Interchange Justification Study
I-90 at Marion Road

Sioux Falls, South Dakota
March 2006

Prepared for:

South Dakota Department of Transportation
Office of Transportation Planning and Programs
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1.0 Introduction

1.1. Study Purpose

The purpose of this report is to investigate the feasibility of constructing an additional interchange on Interstate 90 at Marion Road (MRM 395) in Sioux Falls, South Dakota. The justification study is based on guidelines identified by the Federal Highway Administration (FHWA) in the Federal Register. This report was prepared for submittal to SDDOT and FHWA for approval.

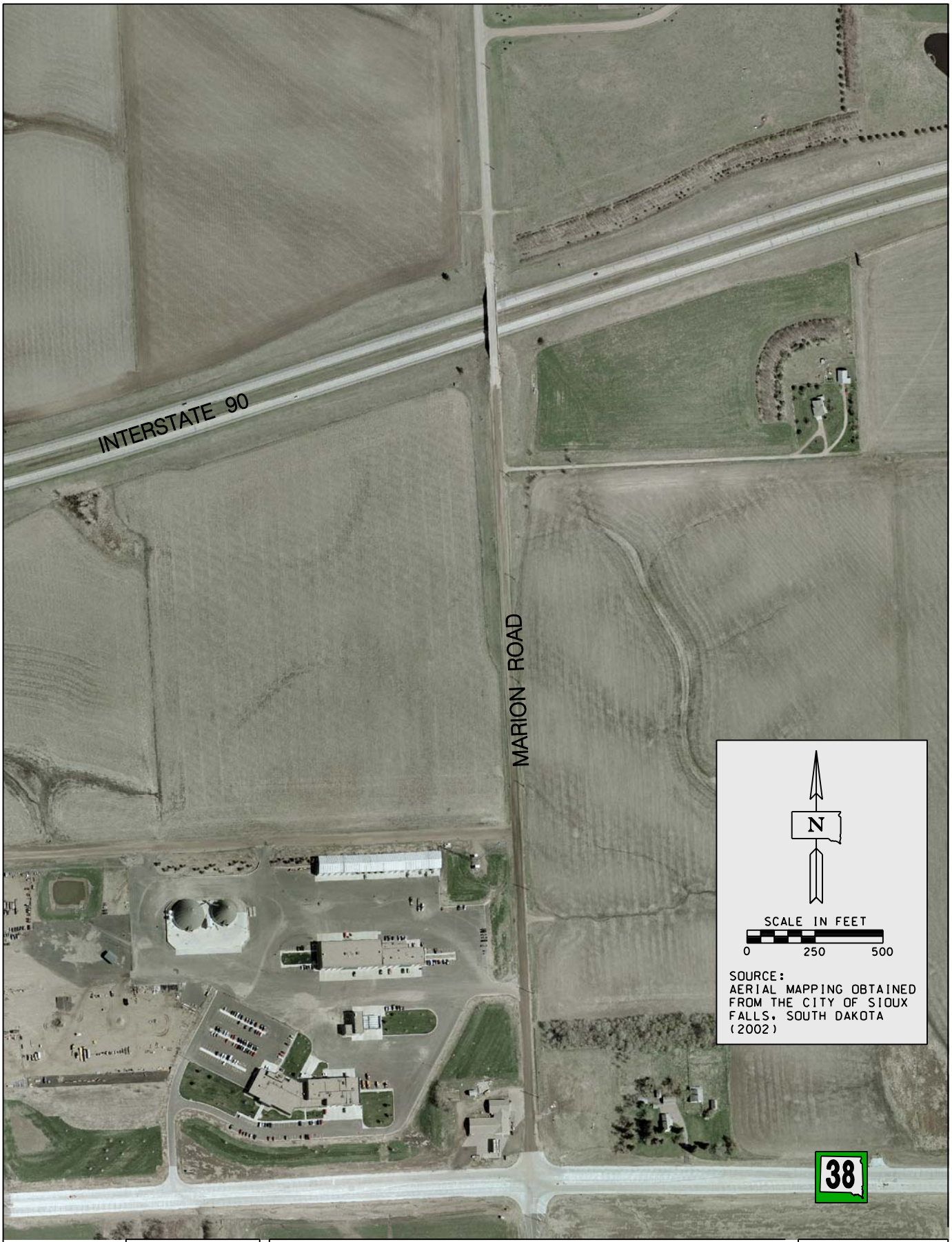
1.2. Location of Proposed Interchange

The proposed service interchange will be located along Interstate 90 at the existing Marion Road alignment in northern Sioux Falls, South Dakota. Existing interchanges on Interstate 90 adjacent to the Marion Road alignment include the Highway 38 interchange (Exit 390), 5 miles west; I-90/I-29 interchange (Exit 396), 1 mile east, and Cliff Avenue interchange (Exit 400), 4 miles east. An area map showing the location of the proposed Exit 390 along with the existing transportation network is shown in Figure 1.

1.3. Project Development

In 1979, the City of Sioux Falls adopted its first comprehensive growth management plan. This original plan estimated future land use and infrastructure necessary to support growth to the Year 2000. In 1996, the City updated the comprehensive plan from Year 2000 to Year 2015 and in 2004; the City again updated the comprehensive plan to Year 2025. In the updates, new policies and growth development schemes were adopted including updated estimates of future population, land use, utilities, schools, and rural development. The comprehensive plan also provided an estimate of the transportation framework needed to support future traffic in and around the Sioux Falls area. According to the plan, Marion Road is classified as a minor arterial and will be improved within the Study Area and continue to provide grade separation at I-90 and provide access for a planned large industrial land use north of I-90.

In 1999, the City of Sioux Falls as part of their planning process completed an Interchange Justification Study (IJS) at Marion Road/Interstate 90. This study reviewed traffic operations up to the year 2020 and accounted for growth as generated from the 2015 growth management plan. Since the original IJS was completed, an updated traffic forecast model has been developed with land uses projected to Year 2025. The purpose of this Justification Study is to update the original study with known changes to the street networks and assumed growth.



PROPOSED MARION ROAD INTERCHANGE LOCATION

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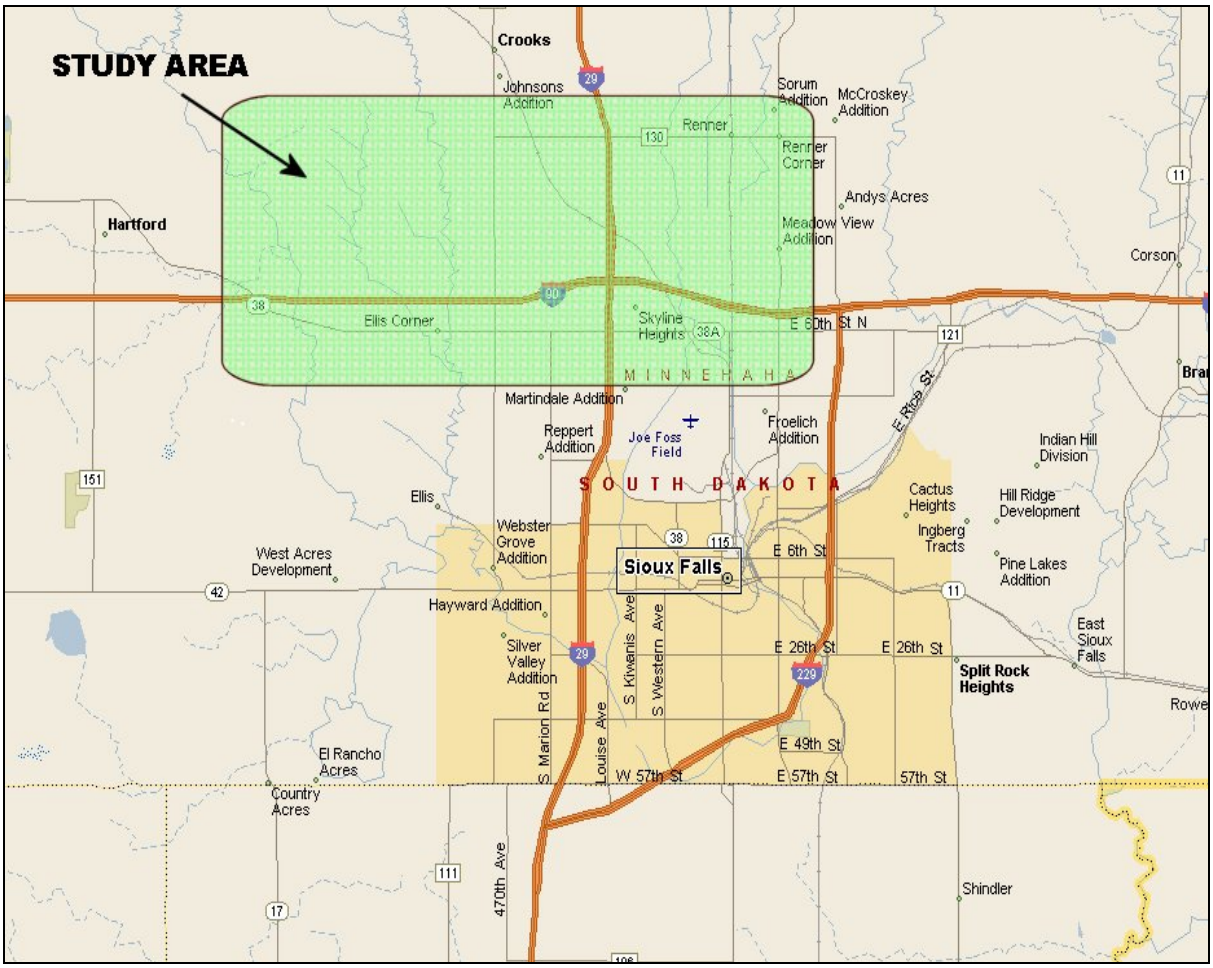
1.4. Study Area Boundary

The guidelines for the report are published in the Federal Register by the FHWA and recommend that the first adjacent existing or proposed interchange be studied for operation/capacity. It is also recommended that crossroads and other streets be included in the analysis to insure their ability to distribute traffic to and from the proposed interchange. The study area boundary is shown in Figure 2.

Figure 2 – Proposed Study Area Boundary



2.0 Existing Conditions

2.1. Existing Roadway System

The existing local roadway system in the study area is made up of minor arterials, collectors and a principal arterial (SD Highway 38/60th Street North). The majority of the land north and south of the I-90 corridor from Exit 390 (SD 38) to Exit 396 (I-90/I-29 Interchange) is currently undeveloped farmland. Land use east of Exit 396 and Exit 400 (Cliff Avenue) is comprised of a combination of commercial, industrial, residential, and undeveloped farmland. According the *City of Sioux Falls 2015 and 2025 Growth Management Plan*, the predominant future land uses north and south of I-90 west of I-29 is industrial and commercial. As development occurs, existing gravel and asphalt roadways in the study area will be improved to handle the additional traffic these developments are anticipated to generate.
A description of the Study Area existing roadways is provided in the following paragraphs. Existing geometrics for study area roadways and interchanges are shown in Figure 3.

2.1.1. South Dakota State Highway 38 (SD 38)/60th Street North

South Dakota State Highway 38 (SD 38) travels east/west along the south edge of the Study Area. SD 38 travels east from Mitchell, South Dakota to I-29 and consists of one lane in each direction within in the western portion of the study area with a speed limit of 65 mph. SD 38 then widens to four lanes with a center raised concrete median from ¼ mile west of Marion Road to Interstate 29 and a speed limit posted at 55 mph. SD 38 changes in designation to 60th Street North east of I-29 and maintains four lanes for approximately 1500' to Kiwanis Avenue. 60th Street North then narrows to one lane in each direction from Kiwanis Avenue to Cliff Avenue. Currently, the I-29 on- and off-ramp interchange intersections are signalized with exclusive eastbound and westbound left turn lanes provided at each intersection.

According to the City of Sioux Falls Major Street Plan, SD 38 and 60th Street North are classified as principal arterial roadways within the study area.

2.1.2. Marion Road

Marion Road is a north/south route that begins at 57th Street and continues north of I-90. Within the Study Area, Marion Road consists of a two-lane gravel road north of SD 38 and a two-lane road with asphalt surfacing south of SD 38. (City of Sioux Falls currently has included in their CIP improving Marion Road to a 4-lane divided street.) The intersection of Marion Road/SD 38 is stop controlled on the north and south approaches. In addition to being classified as a minor arterial, bike route 13 travels along Marion Road south of SD 38. Marion Road currently is posted at 35 mph.

According to the City of Sioux Falls Major Street Plan, Marion Road is classified as a minor arterial roadway within the study area.

2.1.3. North La Mesa Drive

North La Mesa Drive is classified as a minor arterial within the Study Area and begins at SD 42 (12th Street) and provides north/south progression to North of I-90. North La Mesa Drive consists of a two-lane street with asphalt surfacing north of SD 38 and gravel surfacing south of SD 38. The intersection of North La Mesa Drive/SD 38 is stop controlled on the north and south approaches. North La Mesa Drive is also being considered as one of two possible termination locations of the West Corridor that is being evaluated as well as a possible location of an interchange. The other location for the termination of the West Corridor is further west and would provide added distance between the interchanges. The speed limit on North La Mesa Drive within the project limits is 55 mph.

2.1.4. 469th Avenue

469th Avenue (Tea-Ellis Road) connects the City of Tea to SD 38 and consists of a two-lane roadway with asphalt surfacing south of SD 38. 469th Avenue forms a T-intersection at SD 38 and is stop controlled on the south approach. The speed limit on 469th Avenue within the project limits is 55 mph.

According to the City of Sioux Falls Major Street Plan, Tea-Ellis Road is classified as a principal arterial roadway within the study area.

2.1.5. Minnehaha County 130 (MC 130)

MC 130 runs east-west giving access for Crooks and Renner, South Dakota along with a developing rural area to I-29. Within the study area, MC 130 consists of a two-lane section with asphalt surfacing east and west of I-29. I-29 ramp intersections with MC 130 are stop controlled. The speed limit on MC 130 within the project limits is 55 mph.

According to the City of Sioux Falls Major Street Plan, MC 130 is classified as a collector roadway within the study area.

2.1.6. South Dakota State Highway 115 (SD 115)/Cliff Avenue

SD 115/Cliff Avenue is an important arterial roadway for the City of Sioux Falls allowing north/south traffic to traverse from city limit to city limit. SD115/Cliff Avenue consists of a four-lane section with a center two-way-left-turn-lane and signalized major intersection from 1,000' north of I-90 south through the Study Area. SD115/Cliff Avenue services a large industrial area and provides the City's only direct access to I-90. Cliff Avenue is a principal arterial that extends through the City of Sioux Falls intersecting the city limits on both the south and north. The speed limit on Cliff Avenue within the project limits is 35 mph.

According to the City of Sioux Falls Major Street Plan, Cliff Avenue is classified as a principal arterial roadway within the study area.

2.1.7. Interstate 29 (I-29)

I-29 is a north/south access-controlled freeway that serves the Midwestern portion of the United States. I-29 begins in Kansas City, Missouri, follows the Missouri River on the west edge of Iowa, and continues north to the border of Canada. Following scheduled reconstruction of I-29 from 26th Street north to 12th Street, I-29 will be a six lane freeway plus auxiliary lanes from 26th Street to SD 38/60th Street North. I-29 is a six-lane section from the 41st Street interchange to the 26th Street interchange and from the SD 38 interchange to the I-90 interchange. The remainder of I-29 in the Sioux Falls area is a four-lane freeway. The speed limit is 65 mph through Sioux Falls and is 75 mph in the rural areas.

2.1.8. Interstate 90 (I-90)

I-90 is an east/west access controlled freeway that serves the northern portion of the United States. I-90 begins in Seattle, Washington and traverses east to Boston, Massachusetts. Within the Study Area, I-90 is a four-lane freeway with a posted speed limit of 75 mph from the west to Marion Road, 65 mph from Marion Road to I-229, and 75 mph east to the Minnesota state line.

2.2. Existing Interchanges

Along I-29, interchanges are located every mile from 41st Street to I-90. Along I-90, existing interchange spacing is from 2 to 5 miles with Cliff Avenue (Exit 400) serving as the only service interchange along I-90 within the city limits.

2.2.1. Minnehaha County 130 (MC 130)/I-29 (Runner/Crooks Exit) Exit 86

The MC 130/I-29 interchange is a diamond interchange with stop controlled intersections. All ramps are single lane with a 25 foot surfacing width to allow for "Defacto" right turns. The intersection located on the east side (northbound I-29) of the interchange has the following lane geometry: the south approach consists of a left turn lane with a "Defacto" right turn lane, the east approach consists of a shared through/right-turn lane, and the west approach consists of a shared through/left-turn lane. The intersection located on the west side (southbound I-29) of the interchange has the following lane geometry: the north approach consists of a left turn lane with a "Defacto" right turn lane, the east approach consists of a shared through/left-turn lane, and the west approach consists of a shared through/right-turn lane.

2.2.2. South Dakota State Highway 38 (SD 38/I-90-Buffalo Ridge Exit) Exit 390

The SD 38/I-90 interchange is a partial clover interchange with all ramps located east of SD 38. All ramps have a minimum design speed of 30 mph and are 25 feet wide. The intersection located south (eastbound I-90) of I-90 has the following lane geometry: the south approach consists of a shared through/right-turn lane; the north approach consists of a shared through/left-turn lane, and the east approach consists of a left-turn lane with a "Defacto" right turn lane. The intersection located north (westbound I-90) of I-90 has the following lane geometry: the south approach consists of a shared through/right-turn lane, the north approach consists of a shared through/left-turn lane, and the east approach consists of a left-turn lane with a "Defacto" right turn lane. The east approaches on both intersections are stop controlled.

N

NOT TO SCALE

MC-130

MC-130

I-90

I-90

I-90

SD 38

60th Street North

Buffalo Ridge

Tea- Ellis Rd.

La Mesa Dr.

Marion Rd.

I-29

Cliff Ave.

Existing Lane Geometry

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2.2.3. South Dakota State Highway 38 (SD 38/I-29-60th St. North Exit) Exit 83

The SD 38/I-29 interchange is a partial clover interchange with the northbound I-29 on/off ramps configured as a traditional diamond interchange. All ramps are single lane at the entrance/exit ramp terminals to I-29. The intersection located on the west side (southbound I-29) of the interchange has the following lane geometry: the south approach consists of a right-turn lane and left-turn lane, the west approach consists of two through lanes and a right-turn lane, and the east approach consists of two through lanes and dual left turn lanes. The dual left turning movements merge prior to entering I-29. The intersection located on the east side (northbound I-29) of the interchange has the following lane geometry: the south approach consists of a right-turn lane and a left turn lane, the west approach consists of two through lanes and a left-turn lane, and east approach consists of two through lanes and a right-turn lane. Both intersections are signalized and coordinated.

2.2.4. SD 115-Cliff Avenue/I-90 Exit 399

The SD 115-Cliff Avenue/I-90 interchange is a traditional diamond interchange and all ramps are single lane at the entrance/exit ramp terminal with I-90. The intersection located on the north side (westbound I-90) of the interchange has the following lane geometry: the south approach consists of two through lanes and a left-turn lane, the east approach consists of a right turn lane and a left-turn lane, and the north approach consists of one through lane and one shared through/right-turn lane. The intersection located on the south side (eastbound I-90) of the interchange has the following lane geometry: the south approach consists of one through lane and one shared through/right-turn lane, the west approach consists of a right-turn lane and a left-turn lane, and the north approach consists of two through lanes and a left-turn lane. Both intersections are signalized and coordinated.

The existing structures carrying I-90 traffic over Cliff Avenue are expected to be replaced in approximately 20 years. At this time, the interchange would be upgraded according to the current and projected traffic counts.

2.2.5. I-29/I-90 Exit 396/Exit 84

The I-90/I-29 interchange is a free flowing system-to-system interchange. The interchange is a “full cloverleaf” interchange and all loops and ramps consist of single lanes at the ramp terminals.

3.0 Proposed Conditions

Areas in and around the City of Sioux Falls are anticipated to continue growing with residential, commercial and industrial land uses. The current roadway system will need to be improved to handle the traffic that these developments will generate. The following sections discuss areas of projected development and the projected roadway system improvements.

3.1. Proposed Land Uses

In order to identify growth areas, the City of Sioux Falls prepared The *Sioux Falls 2025 Growth Management Plan.* This management plan outlines areas where future growth is expected and identifies the northwest portion of Sioux Falls to develop into multiple residential, industrial, and commercial developments within the horizon year where the study area was comprised almost entirely of agricultural uses in 2003. Currently, several small commercial enterprises, an institutional use, a rural residential subdivision, and the South Dakota Department of Transportation Area Office surround existing agricultural land.

By 2025, the portion of the study area bounded by 469th Avenue (Tea-Ellis Road), MC 130, Kiwanis Avenue (MC 131), and SD 38, is expected to see a significant increase in commercial, industrial, and residential development. In addition, much of the traffic generated by this area is expected to use the study area road network.

Land uses in the study area are summarized in Table 1 for existing and 2025.

Table 1 – Existing and Proposed Land Use Types by Area

Land Use Classification	Existing (Acres)	Year 2025 (Acres)	Difference (Acres)
Single Family Residential	272	516	+244
Multi-Family Residential	-	195	+195
Industrial/Transportation	36	986	+950
Commercial	44	472	+428
Office/Institutional	8	45	+37
Parks / Open Space	56	200	+144
Agricultural	3134	1136	-1998
Total	3550	3550	-

3.2. Proposed Roadway Network

Future developments built out by Year 2025 will require existing roadways to be improved along with new roadways to be constructed in order to adequately accommodate the traffic volumes generated by the resultant developments. The Year 2025 proposed roadway network is shown in Figure 4. The timing of roadway improvements and construction in the study area will occur as development adjacent to roadways is constructed. Improvements include additional roads as well as widening existing roads. As an example of future improvements, arterial roadways are assumed to provide for additional through lanes along with exclusive turn lanes.

The below table indicates the assumptions used for lane geometrics within the study area.

Table 2 – Lane Configuration Utilized as Basis of Traffic Analysis (Including projects within current STIP)

ROADWAY	LANEAGE
Highway 38	2 lanes west of Marion, 4 lanes east of Marion
MC-130	2 lanes
I-90	4 lanes
Tea-Ellis	2 lanes
La Mesa	2 lanes
Marion	4 lanes south of Hwy 38, 6 lanes north of Hwy 38
I-29	6 lanes south of I-90, 4 lanes north of I-90
Cliff	4 lanes
Buffalo Ridge	2 lanes
West Corridor	4 lanes

3.2.1. Proposed I-90 Improvements

As shown in Table 2, all traffic analysis was based on 4 interstate lanes (2 lanes eastbound and 2 lanes westbound). However, when analyzing even the No-Build option, I-90 between I-29 and I-229 is either approaching or has reached a less than desirable LOS. This information has allowed the City of Sioux Falls and SDDOT to review and revise its Long Range Plan to include additional lanes on I-90 within this corridor.

The typical section of I-90 between I-29 and I-229 following the proposed improvements will be a third lane/auxiliary lane beginning at the I-29 northbound to I-90 eastbound ramp and continuing to Cliff Avenue where it would be a drop lane for traffic taking the Cliff Avenue Exit. Two lanes would be carried through the interchange with an auxiliary lane beginning at the eastbound on-ramp. This auxiliary lane would then drop off at the I-229 interchange carrying traffic to southbound I-229. Although an A.M. traffic analysis was not performed, typical traffic patterns would indicate deficiencies in the opposite direction during the A.M. Peak hour. This is typical when the available route choices connect residential land uses to commercial/Industrial uses. Therefore, I-90 westbound lane configuration would mirror the eastbound lanes.

Table 3 is an aid to help in determining a tentative schedule as to when auxiliary lanes should be constructed. It should be noted that the study years for the traffic analysis were: existing conditions, 2015, and 2025. Therefore the constructed year is centered on these years.

Table 3 – Lane Configuration Utilized as Basis of Traffic Analysis (Including projects within current STIP)

I-90	PM PEAK HOUR VOLUMES - LOS		
SECTION	EXISTING	2015	2025
I-29 to Cliff Ave	610 – A	1,750 – B	2,870 – D
Cliff Ave to I-229	975 – A	2,780 – D	3,690 - E

N

NOT TO SCALE

MC-130

MC-130

I-90

I-90

I-90

Highway 38

60th Street North

Buffalo Ridge

Tea- Ellis Rd.

West Corridor

La Mesa Drive

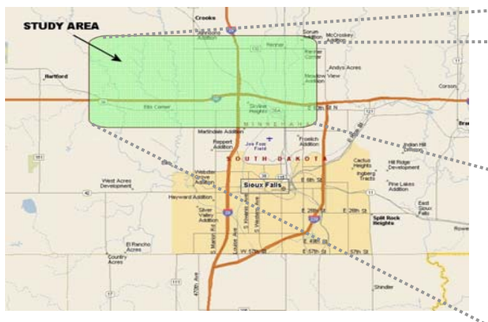
Marion Rd.

I-29

Cliff Ave.

NOTE: ADDITIONAL LANES TO BE ADDED UNDER BOTH BUILD SCENARIO'S AT MARION ROAD

NOTE: THE CONNECTION OF THE WEST CORRIDOR IS SHOWN ONLY IN THE BUILD SCENARIO'S, THE GROWTH AREA GENERATING THE VOLUMES IS CONSISTENT IN ALL SCENARIOS.



2025 Proposed Roadway Network

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3.3. Traffic Projections/Model Development

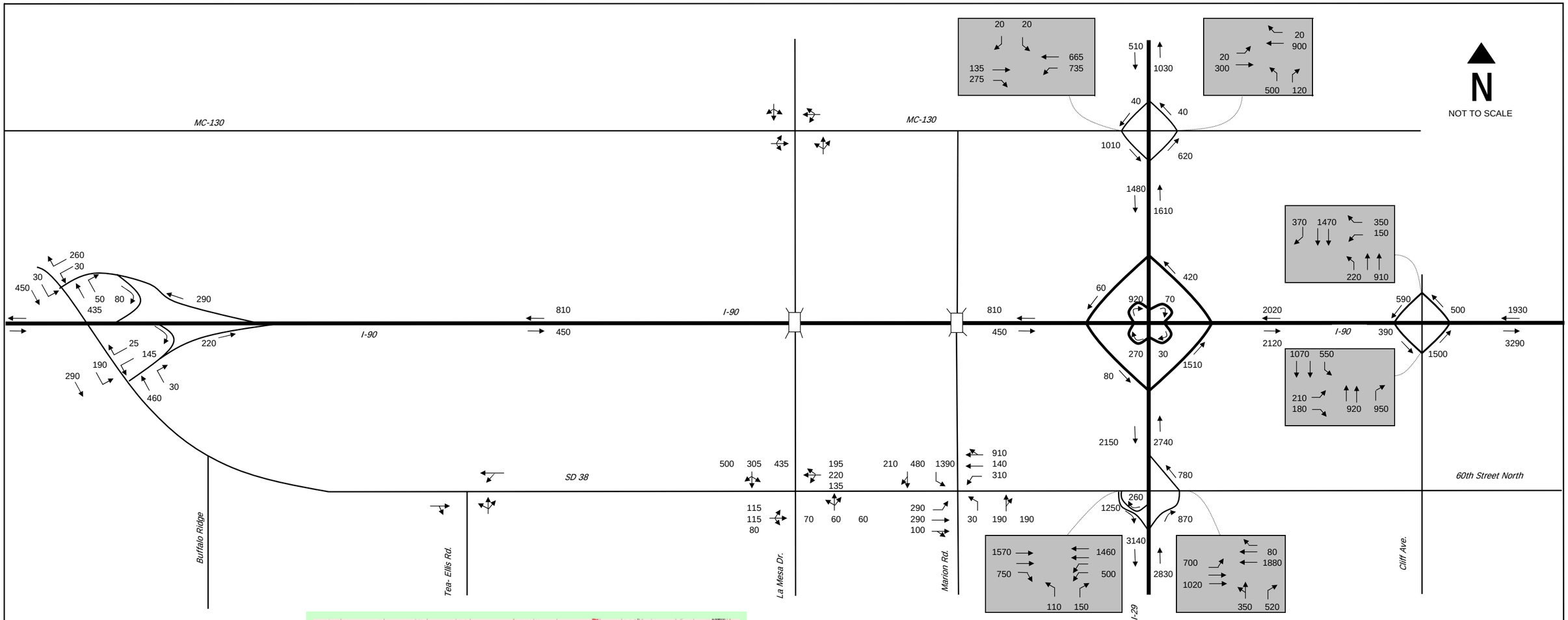
In order to adequately identify impacts of an interchange at Marion Road, multiple factors including future development areas, past traffic growth trends, and future roadway networks were analyzed. From these factors, future traffic volume estimates were developed and analyzed from three different volume scenarios. The three scenarios analyzed are a No Build Scenario, the second scenario consisted of the construction of an interchange at Marion Road, and the third scenario consisted of construction of interchanges at both Marion Road and the future West Corridor connection. (A fourth scenario was studied and consisted of the construction of the West Corridor interchange only. Additional information regarding this scenario is discussed in more detail in Section 5.4.) Following are discussion regarding the formation of the original three scenarios.

Sioux Falls, South Dakota continues to be one of the fastest growing regional centers of commerce and industry in the upper Midwest. Census data show that Sioux Falls has enjoyed double digit population growth since 1970 and the City has continued to grow by almost 3,500 residents per year between 2000 and 2004, with an estimated population in January, 2004 of 138,000. Since 2000, yearly new construction has averaged approximately $360 million in Sioux Falls and much of Sioux Falls' growth is occurring in the western portion of the city in areas west of Marion Road. The Sioux Falls 2025 Growth Management Plan has identified major growth within the study area is to occur west of I-29 and north of 12th Street. The trip generation potential and traffic distribution trends of these developments were analyzed in order to estimate future interstate and arterial roadway volumes in the study area.

In order to model each scenario, the Sioux Falls Metropolitan Area travel demand model for the year 2025 was obtained from the City of Sioux Falls. The roadways represented in this model reflect additions and improvements planned for the metropolitan area as documented in the 2025 Long Range Transportation Plan. Network manipulations were made to the model's roadway system to reflect each scenario.

3.3.1. 2025 No Build

The 2025 No Build scenario represents traffic volumes expected in 2025 as determined from the City of Sioux Falls Traffic Demand Model. The volumes were assigned in the model to the existing roadways built-out assuming no interchange at Marion Road. The purpose of this scenario is to serve as a base model in order to identify impacts to the roadway system from each of the scenarios. Results of Year 2025 No Build volumes are as shown in Figure 5.



KEY

XXX → Peak Hour Volume and Existing Geometrics

South Dakota DOT Department of Transportation

2025 NO BUILD TRAFFIC VOLUMES

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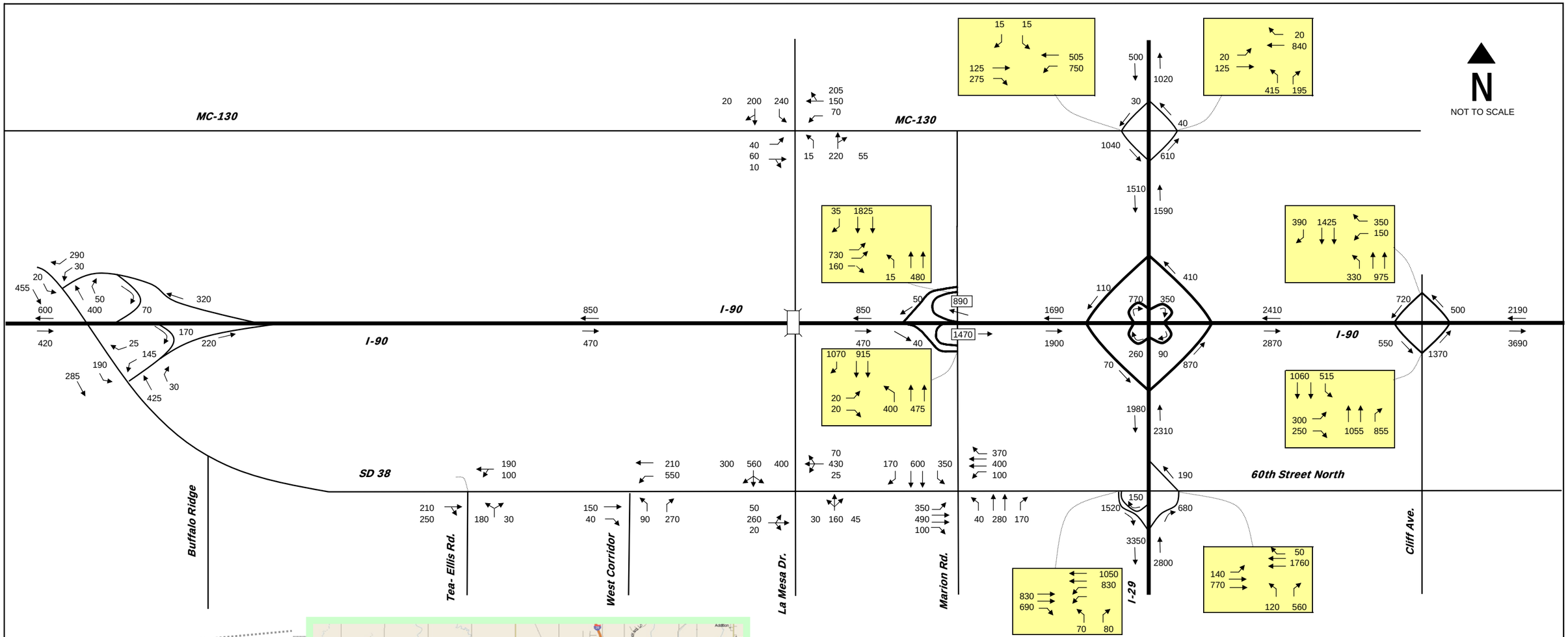
3.3.2. 2025 Build Marion Road

The 2025 Build Marion Road scenario represents traffic volumes projected for year 2025 as determined from manipulating the City of Sioux Falls Traffic Demand Model to include a connection to I-90 at Marion Road. The volumes were assigned in the model to the proposed roadways build-outs; including improvements to Marion Road, as well as the interchange. The results of this alternative show impacts that an interchange along I-90 at Marion Road will have on the roadways within the study area. The Year 2025 Build Marion Road traffic volumes are shown in Figure 6.

3.3.3. 2025 Build Marion Road and West Corridor

The 2025 Build Marion Road and West Corridor scenario represents traffic volumes projected for year 2025 as determined from manipulating the City of Sioux Falls Traffic Demand Model to include connections to I-90 at both Marion Road and the future West Corridor. The volumes were assigned in the model to the proposed roadway build-outs; including improvements to Marion Road as well as interchanges at both Marion Road and the West Corridor. The results of this alternative show impacts that all future interchanges along I-90 within the study area have on roadways within the study area. The Year 2025 Build Marion Road and West Corridor traffic volumes are shown in Figure 7.



KEY

XXX → PM Peak Hour Volume and Proposed Geometrics

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2025 Build Marion Road Traffic Volumes

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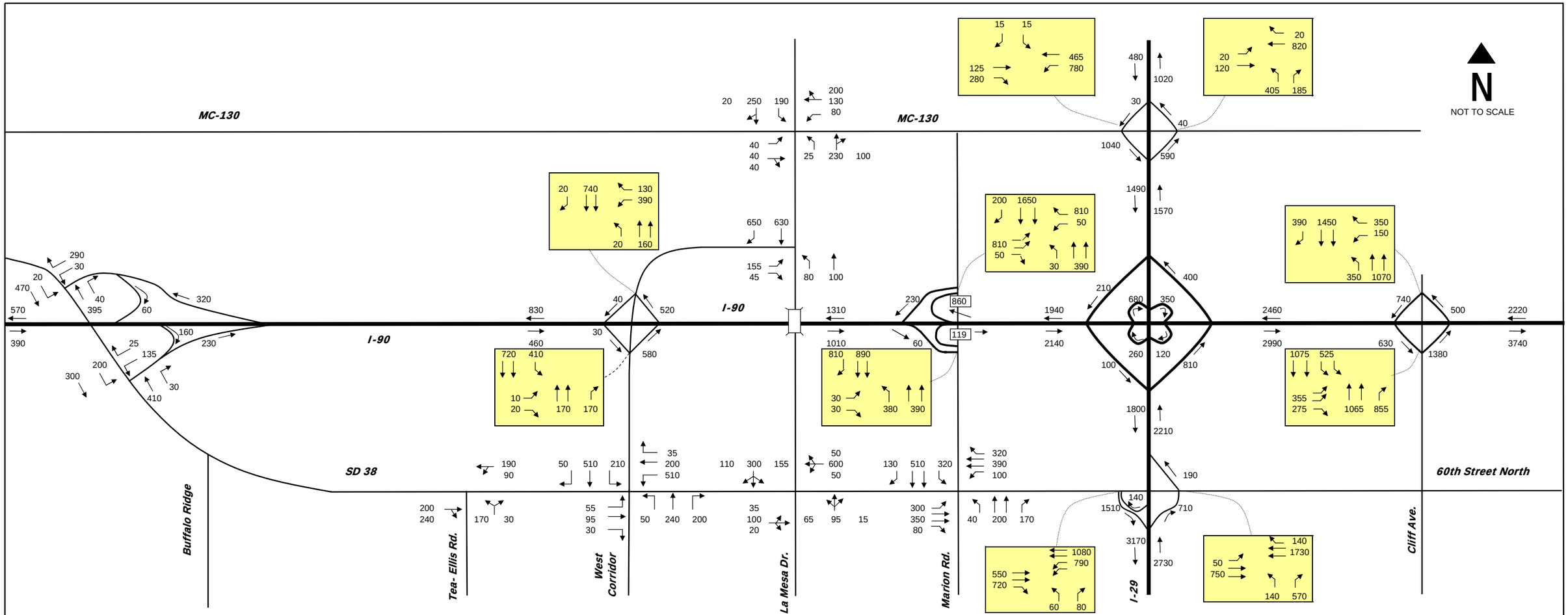

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XXX ⟶ PM Peak Hour Volume and Proposed Geometrics

2025 BUILD MARION ROAD AND WEST CORRIDOR TRAFFIC VOLUMES

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4.0 Alternative Concepts

4.1. I-29/I-90 Interchange Modification Discussion

In order to preserve right-of-way for future improvements at the I-29/I-90 system interchange, an independent study was completed for the evaluation of needed geometrics in support of future traffic volumes. For this study, seven alternatives were reviewed that would adequately serve the traffic volumes projected for this interchange. Options 1 through 7 of the I-29/I-90 Interchange Modification Study are shown in Figures 8 through 11. Since the Marion Road Interchange construction was scheduled in the Long Range Plan each option considered was linked to a corresponding interchange at Marion Road and would serve projected traffic volumes. This step was critical to guarantee that design criteria were met for spacing between the Marion Road/I-90 and I-29/I-90 Interchange. Each option evaluated was included in a comparison matrix (Table 4) and brought to the public for review and comment. Based on the comparison matrix findings along with consideration of public, SDDOT, and FHWA comments, the seven options were reduced to two. The two options were evaluated further and a recommendation was presented to the Metropolitan Planning Organization (MPO) committees for approval. Based on design criteria, impacts, and public comment, Option 5 was selected.

4.2. Identification of Preliminary Alignments

In determining potentially needed ROW to construct an interchange at Marion Road, seven interchange build alternatives and a no-build alternative were evaluated. The evaluation of an interchange at Marion Road was controlled by minimum interchange and ramp gore spacing requirements between adjacent interchanges. A proposed Marion Road interchange would be located one mile west of I-29, and due to the large footprint of a reconstructed I-90/I-29 interchange, any geometrics for a future interchange at Marion Road must be compatible with what may be constructed at the I-90/I-29 interchange. During the evaluation process, the system to system interchange took precedence and dictated the configuration at Marion Road. Each alternative was evaluated in detail within the I-90/I-29 INTERCHANGE CORRIDOR PRESERVATION *CONCEPT OPTIONS ANALYSIS FINAL REPORT*, dated April 9, 2004. As a result of the Options Analysis, the base interchange in all but one Marion Road alternative is a folded diamond interchange with all ramps located to the west of Marion Road. Spur ramps are placed on a few of the alternatives depending on the footprint of the I-90/I-29 interchange. Following are descriptions for each of the interchange Alternatives:

4.2.1. No-Build Alternative

A no-build alternative would maintain the current grade separated crossing at I-90 with no connections to I-90. According to the City of Sioux Falls Long Range Plan, Marion Road is scheduled to be widened to a five-lane urban section regardless of FHWA interchange approval, thus requiring additional ROW. The results of the traffic analysis indicate that there will be multiple locations within the existing roadway network that will result in a substandard LOS by year 2025 without an interchange at Marion Road.

4.2.2. Preliminary Build Alternatives

Each of the first six alternatives combined I-90/I-29 Interchange/Marion Road Interchange options itemized below were presented to FHWA and SDDOT in a “Brainstorming” meeting on March 5, 2004. A seventh option was developed as a follow-up to the meeting. The general design criteria used to develop the seven options are as follows:

- Provide adequate spacing to adjacent interchanges.
- Reduce traffic delays within the current roadway network.
- 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.

Option 1

As shown in Figure 8, this option features a folded diamond interchange with the loops accommodating the I-90 westbound off- and eastbound on-ramps. The loops have a design speed of 30 miles per hour (mph) which is achieved with 300-foot-radius loops. The minimum speed for the I-90 westbound on- and I-90 eastbound off-ramps is 60 mph.

The corresponding I-90/I-29 interchange is 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, Option 1 requires the most ROW of all options.

Option 2

Similar to Option 1, Option 2 (Figure 8) is a folded diamond interchange with loops to the west of Marion Road. A spur ramp is added in the northeast quadrant of the interchange, which will allow I-90 westbound traffic wishing to go north on Marion Road a free right movement. The gore-to-gore spacing between the I-90/I-29 interchange and the Marion Road interchange allows for the future expansion of the interchange by constructing the spur ramp. However, the spur ramp will not be built until traffic warrants the need.

The corresponding I-90/I-29 interchange 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 obtaining full benefits from this configuration. A design speed of 25 mph on the loops would be considered adequate by AASHTO standards given that 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. Option 2 has the lowest construction costs of the seven build options.

Option 3

Option 3 (Figure 9) features a diamond style interchange on the north side of the interstate (westbound traffic) and a partial clover style interchange with a spur ramp on the south side of the interstate (eastbound traffic).

The loop in the southwest quadrant will be utilized for southbound traffic on Marion Road and will accommodate a design speed of 30 miles per hour (mph) while northbound traffic will utilize the spur ramp in the southeast quadrant.

The corresponding I-90/I-29 interchange option 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. Option 3 maximizes separation with the proposed Marion Road interchange, but requires a significant amount of right-of-way in the northeast and southeast quadrants.

Option 4

Option 4 (Figure 9) features a folded diamond interchange with spur ramps on the east side of Marion Road in order to accommodate future high traffic movements. The spur ramps are located in the northeast quadrant accommodating the I-90 westbound to Marion Road northbound movement and in the southeast quadrant accommodating the Marion Road northbound to I-90 east-bound movement. The loops in the northwest and southwest quadrants will accommodate a 30 mph design speed while the spur ramps will accommodate a 40 mph design speed. As discussed in previous options, the spur ramps will not be built until development increases and place additional pressure on the infrastructure and will be built in the future in order to maintain acceptable LOS at the interchange.

The corresponding I-90/I-29 interchange option has semi-directional ramps in all quadrants, accommodating a 40 mph design speed. Along with minimal ROW required, Option 4 provides for a long weaving distance between SD 38 and I-90. Drawbacks to this option are the high construction and maintenance costs of structures and the intricacies associated with the maintenance of traffic during construction.

Option 5

Option 5 (Figure 10) features a folded diamond interchange with spur ramps on the east side of Marion Road in order to accommodate future high traffic movements. The spur ramps are located in the northeast quadrant accommodating the I-90 westbound to Marion Road northbound movement and in the southeast quadrant accommodating the Marion Road northbound to I-90 east-bound movement. The loops in the northwest and southwest quadrants will accommodate a 30 mph design speed while the spur ramps will accommodate a 40 mph design speed. As discussed in previous options, the spur ramps will not be built until development increases and place additional pressure on the infrastructure and will be built in the future in order to maintain acceptable LOS at the interchange.

The corresponding I-90/I-29 interchange configuration for this option has loops in the northeast and southwest quadrants and directional "fly-over" ramps in the northwest and southeast quadrants. This option resolves many of the drawbacks of the other options. It requires the least ROW of all of the build options with takings from the northeast and southwest quadrants only. Option 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. Option 5 has the lowest ROW and construction costs combined for the I-90/I-29 interchange.

Option 6

Option 6 (Figure 10) is a folded diamond interchange with the loops accommodating the I-90 westbound off- and eastbound on-ramps. The loops have a design speed of 30 mph which is achieved by laying them out with 300-foot-radius loops. The minimum speed for the I-90 westbound on- and I-90 eastbound off-ramps is 60 mph.

The corresponding I-90/I-29 interchange configuration for this option is a fully directional interchange featuring 50 mph "fly-over" ramps accommodating all turn movements. Although all options accommodate future traffic needs, this option has the greatest capacity of all reviewed options. This is the most expensive I-90/I-29 interchange option due to the combination of high structure costs and the large amount of land required for ROW purposes.

Option 7

Option 7 (Figure 11) features a folded diamond interchange with spur ramps on the east side of Marion Road in order to accommodate future high traffic movements. The spur ramps are located in the northeast quadrant accommodating the I-90 westbound to Marion Road northbound movement and in the southeast quadrant accommodating the Marion Road northbound to I-90 east-bound movement. The loops in the northwest and southwest quadrants will accommodate a 30 mph design speed while the spur ramps will accommodate a 40 mph design speed. As discussed in previous options, the spur ramps will not be built until development increases and place additional pressure on the infrastructure and will be built in the future in order to maintain acceptable LOS at the interchange.

The corresponding I-90/I-29 interchange Option 7 was developed as an alternative to Option 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 Option 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 option do not out-weight the additional ROW costs and C-D road costs as compared to Option 5.

4.3. Determination of Alternatives to Carry Forward

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 and as a result, the following sections describe the alternatives that were carried forward for further evaluation.

4.3.1. No-Build Alternative

As pointed out in the previous section, traffic projections indicate that the current roadway network will have operational implications with a No-Build alternative. However, the No-Build alternative will provide a baseline for comparison of the Build Alternatives carried forward. **Therefore, this alternative was carried forward for analysis.**

4.3.2. Build Alternatives

As discussed above, any possible interchange at Marion Road was dependent on a corresponding I-90/I-29 interchange. Following is discussion on the final selection of the I-90/I-29 interchange along with the corresponding Marion Road Interchange:

Seven build alternatives were evaluated at the inception of the environmental assessment. Based on criteria developed in the *Final Report*, State and Federal Officials along with public comment have narrowed the alternatives down to two. Options 2 & 5 have been chosen for further review. As compared to the other alternatives, these two options minimize overall construction costs, lessen the impact to adjacent land and maximize spacing with adjacent interchanges.

Key features of Option 2 are flexibility of loop radii, lowest construction costs and ease of construction.

Option 5 has the least impact to ROW, its geometrics provide desired functionality & design speed and it has the least combined construction costs with ROW along with maximizing spacing to adjacent interchanges. **Therefore, Options 2 and Option 5 were carried forward for analysis.**

While each alternative was specifically designed to meet the project goals, usually only one or two drawbacks made them prohibitive to construct. While Options 1 & 3 served future capacity needs, they were eliminated due to the extensive amount of ROW required. Options 4 & 6 maximized traffic capacity while maintaining a higher design speed; however, this was accomplished through the use of structures generating high construction costs along with complex constructability. Option 7 was developed to draw upon the advantages of Option 2 & 5, while attempting to further eliminate any drawbacks of these options. Unfortunately, additional ROW was necessary making this Option cost-prohibitive. **Therefore, Options 1, 3, 4, 6 & 7 were eliminated from further analysis.**

The final two options were evaluated further and a recommendation was presented to the Metropolitan Planning Organization (MPO) committees for approval. **Based on design criteria, impacts, and public comment, Option 5 was selected.** As stated above, a comparison matrix evaluating the I-90/I-29 Interchange Alternatives is shown on Table 4; no comparison matrix was created for the Marion Road Alternatives as I-90/I-29 governed the interchange chosen for Marion Road. A cost estimate for the Marion Road Interchange is included in the Appendix.

4.4. High Occupancy Vehicles (HOV) Lanes

A separate alternative would be to provide HOV lanes along I-90 and I-29 in the study area. The goal of the HOV lanes would be to encourage car-pooling by allowing vehicles with multiple passengers an exclusive lane, thus reducing travel time and delay compared to travel in the non-HOV congested lanes. Currently, congestion does exist in the state of South Dakota, but not at a level to consider HOV lanes. In addition, traffic projections for the design year in the study area show there is no need to require that SDDOT provide HOV lanes.

4.5. Other T.S.M. and T.D.M. Alternatives

Several other Transportation System Management (T.S.M.) and Transportation Demand Management (T.D.M.) strategies were considered in order to reduce the need for an interchange at Marion Road. Several of these were addressed as a group since they are related and the success of each is dependant upon similar travel characteristics. These include employee trip reduction (E.T.R.) strategies such as ridesharing, flextime, transit user subsidies, parking fees and telecommuting. Nationwide studies have shown that these programs are more successful in larger urban areas. As key factors such as trip length, travel time and parking costs increase the incentive and success of promoting employee trip reduction plans increases. Urbanized areas under 200,000 population, such as Sioux Falls, with the average commuting trip distances under 8 miles and travel times less than 15 minutes are less successful in showing significant changes in travel. Telecommuting is likely to be the most successful in areas such as Sioux Falls with a growing service industry.

4.6. I.T.S. Alternatives

Several I.T.S. strategies should be reviewed as improvements are made to the I-90 corridor in Sioux Falls. Systems that could prove to be beneficial include variable message signing, electronic surveillance and state of the art signal systems. These strategies can smooth traffic flow and reduce traffic breakdowns due to lane closures, accidents and fluctuating traffic volumes. These measures combined can have a level of service improvement in the capacity of an intersection but are not able to significantly change the need for a highway connection at a given location.

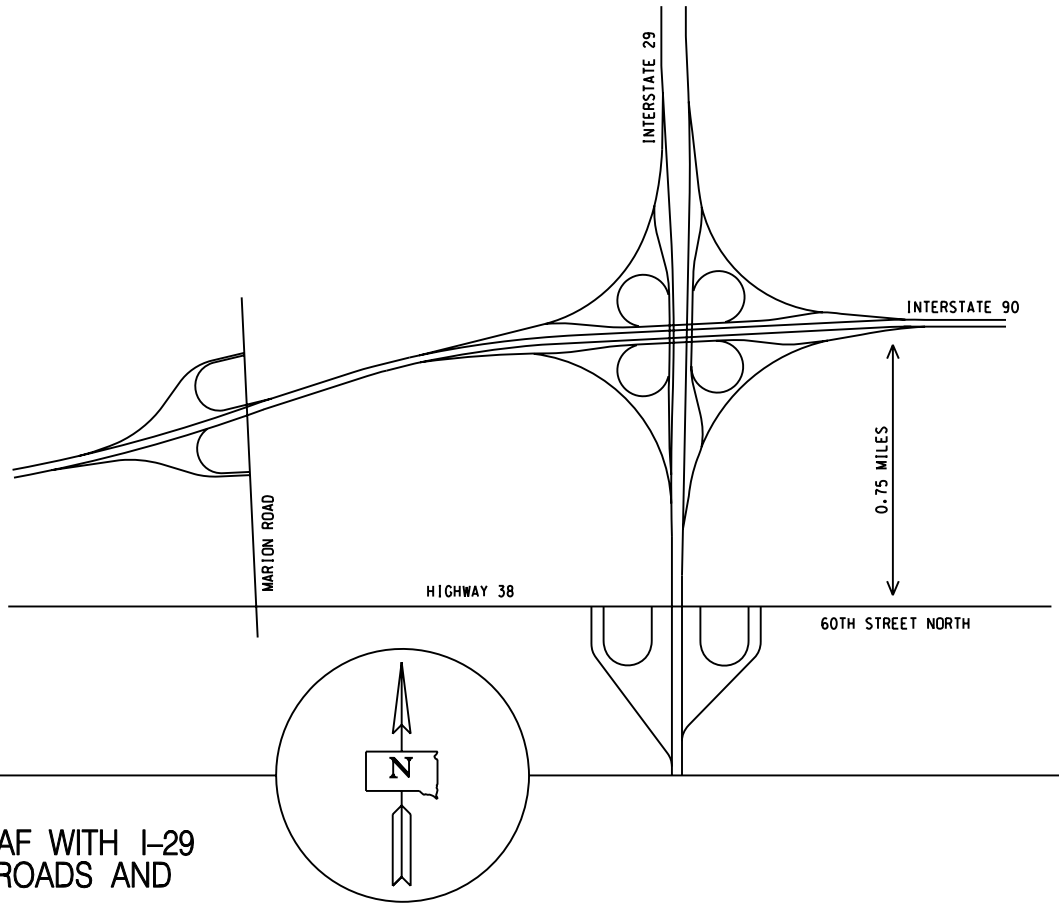
4.7. Alternative Selection

After further review of the configuration of a partial cloverleaf interchange with the corresponding preferred I-29/I-90 Partial Cloverleaf with Northwest and Southwest Quadrant Loops interchange as shown in Option 5, Figure 10, the construction of the partial cloverleaf interchange was selected as the preferred alternative. The capacity analysis indicates that a partial cloverleaf will operate with acceptable delay through 2025 (LOS C). The actual construction of the spur ramps located on the east side of Marion Road will be completed when warranted to allow for expansion.

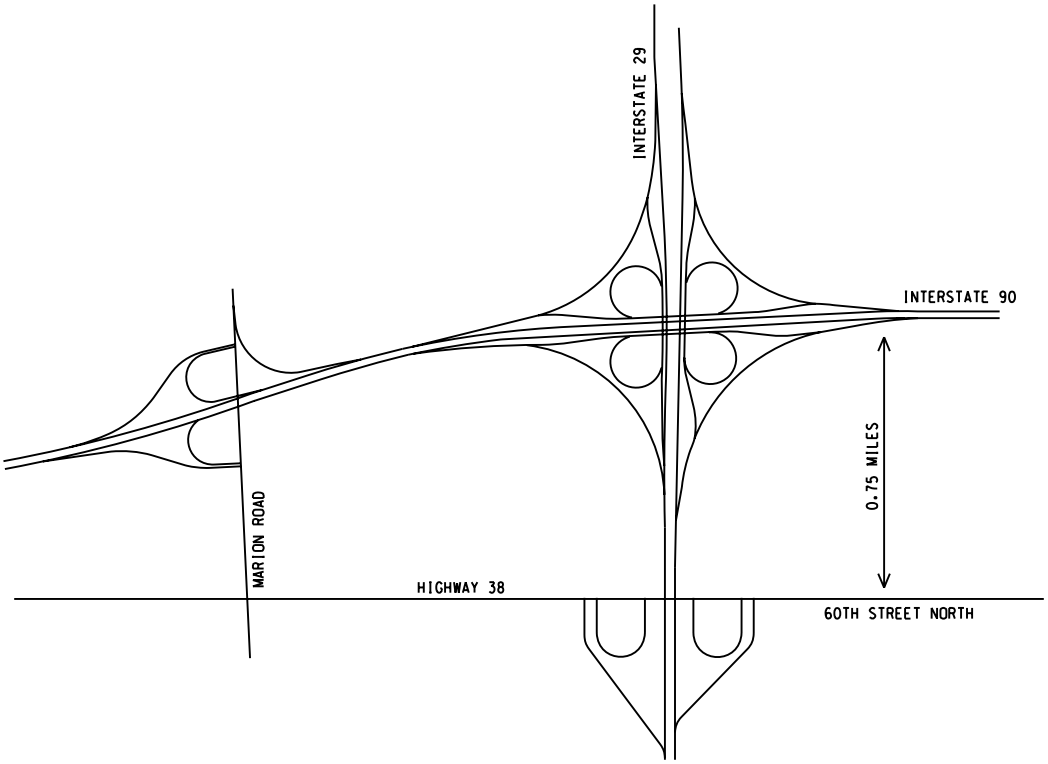
4.8. Interchange Design Criteria

A partial cloverleaf interchange with future spur ramps is the recommended alternative for construction at Marion Road and I-90. This type of interchange will allow for acceptable operations through the design year along with the ability to add additional capacity. Based on the existing topography, the most feasible configuration consists of Marion Road over the interstate mainline.

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



I–291–90 INTERCHANGE CONCEPT ALTERNATIVES

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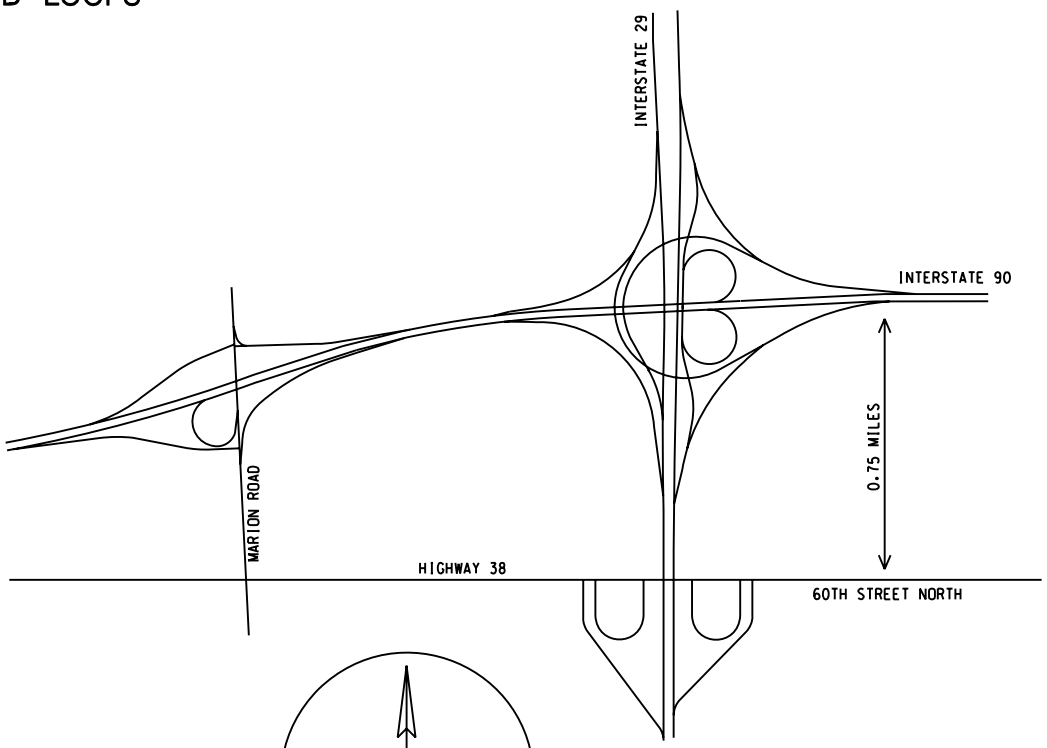
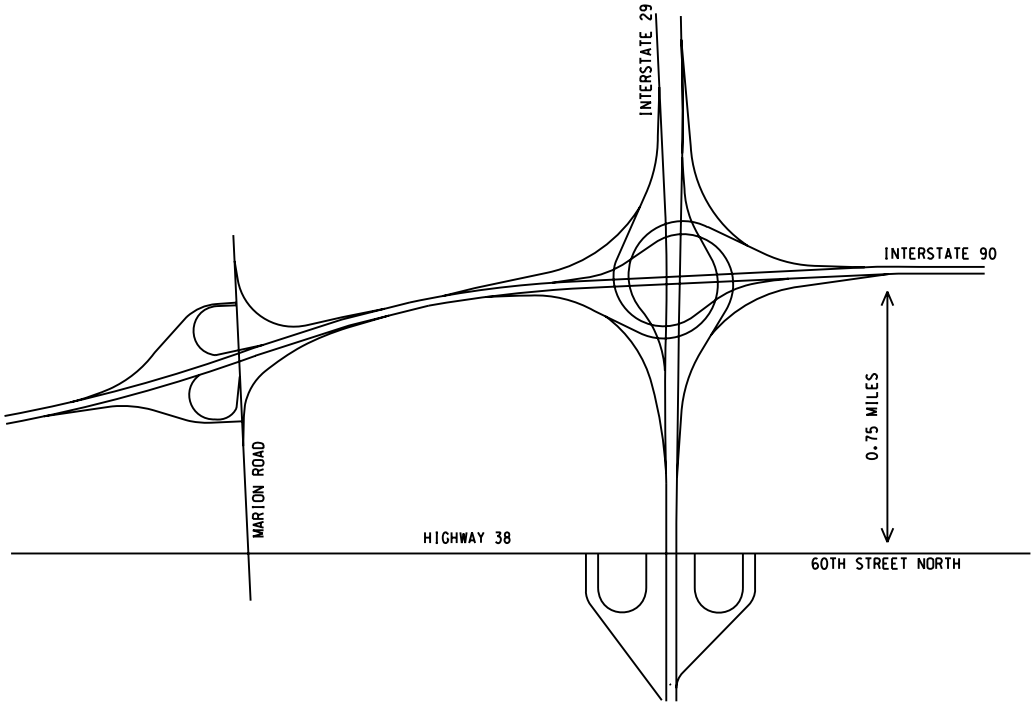
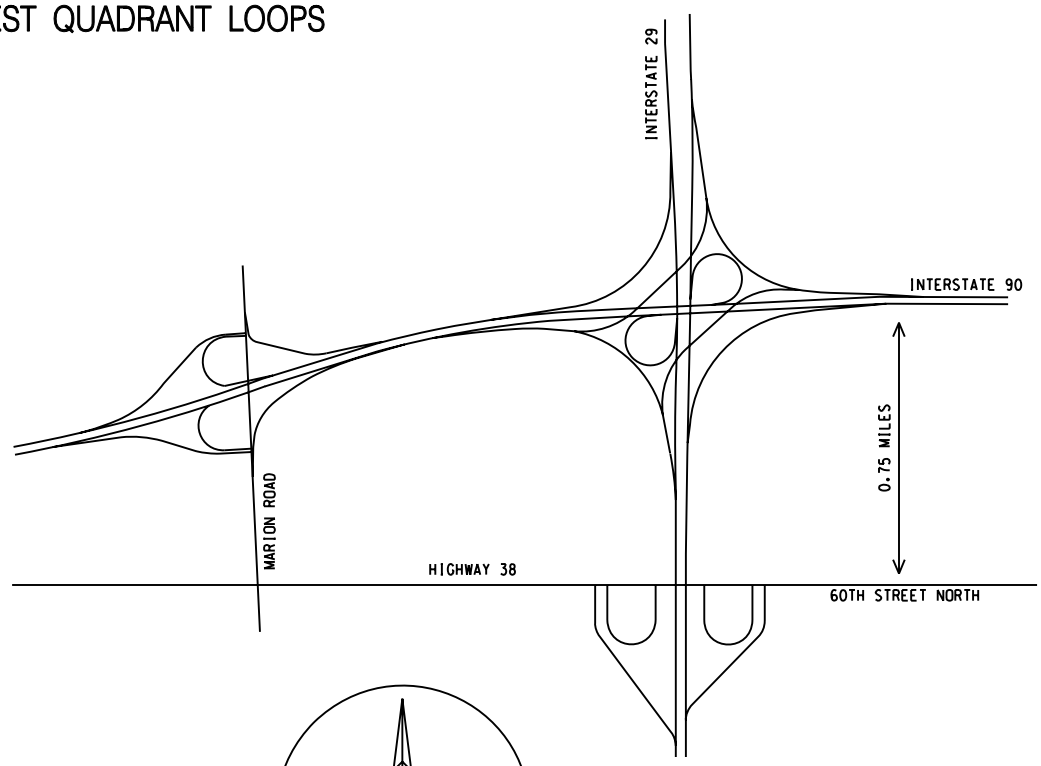
OPTION 3
PARTIAL TURBINE WITH EAST SIDE
C–D ROAD AND LOOPS

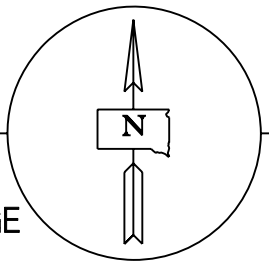


OPTION 4
SEMI–DIRECTIONAL RAMPS IN
ALL QUADRANTS
(TURBINE INTERCHANGE)

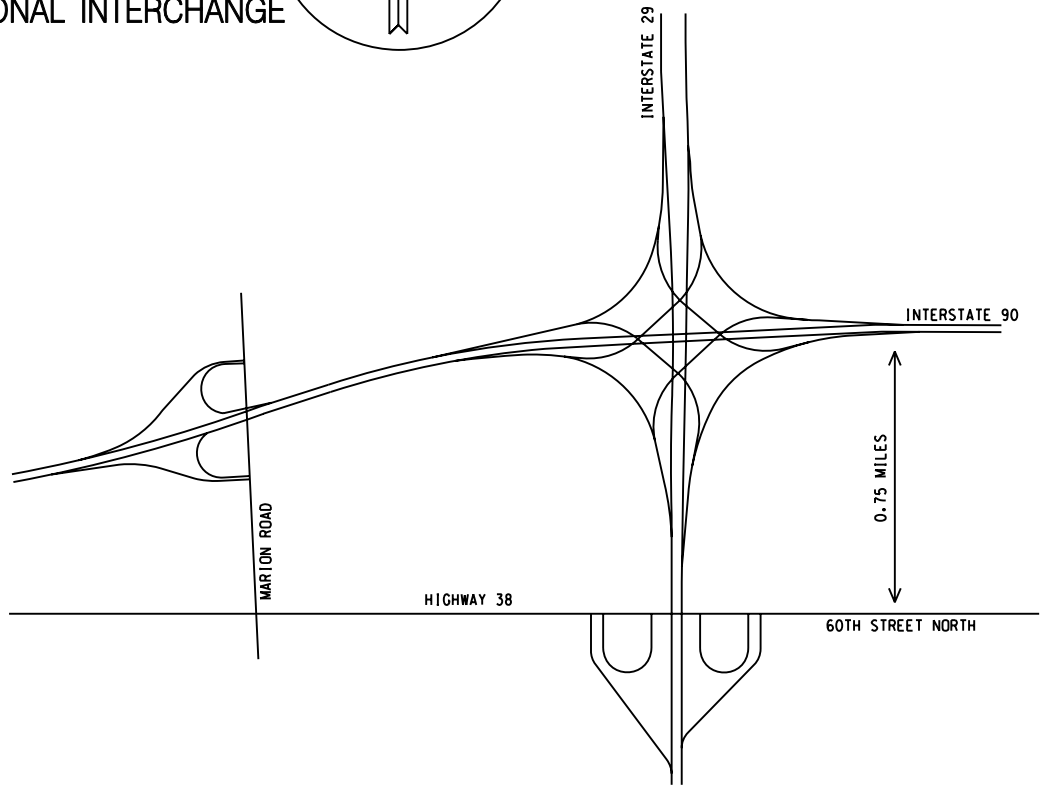


OPTION 5
PARTIAL CLOVERLEAF WITH NORTHEAST AND SOUTHWEST QUADRANT LOOPS

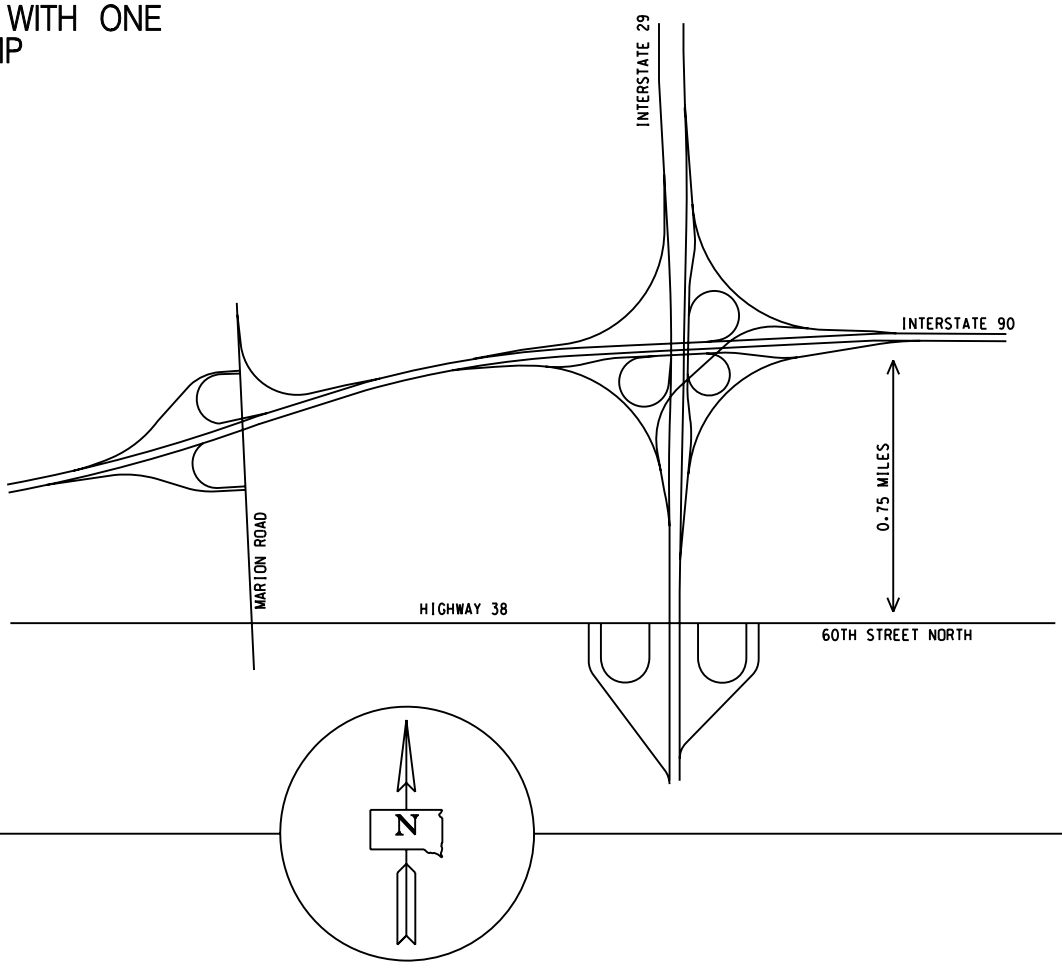




OPTION 6
FULLY DIRECTIONAL INTERCHANGE (TRI-LEVEL)



OPTION 7
THREE LOOPS WITH ONE
FLY-OVER RAMP



I-291-90 INTERCHANGE CONCEPT ALTERNATIVES

MARION ROAD INTERCHANGE JUSTIFICATION REPORT

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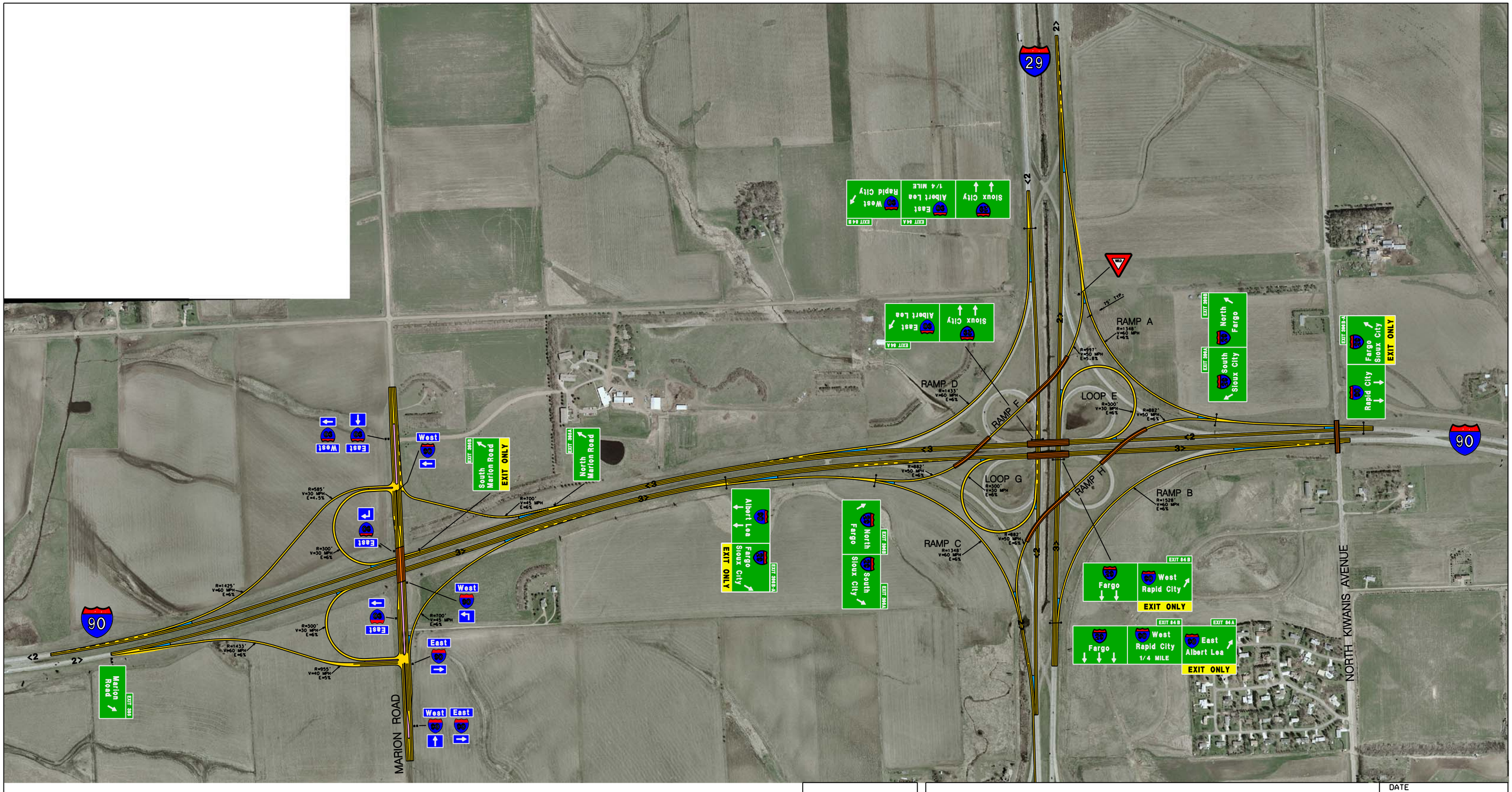
FIGURE 11

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 3rd 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 3rd 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.



INTERCHANGE CONCEPT OPTION #5

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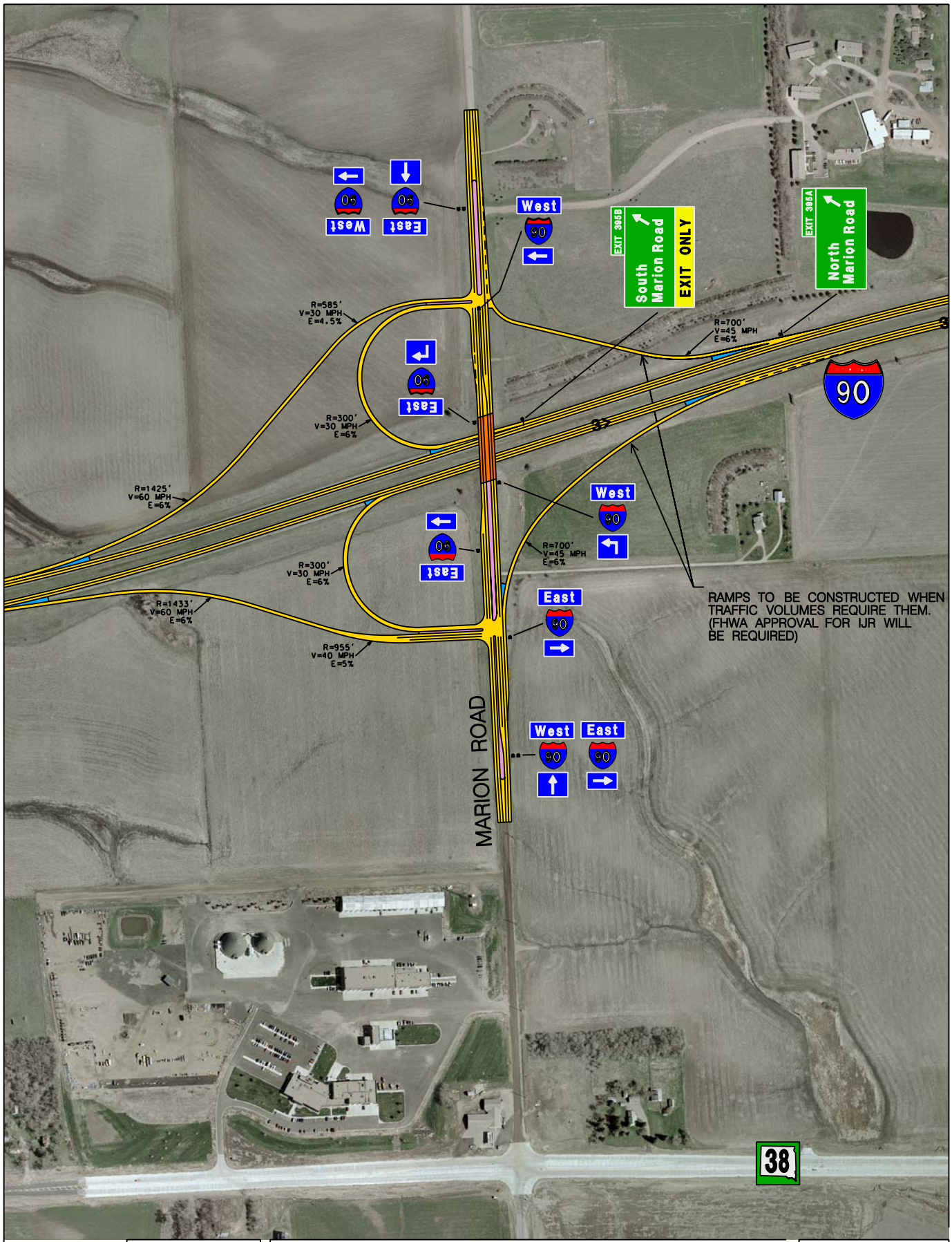

PROPOSED MARION ROAD INTERCHANGE

MARION ROAD INTERCHANGE JUSTIFICATION REPORT

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All SDDOT and FHWA standards outlined in the table below were followed during the concept design phase.

Table 5 – Design Standards

Interstate 90	Criteria	Interchange Ramps	Criteria
Design Year	2025	Design	2025
Design Speed	75 mph	Design Speed	50 mph 30 mph for loops
Superelevation	0.06 ft/ft max	Superelevation	0.04 ft/ft max 0.06 ft/ft max for loops
Min. Vertical Curve Length	1,000 ft	Right Shoulder Width	8 ft
Maximum Gradient	3%	Left Shoulder Width	2 ft
Max. Horizontal Curve	2°45’	Max. Horizontal Curve	3°
Roadway Width	52 ft	Cross Slope	2%
Lane Width	12 ft	Inslope	6:1
Median Shoulder Width	10 ft w/3 lanes in each direction	Clear Zone	30 ft min.
Outside Shoulder Width	10 ft	Lane Width	15
Clear Zone	30 ft		
Closs-Slope	2%		
Shoulder Type	Min. 8” Asphalt		

5.0 Future Traffic Operations

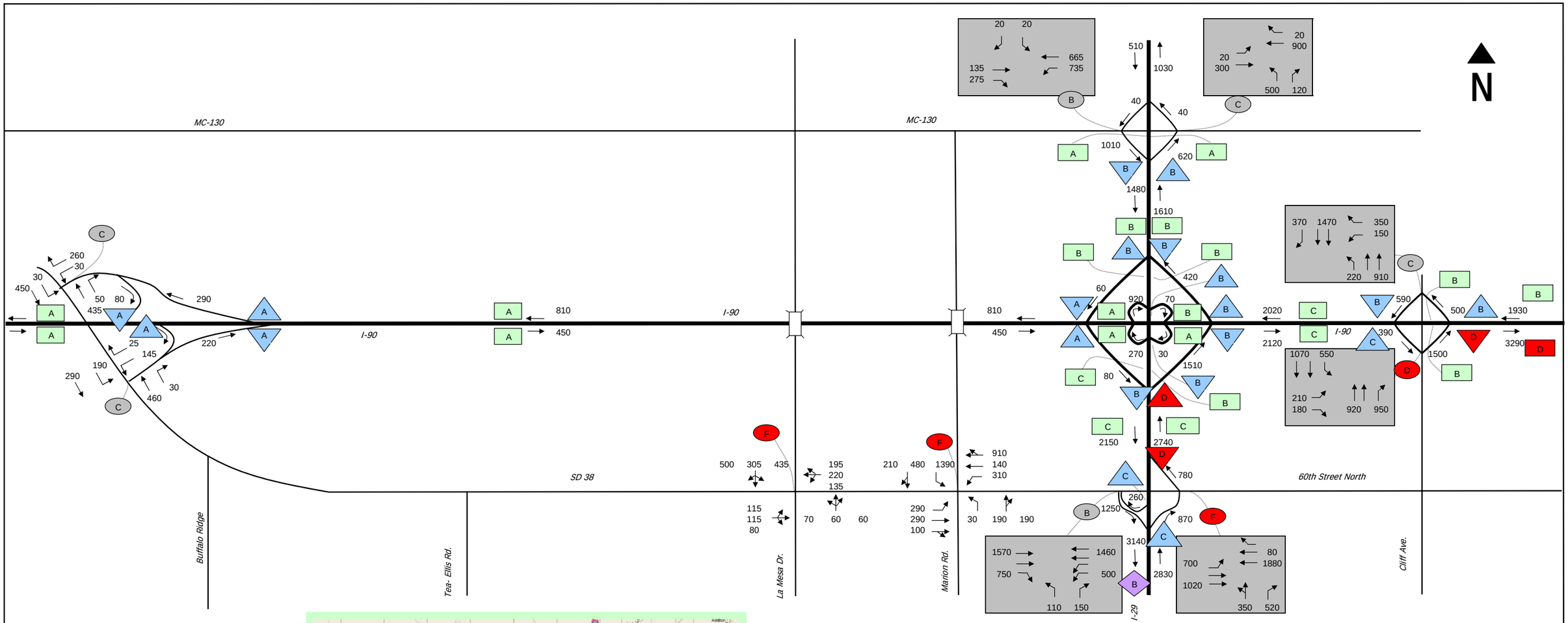
Capacity analysis was conducted for the study interchanges and intersections for each of the roadway network alternatives. The analysis included comparisons of the 2025 No Build base model, 2025 w/ Marion Interchange, and 2025 w/ Marion Road and West Corridor Interchange forecast PM volumes at all locations identified by the study. The capacity analysis was completed using the procedures and methodology as outlined in the HCM and Synchro software was used to evaluate the intersections. Complete copies of the capacity analysis for each scenario can be found in the Technical Appendix.

Since the spacing of signalized intersections along the east/west roadways is less than one mile, the capacity analysis for each intersection was performed utilizing a coordinated signal system. As a result, the traffic operations at each intersection show levels of service based on coordinated system as compared to the analysis of an isolated intersection. This analysis provides a better indication of actual traffic operations for an interconnected signal system. Signals along SD 38 are coordinated currently utilizing fiber optic cable.

5.1. 2025 No Build

Figure 14 documents the 2025 No Build PM peak hour analysis and concludes that deficiencies exist at three existing interchanges. The three deficient interchanges include SD 38/I-29 interchange, the I-29/I-90 system interchange, and the Cliff Avenue/I-90 interchange.

At the SD 38/I-29 interchange; the northbound ramps/SD 38 intersection on the east side of the I-29 operates at LOS F, and the northbound I-29 on-ramp merge operates at LOS D. At the I-29/I-90 system interchange, the northbound I-29 off-ramp to I-90 eastbound diverge operates at LOS D. At the I-90/Cliff Avenue interchange; the eastbound ramps/Cliff Avenue intersection operates at LOS D, and the eastbound on-ramp merge operates at LOS D. In addition, the eastbound freeway segment on I-90 between Cliff Avenue and I-229 operates at LOS D. Also, due to a lack of route choices in a high growth area as is the case in the No Build scenario, the arterial intersections of Marion Road/SD 38 and Le Mesa Drive/SD 38 also experience unacceptable operations. This analysis used 2025 volumes with existing roadways built-out and no additional interchanges west of Interstate 29 on Interstate 90.



2025 NO BUILD - PM PEAK HOUR VOLUMES & LEVEL OF SERVICE

MARION ROAD INTERCHANGE JUSTIFICATION STUDY

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5.2. 2025 Build Marion Road

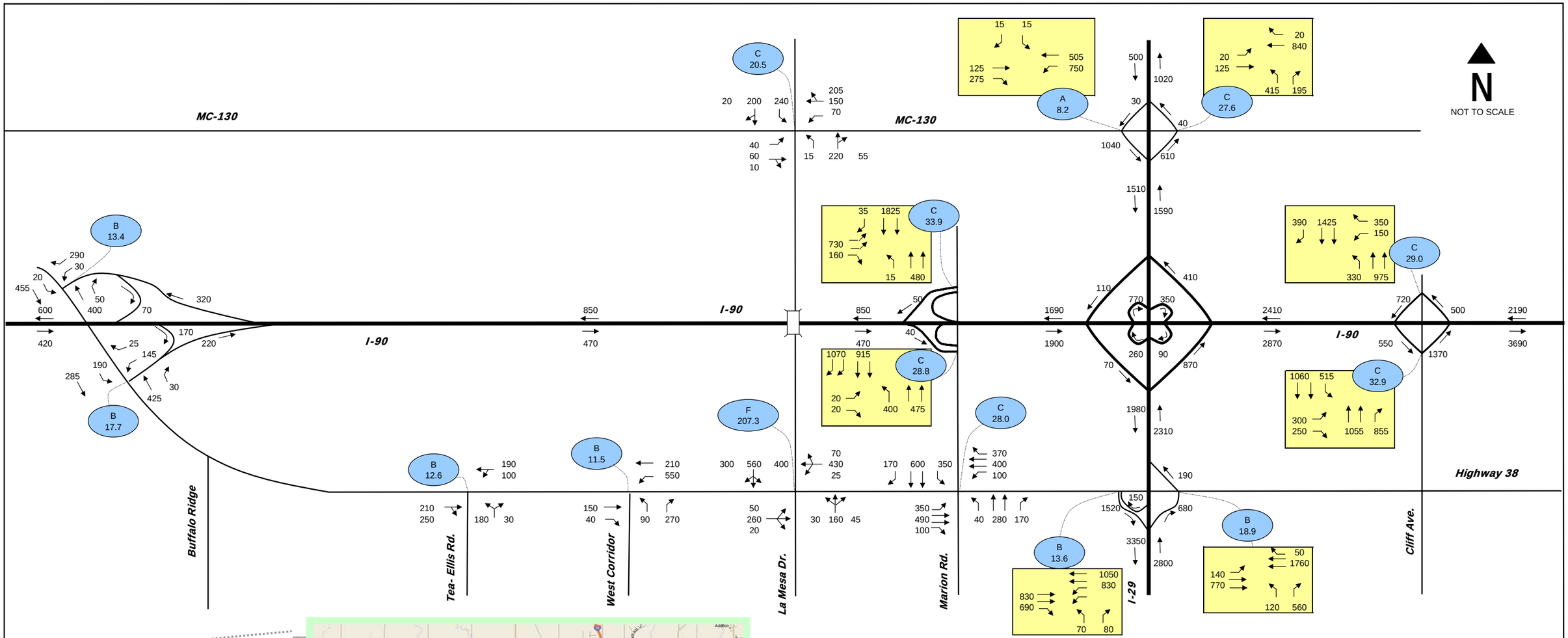
Figures 15 and 16 document the 2025 Build Marion Road PM peak hour volumes and Level of Service. Acceptable operations during the PM peak hour exist in much of the study area with the exception of four locations. The eastbound freeway segment between I-29 and Cliff Avenue operates at LOS D, the eastbound off-ramp diverge movement at Cliff Avenue operates at LOS D, the eastbound on-ramp merge movement at Cliff Avenue operates at LOS E, and the freeway segment between Cliff Avenue and I-229 operates at LOS E.

Table 6 – Freeway LOS Comparison with an Interchange at Marion Road/I-90

Location	No Build Level of Service	w/ Marion Interchange Level of Service	Result
Eastbound I-90 – I-29 to Cliff Avenue	C	D	Lower
Diverge - Eastbound off-ramp at Cliff Avenue	C	D	Lower
Merge – Eastbound on-ramp at Cliff Avenue	D	E	Lower
Eastbound I-90 – Cliff Avenue to I-229	D	E	Lower
Merge – Northbound on-ramp at SD 38	D	C	Improve
Diverge – Northbound I-29 off-ramp at I-90	D	C	Improve

Note: If LOS is acceptable (LOS A, B, or C) in both the No Build and Build Marion Road scenarios no comparison matrix was established.

With an I-90 interchange at Marion Road only, the high trip demand in the Marion Road/I-90 future development area is sufficiently served by immediate interstate access. An increased trip demand is placed on relatively few routes in a large study area that is expected to experience high growth in the long term.



KEY

XXX → Peak Hour Volume and Proposed Geometrics

X
XX.X — Signalized Intersection Level of Service
Average Control Delay, seconds

2025 Build Marion Road PM Peak Hour Volumes and Level of Service

Marion Road Interchange Justification Study

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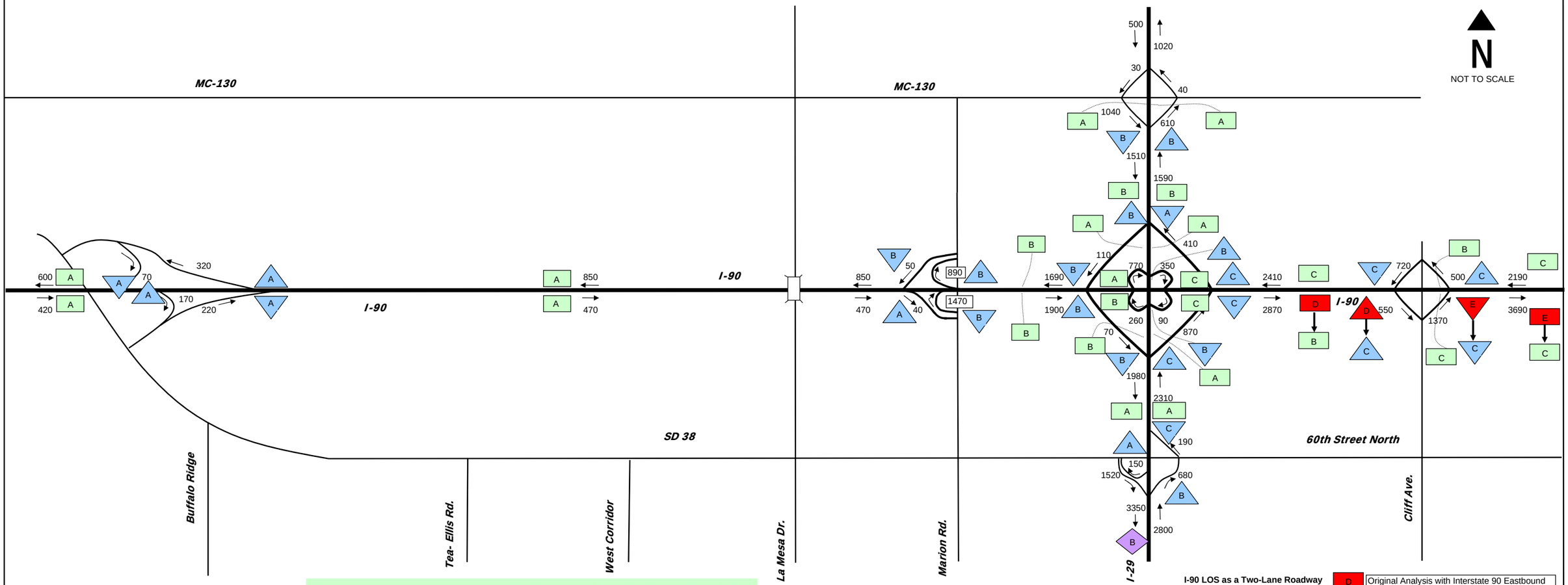
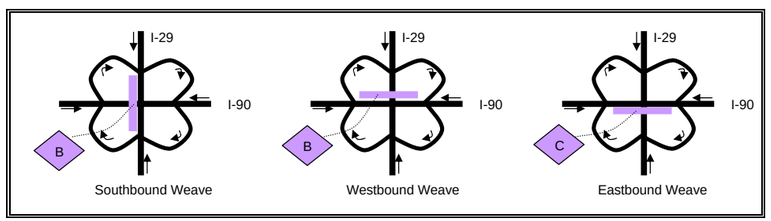


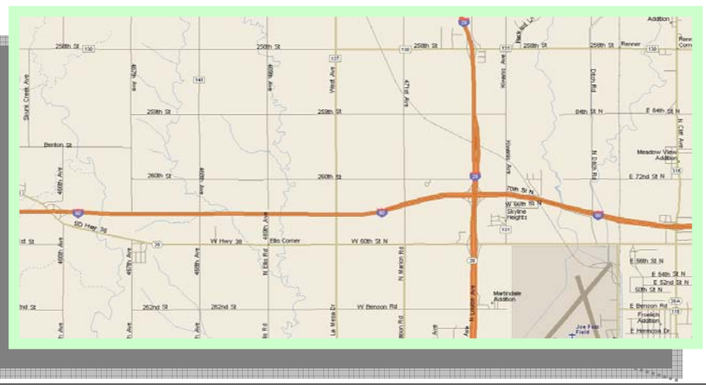
I-90 LOS as a Two-Lane Roadway D

I-90 LOS as a Three-Lane Roadway B

Original Analysis with Interstate 90 Eastbound shows unacceptable LOS as a two-lane section, with the addition of a third lane the LOS concerns are mitigated.

Weaving Analysis: I-90/I-29 System Interchange





KEY

XXX → Peak Hour Volume

X Weave Level of Service

X Diverge Level of Service (A, B or C)

X Merge Level of Service (A, B or C)

X Freeway Level of Service (A, B or C)

X Diverge Level of Service (D, E or F))

X Merge Level of Service (D, E or F)

X Freeway Level of Service (D, E or F)

2025 Build Marion Road PM Peak Hour Volumes and Freeway Level of Service

Marion Road Interchange Justification Study

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Most evident when comparing the LOS between the two scenarios in Table 6 is the reduced LOS on I-90 east of I-29. Although the impacts to I-90 must be considered when determining an additional interchange, improvements to the section of I-29 that, by its constrictions, has no available options for improvements would out-weigh the I-90 impacts. When reviewing the trip assignments in the No Build scenario compared with the Build Marion Road scenario, I-29 between SD 38 and I-90 along with 60th Street North from I-29 to Cliff Avenue volumes are reduced therefore improving traffic operations. The improvement in traffic operations observed on I-29 between SD 38 and I-90 is critical as the interchange spacing between SD 38 and I-90 is approximately 0.75 miles, which is below the minimum standard for interchange spacing and therefore limits any LOS improvement opportunities.

Due to the close proximity of the junction of I-29 and I-90 to the SD 38 interchange, it is very important to consider the affects that a new interchange at Marion Road would have on this segment. It is important to note that sufficient land is available for an additional lane between I-29 and Cliff Avenue in order to mitigate the LOS concerns observed on I-90 under the Build Marion Road interchange condition.

As land uses change along the I-90 corridor, traffic volumes will increase and as a result the LOS will be reduced. Currently development along I-90 is centered around the Cliff Avenue interchange where the LOS in the No Build scenario is projected to fall below LOS "C" and be at a LOS "D" on I-90 between Cliff Avenue and I-229.

Table 7 compares the delay associated with the intersections within the study area for the No Build condition and with the Marion Road interchange constructed. As indicated in the table, SD 38 experiences reduced delay with the addition of the Marion Road Interchange.

Table 7– Intersection Delay Comparison with an Interchange at Marion Road/I-90

Location	No Build Delay (sec)	w/ Marion Interchange Delay (sec)	% Reduction
MC 130/I-29 S.B.	14.6	8.2	44%
MC 130/I-29 N.B.	34.0	27.6	19%
SD 38/N. La Mesa Dr.	211.7	207.3	2%
SD 38/Marion Rd.	207.7	28.0	87%
SD 38/I-29 S.B.	8.9	13.6	No Reduction
SD 38/I-29 N.B.	155.1	18.9	88%
Cliff Ave/I-90 E.B.	35.7	34.7	2%
Cliff Ave/I-90 W.B.	27.5	25.3	8%

Note: The excessive delay observed at North La Mesa Dr. is high as no improvements are identified in the Long Range Plan at this location.

As can be observed, traffic operations greatly improved at SD 38/Marion Road and at SD 38/I-29 northbound intersections due to the construction of the Marion Road interchange. Other intersections within the study area result in only a small delay change.

An additional benefit of the Build Marion scenario is the cost savings to the users due to reduced delay of the roadway network. It was estimated that with the Marion Road connection to I-90 constructed, the users in 2025 would see a total savings per year in excess of Two Hundred Fifty Thousand Dollars ($250,000.00). With an additional lane to mitigate delay on I-90 eastbound the benefits to users improves to Six Hundred Twenty Thousand Dollars ($620,000.00) per year. The table below illustrates how the benefits were calculated to represent savings as indicated above.

Table 8– User Cost Savings Due to Delay Reduction

Roadway User Group	Year 2005 Cost (US$)	Year 2025 Cost (US$)[1]
Passenger Car	$11.50 per hour	$31.65 per hour
Commercial Truck	$25.00 per hour	$68.80 per hour

Note: 1. Assumes Inflation Rate of 4.5% per year.

Alternate	Network Delay (veh-hrs/day)
2025 No Build Scenario	14,121.33
2025 Build Marion Road	14,102.82
2025 Build Marion Road with added lane on I-90 Eastbound from I-29 to I-229	14,072.31

2025 Build Marion Road Scenario			
Benefit (Car) =	$	538.97	per day
Benefit (Truck) =	$	167.93	per day
Total =	$	706.90	per day
Total (year) =	$	258,018.95	per year

2025 Build Marion Road with added lane on I-90 Eastbound from I-29 to I-229 Scenario			
Benefit (Car) =	$	1,427.36	per day
Benefit (Truck) =	$	269.81	per day
Total =	$	1,697.17	per day
Total (year) =	$	619,467.21	per year

5.3. 2025 Build Marion Road and West Corridor

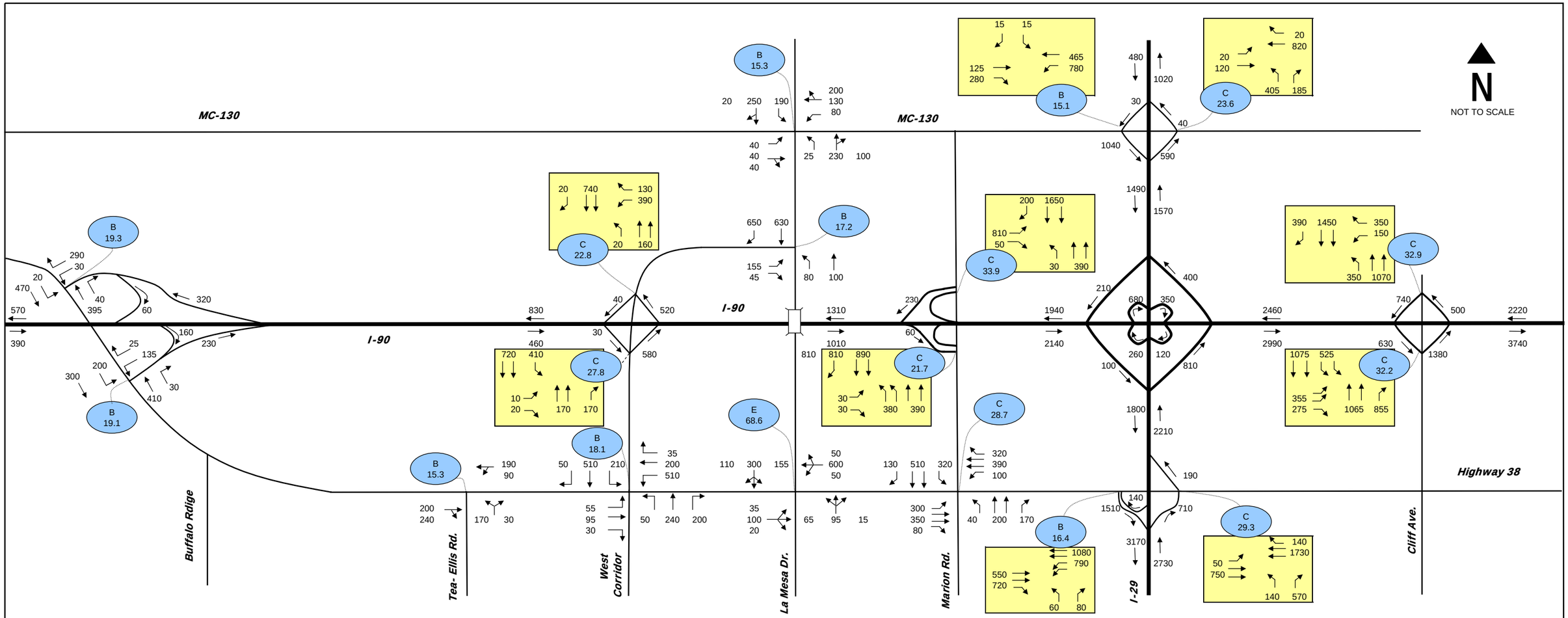
Figures 17 and 18 document the 2025 Build Marion Road and West Corridor PM peak hour volumes and Level of Service. Acceptable operations exist in much of the study area with exception of five locations. The eastbound on-ramp merge at I-90 from I-29 operates at LOS D, the eastbound freeway segment between I-29 and Cliff Avenue operates at LOS D, the eastbound off-ramp diverge movement at Cliff Avenue operates at LOS D, the eastbound on-ramp merge movement at Cliff Avenue operates at LOS E, and the freeway segment between Cliff Avenue and I-229 operates at LOS E.

Table 9 – Freeway LOS Comparison with Interchanges at Marion Road/I-90 and West Corridor/I-90

Location	No Build Level of Service	w/ Both Interchange Level of Service	Result
Merge – Eastbound on-ramp at I-90 from I-29	B	D	Lower
Eastbound I-90 – I-29 to Cliff Avenue	C	D	Lower
Diverge - Eastbound off-ramp at Cliff Avenue	C	D	Lower
Merge – Eastbound on-ramp at Cliff Avenue	D	E	Lower
Eastbound I-90 – Cliff Avenue to I-229	D	E	Lower
Merge – Northbound on-ramp at SD 38	D	C	Improve
Diverge – Northbound I-29 off-ramp at I-90	D	B	Improve

Note: If LOS is acceptable (LOS A, B, or C) in both the No Build and Build Marion Road scenarios no comparison matrix was established.

With construction of interchanges at both Marion Road and the West Corridor, the attractiveness of utilizing a freeway is increased and thus the number of vehicles assigned to the interstate system west of I-29 increases. The increased number of vehicles on I-90 allows for relief of the arterial roadway network and more importantly I-29 between SD 38 and I-90.



KEY

XXX → Peak Hour Volume and Proposed Geometrics

X
XX.X
Signalized Intersection Level of Service
Average Control Delay, seconds

South Dakota DOT Department of Transportation

2025 Build Marion Road and West Corridor PM Peak Hour Volumes and Level of Service

Marion Road Interchange Justification Study

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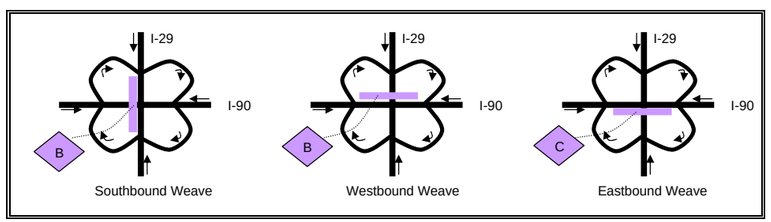
I-90 LOS as a Two-Lane Roadway: D

I-90 LOS as a Three-Lane Roadway: B

Original Analysis with Interstate 90 Eastbound shows unacceptable LOS as a two-lane section, with the addition of a third lane the LOS concerns are mitigated.

Weaving Analysis: I-90/I-29 System Interchange



KEY

XXX → Peak Hour Volume

X — Weave Level of Service

X — Diverge Level of Service (A, B or C)

X — Merge Level of Service (A, B or C)

X — Freeway Level of Service (A, B or C)

X — Diverge Level of Service (D, E or F))

X — Merge Level of Service (D, E or F)

X — Freeway Level of Service (D, E or F)

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2025 Build Marion Road and West Corridor PM Peak Volumes and Freeway Level of Service

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The 2025 Build Marion Road and West Corridor scenario shows similar findings when compared to the 2025 Build Marion Road scenario. The addition of the West Corridor interchange along I-90 will further reduce traffic volumes on I-29 between SD 38 and I-90 while also improving operations on the SD 38/60th Street North arterial system.

Various interchange types were considered at the West Corridor location including a single point urban interchange, tight diamond urban interchange, conventional diamond interchange, and a partial cloverleaf interchange. All interchanges evaluated provided acceptable operations and meet minimum required spacing between adjacent interchange ramps. The interchange type and location has not been chosen, but for the purpose of this study, a conventional diamond was used in the operational analysis. Refer to the Appendix for West Corridor options in association with Marion Road.

The specific location of the West Corridor interchange has not been determined as stated above. The 2025 Build Marion Road and West Corridor analysis included the location of the West Corridor approximately a half-mile west of the existing La Mesa Drive overpass. Another option, shown below as Option #2, is for the West Corridor interchange to utilize the existing La Mesa Drive overpass location as the interchange location, and La Mesa Drive to "T" into the West Corridor south of I-90.

Figure 19 – Option 1

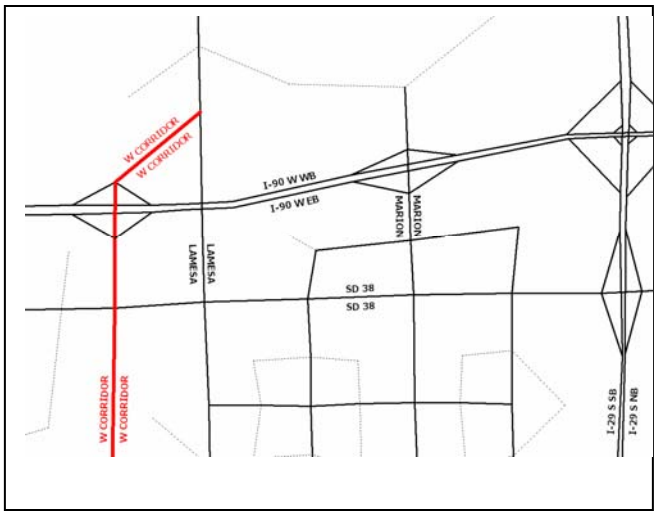
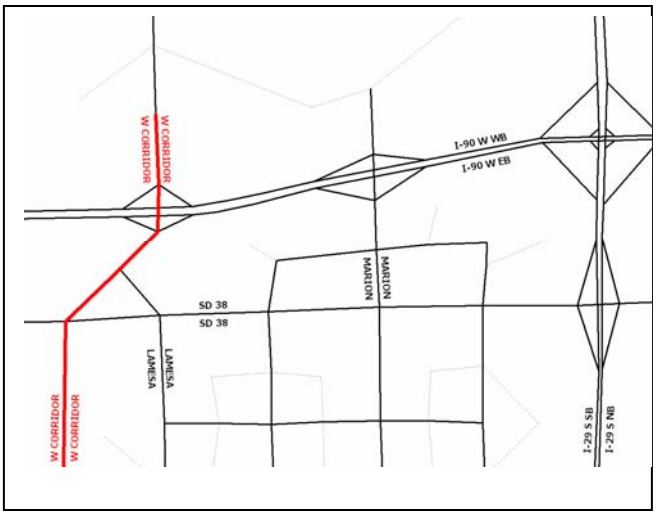
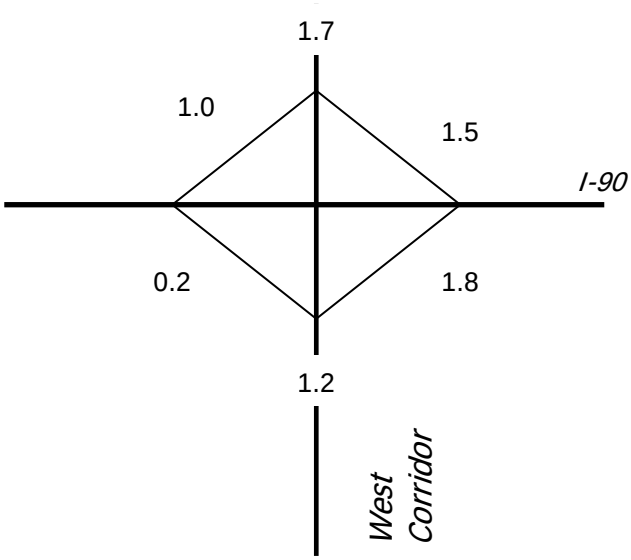


Figure 20 – Option 2



The configuration of the West Corridor was compared between Option #2 and Option #1 to determine the "order of magnitude" difference in traffic volumes from the travel demand model for these two alternatives. Given that the Option #2 West Corridor interchange is situated further to the east, and thus closer to the remainder of the metropolitan area, the demand at the Option #2 interchange is greater than that of Option #1. In Option #2, the continuity of La Mesa Drive breaks south of I-90 so that trips with routes that desire to either travel to/from the interchange junction or cross over I-90 are now concentrated at a single location. In Option #1, there is a route choice to either pass over I-90 on La Mesa Drive, or travel through the I-90 interchange along the West Corridor.

Figure 21 – Trip Demand Affected by Alignment



This above graphic illustrates how trip demand would be affected by an alignment such as Option #2, compared to Option #1. The ratios show the relative change in vehicle trips that the model shows Option #2 would require accommodating at the West Corridor interchange compared to Option #1. Thus, a ratio of 1.0 shows the volumes reported on each alternative are equal.

The I-90 eastbound off ramp volume is lower in Option #2 than with Option #1 (ratio of 0.2). A further look at these two scenarios shows that the eastbound off ramp at Marion Road more than doubles in Option #2, compared to Option #1. Thus, the volume decrease for the eastbound off ramp at the West Corridor is supplemented with a volume increase at the Marion Road interchange in Option #2.

The model results comparing these two options at the West Corridor interchange show that Option #2 will require greater capacity along both the West Corridor and two of the interstate ramps: the eastbound on-ramp and the westbound off-ramp.

As stated above, various configurations could handle the traffic volumes for either Option #1 or Option #2, the conceptual design of Marion Road will not change under either option due the relatively low volumes entering the interchange from the west. It should be noted that the West Corridor is near the edge of the traffic demand model in a primarily undeveloped part of Sioux Falls. It is recommended that as development takes place the model be updated to better represent future traffic demands in this area.

Table 10 compares the delay associated with the intersections within the study area for a No Build condition and with the Marion Road and West Corridor interchanges and is based on the Year 2025 PM peak period. As indicated in the table, Highway 38 experiences reduced delay with the addition of the interchanges.

Table 10 – Intersection Delay Comparison with Interchanges at Marion Road/I-90 and West Corridor/I-90

Location	No Build Delay (sec)	w/ Both Interchanges Delay (sec)	% Reduction
MC 130/I-29 S.B.	14.6	15.1	No Reduction
MC 130/I-29 N.B.	34.0	23.6	30%
SD 38/N. La Mesa Dr.	211.7	68.6	68%
SD 38/Marion Rd.	207.7	28.7	86%
SD 38/I-29 S.B.	8.9	16.4	No Reduction
SD 38/I-29 N.B.	155.1	29.3	82%
Cliff Ave/I-90 E.B.	35.7	32.2	10%
Cliff Ave/I-90 W.B.	27.5	32.9	No Reduction

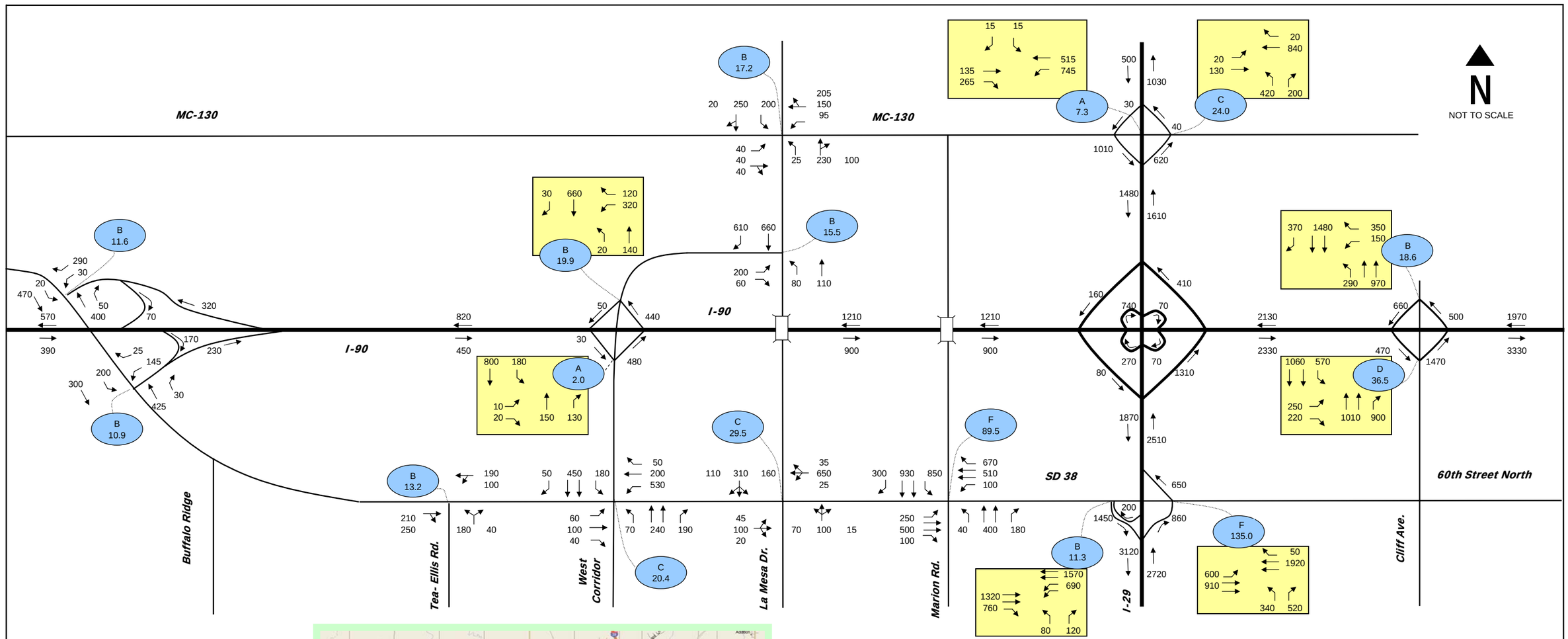
Traffic operations greatly improved at SD 38/Marion Road, SD 38/N. La Mesa Dr., MC 130/I-29 northbound and at SD 38/I-29 northbound due to the construction of the both interchanges. Other intersections within the study area result in only a small delay change.

5.4. Build West Corridor Only

As part of the Marion Road Interchange Justification Study, an additional option reviewed was to build the connection to I-90 at the West Corridor while maintaining an overpass only at Marion Road. This option was reviewed in order to determine the possibility of replacing the two interchanges currently included in the Long Range Plans for the State of South Dakota and the City of Sioux Falls with a single interchange located at the future West Corridor. The goal was to determine if the single interchange at the West Corridor would attract enough trips to improve operations on SD 38, 60th Street North, and I-29 between SD and I-90. As shown in Figure 22 the intersections of SD 38/Marion Road and SD 38/I-29 N.B. result in high delay for the West Corridor only scenerio. Figure 23 indicates unacceptable operations at the I-29 N.B. off-ramp to I-90 E.B. When comparing the results of the Build Marion Road scenario to the Build West Corridor scenario, it can be concluded that the Build Marion Road scenario is more attractive and removes a greater amount of traffic from SD 38, 60th Street North, and I-29. The traffic volumes on the segment of I-29 between SD 38 and I-90 experiences 200 less vehicles northbound and 440 fewer vehicles exiting I-29 to I-90 eastbound under the Marion Road scenario. Although the analysis proves that an interchange at Marion Road provides a greater benefit to the roadway network initially, the construction of the West Corridor interchange in the future will provide additional benefits by further decreasing the traffic volumes on I-29 between SD 38 and I-90.

Table 11 – Freeway LOS Comparison with an Interchange at West Corridor/I-90

Location	No Build Level of Service	w/ West Corridor Interchange Level of Service	Result
Merge – Eastbound on-ramp at I-90 from I-29	B	C	Lower
Eastbound I-90 – I-29 to Cliff Avenue	C	C	Same
Diverge - Eastbound off-ramp at Cliff Avenue	C	C	Same
Merge – Eastbound on-ramp at Cliff Avenue	D	D	Same
Eastbound I-90 – Cliff Avenue to I-229	D	D	Same
Merge – Northbound on-ramp at SD 38	D	C	Improve
Diverge – Northbound I-29 off-ramp at I-90	D	D	Same



KEY

XXX → Peak Hour Volume

X
xx.x
Signalized Intersection Level of Service
Average Control Delay, seconds

2025 Build West Corridor Only PM Peak Hour Volumes and Level of Service

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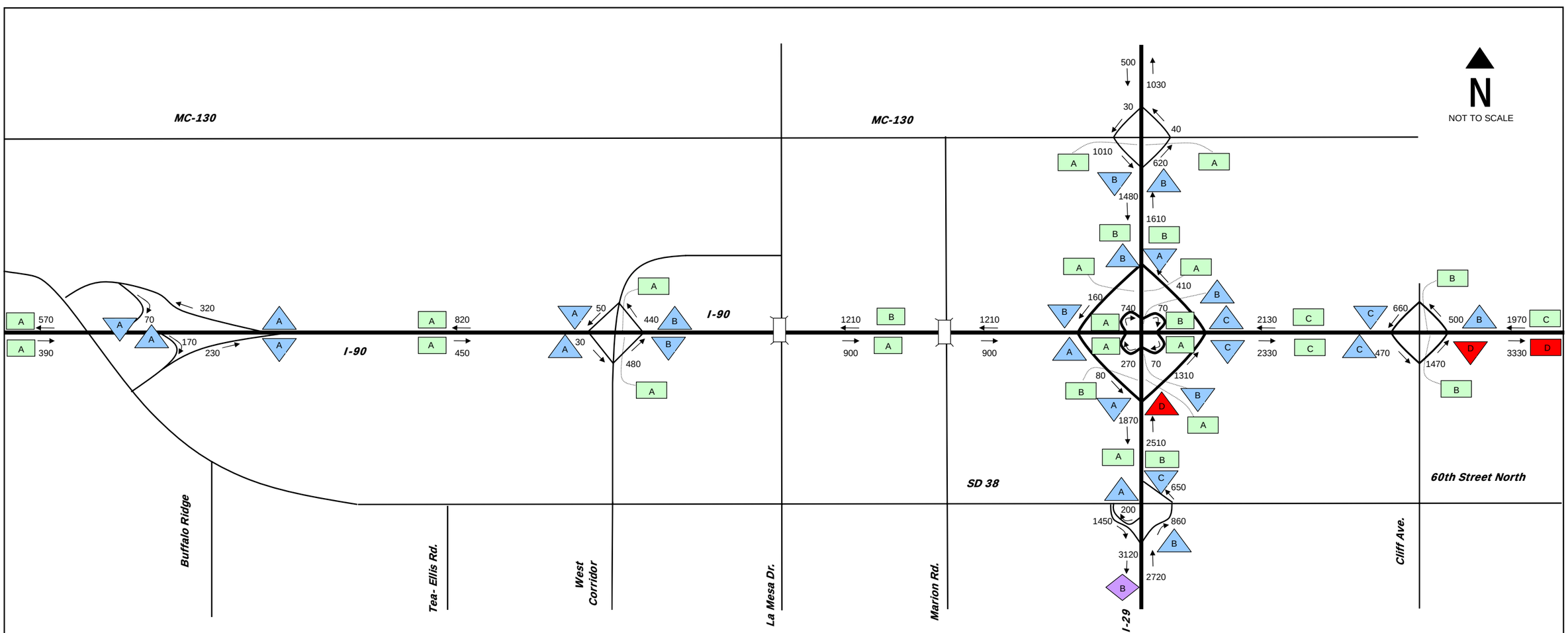


KEY

XXX → Peak Hour Volume

X Weave Level of Service

X Diverge Level of Service (A, B or C)

X Merge Level of Service (A, B or C)

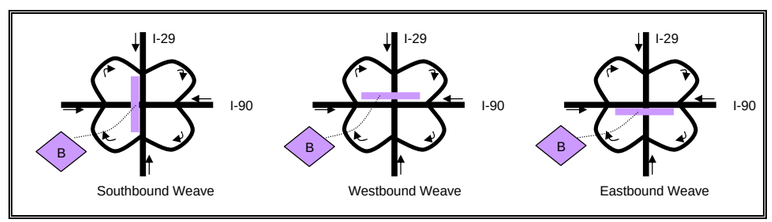
X Freeway Level of Service (A, B or C)

X Diverge Level of Service (D, E or F))

X Merge Level of Service (D, E or F)

X Freeway Level of Service (D, E or F)

Weaving Analysis: I-90/I-29 System Interchange



2025 Build West Corridor Only PM Peak Volumes and Freeway Level of Service

Marion Road Interchange Justification Study

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Table 12 – Intersection Delay Comparison with an Interchange at Marion Road or at the West Corridor.

Location	Build Marion Road Only Delay (sec)	Build West Corridor Only Delay (sec)
MC 130/I-29 S.B.	8.2	7.3
MC 130/I-29 N.B.	27.6	24.0
SD 38/N. La Mesa Dr.	**207.3**	29.5
SD 38/Marion Rd.	28.0	**89.5**
SD 38/I-29 S.B.	13.6	11.3
SD 38/I-29 N.B.	18.9	**135.0**
Cliff Ave/I-90 E.B.	34.7	36.5
Cliff Ave/I-90 W.B.	25.3	18.0

Table 12 as shown above provides a detailed comparison of the intersections within the study area between Marion Road only and the West Corridor only scenario's, the delay reduction at Le Mesa Drive in the West Corridor scenario is due to the connection of the West Corridor to Le Mesa Drive north of I-90 attracting trips away from the SD 38/Le Mesa Drive intersection. The delays experienced at SD 38/Marion Road and SD 38/I-29 N.B. under the Build West Corridor Only scenario are reduced in comparison to the No Build scenario but are much higher than in the Build Marion Road scenario.

5.5. Environment Impacts

After review and approval of the Marion Road Interchange Justification Study, the next step is to review the anticipated impacts associated with the proposed interchange in accordance with the National Environmental Policy Act (NEPA) procedures. Based on similar justification studies, it is anticipated that the environmental impacts associated with the construction of the Marion Road Interchange will not be significant. Some of the key issues that are typically addressed in an environmental assessment include impacts to noise and air quality, wetlands, prime farmland, public and historic lands and environmental justice. Since this proposed interchange is located in a relatively undeveloped area, it is anticipated that the impacts will be minimal.

6.0 Summary/Conclusions

6.1. FHWA Criteria

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 shown in the previous sections, the existing arterial roadways within the study area are planned to be expanded to a minimum of 4 lanes, and all existing interchanges will construct turn lanes as warranted. Since SD 38/60th Street North and I-90 are the only east-west routes within the study area, access to other east-west arterials is limited with the Sioux Falls Regional Airport located just south of the study area. Currently, SD 38 terminates as an east-west cross-town route at Cliff Avenue. With much of the future growth planned to take place west of Cliff Avenue and north of SD 38/60th Street North, both SD 38/60th Street North and I-90 will continue to grow at high rates through the 2025 horizon period.

As determined from the 2025 No Build analysis, I-29 between SD 38 and I-90 is deficient in providing acceptable operations in 2025 under its current configuration. This interchange has been evaluated to determine if options are available to improve this deficiency and it has been determined that closing the northbound on-ramp and constructing a loop in the southeast quadrant would allow for better spacing between SD 38 and I-90, however, this design allows for improved operations only under design volumes but creates a weaving section with vehicles merging from SD 38 at lower speeds. This design also only allows for a single westbound left turn lane at the SD 38/I-29 NB ramp intersection that will not allow for expansion. Although the design is the best alternative available, an increase in traffic volumes as the City of Sioux Falls continues to grow will again start to degrade operations on this segment of I-29. Refer to the Appendix for proposed Interchange Modification at SD 38/I-29.

With the addition of the Marion Road Interchange along I-90, the traffic demand model is predicting that access to I-90 at Marion Road will provide better direct access to I-90 therefore reducing the volumes being placed on the I-29 segment between SD 38 and I-90. SD 38/60th Street North also received benefits of reduced traffic volumes between I-29 and Cliff Avenue when compared to the 2025 No Build scenario. The addition of the West Corridor interchange at I-90 further improves operations on I-29 between Highway 38 and I-90.

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.

Various strategies were reviewed to determine if alternatives were available to preclude the need for the Marion Road interchange. Although some alternatives investigated would provide for increased safety and increased efficiency, no alternative would provide the benefits to the roadway network within the study area that an interchange at Marion Road /I-90 provides.

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.

From the 2025 No Build analysis, deficiencies were determined at the Cliff Avenue/I-90 interchange, along I-90 between Cliff Avenue and I-229, and on I-29 between Highway 38 and I-90. The Marion Road interchange along I-90 provides relief for I-29 improving operations to an acceptable standard but reduces the LOS east of I-29 along I-90.

As indicated in Table 6, I-90 eastbound LOS is reduced from LOS "C" to LOS "D" from I-29 to Cliff Avenue, the eastbound off-ramp diverge movement at I-90/Cliff Avenue is reduced from LOS "C" to LOS "D", the eastbound on-ramp merge movement at I-90/Cliff Avenue is reduced from LOS "D" to LOS "E", and I-90 from Cliff Avenue to I-229 is reduced from LOS "D" to LOS "E". With mitigation warranted on I-90 from Cliff Avenue to I-229 in the No Build scenario, the impacts related to the construction of the Marion Road interchange are less significant than the impacts to I-90 from I-29 to Cliff Avenue. An additional lane or added third lane on I-90 Eastbound from I-29 to I-229 would provide a mitigation opportunity to resolve the LOS deterioration. Figure 16 and Figure 18 provide LOS information to indicate that an additional lane Eastbound along I-90 would improve operations to an acceptable standard.

The spacing between the I-90/I-29 interchange to I-90/Cliff Avenue is approximately 2 miles. It appears through a preliminary review that an additional eastbound lane would not require additional right-of-way to be acquired. The expansion would require the widening of two bridge structures. In contrast, the spacing between the I-90/I-29 interchange to the I-29/SD 38 interchange is approximately 0.75 miles, which is less than typically required for the distance between a system and service interchange. A reduction in traffic volumes on this segment would be a significant benefit with few mitigation options available in the future due to the reduced interchange spacing.

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 HOVs 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 current concept design meets all state and federal requirements. Additionally, the Marion Road interchange as discussed in the previous sections was designed to accommodate the reconfigured I-29/I-90 interchange and an interchange along I-90 at the West Corridor. It is anticipated that the reconstruction of the I-29/I-90 interchange will take place in 40+/- years.

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. The

interchange at MRM 385 (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.

Identified improvements at I-29 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 "partial cloverleaf" 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 an interchange at MRM 394 (West Corridor). The interchange at MRM 394 is included in the West Corridor Study that 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 16 to 25 years.

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.

It is the result of the natural growth of Sioux Falls and the need to improve traffic operations of the entire roadway network within the study area. The logical location for growth over the next years will be located in the NW corner of the Sioux Falls Metro Area. Improvements to I-29 and SD 38/60th Street North are benefits of this new access.

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 environmental assessment for this proposed interchange is being investigated to determine if any impacts will be of significance. The methodology for conducting this investigation is consistent with all state and federal regulations.

Appendix

The Appendix for the Marion Road Interchange Justification Study consists of the following:

Level of Service Definitions

Marion Road Cost Estimate

West Corridor/Marion Road Layouts – Options 1 thru 8

SD 38/I-29 Northbound Ramp Modification

Sioux Falls Maps

Level of Service Information

Level of Service Descriptions

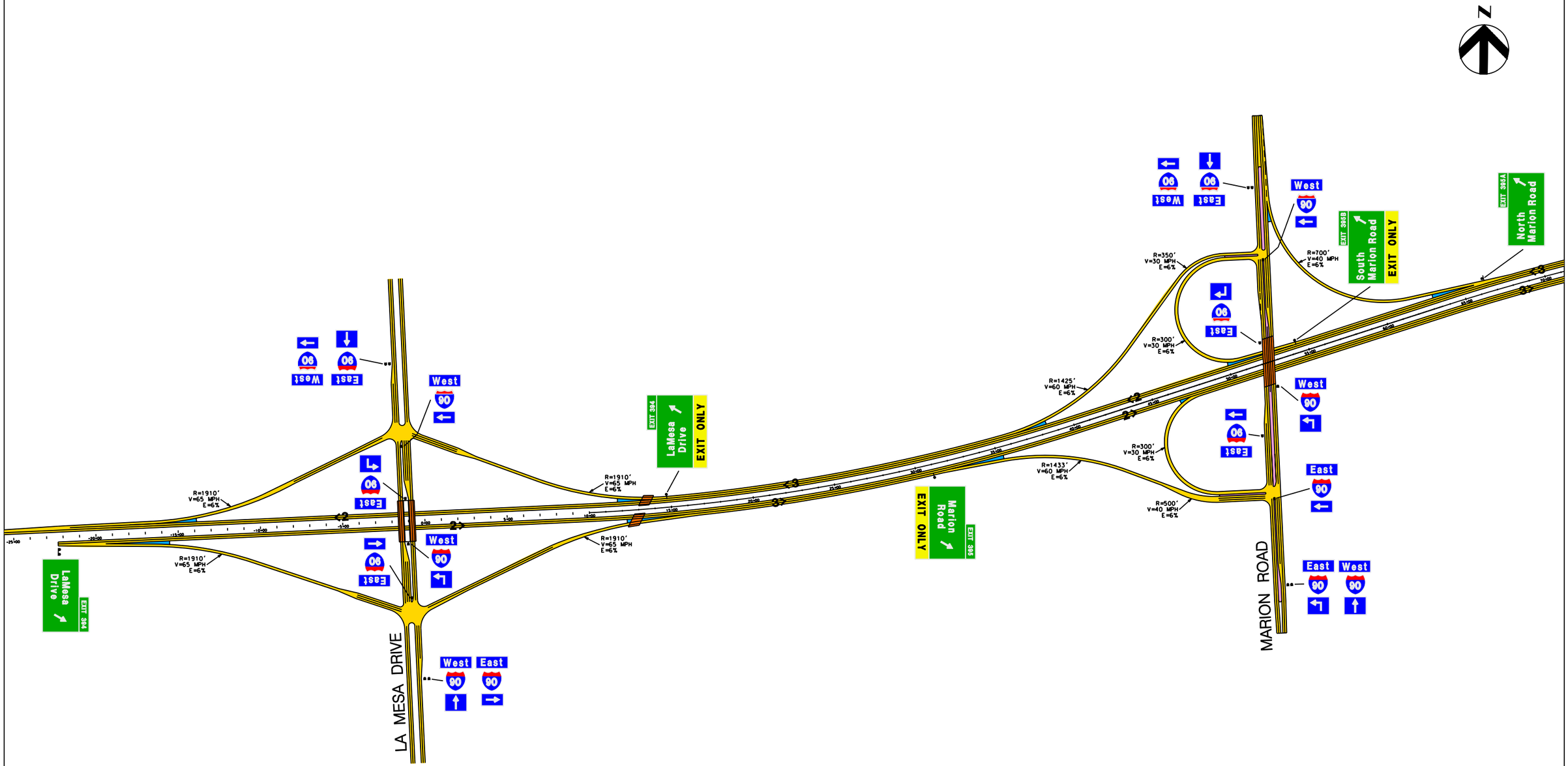
Level of Service	SIGNALIZED Intersection Control Delay (sec)	UNSIGNALIZED Intersection Control Delay (sec)	Intersection LOS Description
A	≤ 10.0	≤ 10.0	Free flow, insignificant delays.
B	10.1-20.0	10.1-15.0	Stable operation, minimal delays.
C	20.1-35.0	15.1-25.0	Stable operation, acceptable delays.
D	35.1-55.0	25.1-35.0	Restricted flow, regular delays.
E	55.1-80.0	35.1-50.0	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	> 80.0	> 50.0	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Marion Road
Cost Estimate

MARION ROAD INTERCHANGE
@ INTERSTATE 90

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED PRICE
		ROADWAY				
1	009	Mobilization	1	LS	$400,000.00	$400,000.00
2	009	Staking	1	LS	$95,000.00	$95,000.00
3	100	Clear & Grub	1	LS	$7,500.00	$7,500.00
4	110	Misc Removals	1	LS	$7,500.00	$7,500.00
5	110	Remove Asphalt Pavement (I-90 Shoulder)	9,500	SY	$3.00	$28,500.00
6	120	Unclassified Excavation	250,000	CuYd	$1.50	$375,000.00
7	120	Select Subgrade Topping	30,000	CuYd	$3.00	$90,000.00
8	120	Option Borrow Excavation	100,000	CuYd	$3.00	$300,000.00
9	120	Undercut	50,000	CuYd	$1.50	$75,000.00
10	120	Water for Embankment	4,300	Mgal	$8.00	$34,400.00
11	120	Water for Granular Material	210	MGal	$8.00	$1,680.00
12	230	Placing Topsoil	60,000	CuYd	$1.50	$90,000.00
13	250	Incidental Work, Grading	1	LS	$10,000.00	$10,000.00
14	250	Incidental Work, Structure	1	LS	$100,000.00	$100,000.00
15	260	Gravel Cushion	21,000	Ton	$8.00	$168,000.00
16	380	8” Nonreinforced PCC Pavement (I-90 sh)	4,800	SqYd	$23.00	$110,400.00
17	380	10.5” Nonreinforced PCC Pavement (ramps)	36,000	SqYd	$28.50	$1,026,000.00
18	380	12.5” Nonreinforced PCC Pavement (I-90)	5,800	SqYd	$30.00	$174,000.00
19	380	Dowel Bar	20,000	Each	$4.00	$80,000.00
20	450	XX" RCP Furn	1,500	Ft	$18.00	$27,000.00
21	450	XX" RCP Inst	1,500	Ft	$15.00	$22,500.00
22	450	XX" RCP Safety End Furn	20	Each	$600.00	$12,000.00
23	450	XX" RCP Safety End Inst	20	Each	$200.00	$4,000.00
24	600	Type II Field Laboratory	1	Each	$12,000.00	$12,000.00
25	621	6' Chain Link Fence with Tension Wired Top	12,500	Ft	$9.00	$112,500.00
26	632	Sign Bridge Installations	2	Each	$45,000.00	$90,000.00
27	632	Cantilever Sign Installations	2	Each	$30,000.00	$60,000.00
28	632	Misc. Permanent Signing	1	LS	$25,000.00	$25,000.00
29	633	Pavement Marking	1	LS	$25,000.00	$25,000.00
30	634	Traffic Control	1	LS	$35,000.00	$35,000.00
31	635	Roadway Lighting	1	LS	$100,000.00	$100,000.00
32	670	Frame and Grate	10	Each	$800.00	$8,000.00
33	670	Drop Inlet	10	Each	$1,200.00	$12,000.00
34	671	Junction Box	5	Each	$1,400.00	$7,000.00
35	700	Rip-Rap	100	Ton	$35.00	$3,500.00
36	730-734	Erosion Control & Restoration	1	LS	$50,000.00	$50,000.00
						$3,778,480.00
					CONTINGENCIES (20%):	$755,696.00
					SUBTOTAL:	$4,534,176.00
		STRUCTURE				
37	410	Marion Road Bridge over I-90	20,000	SqFt	$75.00	$1,500,000.00
						$1,500,000.00
					SUBTOTAL:	$1,500,000.00
					GRAND TOTAL:	**$6,034,000.00**

West Corridor
Concept Layouts



South Dakota DOT Department of Transportation	WEST CORRIDOR OPTION #1 MARION ROAD INTERCHANGE JUSTIFICATION REPORT	DATE NOV 2005 FIGURE

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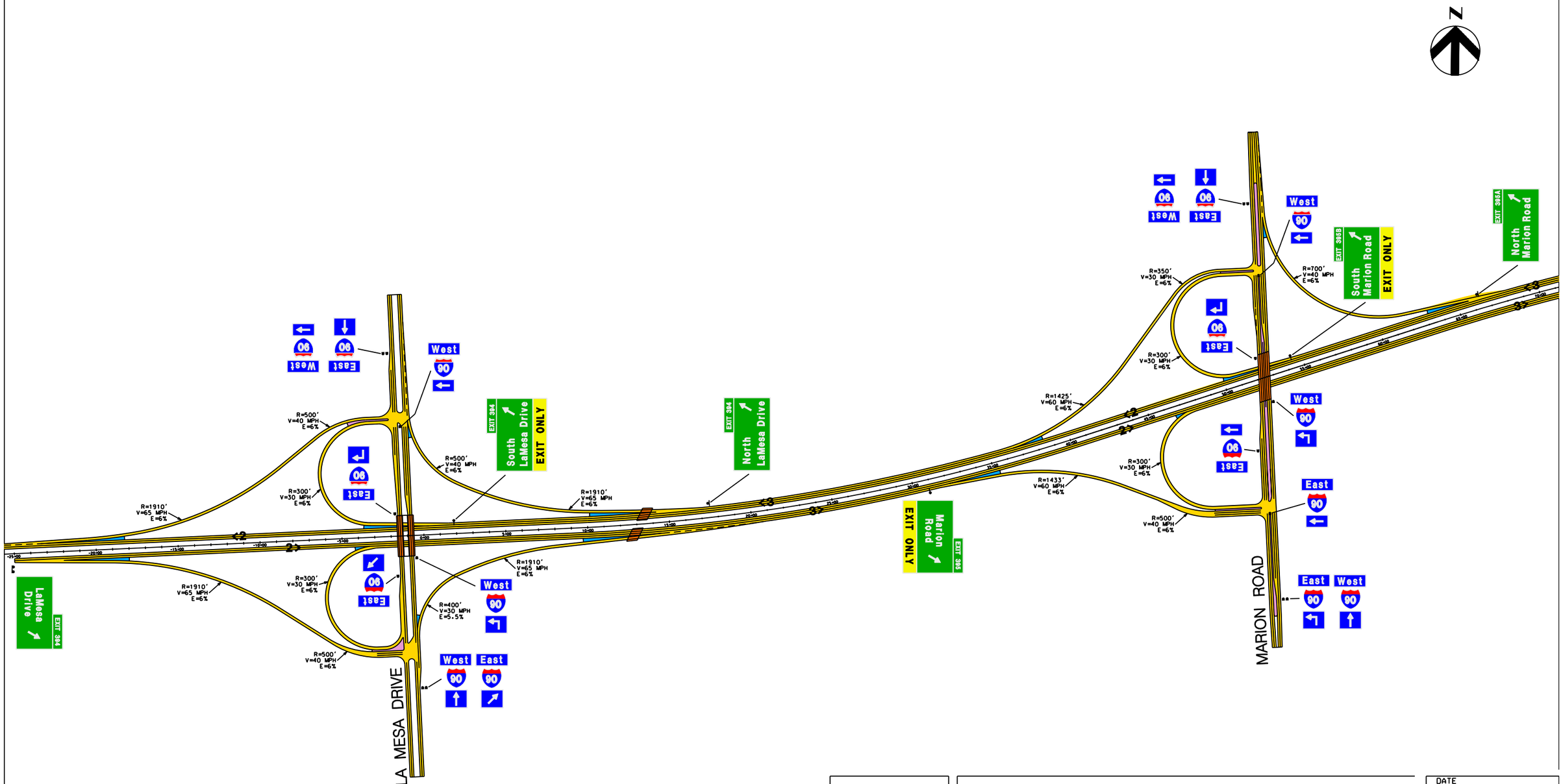
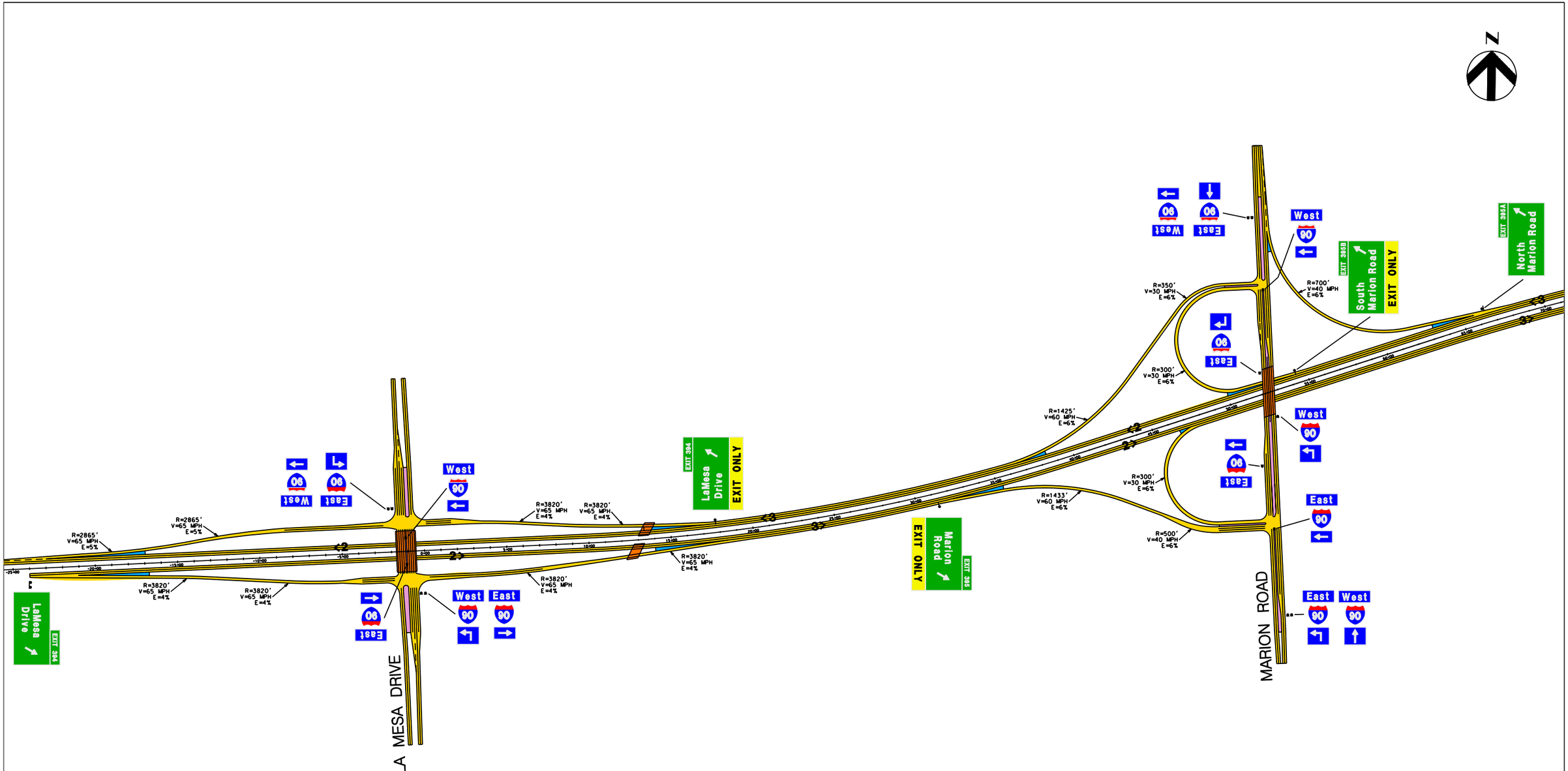


	WEST CORRIDOR OPTION #2 MARION ROAD INTERCHANGE JUSTIFICATION REPORT	DATE NOV 2005 FIGURE



	WEST CORRIDOR OPTION #3 MARION ROAD INTERCHANGE JUSTIFICATION REPORT	DATE NOV 2005 FIGURE

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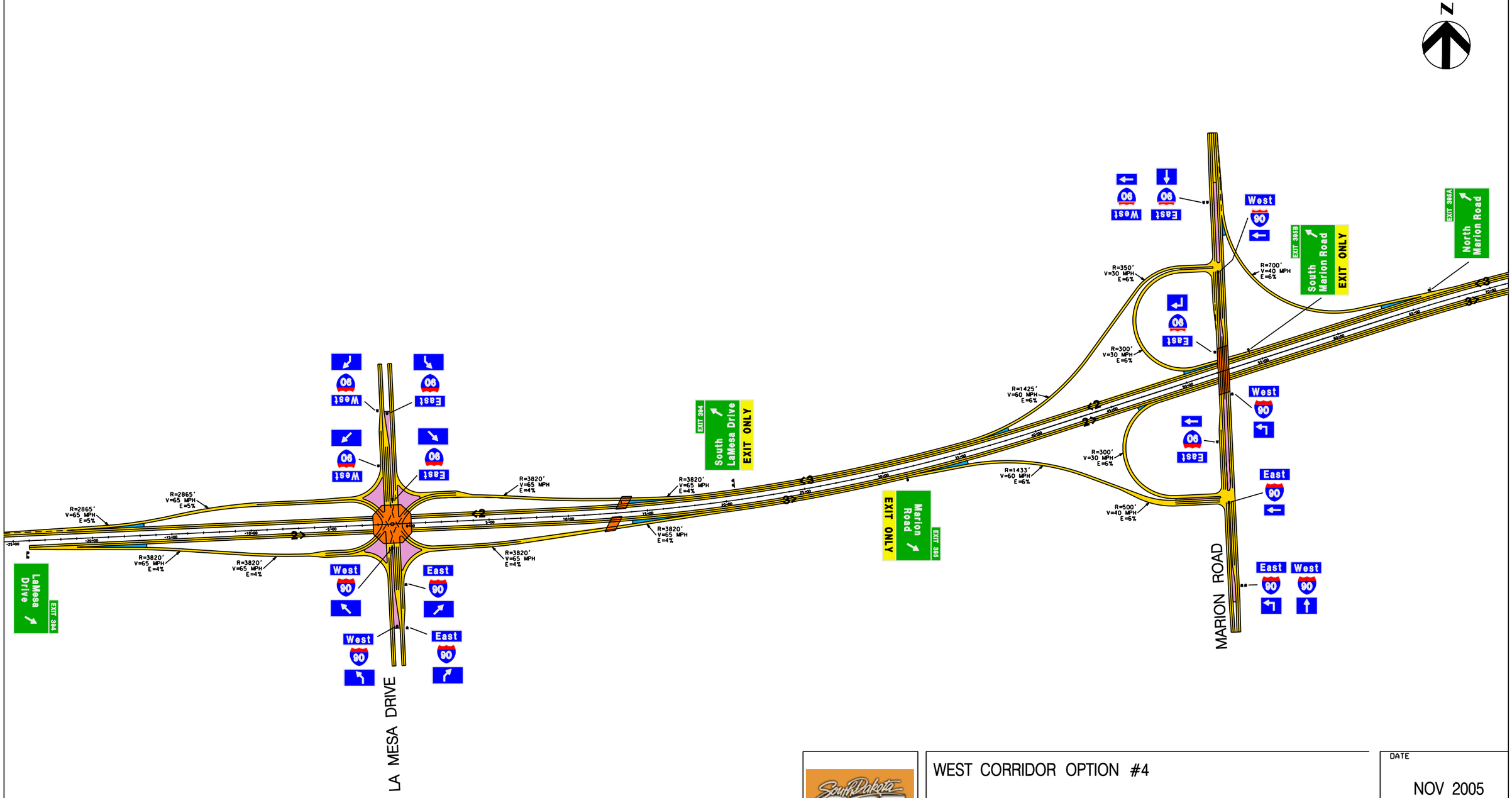

WEST CORRIDOR OPTION #4

MARION ROAD INTERCHANGE JUSTIFICATION REPORT

DATE
NOV 2005

FIGURE

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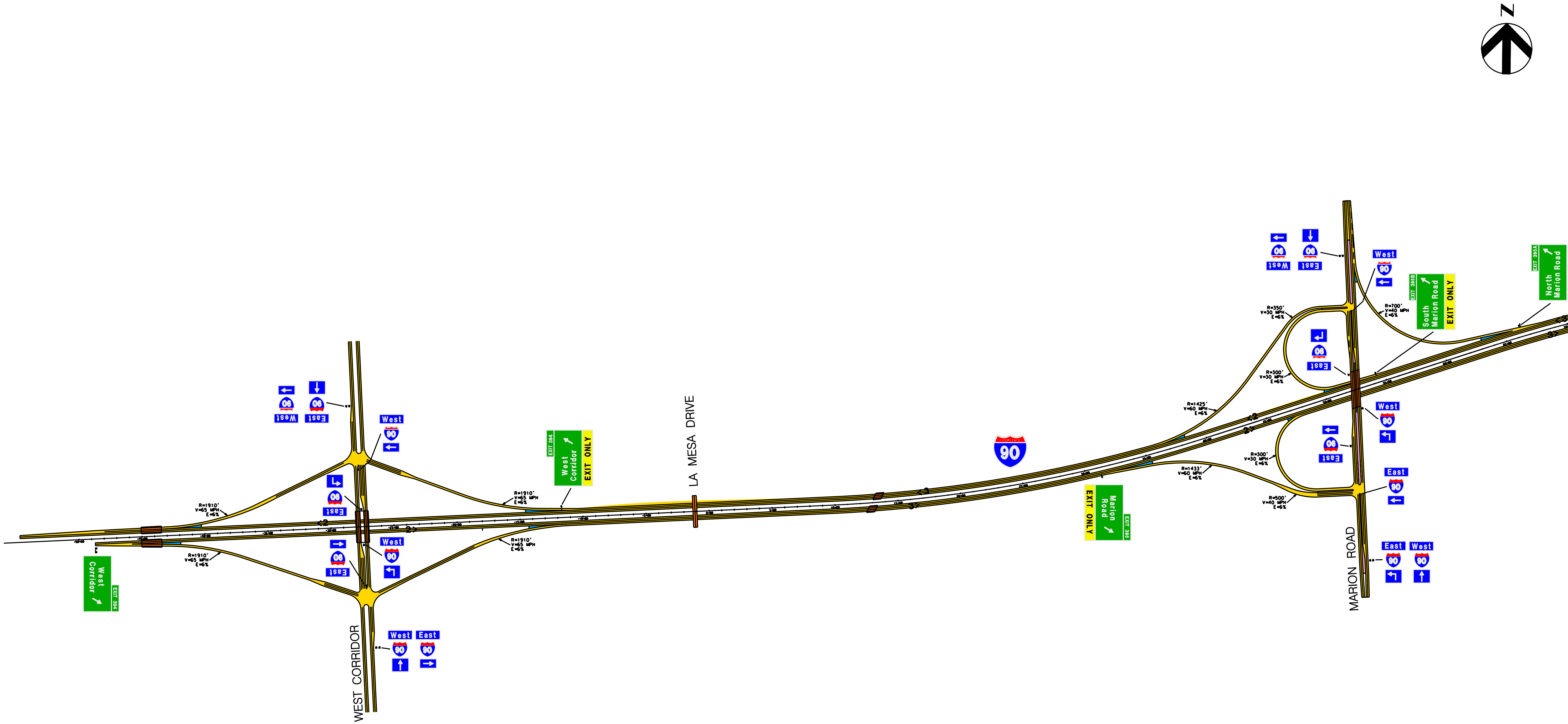

WEST CORRIDOR OPTION #5

MARION ROAD INTERCHANGE JUSTIFICATION REPORT

DATE

NOV 2005

FIGURE

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Department of Transportation	WEST CORRIDOR OPTION #6 MARION ROAD INTERCHANGE JUSTIFICATION REPORT	DATE NOV 2005 FIGURE

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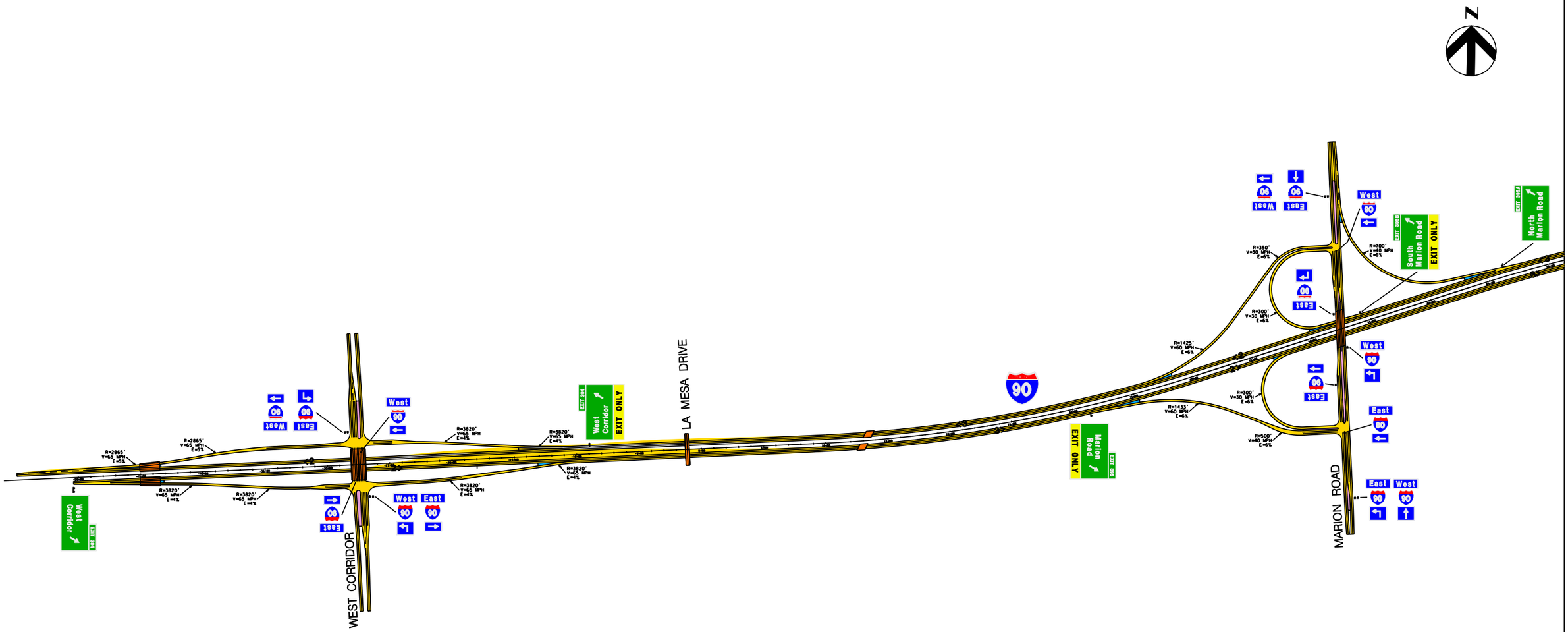


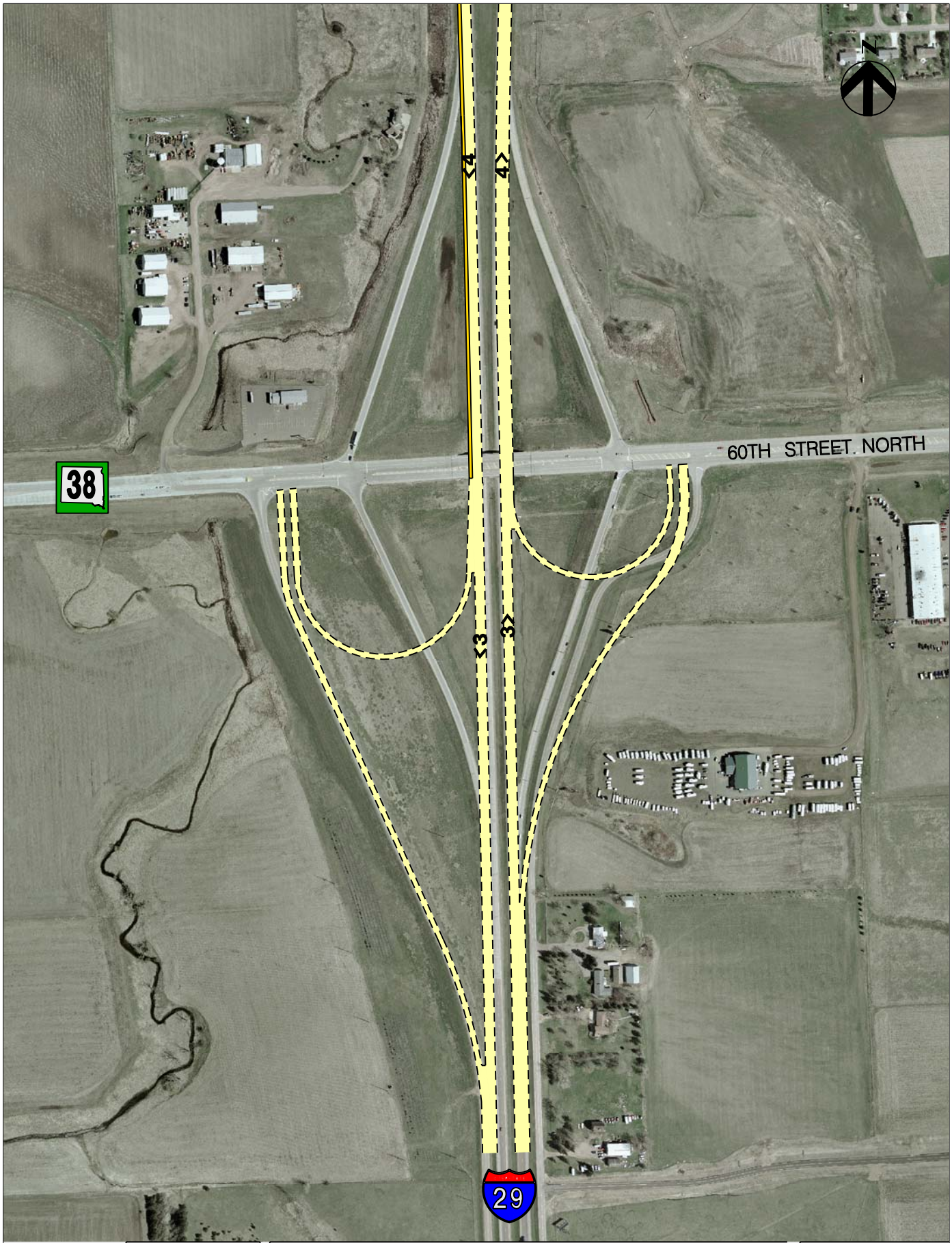
SOUTH DAKOTA DOT Department of Transportation	WEST CORRIDOR OPTION #7 MARION ROAD INTERCHANGE JUSTIFICATION REPORT	DATE NOV 2005 FIGURE

...\WEST-CORR-7.DGN 11/2/2005 2:55:38 PM

South Dakota DOT Department of Transportation	WEST CORRIDOR OPTION #8 MARION ROAD INTERCHANGE JUSTIFICATION REPORT	DATE NOV 2005 FIGURE

...\WEST-CORR-8.DGN 11/2/2005 2:56:22 PM

SD 38 & I-29
Concept Layout



I–29/HIGHWAY 38 INTERCHANGE

MARION ROAD INTERCHANGE JUSTIFICATION REPORT

DATE
NOV 2005

FIGURE

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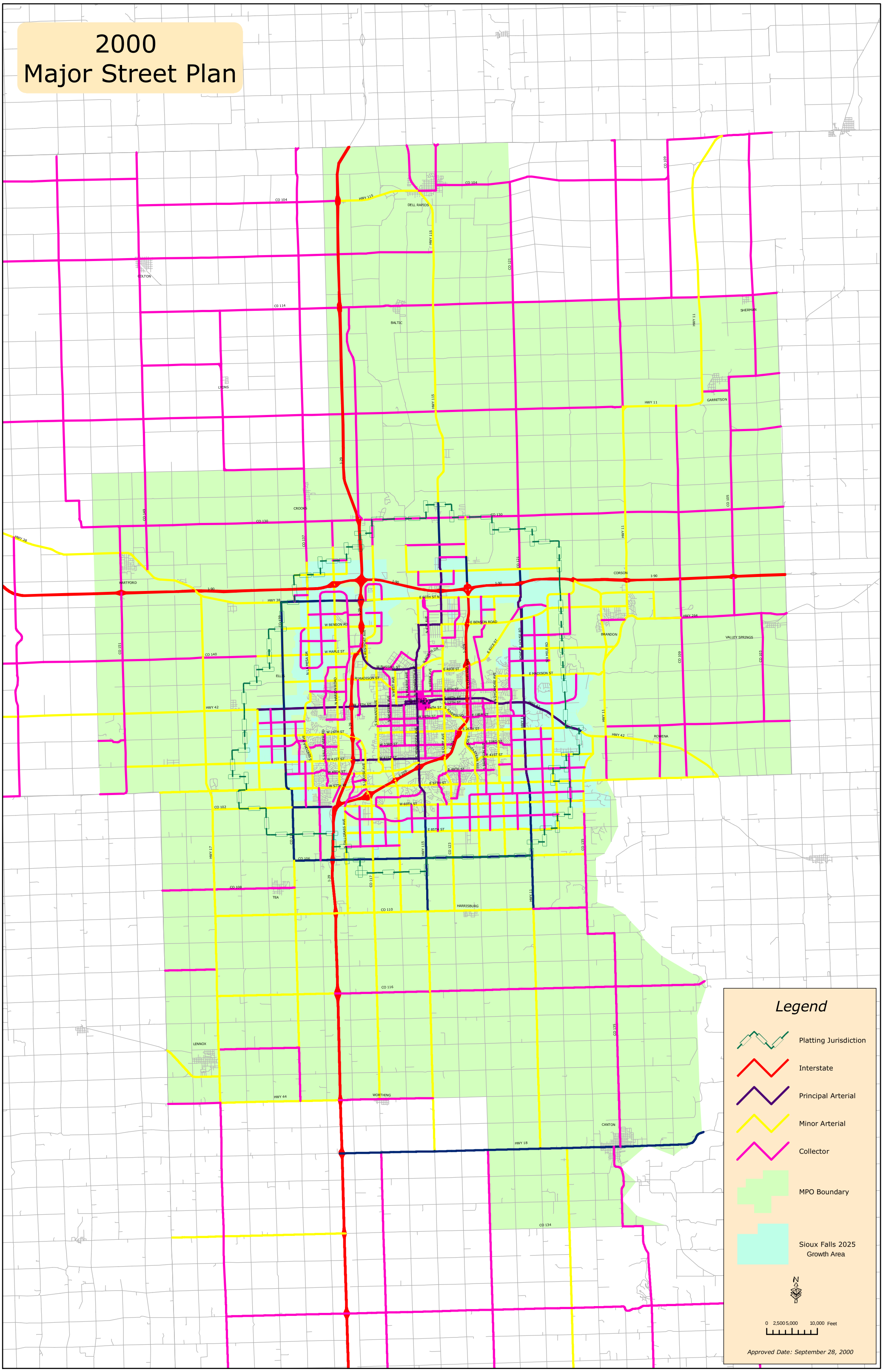
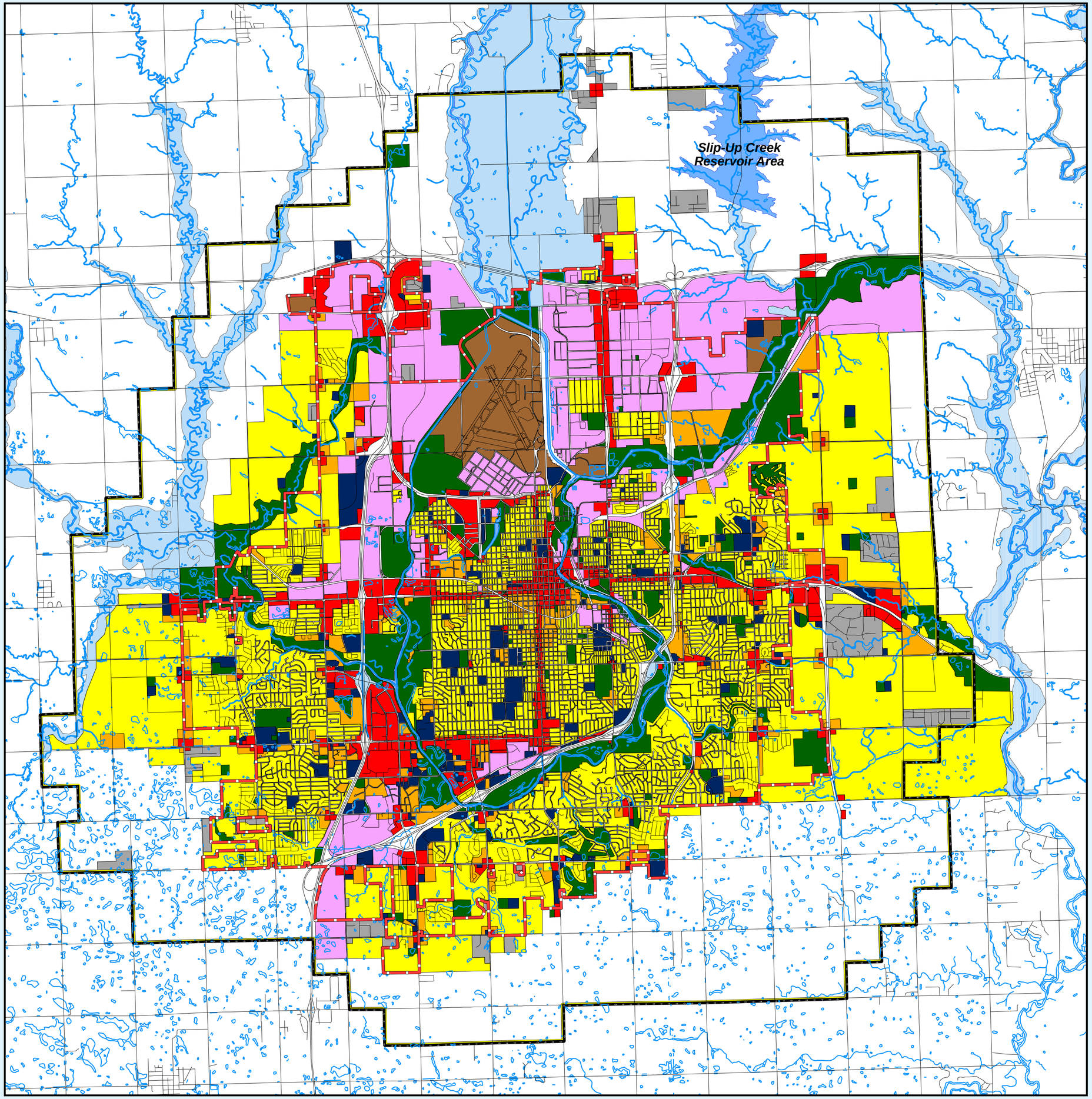
City of Sioux Falls
Planning Maps

2000
Major Street Plan



Map IV (a)

Future Land Use Plan City of Sioux Falls and 2015 Growth Areas



Legend

- Single Family Residential
- Existing Rural Residential
- Multi Family Residential
- Industrial/Economic Development
- Transportation/Utilities
- Commercial
- Office/Institutional
- Parks & Open Spaces
- 100-Year Flood Plain
- Drainageways & Wetlands
- Rivers & Lakes
- Existing City Limits
- Platting Jurisdiction

N
W E
S

CITY of SIOUX FALLS
PLANNING

DDA

City of Sioux Falls
2025 Growth Area

- Before 1970
- 1970 - 1974
- 1975 - 1979
- 1980 - 1984
- 1985 - 1989
- 1990 - 1994
- 1995 - 2000
- 2015
- 2025

I-90
HWY 38
CO 139
CO 137
W BENSON RD
CO 140
W MAPLE ST
ELLIS
N LA MESA DR
W MADISON ST
N MARION ROAD
HWY 42
TEA-ELLIS RD
W 26TH ST
S SEDONA AVE
S VALLEY VIEW RD
CO 148
W 41ST ST
W 49TH ST
S ROLLBROOK AVE
W 57TH ST
CO 102
I-29
CO 111
CO 106
CO 121
E 60TH ST N
N 4TH AVE
N WESTPORT AVE
N LOUISE AVE
W RUSSELL ST
N MORELAND
N CLIFF AVE
E RICE ST
I-229
E BENSON ROAD
E RICE ST
POWDER HOUSE RD
SIX MILE RD
BRANDON
E MADISON ST
N CLEVELAND AVE
N WEBER AVE
N WEST AVE
N PRAIRIE AVE
N MINNESOTA AVE
W 10TH ST
W 11TH ST
W 12TH ST
E 6TH ST
E 10TH ST
E 12TH ST
E 14TH ST
E 18TH ST
W 18TH ST
N SYCAMORE AVE
SD 42
SD 11
HWY 11
E 26TH ST
S WESTERN AVE
S KIWANIS AVE
W 33RD ST
S MINNESOTA AVE
E 33RD ST
S CLIFF AVE
S SOUTHEASTERN AVE
E 33RD ST
S SYCAMORE AVE
E 41ST ST
S BAHNSON AVE
E 49TH ST
S LOUISE AVE
E 57TH ST
S LEWIS AVE
W 69TH ST
E 85TH ST
HWY 115
CO 123
CO 135
CO 102
CO 106

CITY OF SIOUX FALLS GIS

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1:2500

Map Date: June 12, 2000