicated no decrease in the level of service.

Traffic Analysis Summary for No-Build Scenario						
Roadway/Segment	From:	Level of Service			Analysis Type	Year of Failure (LOS D or LOS E)*
		2001	2025	2050		
Northbound Interstate 29	1 Hwy 38 to Interstate 90	A	B	C	Basic Freeway Segment	2062
	2 Interstate 90 to MC 130	A	B	C	Basic Freeway Segment	2065
	3 Between Loops E & F	A	A	B	Freeway Weaving	2100+
	4 I-29 Exit to Ramp B	B	C	D	Ramp Diverge	2067
	5 Ramp A to I-29	A	B	B	Ramp Merge	2100+
Southbound Interstate 29	1 MC 130 to Interstate 90	A	B	B	Basic Freeway Segment	2076
	2 Interstate 90 to Hwy 38	A	B	B	Basic Freeway Segment	2076
	3 Between Loops G & H	A	B	D	Freeway Weaving	2054
	4 I-29 Exit to Ramp D	A	B	C	Ramp Diverge	2084
	5 Ramp C to I-29	A	B	B	Ramp Merge	2100+
Eastbound Interstate 90	1 Marion Rd to Interstate 29	A	A	B	Basic Freeway Segment	2094
	2 Interstate 29 to Cliff Ave**	A	C	D	Basic Freeway Segment	2040
	3 Between Loops F & G	A	A	B	Freeway Weaving	2095
	4 I-90 Exit to Ramp C	A	B	B	Ramp Diverge	2100+
	5 Ramp B to I-90	A	C	D	Ramp Merge	2059
Westbound Interstate 90	1 Cliff Ave to Interstate 29**	A	C	D	Basic Freeway Segment	2047
	2 Interstate 29 to Marion Rd	A	A	B	Basic Freeway Segment	2093
	3 Between Loops E & H	A	C	E	Freeway Weaving	2044
	4 I-90 Exit to Ramp A	A	B	D	Ramp Diverge	2062
	5 Ramp D to I-90	A	B	C	Ramp Merge	2081

* LOS D for mainline and LOS E for ramps.

** Based on year of failure analysis, Interchange Concept Options 1 to 6 assume 3 through lanes on Interstate 90 from I-29 to Cliff Ave.

ASSUMPTIONS:

PHF = 0.92 %HV = 10 $f_{HV} = 0.952$ $f_p = 1.0$

Basic Freeway Segment Analysis done for eight links to the interchange.

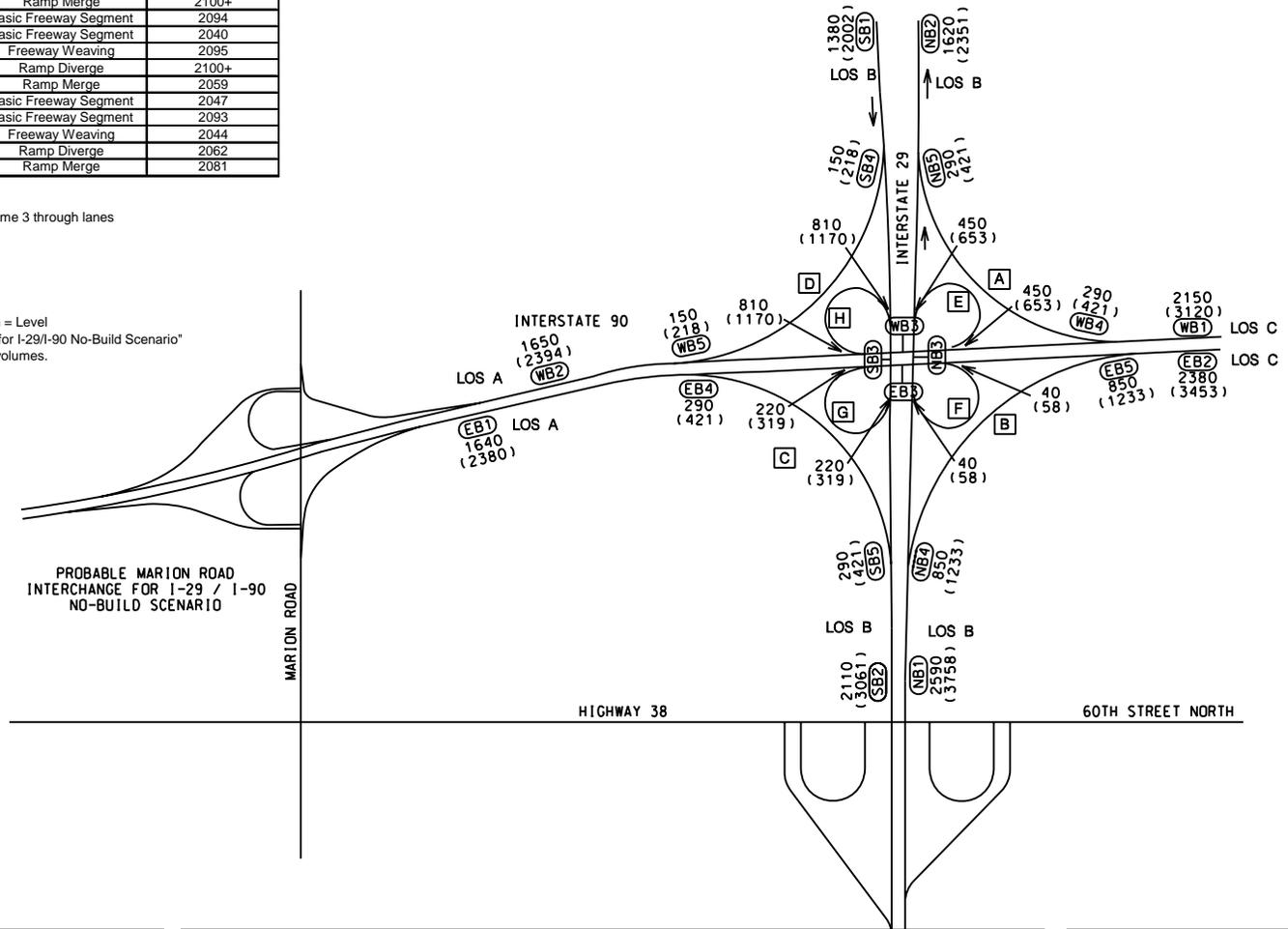
NB & SB interchange density = 0.75, EB & WB = 0.5 General terrain = Level

Analyses done according to geometrics shown in the figure "Traffic Volumes for I-29/I-90 No-Build Scenario"

A 1.015 traffic growth factor per year was used after year 2025 for projected volumes.

LEGEND

- (NB1) ROADWAY SEGMENT
- [D] RAMP LABEL/DESIGNATION
- XXX 2025 PEAK HOUR VOLUME
- (XXX) 2050 PEAK HOUR VOLUME



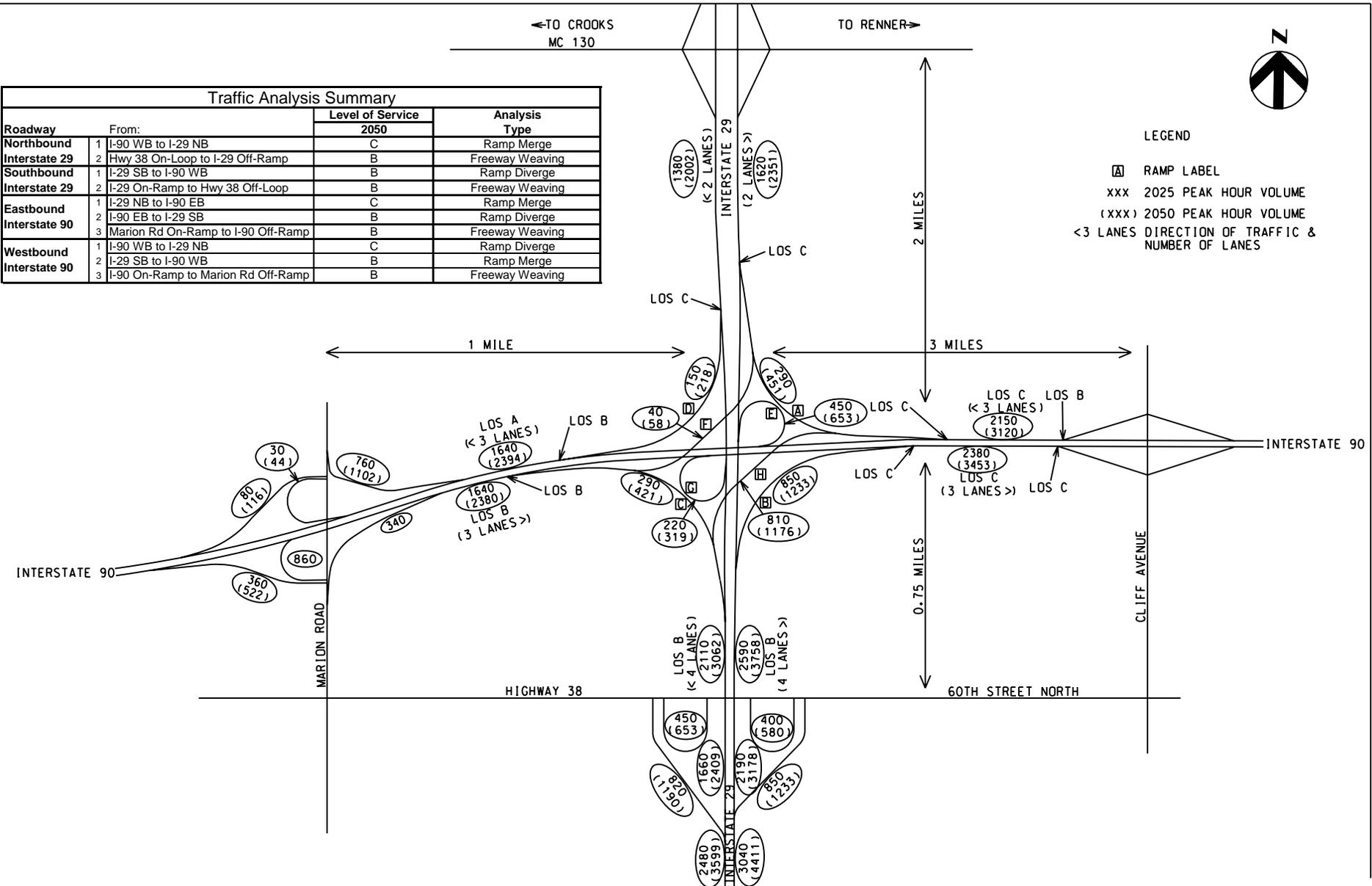
**2025 PM PEAK HOUR LEVEL OF SERVICE
NO BUILD ALTERNATIVE**

MINNEHAHA COUNTY, SOUTH DAKOTA
I-90/I-29 INTERCHANGE JUSTIFICATION REPORT

DATE
MAR. 2006

FIGURE
FIGURE 9

Traffic Analysis Summary			
Roadway	From:	Level of Service	Analysis Type
		2050	
Northbound Interstate 29	1 I-90 WB to I-29 NB	C	Ramp Merge
Interstate 29	2 Hwy 38 On-Loop to I-29 Off-Ramp	B	Freeway Weaving
Southbound Interstate 29	1 I-29 SB to I-90 WB	B	Ramp Diverge
Interstate 29	2 I-29 On-Ramp to Hwy 38 Off-Loop	B	Freeway Weaving
Eastbound Interstate 90	1 I-29 NB to I-90 EB	C	Ramp Merge
Interstate 90	2 I-90 EB to I-29 SB	B	Ramp Diverge
	3 Marion Rd On-Ramp to I-90 Off-Ramp	B	Freeway Weaving
Westbound Interstate 90	1 I-90 WB to I-29 NB	C	Ramp Diverge
Interstate 90	2 I-29 SB to I-90 WB	B	Ramp Merge
	3 I-90 On-Ramp to Marion Rd Off-Ramp	B	Freeway Weaving



2050 PM PEAK HOUR LEVEL OF SERVICE ALTERNATIVE 5

MINNEHAHA COUNTY, SOUTH DAKOTA
I-90/I-29 INTERCHANGE JUSTIFICATION REPORT

DATE	MAR. 2006
FIGURE	FIGURE 10

- 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 the interstate system only and will continue to provide for all traffic movements. The improvements 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 improvements are consistent with local land use plans, the STIP and local transportation planning and MPO and State Long Range Plans. Currently, the existing I-90/I-29 interchange ramps are planned to be reconstructed in 2007 and 2008. The plan is to do a complete interchange reconstruct once the pavement has met or exceeded its design life.

The interchange at MRM 395 (Marion Road) is currently planned to be constructed in 2007 and 2008 pending approval by FHWA of a revised Interchange Justification Request.

- 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 SDDOT has identified multiple interchange modifications and additions in the vicinity of the I-90/I-29 interchange. Current modifications included in the Region MPO are modifications to Exit 83 (SD 38) and construction of new interchanges at MRM 394 (West Corridor) and MRM 395 (Marion Road). Each of the proposed interchanges were reviewed and considered when performing concept alternatives for the I-90/I-29 Interchange. Including the adjacent interchanges in the concept alternatives phase of the project ensured that all interchanges would coexist. Spacing requirements and LOS for weaving movements were verified to show no negative impacts.

Identified improvements at Exit 83 (SD 38) are to reconstruct the northbound ramps. The proposed ramp modification will remove the existing northbound on-ramp in the northeast quadrant of the interchange and construct the ramp in the southeast quadrant as a loop with the northbound off-ramp re-built outside of the loop. The completed interchange at Exit 83 (SD 38) will be a “Folded Diamond” interchange. The Department will continue to monitor the LOS at Exit 83 northbound on-ramp and when traffic volumes warrant, a project to modify the ramp will be added to the State Transportation Improvement Plan.

Also included in the MPO’s Long Range Plan is the construction of interchanges at MRM 394 (West Corridor) and MRM 395 (Marion Road). The interchange at MRM 395 is currently planned to be constructed in 2007 and 2008 pending approval by FHWA of a revised Interchange Justification Request. The interchange at MRM 394 is included in the West Corridor Study which is currently in the comment phase of the Environmental

Assessment. The identified location for the West Corridor interchange will be 1 to 1.5 miles west of the proposed interchange at Marion Road. The scheduled construction of the West Corridor interchange is from 16 to 25 years from now.

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 corrects problems with the existing interchange configuration. It is the result of the natural growth of Sioux Falls and the need to improve traffic operations of the existing interchange. The goal improvement is to eliminate weaving problems associated with a “Full Cloverleaf” interchange to improve operation of the system to system 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.

Currently the reconstruction of the I-90/I-29 Interchange is not currently included in the 2000-2025 Long Range Transportation Plan for the Sioux Falls Regional MPO, but is included in the SDDOT’s Long Range Plan. Although the reconstruction is not included in the plan, the MPO, including the SDDOT and City of Sioux Falls have identified the need for corridor preservation at the interchange. Corridor preservation is based upon the basic goal of transportation planning which is to address overall social, economic, and environmental effects of transportation decisions. Proper planning can mitigate and address impacts well in advance of construction.

APPENDIX A



OPEN HOUSE COMMENT FORM



Study of Modifications to I-90/I-29 Interchange
Study of Proposed I-90/Marion Road Interchange
In Sioux Falls, South Dakota
HP 5596(06) AFE # 8160



MARION ROAD

- Comments regarding I-90/I-29 Interchange
- Comments regarding I-90/Marion Road Interchange
- Comments regarding both Interchanges

I would be in favor of option 5 because of the lower right-of-way costs.

(Use additional sheets if necessary. Feel free to make comments you consider beneficial for the project.)

Name: Bob Nady

Address: 4500 Glenview Road
SF SD 57103

Phone: 335-7495

HDR
Attn: Steve Hoff
600 S. Cliff Ave. Suite 106
Sioux Falls, SD 57104
Phone: 605-338-2660
Fax: 605-338-2695



OPEN HOUSE COMMENT FORM



Study of Modifications to I-90/I-29 Interchange
Study of Proposed I-90/Marion Road Interchange
In Sioux Falls, South Dakota
HP 5596(06) AFE # 8160



MARION ROAD

- Comments regarding I-90/I-29 Interchange
- Comments regarding I-90/Marion Road Interchange
- Comments regarding both Interchanges

Steve: I have a strong feeling for option # 5. As commercial and industrial demands develop north of the I-90 and Marion road intersection, the westbound exit northbound on Marion road without crossing traffic becomes more critical. This option rightly provides for that. Even though the structure costs are somewhat higher than several of the other options, this cost is far outweighed by roadway and right-of-way costs on the other options resulting in the total least cost option. Your rating for Lowest Level of service of ramp junctions and weaving sections and Spacing to adjacent interchanges both certainly should be considered strong factors. The space saving over the top exits from I-90 to I-29, while requiring more structure cost certainly makes sense when looking at the right-of-way costs. Some may differ but I have always felt that an exit and entry from the left lane with lighter traffic was far safer than from the right lane with heavier traffic.

I felt your meeting was an excellent presentation on these options and appreciate the opportunity to meet you and to discuss the options with personnel from your office as well as from D.O.T. and feel privileged to be able to enter comments.

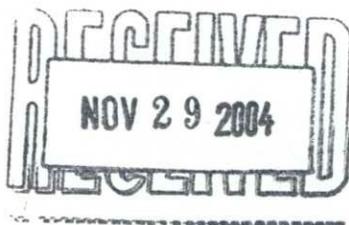
(Use additional sheets if necessary. Feel free to make comments you consider beneficial for the project.)

Name: Glen Wintersteen

Address: 2604 W. 18th St.

Sioux Falls, SD 57104

Phone: (605) 335-0881



HDR
Attn: Steve Hoff
600 S. Cliff Ave. Suite 106
Sioux Falls, SD 57104
Phone: 605-338-2660
Fax: 605-338-2695

Please return your comment form by December 6, 2004



OPEN HOUSE COMMENT FORM



Study of Modifications to I-90/I-29 Interchange
Study of Proposed I-90/Marion Road Interchange
In Sioux Falls, South Dakota
HP 5596(06) AFE # 8160



- Comments regarding I-90/I-29 Interchange
- Comments regarding I-90/Marion Road Interchange
- Comments regarding both Interchanges

Option # 5 is the most desirable.

Exit on to Kiwanis Ave From east

Exit off Kiwanis Ave to east road

relieve traffic on interchange. Suggest

Looking at this. ~~Down~~ Southeast corner

of interchange is being developed as

Redstone Village. There is millions

of dollars invested in the infrastructure

to date. Negotiations are underway with

a developer to build a Mall on this

corner. The wrong interchange could

result in the loss of 30 to 50 million \$

(Use additional sheets if necessary. Feel free to make comments you consider beneficial for the project.)

Cost is better also

Name: Jim Petrate

Address: 400 E Lotta

Sioux Falls SD 57105

Phone: 605-338-9975

HDR
Attn: Steve Hoff
600 S. Cliff Ave. Suite 106
Sioux Falls, SD 57104
Phone: 605-338-2660
Fax: 605-338-2695



OPEN HOUSE COMMENT FORM



Study of Modifications to I-90/I-29 Interchange
Study of Proposed I-90/Marion Road Interchange
to Sioux Falls, South Dakota
HP 0596000-AL1 - 5160



- Comments regarding I-90/I-29 Interchange
- Comments regarding I-90/Marion Road Interchange
- Comments regarding both Interchanges

1. I-90 EAST BOUND EXIT RAMP INTERSECTION W/MARION RD.
FULL 4-WAY INTERSECTION TO PROVIDE MAJOR ACCESS
POINT TO SIOUX EMPIRE DEV. PARK AND ADJACENT
PROPERTY IN THIS QUADRANT.

2. OPTION #2 CLOVER LEAF MOST FAVORABLE. WE
FEEL IT IS THE SAFEST DESIGN FOR SD WINTER
CONDITIONS. LEAST AMOUNT OF BRIDGES & ELEVATED
ROADWAY. PREFER 250' RADIUS CLOVER LEAF
'VS' 300'R.

3. ACCELERATE CONSTRUCTION SCHEDULE

4. MY CLIENT HAS DRAINAGE CONCERNS WITH
THE PROJECT, WE LOOK FORWARD TO WORKING WITH
(Use additional sheets if necessary) Feel free to make comments you consider beneficial for the project.)
YOU & SA DOT.

Name: ERIC WILLADSEN - WLE

Address: 902 S. CLEVELAND AVE
SFSD 57103

Phone: 338-6950

FOR: ASSAM PROPERTIES

HDR

Attn: Steve Hoff
600 S. Cliff Ave. Suite 106
Sioux Falls, SD 57104
Phone: 605-338-2660
Fax: 605-338-2695



OPEN HOUSE COMMENT FORM



Study of Modifications to I-90/I-29 Interchange
Study of Proposed I-90/Marion Road Interchange
In Sioux Falls, South Dakota
HP 5596(06) AFE # 8160



MARION ROAD

- Comments regarding I-90/I-29 Interchange
- Comments regarding I-90/Marion Road Interchange
- Comments regarding both Interchanges

11-22-04

I WAS EXTREMELY surprised to find out that the Marion Rd Interchange is no longer scheduled for 2007. I am convinced that whoever made this decision does not see what is happening in the NW quadrant of the City. The Marion Road interchange should be a priority, not only because of the traffic now, but because of what the interchange will do for the growth of the City the moment it opens. It was easy to understand why the Benson Road interchange on I-29 suddenly became a high priority when there never even was AN interchange planned there, but now to moving the ~~long range~~ marion road interchange into the long range plan is very ill advised

(Use additional sheets if necessary. Feel free to make comments you consider beneficial for the project.)

Name: DAN SCOTT

Address: 200 N PHILLIPS Suite 101
Sioux Falls, SD 57104

Phone: 339-0103

HDR
Attn: Steve Hoff
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Sioux Falls, SD 57104
Phone: 605-338-2660
Fax: 605-338-2695



OPEN HOUSE COMMENT FORM



Study of Modifications to I-90/I-29 Interchange
Study of Proposed I-90/Marion Road Interchange
In Sioux Falls, South Dakota
HP 5596(06) AFE # 8160



- Comments regarding I-90/I-29 Interchange
- Comments regarding I-90/Marion Road Interchange
- Comments regarding both Interchanges

1) option # 5 is the only really good option. It is the most cost effective & disruptive to present landowners the least - Redstone Development already has \$ millions invested in this area & it would be a severe blow to change this.

2) I highly suggest the addition of a 1/2 interchange at Kiwanis & I-90. Exit 190 E → W & Enter I-90 W → E. The right of way is already state owned.

3) The Kiwanis Ave & bridge will be widened to 5 lanes & will provide a great additional option to divert southbound flow from I 29 to Kiwanis Ave.

(Use additional sheets if necessary. Feel free to make comments you consider beneficial for the project.)

of current development plans for this SE quadrant will add a lot of traffic to current counts

Name: Lloyd B. Solberg

Address: 1100 S. Euclid Ave

Sioux Falls S.D. 57105

Phone: (605) 378-7541

HDR
Attn: Steve Hoff
600 S. Cliff Ave. Suite 106
Sioux Falls, SD 57104
Phone: 605-338-2660
Fax: 605-338-2695

To: Mark Leiferman, SDDOT	
From: HDR	Project: I-90/I-29 Interchange; Marion Road/I-90 Interchange
CC: file	
Date: 1/21/05	Job No: 15202

N:\users\Gail\Stationery & Forms\Forms\memo.doc

RE: SECOG Meeting Summaries and Project Recommendations

The following provides a summary of the meetings regarding the I-90/I-29 and Marion Road/I-90 Interchanges with the Community Advisory Committee (CAC), Technical Advisory Committee (TAC), and the Urbanized Development Committee (UDC):

CAC (January 19, 2005, 7:00 pm)

- HDR presented the Projects' purpose and need, option evaluation criteria, described options, explained option screening, and discussed future efforts.
- Asked for input on all options, and, a recommendation from the Committee for a technically favored option.
- Addressed the following questions (response in *italics*):
 - Wasn't Marion Road IJR approved? *Yes, approved in concept. But configuration was a diamond interchange. Due to its compatibility with I-90/I-29, needed to re-evaluate (response provided by Mark Hoines, FHWA).*
 - Is Marion Road/I-90 and I-90/I-29 two separate documents? *Yes (HDR Engineering).*
 - In the SE quadrant of Marion Road, will there need to be an extra ramp? *No. Currently, SDDOT intends to build three lanes from Marion Road to I-29. The third (auxiliary) lane will begin with the loop in the southwest quadrant and continue to I-29. The spur ramp in the southeast quadrant be laid out as a typical on-ramp as seen throughout South Dakota. The ramp will have an acceleration lane and then taper into the auxiliary lane. (HDR Engineering).*

CAC discussed Option 5, and recommended Option 5 as their preferred option due to least cost and constructability, with Option 2 as a second choice. Vote was unanimous.

TAC (January 20, 2005, 1:30 pm)

- HDR presented the Projects' purpose and need, option evaluation criteria, described options, explained option screening, and discussed future efforts.
- Asked for input on all options, and, a recommendation from the Committee for a technically favored option.
- Addressed the following questions:
 - What is the difference in ramp speed between Option 2 and 5? *Option 2 ramp speed is 28 mph (250' radius). Option 5 ramp speed from I-90 WB to I-29 SB (and I-29 SB to I-90 WB) is 50 mph. Clover ramp speeds are 30 mph (300' radius) (HDR Engineering).*

TAC recommended Option 5 as the technically favored option. Vote was unanimous.

UDC (January 30, 2005, 4:00 pm)

- HDR presented the Projects' purpose and need, option evaluation criteria, described options, explained option screening, and discussed future efforts.
- Asked for input on all options, and, a recommendation from the Committee for a technically favored option.
- Addressed the following questions (response in *italics*):
 - What is the safest and best option regarding safety and for citizens of Sioux Falls verses what is best for developers? *Both options provided LOS of C or better in both planning years of 2025 and 2050. Option 5 has LOS B in both planning years. LOS relates to congestion on the roads, and can be indicative of improved safety (HDR Engineering).*
 - What about ice on the bridges? How does that factor in? *Icing is an issue that will need to be addressed. However, as construction timing of the I-90/I-29 reconstruction is beyond 2025, newer technologies may be present that will address this issue (Mark Hoines, FHWA). In addition, the options should be considered for year-round advantages, not just for seasonal advantages (Craig Smith, SDDOT).*

UDC recommended Option 5 as the technically favored option. Vote was unanimous.

Project Recommendations

As a result of Option 5 being the technically favored option by SDDOT, the CAC, TAC, and UDC, it is recommended to proceed with Option 5 for further evaluation as the preferred alternative in the environmental assessment and seek FHWA concurrence on this recommendation.

A technical memorandum would be developed to outline the screening process and provide wetland and other waters of the U.S. comparison information for future United States Corps of Engineers review for Section 404 permit approval.

**I-90/I-29 and Marion Road/I-90 Interchange
February 8, 2005, Public Hearing
Oral Comment/Response Summary**

Question/Comment	Response	Resolution
What are the traffic counts for west-bound to south-bound and north-bound to east-bound traffic for I-90/I-29 interchange?	[HDR] Counts were provided per the Concept Options Analysis Final Report and noted that they included an interchange at Marion Road.	None required.
What are the accident counts are at the I-90/I-29 interchange?	[SDDOT] Accident rates were not available at the meeting, but were not believed to be high. There have been a few semi-truck trailers overturned on the ramps.	None required.
When will SDDOT feel comfortable enough to begin to acquire ROW?	[SDDOT] In about a year.	None required.
What does peak hour mean?	[SDDOT] Peak hour means the most traffic in any given hour. Generally reflects morning and afternoon commutes.	None required.
How will different types of land use, business verses residential for example, affect traffic loads?	[HDR] Land use has large effects on traffic loads. The 2015 and 2025 Growth Plans, and subsequently future land use, were used to develop the projections for the traffic counts.	None required.
If something changes and Option #5 no longer is viable, what happens?	[SDDOT] A press release would likely be issued and another public meeting held if warranted.	None required.
Is there an opportunity to email comments?	[SDDOT/HDR] The comment form will be place on the web site for download. It can then be filled out an mailed in.	Need to place comment form and email address for comments on web page.
Where are the wetlands?	[HDR] Wetland locations were shown to commenter.	None required.
What is next?	[SDDOT] The EA will be completed and will be made available for comment through a notice in the Argus Leader detailing the comment period and locations for its availability.	None required.