Interstate Modification Justification Report

Interstate 29 - Exit 86 (258th Street)

Sioux Falls, SD

IM 0293(115)86; PCN 08LT

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Executive Summary

This Interchange Modification Justification Report (IMJR) provides technical analysis related to the proposed changes to the existing Exit 86 (258th Street) interchange on Interstate 29 (I-29) in Minnehaha County, SD, just north of Sioux Falls; the interchange is also known as the Renner/Crooks interchange.

The proposed action is a reconfiguration of the existing Exit 86 interchange on Interstate 29. The action is proposed to bring the existing interchange up to current design standards and provide improved safety and operational capacity for future traffic demand for all roadway users.

The existing Exit 86 interchange was first identified as having capacity problems during a traffic impact study for the Foundation Park development. The development includes approximately 1,000 acres of warehouse, commercial, and industrial land uses located west of I-29 between I-90 and 258th Street. Subsequently, the Minnehaha County Highway 130 Corridor study and the 2020 Decennial Interstate Corridor Study, both included recommendations for interchange improvements at the Exit 86 interchange.

No adverse impacts to the Interstate highway system are expected due to the proposed changes at the interchange. The existing interstate system will convert to an urban interstate facility and be able to handle the regional growth in the metropolitan area at an acceptable level of service through the forecast year 2050.

The 258th Street arterial corridor is expected to have significant operational issues under the No Build alternative. The existing 2-lane roadway, with no existing turn lanes, cannot handle the increase in traffic demands that in some locations is over 4-times the existing traffic volumes. With such an increase in traffic, the existing minor street stop-controlled intersections will have significant delays and vehicles may begin to make riskier maneuvers and create safety concerns.

The proposed mitigations along 258th Street include expanding the roadway to a 4-lane divided facility with turn lanes at all intersections within the interchange area. Outside of the interchange area, Dawson Avenue will be the first full access intersection to the west and will be controlled by a traffic signal; Cottonwood Avenue will be converted to a Right-In/Right-Out (RI/RO) access to improve access spacing. 472nd Avenue will be converted into a ¾-access intersection to provide a safety improvement while still allowing most movements at the intersection. Trade Avenue and Kiwanis Avenue are outside of the project area and should be monitored for future traffic control changes. 471st Avenue/Marion Road is being reconstructed in 2023 to include turn lanes and a traffic signal, by 2050 the planned westbound left turn lane is expected to require lengthening, this should be done in conjunction with a future Minnehaha County project along the 258th Street corridor.

The Federal policy considerations and requirements have been addressed in the Recommendations section of this report including the two technical requirements for approval.

The proposed change is a reconfiguration of an existing interchange and improvements to the existing arterial facility. These changes will correct existing deficiencies including:

- Safety
- Operations
- Intersection Spacing
- Non-motorized facilities

Executive Summary (continued)

The proposed changes, as part of **Alternative 1**, do not result in any new access points on the Interstate Highway System. The existing diamond interchange will be reconstructed with additional capacity and 258th Street will be expanded to a 4-lane divided roadway from east of Cottonwood Avenue to 472nd Avenue to handle the future traffic growth. The analysis included additional capacity improvements between 471st Avenue/Marion Road and Cottonwood Avenue that will be constructed by others after the interchange project is complete and as future traffic volumes grow.

The concept alternatives for the interchange and changes to the crossroad arterial street satisfy current design standards and meet the transportation needs within the study area.

Mass transit reaches a limited market in South Dakota and High Occupancy Vehicle (HOV) facilities are currently not in use because they have not been shown to be economically feasible at this time. Neither mass transit nor HOV facilities will correct design deficiencies or provide sufficient relief to future travel demands within the study planning horizon year.

The operational and safety analysis contained in this study show that the proposed build alternatives are not expected to adversely affect the safety or efficiency of the interstate system. The build alternatives are also expected to improve access management and non-motorized facilities on the crossroad in the vicinity of the interchange area.

The proposal is the result of land use and transportation plans prepared within the Metropolitan Planning Organization (MPO) process, including the Sioux Falls MPO Long Range Transportation Plan. The current 2024-2027 STIP does not include the funding and construction years for this project as it is currently anticipated to be constructed in 2029.

Analysis techniques included evaluation of operational capacity using the Highway Capacity Manual (HCM), 7th Edition, techniques via the Highway Capacity Software (HCS) Version 2022/2023. Highway Safety Manual (HSM) techniques were used to the extent possible in this report; the Federal Highway Administration's (FHWA) Interactive Highway Safety Design Model (IHSDM) was utilized. Other techniques and reference materials are detailed in the Methods and Assumptions document prepared for this study and signed by the SDDOT and FHWA participants on March 17, 2022 and modified as necessary throughout the study. The Methods and Assumptions document is included in **Appendix H**.

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Interstate Modification Justification Report

Interstate 29 - Exit 86 (258th Street)

Prepared for the South Dakota Department of Transportation in cooperation with the Federal Highway Administration, Sioux Falls Metropolitan Planning Organization, Minnehaha County, City of Sioux Falls, and the City of Crooks, SD.

1 Introduction

The South Dakota Department of Transportation (SDDOT) has initiated an assessment of the existing interchange on Interstate 29 (I-29) at Exit 86 (258th Street/County Highway 130) in Sioux Falls, South Dakota; the exit is also known as the Renner/Crooks exit.

This Interchange Modification Justification Report (IMJR) is the culmination of several steps that have been completed to document the benefits and impacts associated with a range of modification alternatives for the existing interchange. This document was completed following the outline provided in the Federal Highway Administration (FHWA) August 2010 Interstate System Access Informational Guide and meets the requirements of the Access to the Interstate System policy printed in the Federal Register on August 27, 2009 and updated on May 22, 2017.

1.1 Background

SDDOT and FWHA have conducted an interchange study to evaluate the design, safety, and operations, as well as policy and funding implications, of modifying the Exit 86 (258th Street) interchange along I-29.

The existing interchange provides access to a rural collector roadway that currently carries a low volume of commuting traffic that is anticipated to rapidly urbanize as Sioux Falls expands north. The IMJR is being prepared in conjunction with applicable environmental reviews and analyses and will provide the traffic analysis for the selection of the preferred alternative design.

1.2 Purpose

The purpose of the project is to improve travel mobility and safety at the I-29 interchange with Exit 86 (258th Street) and along the 258th Street corridor for all roadway users. The transportation planning process will be used to shape the project's objectives and purpose and need in the National Environmental Policy Act (NEPA) process.

The existing Exit 86 interchange was first identified as having safety and capacity problems during a traffic study for the Foundation Park development, located west of I-29 between I-90 and 258th Street. In addition, Minnehaha County studied the 258th Street/County Highway 130 corridor in 2021 to determine potential short- and long-term solutions for the corridor.

The SDDOT then studied the interchange as part of the 2020 Decennial Interstate Corridor Study (DICS), which identified the need for improvements at the interchange.

The 2020 study recommended full reconstruction of the interchange due to major capacity constraints on the existing facility; the study did not mention any potential widening of I-29 in the study area by the forecast year 2050. Overall, the interchange need ranked #24 out of the 151 studied interchanges. The study provided two high-level solutions for the existing interchange included traditional widening of the existing diamond interchange and reconstruction to a single point urban interchange (SPUI).

1.3 Project Location

The subject interchange is at mileage reference marker 86 on I-29, located north of Sioux Falls, SD and is the exit ramp for both the City of Crooks and unincorporated community of Renner. The interchange is approximately two miles north of the I-29/I-90 system interchange and eight miles south of the next service interchange at Exit 94 (Baltic).

This location is within the Sioux Falls Metropolitan Planning Organization (MPO) and within the City of Sioux Falls future growth area. The 258th Street corridor is primarily a commuter route to access I-29 from the land uses surrounding Crooks and Renner.

258th Street is a two-lane rural collector through the project area; there are currently no turn lanes provided at any of the study intersections along the corridor. Major intersections include 471st Avenue/N Marion Road, Cottonwood Avenue, the I-29 ramp terminal intersections, and Kiwanis Avenue; however, there are more local roadway intersections and driveway access locations along the corridor.

1.4 Logical Termini

As the existing interchange is in the existing rural area of the Sioux Falls MPO boundary, the project termini extend relatively close to the study interchange. The project study area will include just over 4-miles of interstate freeway and 1-½ miles of arterial roadways. The study area is shown in **Figure 1**, and **Figure 2** shows the eight study intersections.

- Northern Limits along I-29: the closest service interchange to the north is Exit 94 (Baltic/Colton), this interchange is approximately 8-miles north of Exit 86. Due to the rural nature of I-29 north of Exit 86, the northern terminus for the study area was determined to be at the Sioux Falls MPO boundary, which is located at 256th Street and approximately 2-miles north of Exit 86.
- Southern Limits along I-29: the closest interchange to the south is the system interchange at I-90, this interchange is approximately 2-¼ miles south of Exit 86. Therefore, this interchange is a reasonable southern terminus for this study area.
- Western Limits along 258th Street: the interchange project only intends to reconstruct 258th Street between Cottonwood Avenue and Trade Avenue; however, the Foundation Park development will impact the corridor from 471st Avenue/N Marion Road to the interchange. Therefore, the western terminus of the study area along 258th Street is the intersection of 471st Avenue/N Marion Road.
- Eastern Limits along 258th Street: the interchange project only intends to reconstruct 258th Street between Cottonwood Avenue and Trade Avenue; however, the reconstruction of the interchange could impact the adjacent intersection. Therefore, the eastern terminus of the study area along 258th Street is the intersection of Kiwanis Avenue.

Figure 1 – Project Study Area

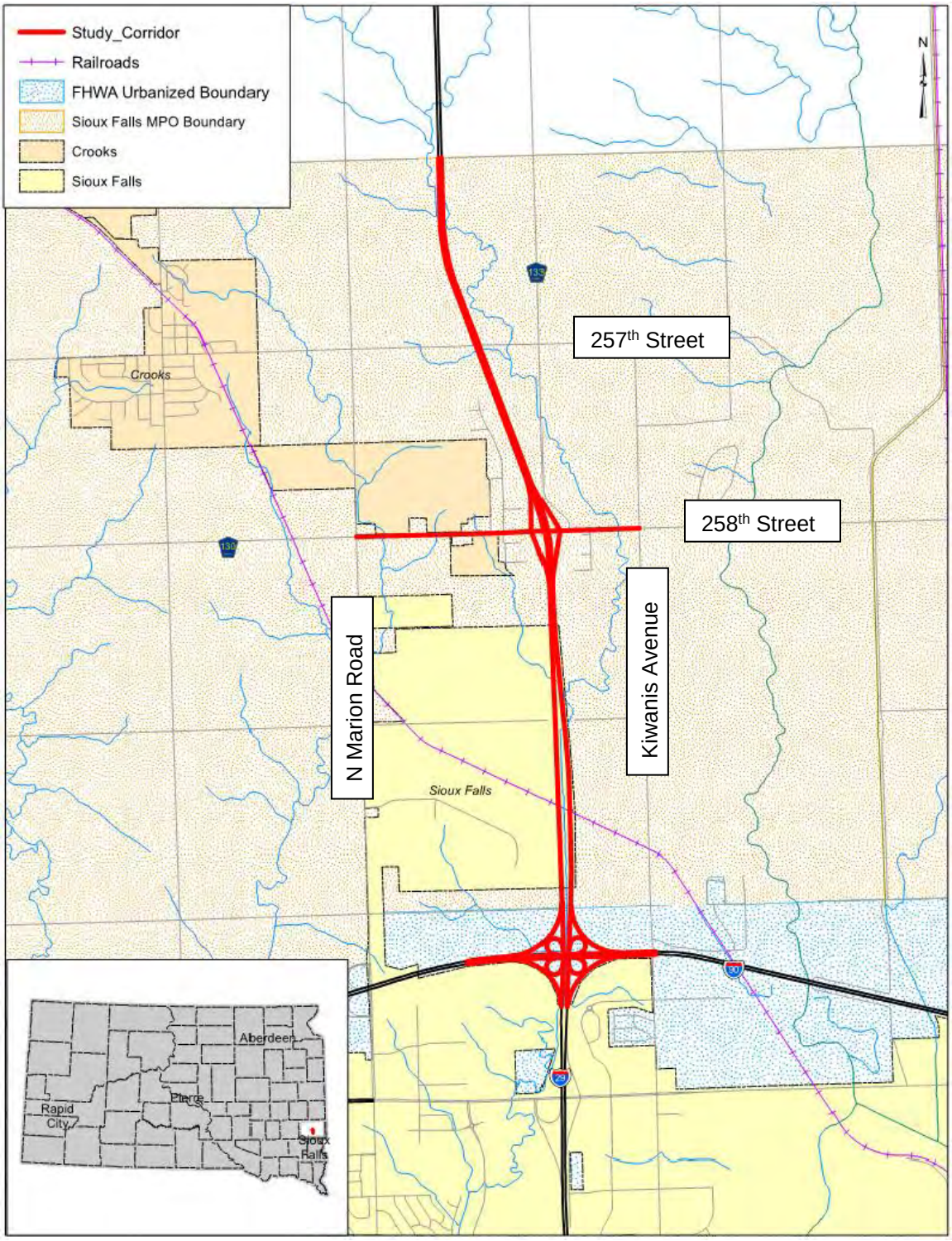
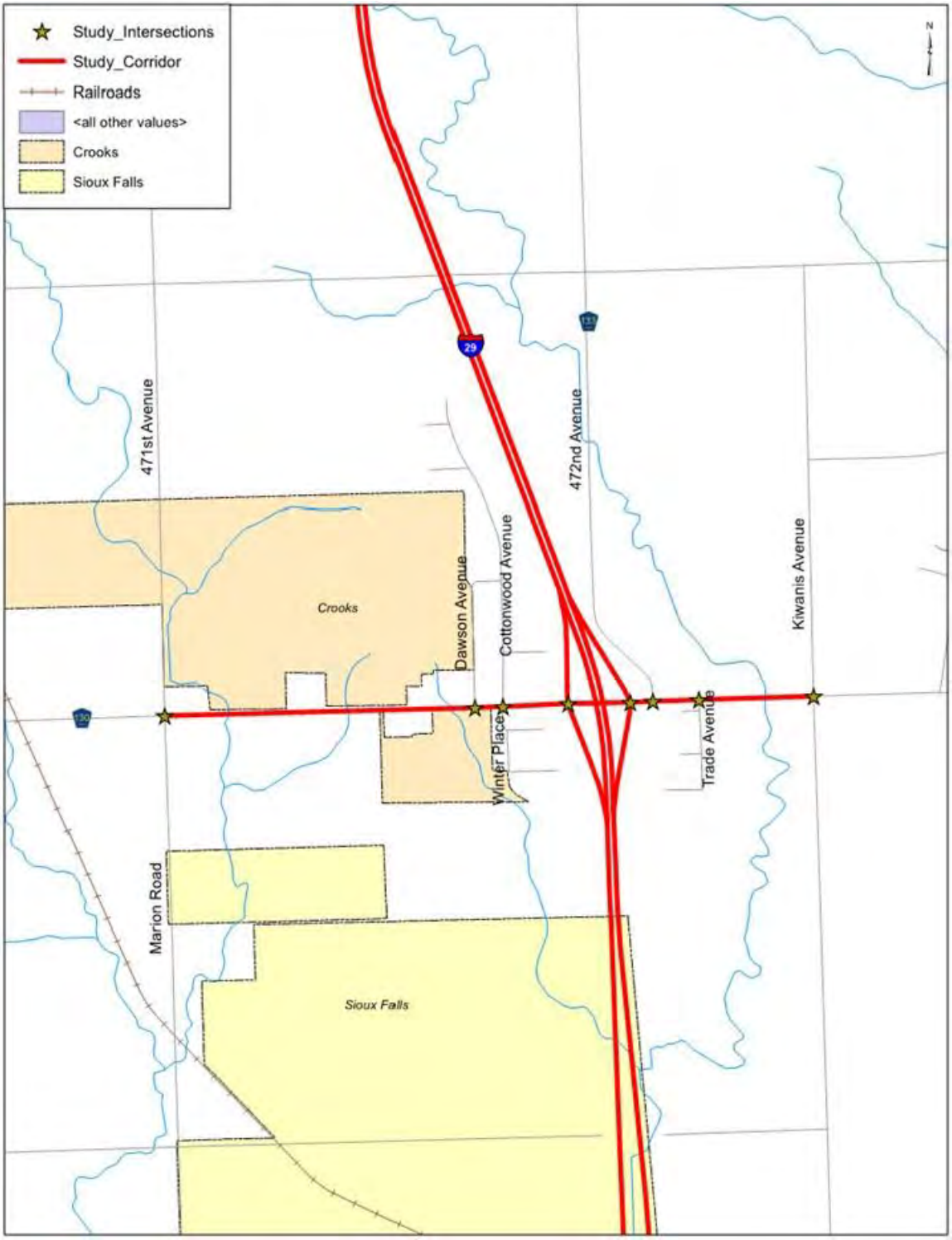


Figure 2 – Project Study Intersections



2 Methodology

This Interchange Modification Justification Report (IMJR) demonstrates that the action associated with implementing the proposed project does not have any fatal flaws. Demonstrating that no fatal flaws exist does not endorse the action, but rather allows for the conclusion that the identified access alternatives are not flawed from the perspective of traffic operations and safety, as required by FHWA. Fatal flaws would include a proposed interchange justification that:

- Does not provide full access to public roadway.
- Would negatively impact interstate facility traffic operations and cannot be reasonably mitigated.
- Would negatively impact interstate facility/cross street safety and cannot be reasonably mitigated.
- Conflicts with, or is inconsistent with, local and regional plans.
- Would create the potential for environmental consequences which could not be mitigated.

This IMJR, including the analysis and documentation, was developed through the following steps:

- Establish an appropriate study area; determined in the Methods and Assumption document and represented in the previous **Figure 1**.
- Data gathering; review available traffic volume data, crash history, land use, and any other additional information.
- Review previous interstate and/or traffic studies, and coordinate with preparation of the environmental studies as part of the NEPA process, including the feasible alternatives and the best technical solution developed through the IMJR.
- Determine existing and future operational and safety characteristics of both the interstate and local cross street facilities to address FHWA requirements for interstate access modifications.
- Prepare and deliver the IMJR.

Traffic forecasts were prepared using output from the regional travel demand model maintained by the City of Sioux Falls for the MPO. Analysis techniques included evaluation of operational capacity using the Highway Capacity Manual (HCM), 6th Edition, techniques via the Highway Capacity Software (HCS) Version 2022. Highway Safety Manual (HSM) techniques were used to the extent possible in this report.

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

This IMJR was developed with oversight from FHWA, SDDOT and other project partners following the criteria outlined in the Methods and Assumptions (M&A) document for the study. The final M&A document is attached in **Appendix H**.

A Study Advisory Team (SAT) was set up and includes representatives of the SDDOT, FHWA, Minnehaha County, Sioux Falls MPO, City of Sioux Falls, and the City of Crooks. The SAT was formed to guide the study through completion.

3 Existing Conditions

The study area consists of two interchanges along I-29, including the Exit 86 (258th Street) service interchange and the I-90 (Exit 84) system interchange; this includes over 4-miles of I-29. Along the cross street, a total of approximately 1 ½ -miles of roadway, including eight study intersections, were evaluated.

Within the study area, the transportation system has functionally classified roadways from local streets through interstate routes.

3.1 Demographics

The Sioux Falls metropolitan area enjoys a strong economy and sustained population growth. During the period 1980 – 2020 the population grew at a steady rate of between 2% and 2.5% per year.

The 2020 Census data estimated a current population of 192,517 for the City of Sioux Falls, 1,362 for the City of Crooks, and 347 for the Census Designated Place of Renner. The Metropolitan Statistical Area (MSA) had a population of 276,730 in the 2020 Census; this area includes the four counties surrounding the City of Sioux Falls.

3.2 Existing Land Use

The study area is currently comprised of a mix of different land uses including commercial, industrial, and residential. While most of the study area is rural in nature, 258th Street is the northern limit of the planned Sioux Falls growth area.

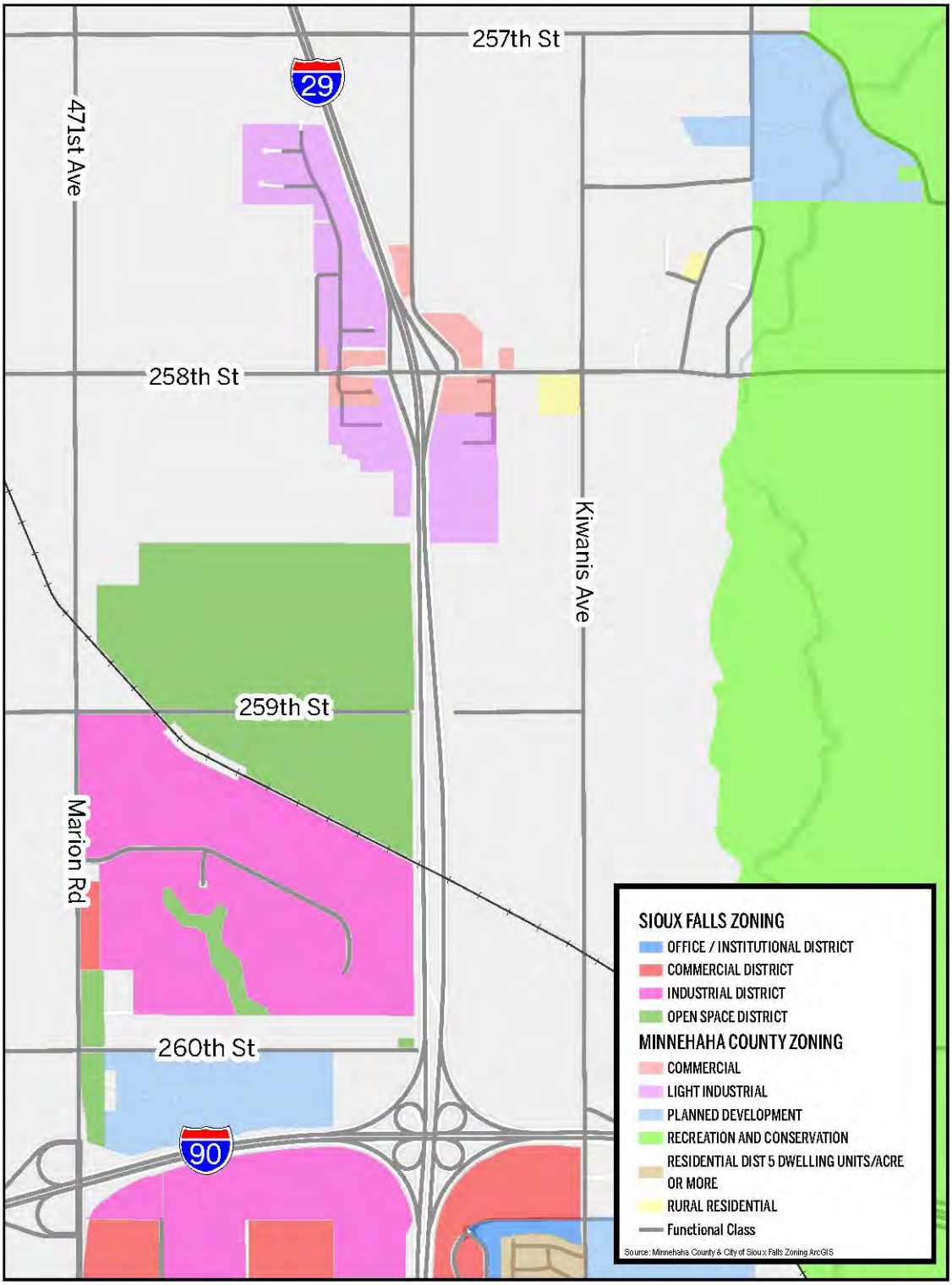
Along 258th St, there is a mix of commercial and industrial land uses directly abutting the interchange. Residential properties are scattered along the corridor, with the City of Crooks to the west and the unincorporated community of Renner to the east.

Foundation Park is a large development project with approximately 1,000 acres of developable land in the northwest quadrant of I-90 and I-29. The park's area is bound by 260th St to the south, I-29 to the east, N Marion Road to the west, and CR-130 to the north. The site is zoned for industrial usage and construction for a mix of manufacturing and warehousing development has already begun and some businesses will soon be operational.

The study area Traffic Analysis Zones (TAZ's) currently reflect the existing population and employment inputs. The future year TAZ's show increases in population and employment inputs in the surrounding land, including Foundation Park.

The current City of Sioux Falls and Minnehaha County zoning for the study area is represented in **Figure 3**; data from the City of Crooks was unavailable.

Figure 3 – Existing Zoning Map



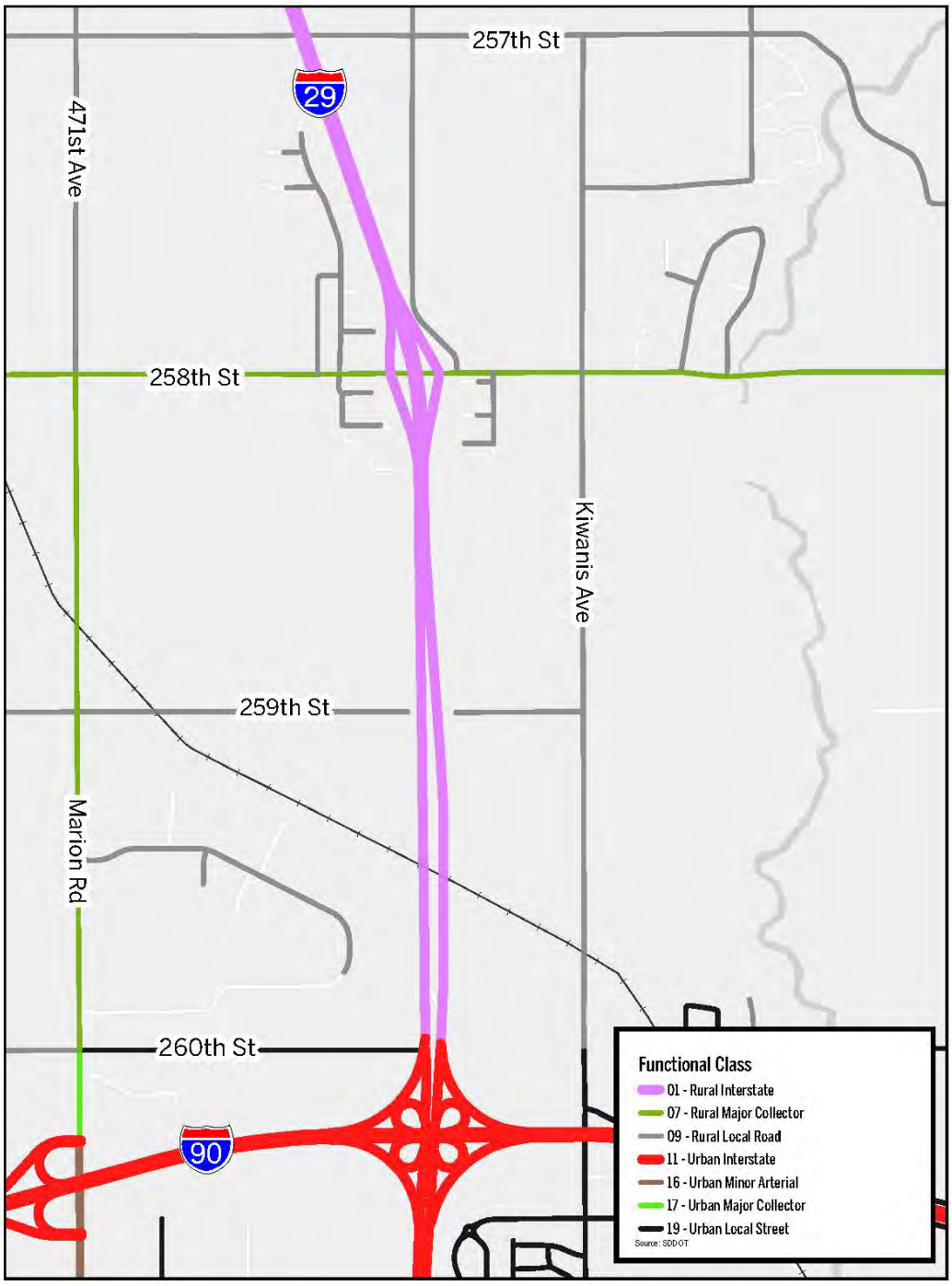
3.3 Existing Roadway Network

The existing roadway network, represented by their Federal functional classification, surrounding the project area is shown in **Figure 4**.

The existing major roadways within the study area include:

- **I-29** – Rural Interstate facility, currently two continuous lanes in each direction; south of I-90, I-29 is an urban interstate facility.
- **I-90** – Urban Interstate facility, currently two continuous lanes in each direction.
- **258th Street (CR-130**) – Rural Major Collector, two-lane undivided corridor with no turn lanes provided at any intersection. Posted speed limit varies from 45 mph to 55 mph.
- **471st Avenue (N Marion Road)** – Rural Major Collector south of 258th Street, Local Roadway north of 258th Street. Between I-90 and 259th Street, 471st Avenue is a 2-lane undivided corridor with turn lanes provided at some intersections; north of 259th Street, 471st Avenue is currently an unpaved, gravel roadway. Posted speed limit of 40 mph.
- **Dawson Avenue** – Private local roadway, currently an unpaved, gravel roadway. Posted speed limit of 25 mph.
- **Cottonwood Avenue** – Local Roadway, two-lane undivided corridor with no turn lanes provided at the CR-130 intersection. Posted speed limit of 25 mph.
- **I-29 Interchange Ramps** – The southbound and northbound I-29 ramp connections to CR-130 are single-lane ramps with no turn lanes provided at CR-130/258th Street.
- **472nd Avenue** – Local Roadway, two-lane undivided corridor with no turn lanes provided at the CR 130 intersection. Posted speed limit of 55 mph.
- **Trade Avenue** – Local Roadway, two-lane undivided corridor with no turn lanes provided at the CR 130 intersection.
- **Kiwanis Avenue** – Local Roadway, two-lane undivided corridor with no turn lanes provided at the CR 130 intersection. Posted speed limit of 55 mph.

Figure 4 – Existing Federal Functional Classification



3.4 Alternative Travel Modes

Travel within the study area is primarily by automobile. Pedestrian and bicycle facilities are not provided throughout the study area. There are currently no municipal transit routes that serve this area.

3.5 Interchanges

The following is a description and aerial photograph of the two existing interchange within the entire project study area.

3.5.1 I-29 at Exit 86 (258th Street)

This service interchange along I-29 is a standard diamond configuration as shown in **Figure 5**. All ramp connections are currently single lane ramps at the merge and diverge locations with I-29. At this interchange, 258th Street travels over I-29 on a single, 2-lane bridge structure.

Both ramp terminal intersections are controlled with stop signs on the minor ramp approaches with approximately 760 feet between the intersections; the adjacent intersections are:

- 472nd Avenue (minor street stop control), east of the interchange approximately 270 feet.
- Cottonwood Avenue (minor street stop control), west of the interchange approximately 780 feet.

Figure 5 – Existing I-29 Exit 86 Service Interchange

3.5.2 I-29 at I-90 System Interchange

This system interchange is a standard cloverleaf interchange configuration as shown in **Figure 6**. All ramp connections are currently single lane ramps at the merge and diverge locations with I-29 and I-90. At this interchange, I-90 travels over I-29 on two separate, 3-lane bridge structures.

All movements at the cloverleaf interchange are free flowing, with the four loop ramp connections posted with a 25-mph advisory plate. Auxiliary lanes are provided at various locations at the interchange, including:

- Between the loop ramp entrances and exits.
  - The exception is northbound I-29 between the eastbound I-90 entrance and westbound I-90 exit. The 3-rd continuous lane along I-29 extends through the cloverleaf interchange; this creates a standard merge and diverge at these loop ramp connections with only approximately 675 feet between them.
- I-90 has full auxiliary lanes between N Marion Road and I-29.
- I-29 has auxiliary lanes south of I-90 that become continuous lanes through Sioux Falls.

Figure 6 – Existing I-29 at I-90 System Interchange

3.6 Existing Data

The data used to create this document came from the participating agencies including the SDDOT, Sioux Falls MPO, and the City of Sioux Falls. The most recent data available was used in the analysis including traffic counts, crash data, and the travel demand forecast model.

The freeway mainline and ramp traffic data was collected in May 2022 by the SDDOT. In addition, the weigh-in-motion (WIM) site #806, located north of Exit 86, was used to determine the vehicle fleet compositions, and provide detailed 15-minute data. Intersection turning movement counts were collected at all eight study intersections during the same days in May 2022.

The existing freeway traffic counts and intersection turning movements at all study intersections can be found in **Appendix G** of the I-29 Exit 86 Interchange Modification Study – Traffic Forecasts memorandum.

3.7 Operational Performance

A traffic operations study was conducted for the project area using 2022 traffic volumes. A total of eight existing intersections and twelve ramp junctions were analyzed within the interchange study area.

Analysis techniques included evaluation of operational capacity using the Highway Capacity Manual (HCM), 7th Edition, techniques via the Highway Capacity Software (HCS) Version 2022.

It should be noted that the HCM does not recommend using the merge and diverge analysis procedures when a full-length auxiliary lane is provided; the methodologies were derived from acceleration and deceleration lengths of 1,500 feet or less. Page 14-30 of the HCM 7th Edition says:

- The freeway segment downstream of the on-ramp or upstream of the off-ramp is simply considered to be a basic freeway segment with an additional lane.
- The case of an on-ramp followed by an off-ramp lane drop may be a weaving segment and should be evaluated with the procedures of Chapter 13, Freeway Weaving Segments.

Therefore, for this analysis both the basic lane and weaving segment analysis were conducted on all freeway mainline segments that include full auxiliary lanes between ramp connections.

3.7.1 Level of Service Criteria

The freeway and arterial Level of Service (LOS) criteria presented in the following tables were used to evaluate the traffic operations in the study area; the information is from the SDDOT Road Design Manual (Chapter 15) and based on the Highway Capacity Manual (HCM).

The SDDOT has established a minimum of LOS B on rural interstate highway corridors and LOS C on urban interstate highway corridors, including ramp terminal intersections.

The City of Sioux Falls and Minnehaha County has established a minimum of LOS D on arterial unsignalized and signalized intersections and any intersection movement at LOS E or better.

Table 1 – Freeway – LOS Criteria

Level of Service (LOS)	Description	Density (pc/mi/ln)
A	Free-flow operation	≤ 11.0
B	Reasonably free-flow operation; minimal restriction on lane changes & maneuvers	> 11.0 to 18.0
C	Near free-flow operation; noticeable restriction on lane changes & other maneuvers	> 18.0 to 26.0
D	Speed decline with increasing flows; significant restriction on lane changes & other maneuvers	> 26.0 to 35.0
E	Facility operates at capacity; very few gaps for lane changes & other maneuvers; frequent disruptions & queues	> 35.0 to 45.0
F	Unstable flow; operational breakdown	> 45.0

Source: SDDOT Road Design Manual (Table 15-1)

Table 2 – All-Way Stop & Two Way Stop Intersection Control – LOS Criteria

Level of Service (LOS)	Description	Un-signalized Delay (sec/veh)
A	Queuing is rare	≤ 10.00
B	Occasional queueing	> 10.0 to 15.0
C	Regular queueing	> 15.0 to 25.0
D	Queue lengths increase	> 25.0 to 35.0
E	Significant queueing	> 35.0 to 50.0
F	Volume to capacity ratio approaches 1.0; very long queues	> 50.0

Source: SDDOT Road Design Manual (Table 15-6 and 15-7)

Table 3 – Signalized Intersection Control – LOS Criteria

Level of Service (LOS)	Description	Signalized Delay (sec/veh)
A	Very minimal queueing; excellent corridor progression	≤ 10.00
B	Some queuing; good corridor progression	> 10.0 to 20.0
C	Regular queueing; not all demand may be serviced on some cycles (cycle failure)	> 20.0 to 35.0
D	Queue lengths increased; routine cycle failures	> 35.0 to 55.0
E	Majority of cycles fail	> 55.0 to 80.0
F	Volume to capacity ratio approaches 1.0; very long queues, almost all cycles fail	> 80.0

Source: SDDOT Road Design Manual (Table 15-5)

3.7.2 Existing Operations

The summation of the existing traffic operations analysis show that mainline I-29 operates acceptably. All existing ramp junctions and segment analysis operate at a LOS B or better during the AM and PM peak hours. In addition, all eight study intersections operate at a LOS B or better at all the minor street stop approaches.

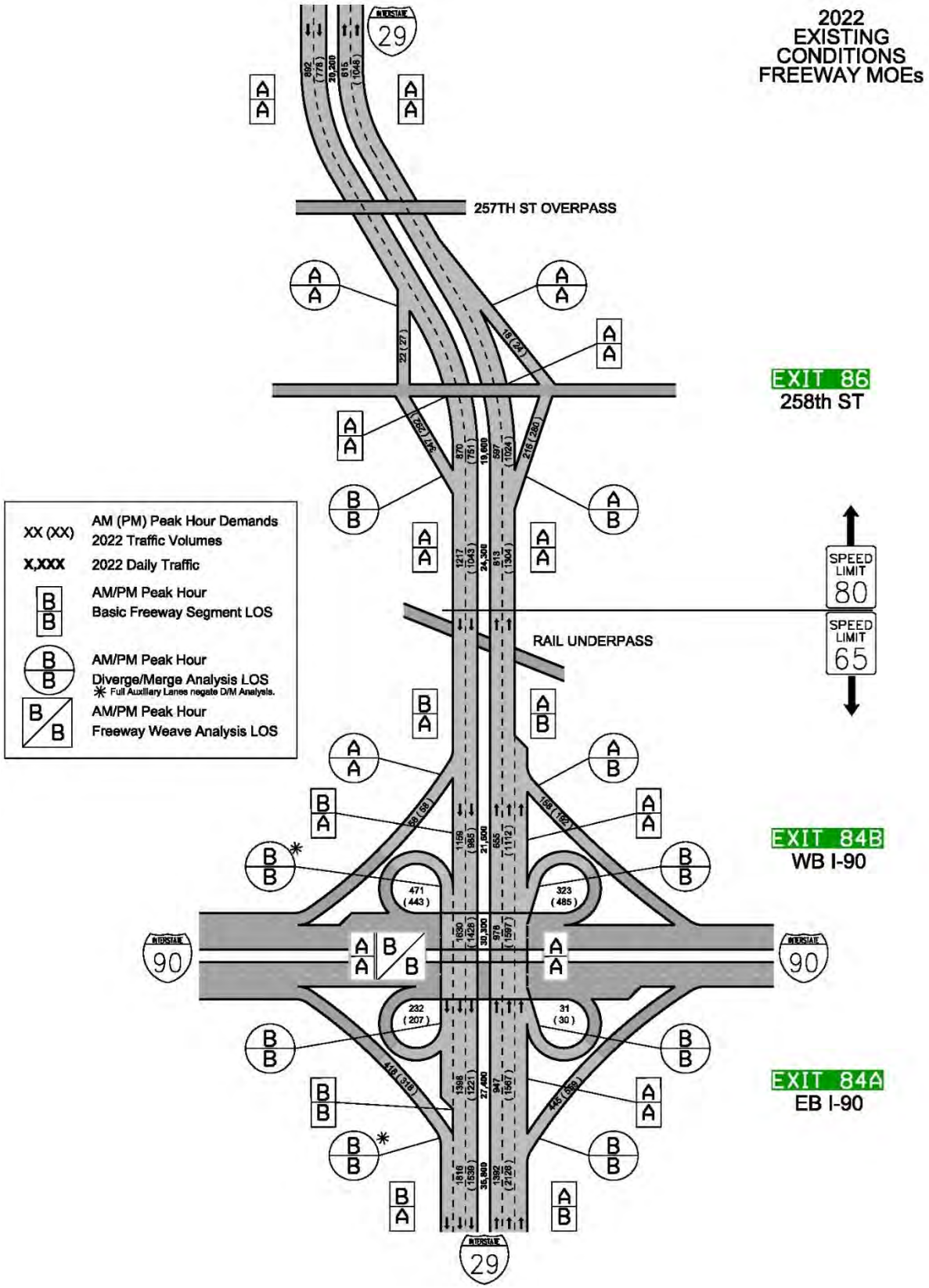
Results for the individual freeway segments and ramp junctions of I-29 are shown in **Table 4** as well as **Figure 7**. **Appendix B** includes all HCS summary reports for the existing condition.

Table 4 – Existing 2022 Freeway Operation Results

Road	Description	Analysis Type	AM Peak LOS	PM Peak LOS
Northbound I-29	South of I-90	Basic	B	A
	Eastbound I-90 Exit Ramp	Diverge	B	B
	Between EB I-90 Ramps	Basic	A	A
	Eastbound I-90 Entrance Loop Ramp	Merge	B	B
	Between I-90 Loop Ramps (no auxiliary lane)	Basic	A	A
	Westbound I-90 Exit Loop Ramp	Diverge	B	B
	Between WB I-90 Ramps	Basic	A	A
	Westbound I-90 Entrance Ramp	Merge	A	B
	North of I-90 (Urban Section)	Basic	A	B
	South of Exit 86 (Rural Section)	Basic	A	A
	Exit 86 Exit Ramp	Diverge	A	B
	Between Exit 86 Ramps	Basic	A	A
	Exit 86 Entrance Ramp	Merge	A	A
	North of Exit 86	Basic	A	A
Southbound I-29	North of Exit 86	Basic	A	A
	Exit 86 Exit Ramp	Diverge	A	A
	Between Exit 86 Ramps	Basic	A	A
	Exit 86 Entrance Ramp	Merge	B	B
	South of Exit 86 (Rural Section)	Basic	A	A
	North of I-90 (Urban Section)	Basic	B	A
	Westbound I-90 Exit Ramp	Diverge	A	A
	Between WB I-90 Ramps	Basic	B	A
	Westbound I-90 Entrance Loop Ramp	Merge**	B	B
	Between I-90 Loop Ramps	Basic	A	A
		Weave	B	B
	Eastbound I-90 Exit Loop Ramp	Diverge	B	B
	Between EB I-90 Ramps	Basic	B	B
	Eastbound I-90 Entrance Ramp	Merge**	B	B
	South of I-90	Basic	B	A

Notes: **Merge Analysis includes full auxiliary lane; downstream basic lane analysis controls LOS.

Figure 7 – Existing 2022 Freeway Operations Summary



The project study area also includes eight arterial intersections along the 258th Street corridor. Currently, all intersections are controlled with minor street stop control and no turn lanes are provided at any of the intersections.

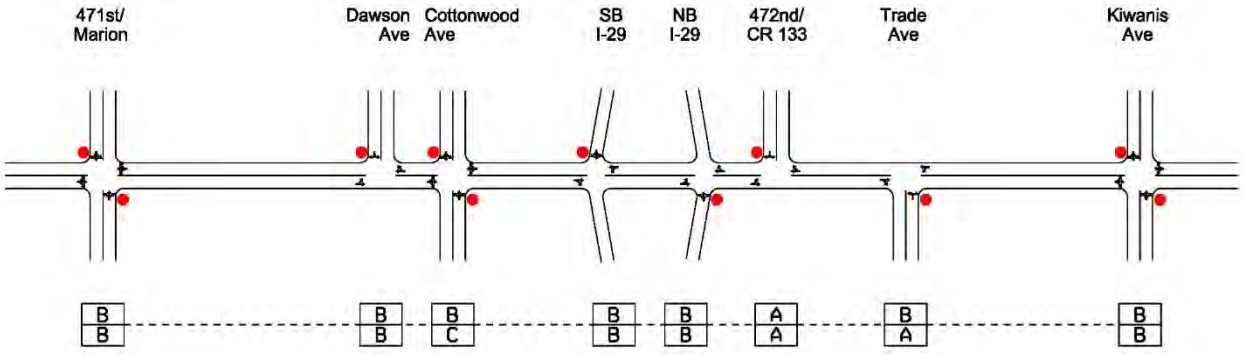
Results for the existing study intersections are shown in **Table 5** as well as **Figure 8**.

Table 5 – Existing 2022 Arterial Intersection Results

258th Street at:	Control Type	AM Peak Hour	PM Peak Hour
471st/Marion Road	Minor Stop	B	B
Dawson Avenue	Minor Stop	B	B
Cottonwood Avenue	Minor Stop	B	C
I-29 SB Ramp	Minor Stop	B	B
I-29 NB Ramp	Minor Stop	B	B
472nd Avenue	Minor Stop	B	A
Trade Avenue	Minor Stop	B	B
Kiwanis Avenue	Minor Stop	B	B

Notes: Average Intersection LOS shown, individual movements and/or approaches may differ. Minor Street Stop Control intersection LOS represents the worst minor approach LOS, major road would operate at LOS A.

Figure 8 – Existing 2022 Arterial Intersection Summary



3.8 Existing Safety Issues

A comprehensive safety analysis was conducted for the entire project area for this study. The analysis included the most recent 5-years of crash history available from the SDDOT. This included the five calendar years of 2017 through 2021.

The crash records were segregated into crashes for each of the study intersections and the arterial and freeway segments. The type and severity of the crashes were reviewed, and crash rates and critical rates were calculated for each.

Crash severity is comprised of 5 separate types including fatal, an incapacitating injury (Severity A), a non-incapacitating injury (Severity B), a possible injury (Severity C), or a property damage only (PD) crash; wild animal hits are coded in a separate category.

Crash rates are expressed as the number of crashes per million entering vehicles (MEV) at an intersection or along a segment. The critical crash rate is a statistical value that is unique to each intersection. It is based on vehicular exposure and the average crash rate for similar intersection or segment; a crash rate higher than the critical rates indicates a sustained crash problem. A critical crash rate index is calculated by dividing the crash rate by the critical rate. Any index value above 1.0 indicates a crash rate at or exceeding the critical rate.

The average crash rate for an urban freeway system was 1.03 crashes per MEV and a rural freeway system was 0.90 crashes per MEV, data provided by SDDOT from 2020. The City of Sioux Falls provided the most recent average crash data, from 2015, for the varying arterial roadway and intersection control types.

A total of 287 crashes occurred within the entire project area during the 5-year analysis period. A total of 12 occurred at the study intersections, 4 crashes occurred along the study area roadway segments, and 271 crashes occurred along the freeway mainline or ramp connections.

The following tables show the severity breakdown of the study area freeway and intersection crash history.

Table 6 represents the I-29 freeway mainline segments through the study area. Most of the freeway mainline segments are below the calculated critical rates; however, there are five segments that are currently at or above the critical rates. The five segments include:

- **NB I-29 between 60th Street and I-90 Eastbound Exit**: short weaving segment, approximately 1,000 feet with no auxiliary lane provided.
- **NB I-29 between the I-90 Loop Ramps**: short weaving segment, approximately 675 feet with no auxiliary lane provided.
- **NB I-29 between I-90 and Exit 86**: approximately 1.4 miles of rural interstate; high percentage of wild animal hits.
- **SB I-29 between Exit 86 and I-90**: approximately 1.4 miles of rural interstate; high percentage of wild animal hits.
- **SB I-29 between the I-90 Loop Ramps**: short weaving segment, approximately 600 feet, does provide a short auxiliary lane that drops 500 feet downstream.

Approximately 32% of all mainline crashes were single vehicle departing the roadway, 29% were wild animal crashes, and 19% for both rear-end crashes and side-swipe crashes. Poor weather or poor surface conditions were only observed in approximately 30% of the mainline crashes.

Three of the segments above the critical rates include short weaving segments between an entrance ramp and exit ramp. Two of these segments do not include an auxiliary lane between the ramps, and while the third segment does have an auxiliary lane, it drops shortly downstream. These segments have a high percentage of side swipe crashes and single vehicles departing the roadway.

The remaining two segments above the critical rates include I-29 between I-90 and Exit 86 in both directions. This segment is a rural interstate with limited development surrounding the corridor. Animal hits are the major crash type on these segments, such that northbound I-29 has approximately 44% and southbound I-29 has approximately 48% animal hits. With animal hits removed from the calculations, both segments would have a crash rate significantly below the critical crash rate.

The SDDOT recently completed a study on reducing wildlife-vehicle collisions (WVC); *Reducing WVC in South Dakota Final Report* (July 2016). This segment of I-29 in not included in the list of the highest animal hit locations through the State of South Dakota.

Table 6 – Crash History – I-29 Mainline

	Segment Description	Crash Severity							Rate Information		
		Fatal	A	B	C	PD	Wild Animal	Total	Crash Rate	Critical Rate	Critical Index
Northbound I-29	Between 60th St and EB I-90	0	1	0	0	12	1	14	**2.12**	**2.12**	**1.00**
	Between EB I-90 Ramps	0	0	1	0	1	0	2	0.40	2.30	0.17
	Between I-90 Loop Ramps	0	0	1	1	25	1	28	**8.10**	**2.58**	**3.14**
	Between WB I-90 Ramps	0	0	0	0	1	0	1	0.31	2.65	0.12
	Westbound I-90 Merge	0	0	0	0	8	1	9	1.78	2.29	0.78
	Between I-90 and Exit 86	0	0	1	0	23	19	43	**1.35**	**1.35**	**1.00**
	Exit 86 Diverge	0	0	0	1	1	0	2	0.79	2.64	0.30
	Between Exit 86 Ramps	0	1	0	0	2	2	5	0.57	1.79	0.32
	Exit 86 Merge	0	0	0	0	2	1	3	0.86	2.35	0.37
	North of Exit 86	0	1	2	0	4	7	14	1.24	1.67	0.74
Southbound I-29	North of Exit 86	0	0	0	0	5	7	12	1.04	1.66	0.62
	Exit 86 Diverge	0	0	0	0	1	0	1	0.51	2.90	0.18
	Between Exit 86 Ramps	0	0	1	0	8	0	9	0.97	1.76	0.55
	Exit 86 Merge	0	0	0	0	3	1	4	1.30	2.46	0.53
	Between Exit 86 and I-90	0	0	0	6	26	29	61	**1.96**	**1.35**	**1.45**
	Westbound I-90 Diverge	0	0	0	0	3	2	5	1.29	2.49	0.52
	Between WB I-90 Ramps	0	0	0	0	3	1	4	0.85	2.34	0.36
	Between I-90 Loop Ramps	0	0	0	1	15	0	16	**4.85**	**2.62**	**1.85**
	Between EB I-90 Ramps	0	0	0	1	5	0	6	1.34	2.38	0.56
	Eastbound I-90 Merge	0	0	0	0	8	2	10	1.63	2.17	0.75
	TOTAL	**0**	**3**	**6**	**10**	**156**	**74**	**246**	n/a	n/a	n/a

Table 7 represents the I-29 ramp connection segments throughout the study area. A total of 22 crashes occurred on the 12 individual ramp connections. Only one of the ramp connections has a crash rate above the critical rate.

The eastbound I-90 loop ramp to northbound I-29 has a crash rate just above the critical crash rate. While there were only two crashes on this ramp, the short segment length and relatively low daily volume of traffic result in a high crash rate. One of the crashes involved high-speeds and the other was weather related with poor surface conditions (snow).

Table 7 – Crash History – I-29 Ramp Connections

	Segment Description	Crash Severity							Rate Information		
		Fatal	A	B	C	PD	Wild Animal	Total	Crash Rate	Critical Rate	Critical Index
Northbound I-29	I-29 NB to I-90 EB Ramp	0	0	0	0	3	0	3	0.86	2.57	0.33
	I-90 EB to I-29 NB Ramp	0	0	0	0	2	0	2	**11.23**	**10.03**	**1.12**
	I-29 NB to I-90 WB Ramp	0	0	0	0	5	0	5	2.96	3.34	0.89
	I-90 WB to I-29 NB Ramp	0	0	0	0	1	1	2	1.45	3.62	0.40
	Exit 86 NB Off Ramp	0	0	0	0	1	0	1	1.00	3.84	0.26
	Exit 86 NB On Ramp	0	0	0	0	0	0	0	0.00	11.18	0.00
Southbound I-29	Exit 86 SB Off Ramp	0	0	0	0	0	0	0	0.00	10.83	0.00
	Exit 86 SB On Ramp	0	0	0	0	0	0	0	0.00	3.54	0.00
	I-29 SB to I-90 WB Ramp	0	0	0	0	0	0	0	0.00	6.07	0.00
	I-90 WB to I-29 SB Ramp	0	0	1	0	3	0	4	2.83	3.58	0.79
	I-29 SB to I-90 EB Ramp	0	0	0	1	1	0	2	2.33	4.44	0.53
	I-90 EB to I-29 SB Ramp	0	2	0	0	1	0	3	0.90	2.62	0.34
	TOTAL	**0**	**2**	**1**	**1**	**17**	**1**	**22**	n/a	n/a	n/a

Table 8 represents the crash history and rates for the eight study intersections. A total of only 12 crashes occurred at the study intersection which results in all intersection being substantially below the calculated critical crash rates.

Table 8 – Crash History – 258th Street Arterial Intersections

Intersection Description: 258th Street at:	Crash Severity							Rate Information		
	Fatal	A	B	C	PD	Wild Animal	Total	Crash Rate	Critical Rate	Critical Index
471st/Marion Road	0	0	0	0	1	0	1	0.17	0.92	0.18
Dawson Avenue	0	0	0	0	0	0	0	0.00	0.91	0.00
Cottonwood Avenue	0	0	0	0	4	0	4	0.40	0.75	0.54
I-29 SB Ramp	0	0	0	1	2	0	3	0.35	0.78	0.45
I-29 NB Ramp	0	0	0	0	2	0	2	0.18	0.73	0.25
472nd Avenue	0	0	0	0	1	0	1	0.16	0.91	0.18
Trade Avenue	0	0	0	0	1	0	1	0.20	1.00	0.20
Kiwanis Avenue	0	0	0	0	0	0	0	0.00	0.97	0.00
TOTAL	**0**	**0**	**0**	**1**	**11**	**0**	**12**	n/a	n/a	n/a

Table 9 represents the crash history along the 258th Street corridor segments between the intersections. Only two segments had crashes not related to one of the study intersections, with no segment above the critical rate. The segment between the I-29 ramp terminal intersections

had two weather related crashes and the segment between Trade Avenue and Kiwanis Avenue had two wild animal hits.

Table 9 – Crash History – 258th Street Arterial Segments

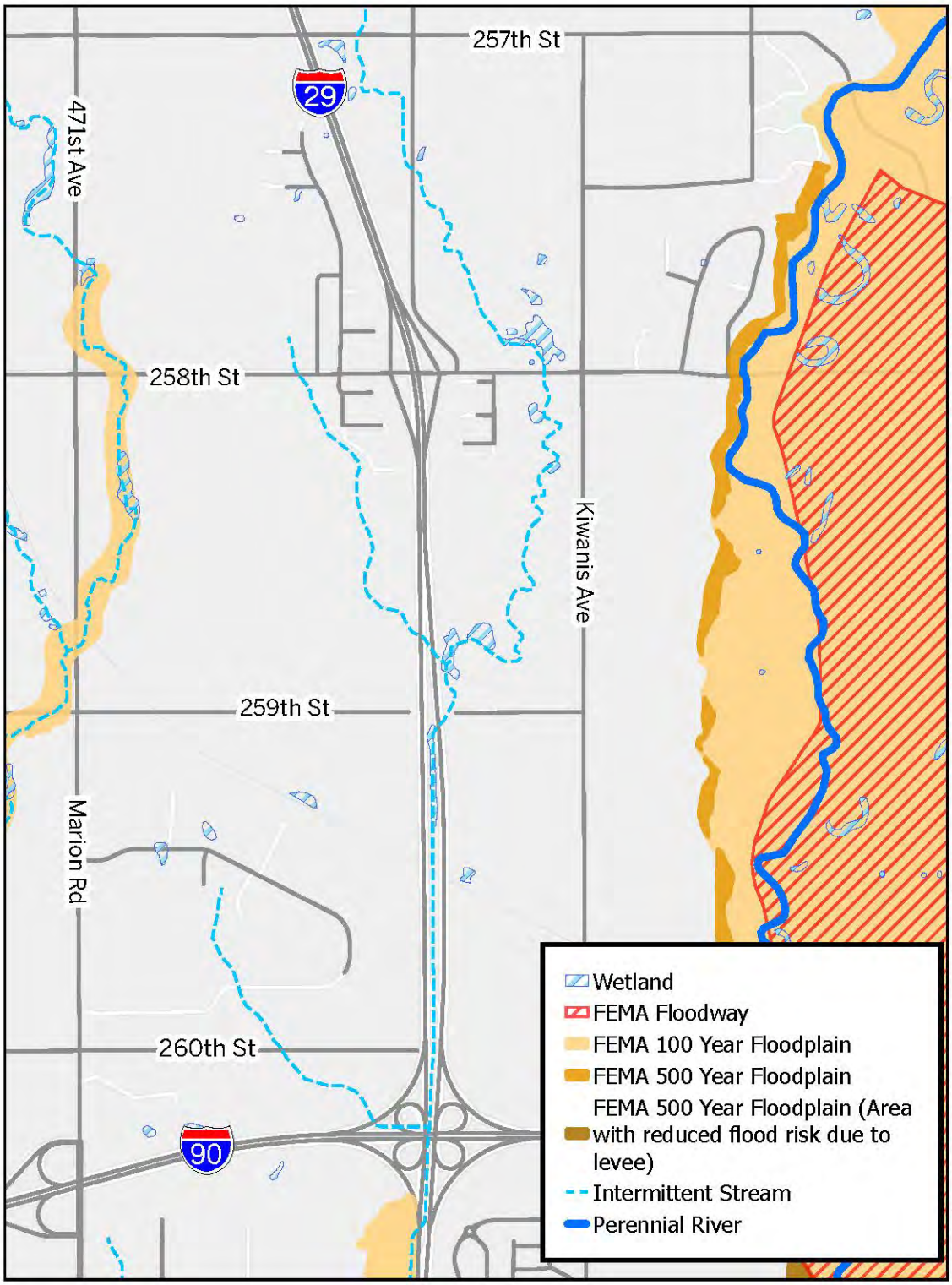
Segment Description:	Crash Severity							Rate Information		
	Fatal	A	B	C	PD	Wild Animal	Total	Crash Rate	Critical Rate	Critical Index
471st Ave to Dawson Ave	0	0	0	0	0	0	0	0.00	2.86	0.00
Dawson Ave to Cottonwood Ave	0	0	0	0	0	0	0	0.00	6.47	0.00
Cottonwood Ave to SB I-29 Ramp	0	0	0	0	0	0	0	0.00	4.35	0.00
SB I-29 Ramp to NB I-29 Ramp	0	0	0	0	2	0	2	1.87	4.82	0.39
472nd Ave to Trade Ave	0	0	0	0	0	0	0	0.00	6.64	0.00
Trade Ave to Kiwanis Ave	0	0	0	0	0	2	2	5.62	6.96	0.81
TOTAL	**0**	**0**	**0**	**0**	**2**	**2**	**4**	n/a	n/a	n/a

3.9 Existing Environmental Constraints

Environmental constraints are being evaluated through the Environmental Screening Report (ESR) that is being prepared concurrently with this IMJR in preparation for the NEPA process. The study area includes portions of the Big Sioux River floodplain, riparian zones, and other wetland areas. An overview of the study area surrounding the existing interchange shows the most potential environmental constraints could be the wetlands.

The NEPA process and document will compare each alternative and their environmental impacts compared to the No Build alternative. **Figure 12** shows the locations of the known environmental constraints within the project area.

Figure 9 – Known Environmental Constraints



4 Project Need

Previous studies including the 2020 Decennial Interstate Corridor Study, the Minnehaha County Highway 130 Corridor Study, and the Foundation Park Traffic Impact Study, have identified the need to improve the I-29 Exit 86 interchange to address safety concerns, correct geometric deficiencies, and improve operations during the peak periods.

The timing of interchange reconfiguration projects in South Dakota typically is controlled by the need to replace the existing pavement and/or structures. A combination of all the various needs at an interchange defines the overall need for an interchange to be reconfigured.

Geometric Deficiencies

Since the interchange was constructed in the early 1960's, geometric design standards have changed. As a result, some of the existing geometric characteristics no longer meet current design standards. Some of the deficiencies include:

- Substandard shoulder widths on the ramp connections; left and right shoulders.
- No turn lanes are provided at the interchange.
- Substandard ramp design.

Pavement

The need to replace or rehabilitate the pavement is often the driving force behind the timing of when the majority of construction projects on the state highway system occur.

The pavement on the existing I-29 mainline through the project area is a mix of bituminous asphalt and concrete pavements. Continuously Reinforced Concrete (CRCP) is currently used through the I-90 system interchange area and extends north to approximately 259th Street. North of 259th Street, and through the Exit 86 interchange, the pavement is bituminous asphalt. Both types of I-29 pavement are in good condition.

As the remaining life of the pavement is relatively short, it is appropriate to evaluate existing and future traffic operations of the existing interchange configuration before replacing the existing pavement.

Structural

The need to replace or rehabilitate a structure is another critical consideration for timing of construction projects on the state highway system.

258th Street has a single bridge over I-29, the structure is currently in fair condition with a sufficiency rating of 94.3. The steel bridge was constructed in 1962 and had a major reconstruction in 1989. The structure has exceeded the 50-year design life.

The existing bridge does not meet the current vertical clearance standard of 17-feet, the existing clearance varies by travel lane, between 16-feet 2-inches to 16-feet 10-inches.

It is appropriate to evaluate the existing and future traffic operations before replacing or rehabilitating a structure with the expectations for continued service life.

Transportation Demand

The existing intersection traffic operations showed that all the study intersections along 258th Street, including the I-29 ramp terminal intersections, have no existing congestion or delay

issues. However, the increase traffic demands from the surrounding developments will quickly overburden the corridor and intersection operations.

With the increased local and regional growth surrounding the interchange and the Sioux Falls metropolitan area, traffic operations will degrade significantly by the Year of Opening 2030 and the design year 2050. The I-29 freeway will continue to operate acceptably. Details pertaining to the future No Build operations can be found in Section 6.

Safety

The Exit 86 (258th Street) interchange does not have an existing safety problem. However, the interchange was ranked 24th out of the 151 interchanges included in Phase 2 of the 2020 Decennial Interstate Corridor Study. The lack of existing turn lanes at any of the study intersections will exacerbate the safety concerns as traffic volumes increase significantly.

5 Alternatives

The purpose of this chapter is to discuss the I-29 facility and proposed access modifications at the Exit 86 (258th Street) interchange.

The 2020 Decennial Interstate Corridor Study (DICS) was completed and included recommendations for the Exit 86 interchange in Phase 2 of the study. The DICS recommended two potential interchange solutions for the Exit 86 interchange to be further evaluated. This study included an additional alternative. The following alternatives were included in this evaluation:

- Standard Diamond – (DICS) Add turn lanes to existing interchange configuration.
- Single Point Urban Interchange (SPUI) – (DICS) convert to SPUI design.
- Diverging Diamond Interchange (DDI) – (new concept) convert to DDI design.

More information regarding the 2020 Decennial Interstate Corridor Study Phase 2 can be found at the following website: SDDOT ICS_Phase 2 Report.

5.1 Design Criteria

The primary design principles and criteria that were used to guide the design process include:

- Basic Lane Capacity
- Route Continuity
- Lane Balance
- Interchange Spacing
- Ramp Spacing

These criteria are described in the American Association of State Highway and Transportation Official's (AASHTO) Policy on Geometric Design of Highways and Streets 2011 edition.

The existing design speed for the urban section of I-29 is 70 mph, with a posted speed limit of 65 mph; the rural design speed of I-29 is 80 mph, with a posted speed limit of 80 mph. The design speed of this project will follow the existing urban design speed.

5.1.1 Basic Lane Capacity

The basic number of lanes is defined as a minimum number of lanes designated and maintained over a significant length of a corridor, regardless of changes in traffic volumes and lane-balance. An assessment of basic lane needs is an indicator of minimum capacity requirements; it is not an indicator of the actual capacity.

Table 10, below, summarizes the basic lane volumes for LOS B, LOS C and LOS D from the Highway Capacity Manual (HCM).

Table 10 – Basic Lane Capacity

Free Flow Speed (mph)	Per-Lane Volume Threshold (pcphpl) / (Vehicle Density (pc/mi/ln))		
	LOS B	LOS C	LOS D
75 mph	1,310 / (18.0)	1,750 / (26.0)	2,110 / (35.0)
70 mph	1,250 / (18.0)	1,690 / (26.0)	2,080 / (35.0)
65 mph	1,170 / (18.0)	1,630 / (26.0)	2,030 / (35.0)
60 mph	1,080 / (18.0)	1,560 / (26.0)	2,010 / (35.0)
55 mph	990 / (18.0)	1,430 / (26.0)	1,900 / (35.0)

Source: Based on Highway Capacity Manual 7th Edition, Exhibit 12-4

Table 11 represents the maximum peak hour traffic volumes along I-29 compared to the basic roadway capacity; typically, the maximum peak hour volumes for northbound I-29 is during the PM peak and for southbound I-29 is during the AM peak. If the basic lane need exceeds the number of lanes provided it would represent a capacity constraint on the roadway indicated by a LOS C or LOS D.

Under the existing 2022 and future 2030 traffic volumes, all demands are below the basic capacity thresholds for both the rural and urban segments throughout the project area.

The future year 2050 traffic volumes will exceed the capacity threshold for only one rural interstate segment for northbound I-29 between I-90 and Exit 86 at a LOS C; however, the segment is anticipated to be converted to an urban interstate where LOS C is acceptable.

Table 11 – Basic Lane Assessment – I-29

Description			Basic # Lanes	2022 Existing		Future 2030		Future 2050	
	From	To		Peak Traffic	LOS	Peak Traffic	LOS	Peak Traffic	LOS
Northbound I-29	NB I-29	EB I-90 Exit	3	2126	B	2725	B	3405	C
	EB I-90 Exit	EB I-90 Entrance	3	1567	A	2115	B	2665	B
	EB I-90 Entrance	WB I-90 Exit	3	1597	A	2230	B	2850	B
	WB I-90 Exit	WB I-90 Entrance	3	1112	A	1515	A	1970	B
	WB I-90 Entrance	258th Exit	2	1304	B	1785	B	**2335**	**C****
	258th Exit	258th Entrance	2	1024	A	1225	A	1615	B
	258th Entrance	NB I-29	2	1048	A	1345	B	1815	B
Southbound I-29	SB I-29	258th Exit	2	892	A	1180	A	1520	B
	258th Exit	258th Entrance	2	870	A	1020	A	1275	A
	258th Entrance	WB I-90 Exit	2	1217	A	1470	B	1935	B
	WB I-90 Exit	WB I-90 Entrance	2	1159	A	1360	B	1790	B
	WB I-90 Entrance	EB I-90 Exit	3	1630	A	1875	A	2490	B
	EB I-90 Exit	EB I-90 Entrance	2	1398	B	1600	B	2105	B
	EB I-90 Entrance	SB I-29	3	1816	A	2140	B	2670	B

- Traffic is the highest/maximum peak hour volume in either of the AM or PM peak hours.
- **Bold/Shaded** indicates Unacceptable LOS; LOS C for Rural and LOS D for Urban segments.
- ** Segment at LOS C is considered unacceptable in the No Build, but acceptable in the Build conditions.

5.1.2 Route Continuity

A route continuity evaluation is used to determine if any forced lane changes are required to continue along a specific highway. A forced lane change occurs when either an established through lane is dropped at a major fork diverge or when an auxiliary lane is added to the left side of the roadway to accommodate the design of a major fork diverge and the through traffic must change lanes in order to continue.

Route continuity is currently satisfied for I-29 in the project area; I-29 has two continuous travel lanes in both directions north of the I-90 system interchange. The proposed interchange design modifications at Exit 86 would not alter the current route continuity of I-29.

5.1.3 Lane Balance

The concept of lane balance is intended to smooth traffic flow through and beyond an interchange. The AASHTO definition of lane balance is as follows:

1. At entrances, the number of lanes beyond the merging of two traffic streams should not be less than the sum of all traffic lanes on the merging roadways minus one.
2. At exits, the number of approach lanes on the highway must be equal to the number of lanes on the highway beyond the exit, plus the number of lanes on the exit, minus one. Exceptions to this principle occur at cloverleaf loop-ramp exits that follow a loop-ramp entrance and at exits between closely spaced interchanges (i.e. interchanges where the distance between the end of the taper of the entrance terminal and the beginning of the taper of the exit terminal is less than 1,500 ft). In these cases, the auxiliary lane may be dropped in a single-lane exit with the number of lanes on the approach roadway being equal to the number of through lanes beyond the exit plus the lane on the exit.
3. The traveled way of the highway should be reduced by not more than one traffic lane at a time.

Lane balance is satisfied at all entrances and exits in the project area.

5.1.4 Interchange Spacing

In rural areas, the minimum recommended interchange spacing is 3-miles. In urban or urbanizing areas, the minimum recommended interchange spacing is 1-mile.

The existing Exit 86 interchange does not currently meet the 3-mile rural spacing criteria, Exit 86 is approximately 2 ¼-miles north of I-90. Rural spacing is met to the north with approximately 8-miles to the next I-29 interchange at 250th Street (Exit 94).

The 2020 DICS evaluated potential interchanges between Exit 86 and Exit 94 at what would be Exit 87, Exit 88, and Exit 89. A potential interchange would possibly better serve some of the smaller communities between the two existing interchanges.

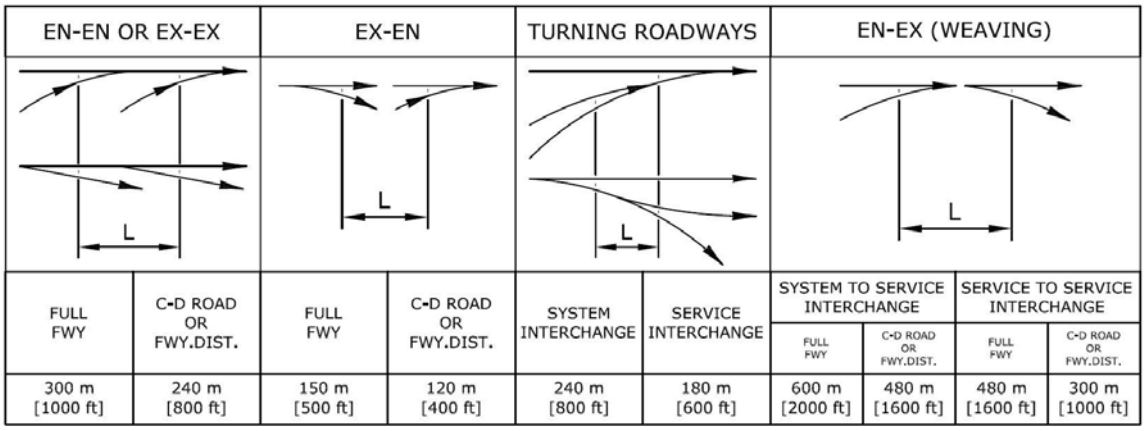
- The high-level analysis resulted in interchanges not being recommended at Exit 88 or Exit 89 due to potential environmental impacts.
- Exit 87 was favored best of the three locations; however, environmental impacts and interchange spacing criteria resulted in not recommending further study at this time.

While not included in the 2020 DICS, discussion of a potential interchange at what would be Exit 85 has been reviewed. The interchange spacing would meet the 1-mile urban/urbanizing criteria if this section of I-29 was improved to meet urban design standards. However, the potential environmental impacts were determined to be too great to further study at this time.

5.1.5 Ramp Spacing

The distance between freeway ramps can be one of the most important features to impact freeway operations. SDDOT has established guidelines for desired interchange ramp spacing based on AASHTO criteria and these guidelines are documented in the SDDOT Road Design Manual, Chapter 13, and are shown in **Figure 10.**

Figure 10 – AASHTO/SDDOT Ramp Spacing Criteria



EN-EN OR EX-EX		EX-EN		TURNING ROADWAYS		EN-EX (WEAVING)			
						SYSTEM TO SERVICE INTERCHANGE		SERVICE TO SERVICE INTERCHANGE	
FULL FWY	C-D ROAD OR FWY.DIST.	FULL FWY	C-D ROAD OR FWY.DIST.	SYSTEM INTERCHANGE	SERVICE INTERCHANGE	FULL FWY	C-D ROAD OR FWY.DIST.	FULL FWY	C-D ROAD OR FWY.DIST.
300 m [1000 ft]	240 m [800 ft]	150 m [500 ft]	120 m [400 ft]	240 m [800 ft]	180 m [600 ft]	600 m [2000 ft]	480 m [1600 ft]	480 m [1600 ft]	300 m [1000 ft]

Within the project area, most of the existing ramp spacing minimum distances are met, there are two locations where the minimum distance is not met. The two segments of I-29 between the I-90 loop ramp connections are both well below the spacing requirement; this is typical of a cloverleaf system interchange design.

The ramps spacings for the current Exit 86 interchange all meet the spacing criteria.

As previously discussed, a potential interchange at Exit 85 would meet the urban interchange spacing criteria; however, the interchange would result in providing barely the minimum ramp spacing between the new service interchange and the existing system interchange with I-90 and service interchange with Exit 86; reaffirming the significant impacts of a potential new interchange access location.

5.2 I-29 at Exit 86 Interchange Alternatives

Constructed in the early 1960's, the Exit 86 (258th Street) interchange consists of a standard diamond configuration. Both ramp terminal intersections are controlled by minor street stop control and there are no existing turn lanes on any of the intersection approaches.

The DICS recommended two proposed build alternatives during the screening process; this study evaluated the two alternatives in addition to one new alternative and the No Build conditions.

5.2.1 Alternative 0 – No Build

This alternative does not alter the current configuration of the existing Exit 86 interchange or apply any improvements along 258th Street or mainline I-29.

5.2.2 Alternative 1 – Diamond Interchange

This alternative is carried forward from the 2020 DICS recommendation, at that time the bridge was recommended to be widened to accommodate the capacity improvements. This updated alternative would add additional capacity to the existing diamond interchange design and provide traffic signal control at both ramp terminal intersections, the existing bridge will be replaced.

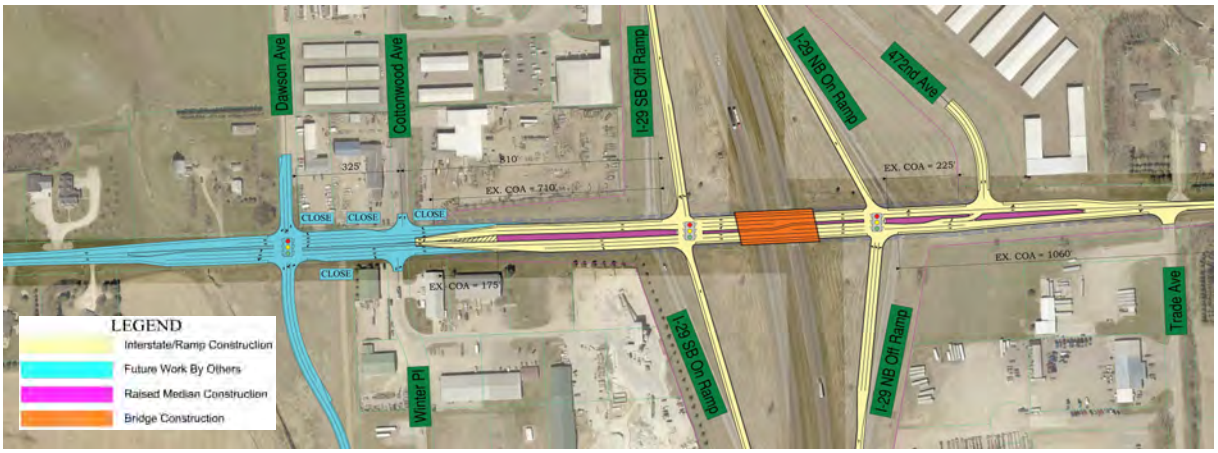
The current traffic forecasts for this study include additional traffic growth out to the design year 2050. The lane configuration in the 2020 DICS was determined to not be fully adequate to maintain a LOS C in the future design year; therefore, the number of lanes differ.

The minimum urban control of Access (COA) of 100-feet for an existing interchange is met on both sides of I-29 for the Exit 86 interchange.

- Cottonwood Avenue is the first access on the west side of I-29 and is over 750-feet from the west ramp terminal intersection.
  - The western most point of the existing interchange COA is unchanged in this option.
  - With the proposed turn lanes, the existing COA for the eastbound approach is reduced to approximately 175-feet.
  - Departing the interchange, the COA is increased to approximately 750-feet.
- 472nd Avenue is the first access on the east side of I-29 and is approximately 350-feet from the east ramp terminal intersection.
  - The eastern most point of the existing interchange COA is unchanged in this option.
  - Existing COA for the westbound approach is increased to approximately 225-feet.
  - Departing the interchange, the COA is increased to approximately 1,060-feet.

472nd Avenue can be reconstructed on the existing alignment. The existing ramp terminal intersections are proposed to be more closely spaced than the existing interchange; the slightly closer spacing allows for improved intersection spacing and COA.

Figure 11 – Alternative 1 – Diamond Interchange



5.2.3 Alternative 2 – Single Point Urban Interchange (SPUI)

This alternative is carried forward from the 2020 DICS recommendation. The alternative would reconfigure the interchange design to a Single Point Urban Interchange (SPUI) with traffic signal control at the single ramp terminal intersection.

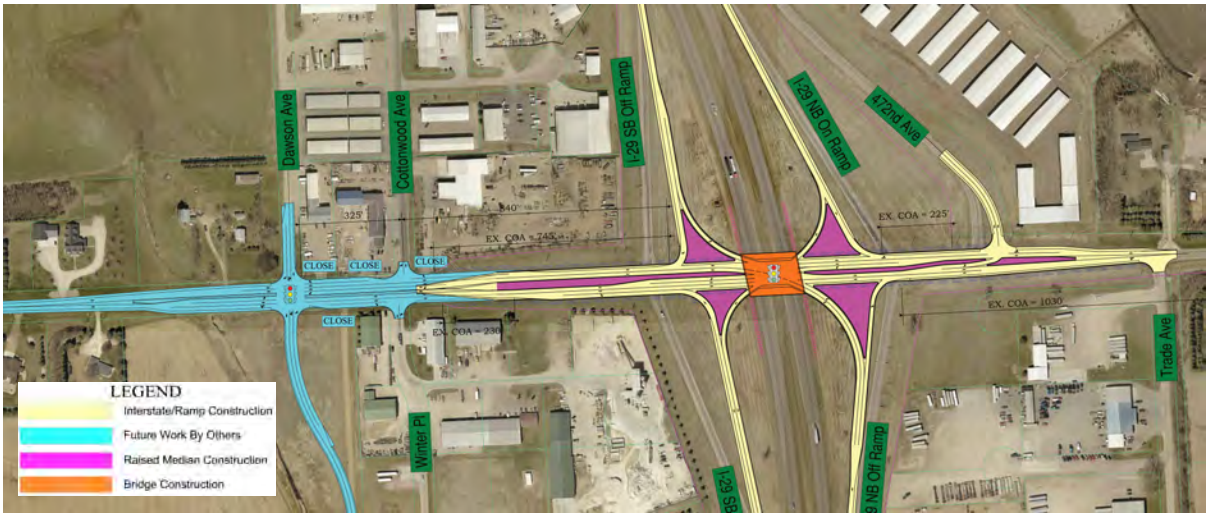
The current traffic forecasts for this study include additional traffic growth out to the design year 2050 and the lane configuration shown in the 2020 DICS was determined to be adequate to maintain a LOS C in the future design year.

The minimum urban control of Access (COA) of 100-feet for an existing interchange is met on both sides of I-29 for the Exit 86 interchange.

- Cottonwood Avenue is the first access on the west side of I-29 and is approximately 1,170-feet from the main ramp terminal intersection.
  - The western most point of the existing interchange COA is unchanged in this option.
  - With the proposed turn lanes, the existing COA for the eastbound approach is reduced to approximately 230-feet.
  - Departing the interchange, the COA is increased to approximately 745-feet.
- 472nd Avenue is the first access on the east side of I-29 and is approximately 700-feet from the main ramp terminal intersection.
  - The eastern most point of the existing interchange COA is unchanged in this option.
  - Existing COA for the westbound approach is increased to approximately 225-feet.
  - Departing the interchange, the COA is increased to approximately 1,030-feet.

To improve intersection spacing and allow a ¾-access at 472nd Avenue, the north leg of 472nd Avenue is shifted to the east slightly to accommodate the design; this will be constructed within the existing ROW.

Figure 12 – Alternative 2 – Single Point Urban Interchange



5.2.4 Alternative 3 – Diverging Diamond Interchange (DDI)

This alternative was developed as part of this study and was not including in the 2020 DICS. The alternative would reconfigure the interchange design to a Diverging Diamond Interchange (DDI) and provide traffic signal control at both ramp terminal intersections.

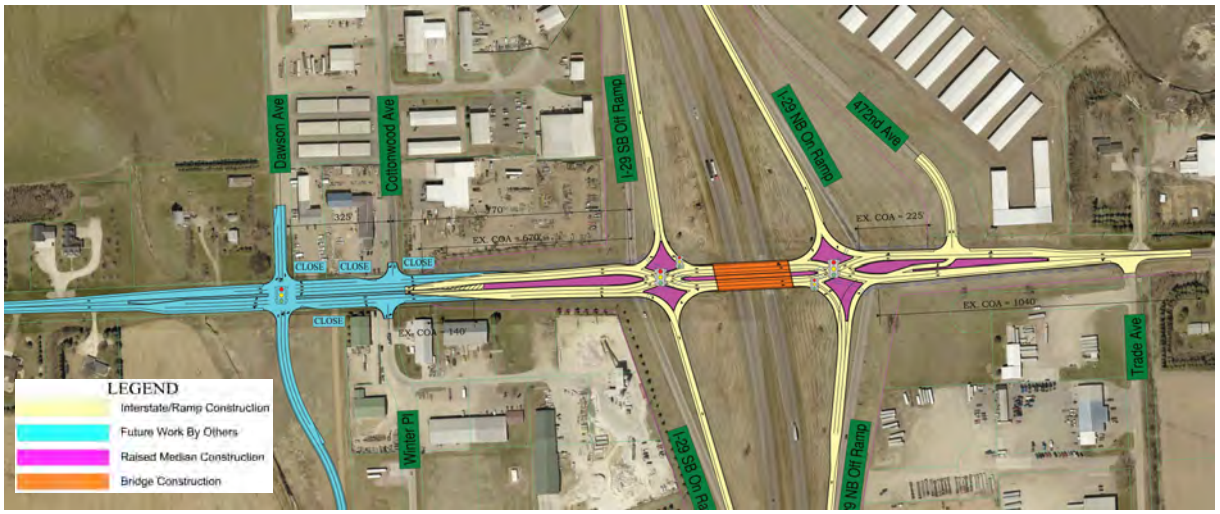
The DDI design reduces the number of vehicle conflict points by temporarily shifting traffic to the other side of the roadway between the freeway ramps. This design has a higher capacity for turning vehicles as the mainline left turning traffic no longer has to cross the opposing through traffic.

The minimum urban control of Access (COA) of 100-feet for an existing interchange is met on both sides of I-29 for the Exit 86 interchange.

- Cottonwood Avenue is the first access on the west side of I-29 and is approximately 875-feet from the west ramp terminal intersection.
  - The western most point of the existing interchange COA is unchanged in this option.
  - With the proposed turn lanes, the existing COA for the eastbound approach is reduced to approximately 140-feet.
  - Departing the interchange, the COA is increased to approximately 670-feet.
- 472nd Avenue is the first access on the east side of I-29 and is approximately 350-feet from the east ramp terminal intersection.
  - The eastern most point of the existing interchange COA is unchanged in this option.
  - Existing COA for the westbound approach is increased to approximately 225-feet.
  - Departing the interchange, the COA is increased to approximately 1,040-feet.

472nd Avenue can be reconstructed on the existing alignment. The existing ramp terminal intersections are proposed to be more closely spaced than the existing interchange; the slightly closer spacing allows for improved intersection spacing and COA.

Figure 13 – Alternative 3 – Diverging Diamond Interchange



5.3 Arterial Improvements

258th Street (County Highway 130) west of I-29 has previously been studied for future roadway needs during both the development traffic impact study for Foundation Park, as well as the Minnehaha County Corridor study. Both studies showed a need for capacity improvements along 258th Street between 471st Avenue/N Marion Road and I-29.

The Minnehaha County study recommended a 3-lane cross section for the corridor, with single through lanes in each direction and a Two-Way Center Left Turn Lane (TWCLTL). While the study ultimately recommended improvements to the corridor, the County currently has no plan or available funding to make improvements to the corridor at this time.

The City of Sioux Falls is currently planning roadway improvements to N Marion Road, which includes intersection improvements to the 258th Street and 471st Avenue/N Marion Road intersection; this project is anticipated to be constructed by 2023. The initial design of the project will convert N Marion Road from the existing gravel road to a 3-lane roadway south of 258th Street and install traffic signal control; this project will be incorporated into the future No Build conditions. If additional capacity is required in the future design year, the City of Sioux Falls will monitor the intersection and construct improvements as needed.

5.3.1 Traffic Control Warrant Review

The FHWA Manual on Uniform Traffic Control Devices (MUTCD) was used to evaluated volume criteria that would warrant a change in traffic to either an All-Way Stop (AWS) control or Traffic Signal control. The satisfaction of a control warrant shall not in itself require the installation, an engineering study should be performed.

MUTCD guidelines suggest that the warrant thresholds may also be reduced based on the roadway speeds and population of the city the intersection is within. If either major approach to the intersection has a posted speed or 85th percentile speed that exceeds 40 mph, then a reduction to 70% threshold volumes is allowed in both all-way stop warrant and traffic signal warrant. Based upon this, the analysis includes a reduction to 70% thresholds.

For the traffic signal warrants, the MUTCD provides nine separate evaluations. Many of these are not applicable for this corridor including warrants for pedestrian volumes, school crossings, signal coordination, and crash history (low existing crashes). However, the volume criteria in Warrant 1 (8-hour), Warrant 2 (4-hour), and Warrant 3 (Peak Hour) were reviewed.

5.3.1.1 Warrant Summary

The existing 2022 traffic volumes at the study intersections currently do not meet either the all-way stop (AWS) warrant or the traffic signal warrants at any location.

The following summarizes the results of the future 2030 and future 2050 intersection warrant analysis:

- 471st/N Marion Road: meets AWS and signal warrants in 2030 and 2050.
- Dawson Avenue: meets peak hour signal warrants in 2030, then AWS and signal warrant in 2050.
- Cottonwood Avenue: reduced access, no control warrants evaluated.
- I-29 SB Ramp: meets signal warrants in 2030 and 2050; AWS warrant met in 2050.

- I-29 NB Ramp: meets AWS and signal warrants in 2030 and 2050.
- 472nd Avenue: does not meet either control warrant.
- Trade Avenue: does not meet either control warrant.
- Kiwanis Avenue: meets AWS warrant and the peak hour signal warrant in 2050; does not meet a control warrant in 2030.

5.3.2 Connection into Foundation Park

One of the major assumptions included in the traffic forecasts for the project is the inclusion of a new connection from 258th Street into Foundation Park. This was assumed to be included in both the 2030 and 2050 forecasts.

The new connection will essentially be driven by development occurring south of 258th Street and north of the current Foundation Park development area. Therefore, both the Cities of Sioux Falls and Crooks, as well as Minnehaha County, have to develop plans as needed to construct the roadway.

To address the short-term implications of not providing the connection, the 2030 intersection analysis includes two volume scenarios, one assuming no connection to Foundation Park and one assuming there is a connection.

It should also be noted, the traffic forecast memorandum assumed the southern connection would occur at either Dawson Avenue or Cottonwood Avenue. However, based on the existing developments along the south leg of Cottonwood Avenue, the connection may be to impactful at this location. Therefore, the proposed connection could be planned to occur at Dawson Avenue to be less impactful to the existing business.

The location of the connection at Dawson Avenue would also create additional impacts including the potential access reduction required at Cottonwood Avenue and need for connections from Cottonwood Avenue to Dawson Avenue to continue to serve all movements effectively.

6 Future Year Traffic

The design year for this project is 2050 with an anticipated year of opening of 2030; no mid-term forecast year were developed for this study.

6.1 Future Year Traffic Forecasts

Traffic forecasts were prepared using the latest version of the Regional Travel Demand Model (RTDM) for the Metropolitan Planning Organization (MPO) area; this model is maintained by the City of Sioux Falls and the Sioux Falls MPO. As part of the interchange project, traffic forecasts were developed for all intersections and roadway segments within the project area.

The latest version of the RTDM is an activity-based model that provides more realistic trip routing than the previous version of the demand model. In addition, trip generation for the Foundation Park development and other surrounding development plans were included in the development of the traffic forecasts.

The full traffic forecast memorandum, *I-29 Exit 86 Interchange Modification Study – Traffic Forecasts* memorandum is provided in **Appendix G**.

6.2 Design Year Analysis – 2050

The 2050 design year traffic forecasts resulted in significant growth throughout the immediate project area.

The projected traffic forecast volumes resulted in the same volumes between the No Build and Build scenarios. The proposed build alternatives add capacity to the interchange area, but do not add significant capacity that would alter regional route choices outside the study area.

Appendix C includes all HCS summary sheets for the 2050 No Build conditions analysis, **Appendix D** includes all HCS summary sheets for the 2050 Build conditions.

6.2.1 2050 No Build Conditions

The summation of the 2050 No Build traffic operations analysis show that mainline I-29 operates acceptably for the majority of the project area; however, there are unacceptable LOS at a few spot locations. The locations of poor LOS results include:

- **Northbound I-29 merge from eastbound I-90**: urban interstate operating at LOS D for the merge analysis; this is outside of the immediate interchange project.
- **Northbound I-29 between I-90 and Exit 86 (Rural Segment)**: rural interstate operating at LOS C for the basic lane analysis; this would be acceptable in an urban condition.
- **Northbound I-29 diverge to Exit 86**: rural interstate operating at LOS C for the diverge analysis; this would be acceptable in an urban condition.

Results for the individual freeway segments and ramp junctions of I-29 are shown in **Table 12** as well as **Figure 14**.

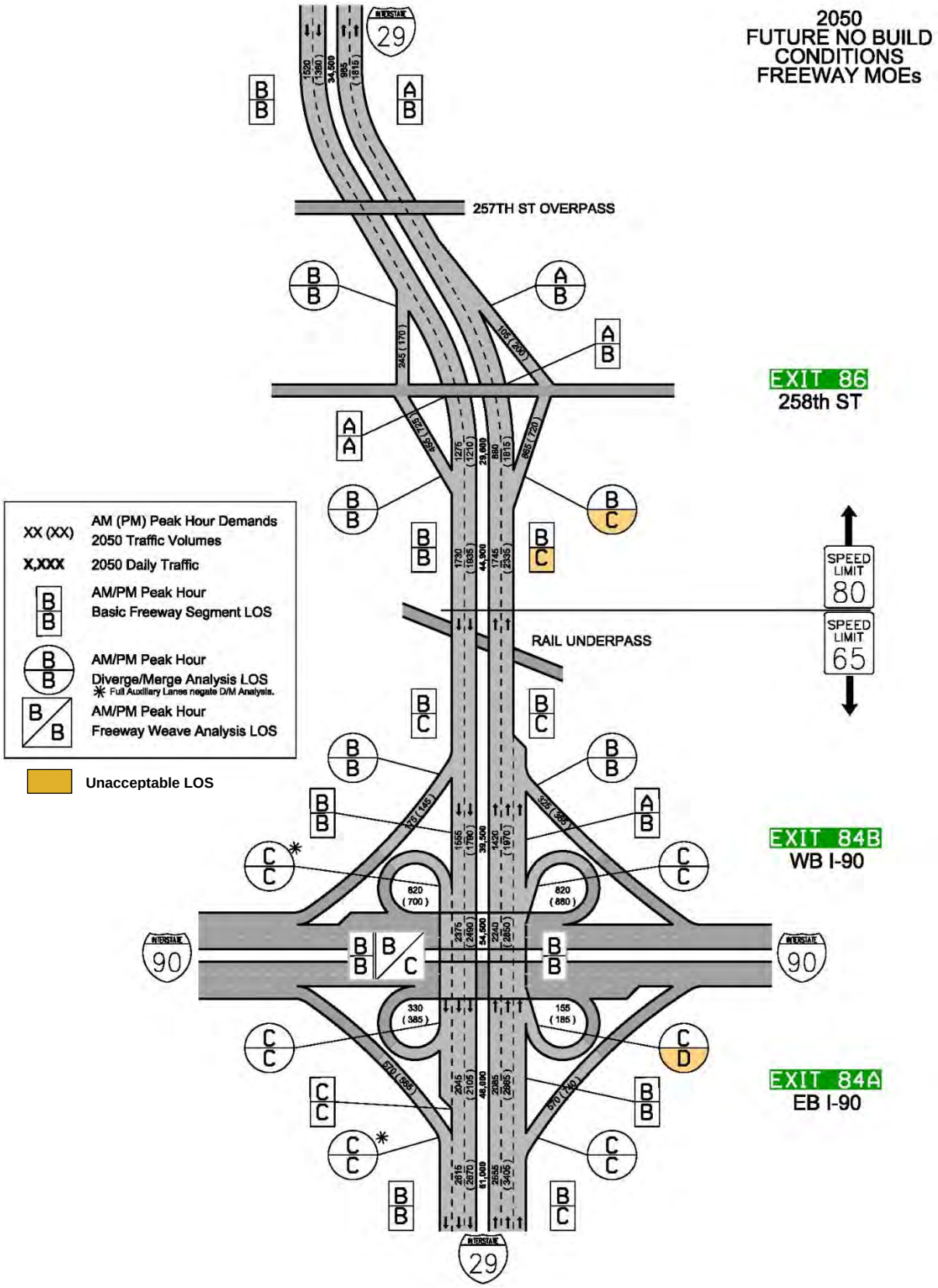
Table 12 – Future No Build 2050 Freeway Operation Results

Road	Description	Analysis Type	AM Peak LOS	PM Peak LOS
Northbound I-29	South of I-90	Basic	B	C
	Eastbound I-90 Exit Ramp	Diverge	C	C
	Between EB I-90 Ramps	Basic	B	B
	Eastbound I-90 Entrance Loop Ramp	Merge	C	**D**
	Between I-90 Loop Ramps (no auxiliary lane)	Basic	B	B
	Westbound I-90 Exit Loop Ramp	Diverge	C	C
	Between WB I-90 Ramps	Basic	A	B
	Westbound I-90 Entrance Ramp	Merge	B	B
	North of I-90 (Urban Section)	Basic	B	C
	South of Exit 86 (Rural Section)	Basic	B	**C**
	Exit 86 Exit Ramp	Diverge	B	**C**
	Between Exit 86 Ramps	Basic	A	B
	Exit 86 Entrance Ramp	Merge	A	B
	North of Exit 86	Basic	A	B
Southbound I-29	North of Exit 86	Basic	B	B
	Exit 86 Exit Ramp	Diverge	B	B
	Between Exit 86 Ramps	Basic	A	A
	Exit 86 Entrance Ramp	Merge	B	B
	South of Exit 86 (Rural Section)	Basic	B	B
	North of I-90 (Urban Section)	Basic	B	C
	Westbound I-90 Exit Ramp	Diverge	B	B
	Between WB I-90 Ramps	Basic	B	B
	Westbound I-90 Entrance Loop Ramp	Merge**	C	C
	Between I-90 Loop Ramps	Basic	B	B
		Weave	B	C
	Eastbound I-90 Exit Loop Ramp	Diverge	C	C
	Between EB I-90 Ramps	Basic	C	C
	Eastbound I-90 Entrance Ramp	Merge**	C	C
	South of I-90	Basic	B	B

Notes: **Merge Analysis includes full auxiliary lane; downstream basic lane analysis controls LOS.

Bold/Shaded indicates unacceptable LOS (Urban LOS D, Rural LOS C)

Figure 14 – Future No Build 2050 Freeway Operations Summary



Six of the project study area's eight arterial intersections have major operational issues due to the increased volumes. Currently, most intersections are controlled with minor street stop control and no turn lanes are provided at any of the intersections; the exception is the intersection of N Marion Road/471st Avenue which the City of Sioux Falls is reconstructing and providing a traffic signal in 2023.

The increased traffic demands along 258th Street significantly reduce the available gaps in mainline traffic that would allow the minor approach traffic to enter the corridor. Without turn lanes, mainline through traffic also is expected to incur major delays waiting behind left turning traffic yielding to oncoming vehicles.

The signalized intersection at N Marion Road/471st Avenue will have queue storage issues for the westbound approach in the AM peak hour; however, the overall intersection LOS will be acceptable.

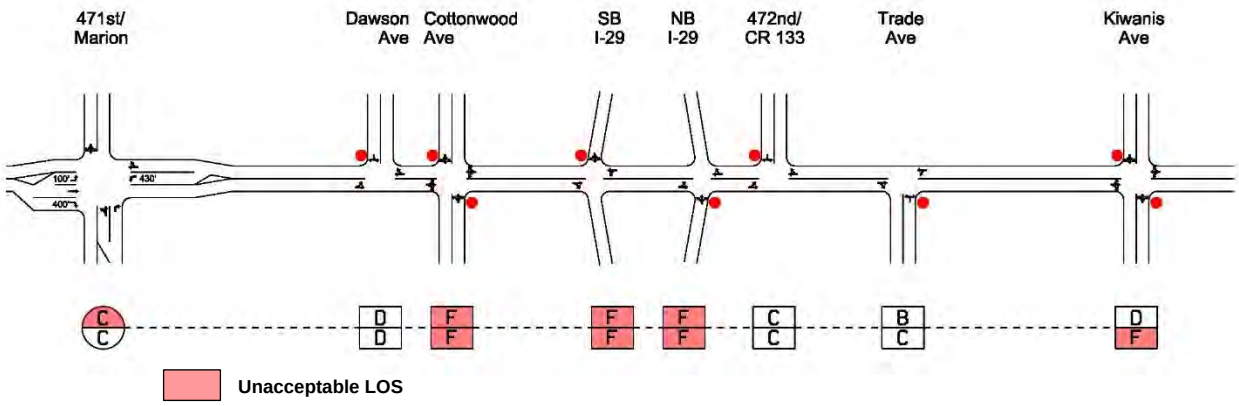
Results for the study intersections are shown in **Table 13** as well as **Figure 15**.

Table 13 – Future No Build 2050 Arterial Intersection Results

258th Street at:	Control Type	AM Peak Hour	PM Peak Hour
471st/N Marion Road	Traffic Signal	**C***	**C**
Dawson Avenue	Minor Stop	**D**	**D**
Cottonwood Avenue	Minor Stop	**F**	**F**
I-29 SB Ramp	Minor Stop	**F**	**F**
I-29 NB Ramp	Minor Stop	**F**	**F**
472nd Avenue	Minor Stop	C	C
Trade Avenue	Minor Stop	B	C
Kiwanis Avenue	Minor Stop	D	**F**

Notes: Average Intersection LOS shown, individual movements and/or approaches may differ. Minor Street Stop Control intersection LOS represents the worst minor approach LOS, major road would operate at LOS A.
*Queue storage issues for the westbound left turn lane.

Figure 15 – Future No Build 2050 Arterial Intersection Summary



6.2.2 2050 Build Conditions

The 2050 Build traffic operations analysis show that mainline I-29 operates acceptably for most of the project area with the extension of the urban interstate through Exit 86. The only unacceptable LOS remains at the northbound I-29 merge location from eastbound I-90, similar to the No Build condition. No mitigations are required as part of the proposed Build conditions.

Results for the individual freeway segments and ramp junctions of I-29 are shown in **Table 14** as well as **Figure 16**.

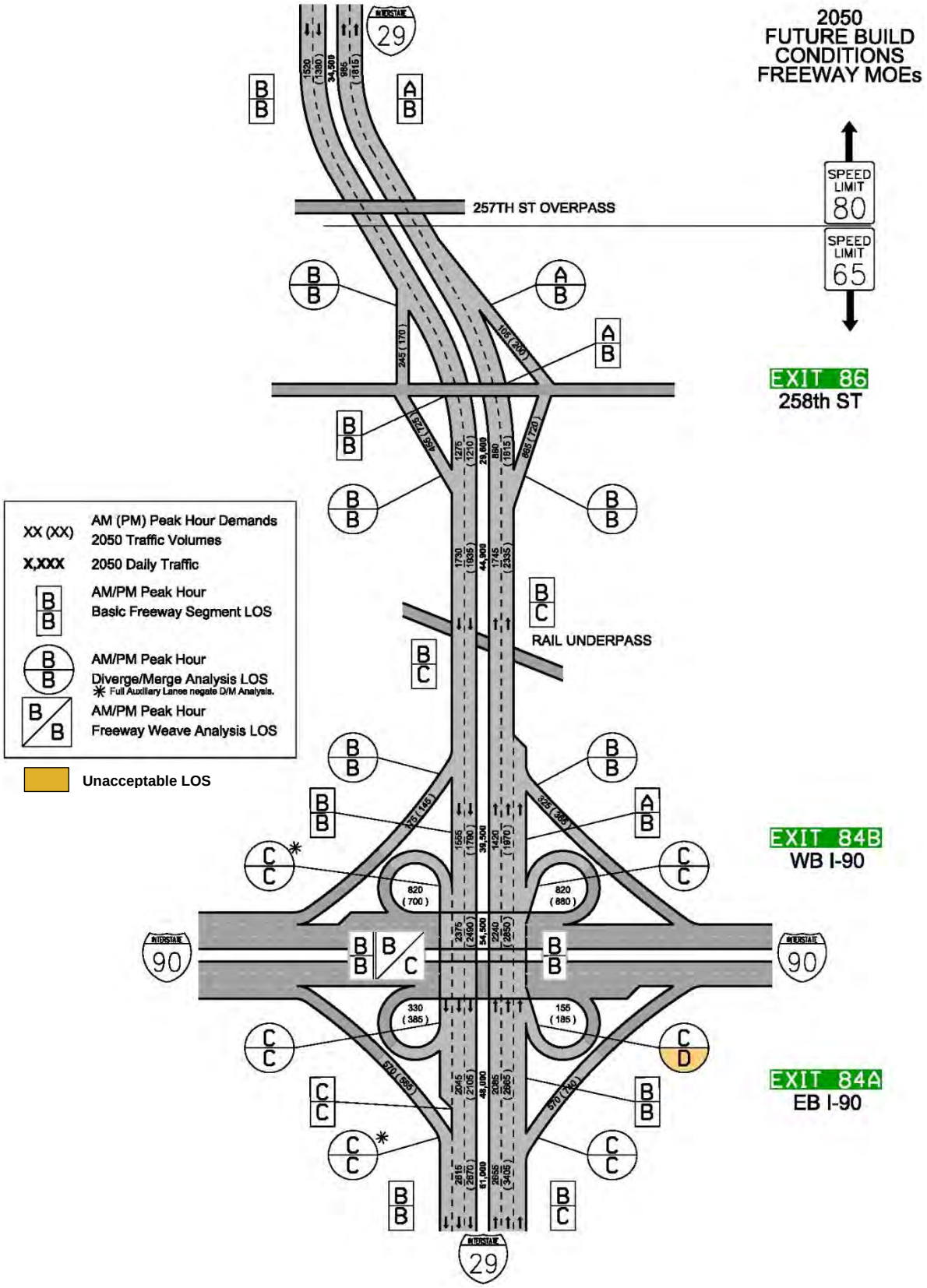
Table 14 – Future Build 2050 Freeway Operation Results

Road	Description	Analysis Type	AM Peak LOS	PM Peak LOS
Northbound I-29	South of I-90	Basic	B	C
	Eastbound I-90 Exit Ramp	Diverge	C	C
	Between EB I-90 Ramps	Basic	B	B
	Eastbound I-90 Entrance Loop Ramp	Merge	C	**D**
	Between I-90 Loop Ramps (no auxiliary lane)	Basic	B	B
	Westbound I-90 Exit Loop Ramp	Diverge	C	C
	Between WB I-90 Ramps	Basic	A	B
	Westbound I-90 Entrance Ramp	Merge	B	B
	North of I-90 (Urban Section)	Basic	B	C
	South of Exit 86 (**Urban** Section)	Basic	B	C
	Exit 86 Exit Ramp	Diverge	B	C
	Between Exit 86 Ramps	Basic	A	B
	Exit 86 Entrance Ramp	Merge	A	B
	North of Exit 86	Basic	A	B
Southbound I-29	North of Exit 86	Basic	B	B
	Exit 86 Exit Ramp	Diverge	B	B
	Between Exit 86 Ramps	Basic	A	A
	Exit 86 Entrance Ramp	Merge	B	B
	South of Exit 86 (**Urban** Section)	Basic	B	B
	North of I-90 (Urban Section)	Basic	B	C
	Westbound I-90 Exit Ramp	Diverge	B	B
	Between WB I-90 Ramps	Basic	B	B
	Westbound I-90 Entrance Loop Ramp	Merge**	C	C
	Between I-90 Loop Ramps	Basic	B	B
		Weave	B	C
	Eastbound I-90 Exit Loop Ramp	Diverge	C	C
	Between EB I-90 Ramps	Basic	C	C
	Eastbound I-90 Entrance Ramp	Merge**	C	C
	South of I-90	Basic	B	B

Notes: **Merge Analysis includes full auxiliary lane; downstream basic lane analysis controls LOS.

Bold/Shaded indicates unacceptable LOS (Urban LOS D, Rural LOS C)

Figure 16 – Future Build 2050 Freeway Operations Summary



To mitigate delay issues at the arterial intersections, traffic control changes and turn lanes were included at many of the study intersections. Along 258th Street, the intersections outside the immediate interchange area would have the same traffic operations in all three proposed build alternatives.

The proposed needs along 258th Street would generally serve as a 3-lane facility west of I-29, similar to the previous Highway 130 study, with a single through lane in each direction and a Two Way Center Left Turn Lane (TWCLTL). The proposed speed limit of the urban arterial is recommended at 45 mph to be able to serve permissive left turn movements at any signalized intersection. The following improvements are necessary at the intersections outside of the interchange area:

- **471st Avenue/N Marion Road**: The 2023 intersection reconstruction and signal project is expected to have queue storage issues in 2050. The westbound left turn is the heaviest movement and requires a 650-foot storage lane; 2023 project is planning to only construct a 430-foot turn lane to limit impacts to an existing culvert along 258th Street.
- **Dawson Avenue**: to provide better intersection spacing and lesson the impacts to the existing business uses, Dawson Avenue will be the first full access intersection west of I-29 and provide the future connection into the Foundation Park development. This will require Dawson Avenue to be paved and to provide shared left-through lanes and a separate right turn lane at the future signalized intersection.
- **Cottonwood Avenue**: with less than 800 feet between the intersection and I-29, Cottonwood Avenue will be converted to a reduced access intersection. With the proximity to Dawson Avenue, the Cottonwood Avenue intersection will be converted into a Right-In/ Right-Out (RI/RO) intersection.
- **472nd Avenue**: no mitigations are required; though widening of interchange in all build alternatives provides space for an eastbound left turn lane to be constructed. The minimum Control of Access (COA) of 100-feet can be obtained in each alternative; however, to improve safety a reduced access intersection is proposed at the intersection.
- **Trade Avenue**: no change, acceptable LOS.
- **Kiwanis Avenue**: to retain minor street stop control, turn lanes on all four approaches were evaluated; however, this resulted in the PM peak hour having poor operations. The existing single lane approaches are expected to operate acceptable under all-way stop control; therefore, the proposed mitigation would be to install all-way stop control.

All three proposed build alternatives provide LOS C or better operations at the ramp terminal intersections and are viable options to serve the projected future traffic volumes through the 2050 design year. All approaches and movements operate at a LOS D or better for all alternatives.

- **Alternative 3** offers the most efficient traffic operations providing LOS B at both ramp terminal intersections during both peak hours; the interchange design is optimal for high turning traffic to and from the interstate freeway system.
- **Alternative 2** provides the next most efficient traffic operations with a LOS C in the morning and a LOS B in the afternoon peaks; the combined signalized traffic movements at a single intersection provide efficient operations and allow the right turning movements to occur outside of the signal operations.
- **Alternative 1** provides the least efficient operations of the three alternatives with LOS C operations at the northbound I-29 ramp terminal in both peak hours. The two ramp

terminal intersections require good coordination to serve vehicles through both intersections in an effective progression.

It should be noted that the northbound to westbound movement from I-29 to 258th Street is the major movement at the Exit 86 interchange. This forecasted volume required a dual left turn lane and to carry two westbound through lanes across the bridge. The current forecasted volumes are slightly higher than previous Highway 130 Corridor Study and the 2020 DCIS due to increased developments in the surrounding area.

Input from the Study Advisory Group suggested to keep eastbound and westbound lanes the same; therefore, all interchange options carry a 4-lane divided section width between Dawson Avenue and 472nd Avenue.

Results for the non-interchange study intersections are shown in **Table 15** and the interchange alternative results are shown in **Table 16**; **Figure 17** summarizes all the intersection analysis.

Table 15 – Future Build 2050 Arterial Intersection Results

258th Street at:	Control Type	AM Peak Hour	PM Peak Hour
471st/N Marion Road	Traffic Signal	C	C
Dawson Avenue	Traffic Signal	A	B
Cottonwood Avenue	Right-In/Right-Out	B	B
472nd Avenue	¾-Access	B	B
Trade Avenue	Minor Stop	B	C
Kiwanis Avenue	All-Way Stop	B	C

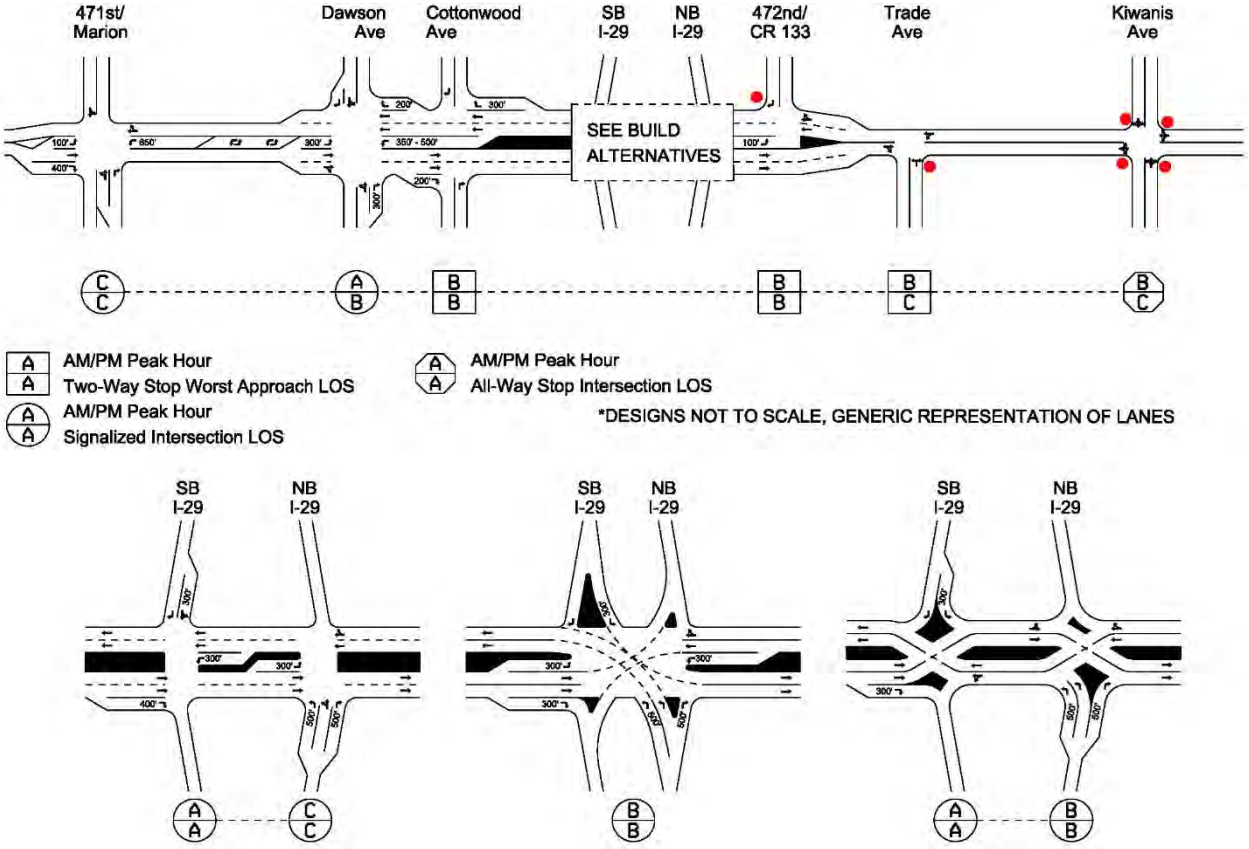
Notes: Average Intersection LOS shown, individual movements and/or approaches may differ. Minor Street Stop Control intersection LOS represents the worst minor approach LOS, major road would operate at LOS A.

Table 16 – Future Build 2050 Interchange Intersection Results

Alt.	Intersection	Control Type	AM Peak Hour	PM Peak Hour
Alt 1 – Diamond	SB I-29 Ramp Terminal	Traffic Signal	A	A
	NB I-29 Ramp Terminal	Traffic Signal	C	C
Alt 2 – SPUI	I-29 Ramp Terminal	Traffic Signal	B	B
Alt 3 – DDI	SB I-29 Ramp Terminal	Traffic Signal	A	A
	NB I-29 Ramp Terminal	Traffic Signal	B	B

Notes: Average Intersection LOS shown, individual movements and/or approaches may differ.

Figure 17 – Future Build 2050 Arterial Intersection Summary



6.3 Year of Opening Analysis – 2030

The interchange project is expected to be open to traffic by the year 2030. The forecast opening year still shows significant growth throughout the immediate project area.

The projected traffic forecast volumes resulted in the same volumes between the No Build and Build scenarios. The proposed build alternatives add capacity to the interchange area, but do not add significant capacity that would alter regional route choices outside the study area.

In the 2030 forecasts analysis, no new connection into the Foundation Park development was considered; however, the 2030 Build analysis evaluated both with and without the connection.

Appendix E includes all HCS summary sheets for the 2030 No Build conditions analysis, **Appendix F** includes all HCS summary sheets for the 2030 Build conditions.

6.3.1 2030 No Build Conditions

The summation of the 2030 No Build traffic operations analysis show that mainline I-29 operates acceptably for the entire project area.

Results for the individual freeway segments and ramp junctions of I-29 are shown in **Table 17** as well as **Figure 18**.

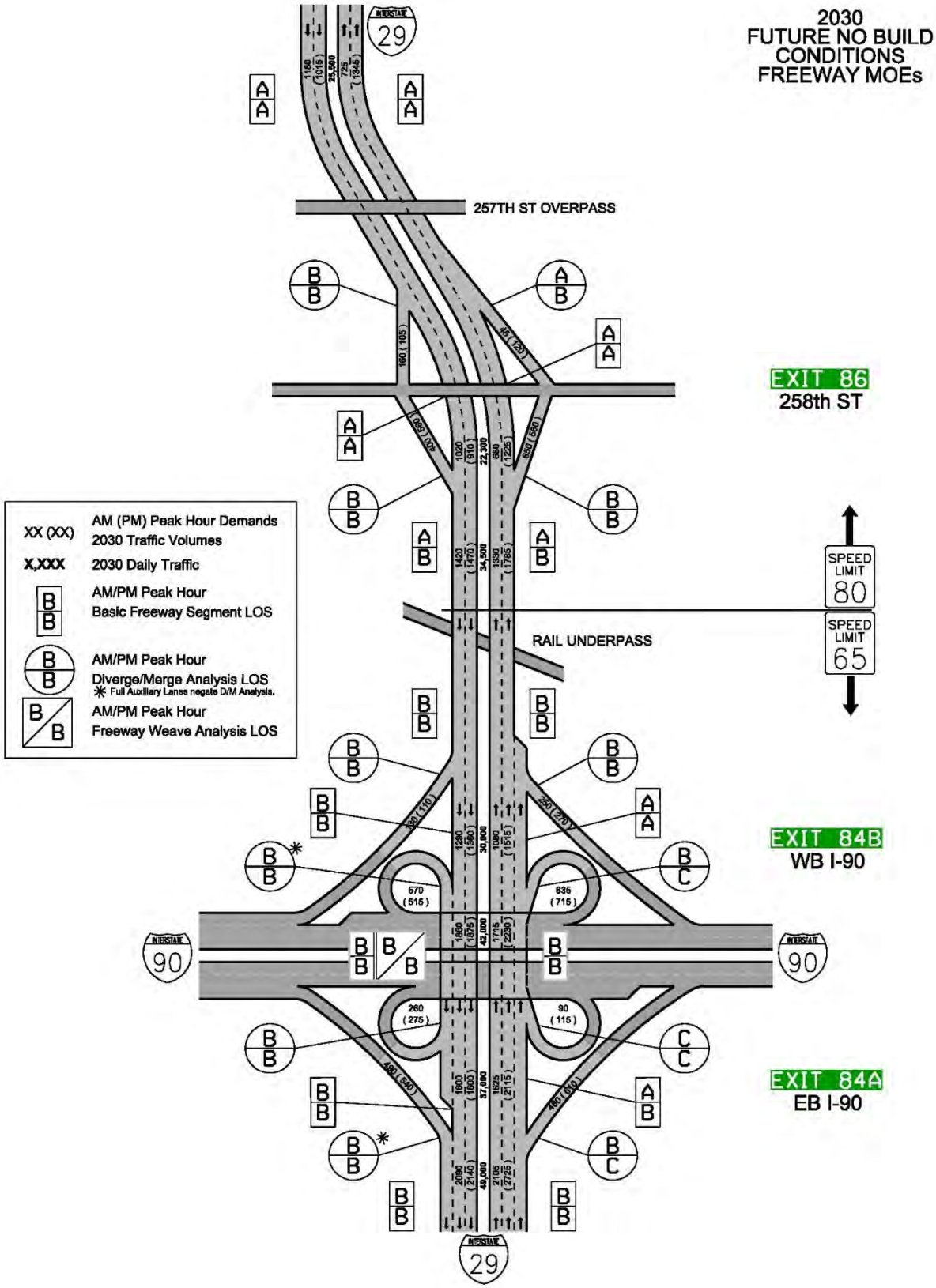
Table 17 – Future No Build 2030 Freeway Operation Results

Road	Description	Analysis Type	AM Peak LOS	PM Peak LOS
Northbound I-29	South of I-90	Basic	B	B
	Eastbound I-90 Exit Ramp	Diverge	B	C
	Between EB I-90 Ramps	Basic	A	B
	Eastbound I-90 Entrance Loop Ramp	Merge	C	C
	Between I-90 Loop Ramps (no auxiliary lane)	Basic	B	B
	Westbound I-90 Exit Loop Ramp	Diverge	B	C
	Between WB I-90 Ramps	Basic	A	A
	Westbound I-90 Entrance Ramp	Merge	B	B
	North of I-90 (Urban Section)	Basic	B	B
	South of Exit 86 (Rural Section)	Basic	A	B
	Exit 86 Exit Ramp	Diverge	B	B
	Between Exit 86 Ramps	Basic	A	A
	Exit 86 Entrance Ramp	Merge	A	B
	North of Exit 86	Basic	A	A
Southbound I-29	North of Exit 86	Basic	A	A
	Exit 86 Exit Ramp	Diverge	B	B
	Between Exit 86 Ramps	Basic	A	A
	Exit 86 Entrance Ramp	Merge	B	B
	South of Exit 86 (Rural Section)	Basic	A	B
	North of I-90 (Urban Section)	Basic	B	B
	Westbound I-90 Exit Ramp	Diverge	B	B
	Between WB I-90 Ramps	Basic	B	B
	Westbound I-90 Entrance Loop Ramp	Merge**	B	B
	Between I-90 Loop Ramps	Basic	B	B
		Weave	B	C
	Eastbound I-90 Exit Loop Ramp	Diverge	B	B
	Between EB I-90 Ramps	Basic	B	B
	Eastbound I-90 Entrance Ramp	Merge**	B	B
	South of I-90	Basic	B	B

Notes: **Merge Analysis includes full auxiliary lane; downstream basic lane analysis controls LOS.

Bold/Shaded indicates unacceptable LOS (Urban LOS D, Rural LOS C)

Figure 18 – Future No Build 2030 Freeway Operations Summary



Three of the project study area's eight arterial intersections have operational issues do to the increased volumes. Currently, all intersections are controlled with minor street stop control and no turn lanes are provided at any of the intersections, the exception is the intersection of N Marion Road/471st Avenue which the City of Sioux Falls is reconstructing and providing a traffic signal in 2023.

The increased traffic demands along 258th Street significantly reduce the available gaps in mainline traffic that would allow the minor approach traffic to enter the corridor. Without turn lanes, mainline through traffic also is expected to incur delays waiting behind left turning traffic yielding to oncoming vehicles.

Without the Foundation Park connection, Cottonwood Avenue will have poor operations in the PM peak hour when the existing development has a high exiting demand. This intersection is expected to be close to meeting a traffic signal warrant at the forecasted year of opening, with 2 hours met and another 6 hours within 10% to 20% of the 8-hour warrant criteria.

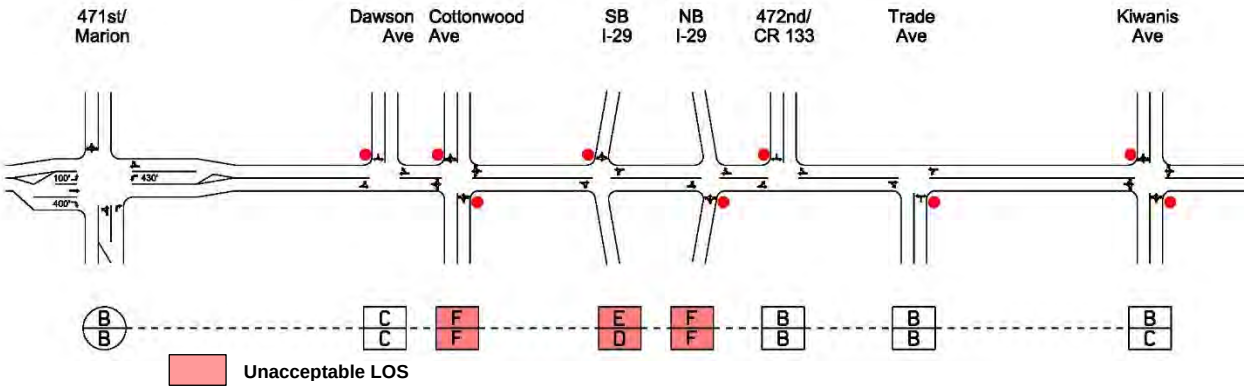
Results for the study intersections are shown in **Table 18** as well as **Figure 19**.

Table 18 – Future No Build 2030 Arterial Intersection Results

258th Street at:	Control Type	AM Peak Hour	PM Peak Hour
471st/N Marion Road	Signal	B	B
Dawson Avenue	Minor Stop	C	C
Cottonwood Avenue	Minor Stop	**F**	**F**
I-29 SB Ramp	Minor Stop	**E**	**D**
I-29 NB Ramp	Minor Stop	**F**	**F**
472nd Avenue	Minor Stop	B	B
Trade Avenue	Minor Stop	B	B
Kiwanis Avenue	Minor Stop	B	C

Notes: Average Intersection LOS shown, individual movements and/or approaches may differ. Minor Street Stop Control intersection LOS represents the worst minor approach LOS, major road would operate at LOS A.

Figure 19 – Future No Build 2030 Arterial Intersection Summary



6.3.2 2030 Build Conditions

The 2030 Build traffic operations analysis show that mainline I-29 operates acceptably for the entire project area. The updated design parameters of the ramp connections for Exit 86 improve the LOS for many of the merge and diverge analysis. No mitigations are required as part of the proposed Build conditions.

Results for the individual freeway segments and ramp junctions of I-29 are shown in **Table 19** as well as **Figure 20**.

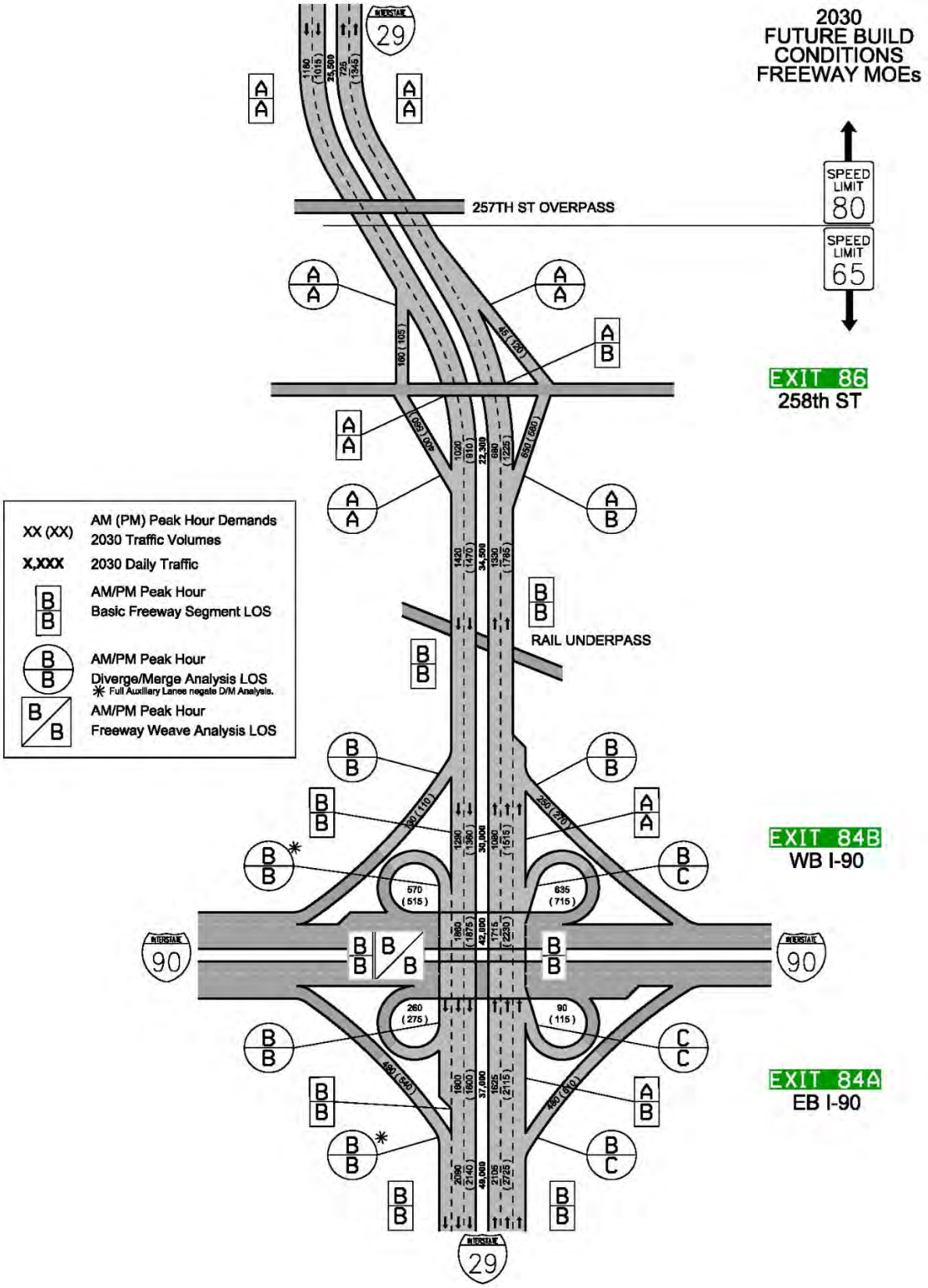
Table 19 – Future Build 2030 Freeway Operation Results

Road	Description	Analysis Type	AM Peak LOS	PM Peak LOS
Northbound I-29	South of I-90	Basic	B	B
	Eastbound I-90 Exit Ramp	Diverge	B	C
	Between EB I-90 Ramps	Basic	A	B
	Eastbound I-90 Entrance Loop Ramp	Merge	C	C
	Between I-90 Loop Ramps (no auxiliary lane)	Basic	B	B
	Westbound I-90 Exit Loop Ramp	Diverge	B	C
	Between WB I-90 Ramps	Basic	A	A
	Westbound I-90 Entrance Ramp	Merge	B	B
	North of I-90 (Urban Section)	Basic	B	B
	South of Exit 86 (**Urban** Section)	Basic	B	B
	Exit 86 Exit Ramp	Diverge	A	B
	Between Exit 86 Ramps	Basic	A	B
	Exit 86 Entrance Ramp	Merge	A	A
	North of Exit 86	Basic	A	A
Southbound I-29	North of Exit 86	Basic	A	A
	Exit 86 Exit Ramp	Diverge	A	A
	Between Exit 86 Ramps	Basic	A	A
	Exit 86 Entrance Ramp	Merge	A	A
	South of Exit 86 (**Urban** Section)	Basic	B	B
	North of I-90 (Urban Section)	Basic	B	B
	Westbound I-90 Exit Ramp	Diverge	B	B
	Between WB I-90 Ramps	Basic	B	B
	Westbound I-90 Entrance Loop Ramp	Merge**	B	B
	Between I-90 Loop Ramps	Basic	B	B
		Weave	B	C
	Eastbound I-90 Exit Loop Ramp	Diverge	B	B
	Between EB I-90 Ramps	Basic	B	B
	Eastbound I-90 Entrance Ramp	Merge**	B	B
	South of I-90	Basic	B	B

Notes: **Merge Analysis includes full auxiliary lane; downstream basic lane analysis controls LOS.

Bold/Shaded indicates unacceptable LOS (Urban LOS D, Rural LOS C)

Figure 20 – Future Build 2030 Freeway Operations Summary



To mitigate delay issues at the arterial intersections in 2030, traffic control changes and turn lanes were included at many of the study intersections. Along 258th Street, the intersections outside the immediate interchange area would have the same traffic operations in all three proposed build alternatives.

The proposed needs along 258th Street would generally be intersection related; the proposed speed limit of the urban arterial is recommended at 45 mph to be able to serve permissive left turn movements at any signalized intersection. The following improvements are necessary at the intersections outside of the interchange area:

- **471st Avenue/N Marion Road**: the 2023 intersection reconstruction and traffic signal project will serve the 2030 traffic demands to an acceptable LOS; no change. The intersection will handle the traffic demands with and without the additional connection to Foundation Park in the 2030 scenario.
- **Dawson Avenue**: to provide better intersection spacing, Dawson Avenue will be the first full access intersection west of I-29; the proposed 2050 geometrics will serve the intersection volumes.
  - Without the Foundation Park connection in 2030, the intersection would operate at a LOS E and LOS F for the minor approaches under two-way stop control; therefore, traffic signal control is required with or without the southerly connection in place.
- **Cottonwood Avenue**: the proposed 2050 geometrics and conversion to a RI/RO intersection will operate acceptably in 2030.
- **472nd Avenue**: no mitigations are required; though widening of interchange in all build alternatives provides space for an eastbound left turn lane to be constructed. To improve safety, a reduced access intersection is proposed at the intersection.
- **Trade Avenue**: no change, acceptable LOS.
- **Kiwanis Avenue**: turn lanes are not required to serve the year of opening traffic demands at this intersection under two-way stop control. Traffic volumes and intersection safety should be monitored to determine the need for intersection improvements.

All three proposed build alternatives provide LOS C or better operations at the ramp terminal intersections and effectively serve the 2030 year of opening traffic. All approaches and movements operate at a LOS D or better for all alternatives.

- **Alternative 3** offers the most efficient traffic operations providing LOS B at both ramp terminal intersections during both peak hours; the interchange design is optimal for high turning traffic to and from the freeway system.
- **Alternative 2** provides the next most efficient traffic operations with a LOS B in the morning and a LOS C in the afternoon peaks; the combined signalized traffic movements at a single intersection provide efficient operations and allow the right turning movements to occur outside of the signal operations.
- **Alternative 1** provides the least efficient operations of the three alternatives with LOS C operations at the northbound I-29 ramp terminal in both peak hours. The two ramp terminal intersections require good coordination to serve vehicles through both intersections in an effective progression.

Results for the non-interchange study intersections are shown in **Table 20** and the interchange alternative results are shown in **Table 21**; **Figure 21** summarized all of the intersection analysis.

Table 20 – Future Build 2030 Arterial Intersection Results

258th Street at:	Control Type	AM Peak Hour	PM Peak Hour
471st/N Marion Road	Traffic Signal	B	C
Dawson Avenue	Traffic Signal	A	B
Cottonwood Avenue	Right-In/Right-Out	B	B
472nd Avenue	¾-Access	A	A
Trade Avenue	Minor Stop	B	B
Kiwanis Avenue	Minor Stop	B	B

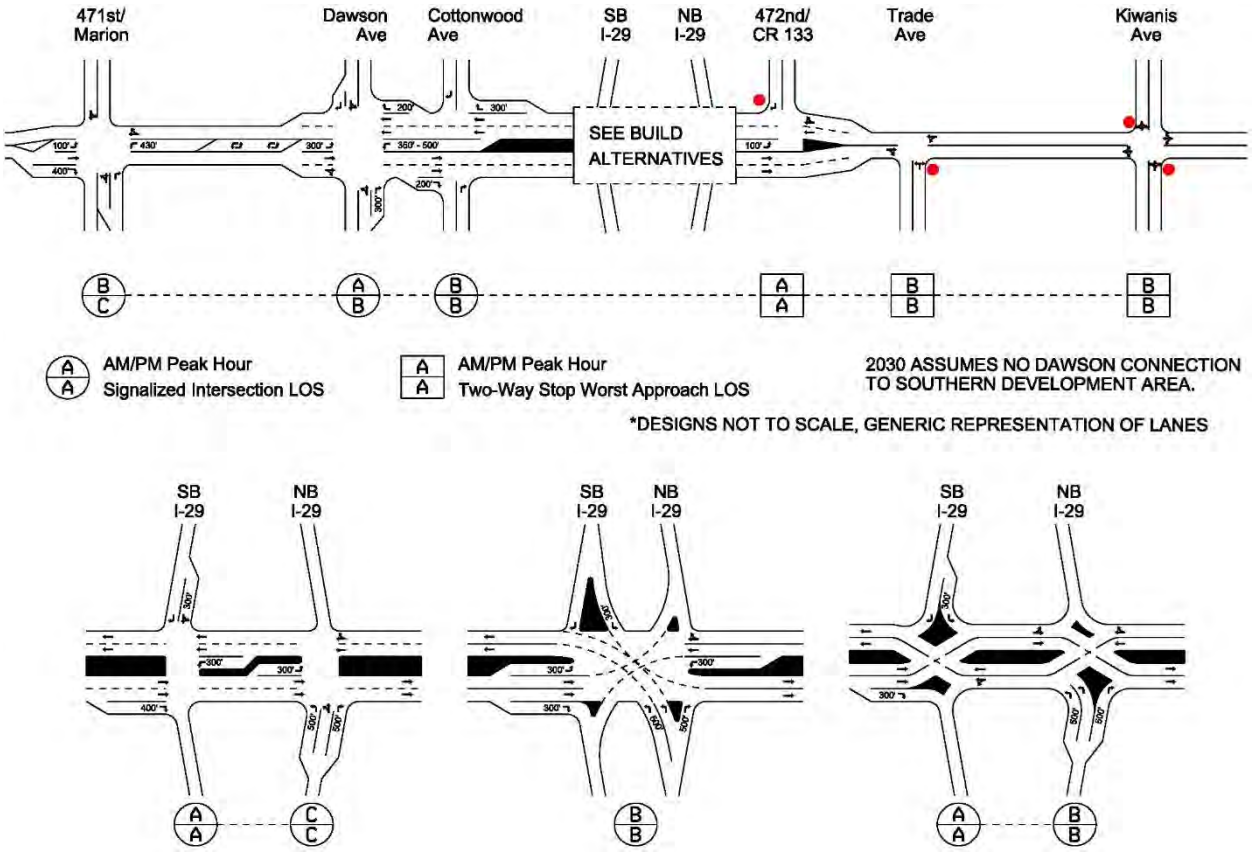
Notes: Average Intersection LOS shown, individual movements and/or approaches may differ. Minor Street Stop Control intersection LOS represents the worst minor approach LOS, major road would operate at LOS A.

Table 21 – Future Build 2030 Interchange Intersection Results

Alt.	Intersection	Control Type	AM Peak Hour	PM Peak Hour
Alt 1 – Diamond	SB I-29 Ramp Terminal	Traffic Signal	A	A
	NB I-29 Ramp Terminal	Traffic Signal	C	C
Alt 2 – SPUI	I-29 Ramp Terminal	Traffic Signal	B	B
Alt 3 – DDI	SB I-29 Ramp Terminal	Traffic Signal	A	B
	NB I-29 Ramp Terminal	Traffic Signal	A	B

Notes: Average Intersection LOS shown, individual movements and/or approaches may differ.

Figure 21 – Future Build 2030 Arterial Intersection Summary



6.4 Design Year Sensitivity Analysis

As all three of the proposed alternatives were designed to provide acceptable traffic operations through the 2050 design year, a sensitivity analysis was conducted at the interchange to test for excess capacity of the proposed interchange designs.

The growth in traffic volumes between 2030 and 2050 was carried further into the future in 5-year increments to evaluate each interchange option and determine when the intersections would begin to operate unacceptably.

Based on the previous analysis, the existing interchange will fail between 2022 and 2030 as development traffic begins to use 258th Street.

Table 22 represents the forecast range for when the proposed 2050 designs will reach a failing LOS result or have a queue storage issue; while slight modifications could improve the life of the interchange, this was done to test the capacity of the current designs.

Alternative 1 would have queue storage issues at the southbound I-29 ramp terminal by 2060 during the PM peak hour; the LOS would still be acceptable.

Alternative 2 would have queue storage issues at the single I-29 ramp terminal by 2070 during the PM peak hour; the LOS would still be acceptable.

Alternative 3 would have queue storage issues at the southbound I-29 ramp terminal by 2085 during the AM peak hour; the LOS would still be acceptable.

Therefore, Alternative 3 has the most excess capacity out of the three proposed interchange alternatives.

Table 22 – Future Build Interchange Failure Analysis Results

Alt.	Intersection	Control Type	Description	Year at LOS D
Alt 0 – Diamond	NB I-29 Ramp Terminal	Minor Stop	Northbound left delays	2022 to 2030
Alt 1 – Diamond	SB I-29 Ramp Terminal	Traffic Signal	Queue storage issue; PM Peak.	2055 to 2060
Alt 2 – SPUI	I-29 Ramp Terminal	Traffic Signal	Queue storage issue; PM Peak.	2065 to 2070
Alt 3 – DDI	SB I-29 Ramp Terminal	Traffic Signal	Queue storage issue; AM Peak.	2080 to 2085

7 Alternatives Analysis

The interchange alternatives were analyzed and compared to determine which may be the most appropriate for meeting the project needs. The areas of analysis and comparison are discussed in the following sections.

7.1 Conformance with Transportation Plans

State and local transportation plans have identified a need for an improved interchange at I-29 and Exit 86 (258th Street) that meets design standards and provides adequate safety and capacity improvements to serve the existing and future travel demand. The following transportation plans have identified the study interchange:

- 2020 Decennial Interstate Corridor Study (SDDOT)
- Highway 130 Corridor Study (Minnehaha County)
- Foundation Park Traffic Impact Study (City of Sioux Falls)

All retained interchange alternatives satisfy this conformance.

7.2 Compliance with Policies and Engineering Standards

Alternative 0, the No Build condition, by its definition will not address the known geometric needs of the existing interchange and therefore does not comply with these standards.

Each of the proposed interchange alternatives has used the latest design guidance from AASHTO, FHWA, and SDDOT; final design of any of the options may be accomplished without conflict with geometric design standards.

Access management was examined at adjacent local street intersections and driveway locations; this includes the SDDOT and City of Sioux Falls spacing.

- SDDOT design standards call for access spacing of at least 100’ from the radius of the ramp termini when rebuilding an existing urban interchange. However, it is further recommended extending the control of access to meet the access spacing requirements established by South Dakota Administrative Rule 70:09; the Administrative Rules call for unsignalized access spacing of 100’ to 660’ and minimum signalized access spacing of 1320’, depending on the classification of the arterial street (258th Street is not within SDDOT jurisdiction and is not currently classified in the State system). With reconstructing an existing interchange, a minimum spacing of 100’ is required for the first unsignalized access.
- Minnehaha County and the City of Sioux Falls design standards call for ¼ mile full access spacing on arterial roadways like 258th Street, but list spacing of unsignalized partial access as “varies”. Other guidelines and research recommend signalized intersections no closer than ¼ mile from interchange ramp termini but allow unsignalized partial access at spacing less than ¼ mile.

West of I-29, all three alternatives effectively satisfy both spacing standards. The first unsignalized access is proposed at Cottonwood Avenue, approximately 750’ west of I-29 and COA easily exceeds 100-feet for all alternatives. The first full access signalized intersection proposed to be at Dawson Avenue, approximately 1,150-feet west; this does not fully meet the recommended 1,320-feet but is within 15% of the ideal spacing distance.

To the east of I-29, all three alternatives would satisfy the COA for an existing urban interchange reconstruction. 472nd Avenue is just under 300-feet east, but the design can provide over 100-feet of access control with the reduced access intersection design. Trade Avenue is just over 800-feet east of I-29, this intersection will be the end of the construction limits.

472nd Avenue, also known as County Highway 133, was a major concern for residents during the public engagement for this study. 472nd Avenue provides 8-miles of parallel roadway to I-29 between the Exit 94 and Exit 86 interchanges. Therefore, the ¾-access intersection was proposed in all alternatives. Kiwanis Avenue would meet the long-term full access intersection spacing as the area develops; however, Kiwanis Avenue only provides connectivity for approximately 1-mile north of 258th Street.

East of the interchange along 258th Street, the intersections of 472nd Avenue, Trade Avenue, and Kiwanis Avenue, should be monitored by the City and County to determine the future needs of lanes and traffic control at the intersections.

7.3 Environmental Impacts

An Environmental Scan Report (ESR) is being developed in conjunction with the IMJR. This document will compare each alternative and their environmental impacts compared to the No Build alternative. The ESR will ultimately recommend the NEPA documentation necessary for the proposed interchange project.

7.4 Safety

All Build alternatives are expected to show a safety benefit when compared to the No Build alternative. A predictive analysis of the alternatives was conducted using FHWA's Interactive Highway Safety Design Model (IHSDM); this is a faithful implementation of the crash prediction methods documented in Part C of the Highway Safety Manual (HSM). IHSDM output sheets are provided in **Appendix I**.

In addition, vehicle conflict points at the three interchange alternatives were reviewed. Vehicle conflict points, locations were vehicle travel paths intersection, is a metric that can be used to evaluate the safety at an intersection or interchange. The following are the total vehicle conflict points for each of the build options:

- Alternative 1: a diamond interchange has 22 conflict points at both ramp terminals.
- Alternative 2: a SPUI interchange has 24 conflict points at the single ramp terminal.
- Alternative 3: a DDI interchange has 18 conflict points at both ramp terminals.

The IHSDM model limits include the immediate project area, including I-29 from just north of I-90 to approximately 256th Street. The arterial corridor includes 258th Street from 471st Avenue/N Marion Road to Kiwanis Avenue.

Table 23 shows the IHSDM analysis results, all proposed Build alternatives have a substantial reduction in predicted crashes when compared to the No Build condition, between a 10% and 15% reduction.

Table 23 – Predicted Crashes (IHSDM) Results (2024 to 2050)

Facility Type	Crash Type	No Build	Alt 1 Diamond	Alt 2 SPUI	Alt 3 DDI
Freeway Mainline	Fatal/Injury	162	159	159	159
	Property Only	294	295	295	295
Ramp Connections	Fatal/Injury	17	18	17	17
	Property Only	19	19	17	17
Arterial Corridor & Intersections	Fatal/Injury	159	112	99	93
	Property Only	283	238	210	215
ALTERNATIVE TOTALS	Fatal/Injury	337	290	276	270
	Property Only	596	551	522	527
	TOTAL	**933**	**841**	**797**	**797**
	% Reduction	**-**	**10%**	**15%**	**15%**

When comparing the crashes by facility type, the freeway mainline crashes are predicted to have only a small reduction of 2 crashes for each build alternative. With no additional lane changes along I-29, the reduction in crashes occurs due to the change in merge and diverge designs. With all build options designed to the same standards and at effectively the same locations, there is no difference in the mainline build alternative crashes.

For the ramp connections, the difference between the No Build and all three build alternatives are fairly minor in the total quantity of crashes predicted. Alternative 1 does include slightly longer ramps than the other two alternatives which is approximately 11% longer than the No Build conditions; this option has a 1 crash increase over the No Build. Alternatives 2 and 3 both have ramps lengths that are slightly shorter than Alternative 1 and result in an overall reduction of 2 crashes compared to the No Build.

The biggest impact in reduction of predicted crashes occurs on the arterial corridor and study intersections. The changes on the arterial include a significant amount of center median being constructed, as well as intersection control and access changes along the corridor. The reduction in crashes for the Build alternatives on the arterial corridor is between 21% and 30%.

- Alternative 1 provides a 21% reduction in crashes, with a 29% reduction in fatal and injury crashes.
- Alternative 2 and 3 provide a 30% reduction in crashes, with a 37% and 41% reduction in fatal and injury crashes, respectively.

Build alternatives 2 and 3 provide essentially the same crash benefit; these two alternatives provide more of a crash reduction due to the reduced number of conflict points or intersections at the interchange junction. Alternative 3 does have slightly less injury crashes than Alternative 2.

Based on the safety analysis, all three alternatives have a safety benefit over the existing and No Build conditions.

7.5 Operational Performance

The operations analysis of the alternative scenarios was evaluated using appropriate level of service techniques. All alternatives were evaluated with forecast demands for the opening year of 2030 and a design year of 2050.

The existing roadway network currently operates with no major safety or operational deficiencies within the project area. Safety and operational problems will be appreciably exacerbated as traffic levels increase from the surrounding developments to the predicted traffic amounts. The proposed interchange alternatives will provide acceptable traffic operations for all users within the project area based on the traffic operations analysis as discussed in **Section 6.0** of this document.

Regardless of the recommended interchange configuration, the 2030 and 2050 analysis indicated that I-29 will not require capacity improvements for the existing 2-lane facility between I-90 and north of Exit 86. However, the roadway between I-90 and just north of Exit 86 should be considered an urban interstate facility with a posted speed of 65 mph.

The majority of the 258th Street study intersections are impacted by the growth in traffic levels along the corridor. Many of the intersections along 258th Street between 471st Avenue/N Marion Road and Kiwanis Avenue will need improvements to serve the future 2050 traffic demands. The immediate reconstruction area for the interchange project will provide a 4-lane divided roadway between Cottonwood Avenue and 472nd Avenue. The following intersection changes are required to serve the future 2050 demands:

- 471st Avenue/N Marion Road intersection will require the westbound left turn lane to be extended from the 2023 construction project.
- Dawson Avenue will be a full access signalized intersection.
- Cottonwood Avenue will be converted to a RI/RO reduced access intersection.
- 472nd Avenue will be converted to a ¾-access intersection.
- Trade Avenue will remain unchanged.
- Kiwanis Avenue can remain unchanged after the year of opening but will need to be converted to an all-way stop controlled intersection prior to 2050. The City of Sioux Falls and Minnehaha County may monitor traffic levels at this intersection to determine the ultimate intersection mitigations as development occurs and traffic increases.

At the 258th Street and I-29 interchange, all three proposed build alternatives provide acceptable traffic operations through the 2050 design year; the lane configurations for all three alternatives result in approximately the same roadway width between Cottonwood Avenue and 472nd Avenue.

To distinguish the interchange build alternatives, a failure year analysis was conducted. Alternative 3 has the longest expected life span of the three alternatives: with Alternative 2 in second, and Alternative 1 with the least excess capacity.

7.6 Evaluation of Alternatives

A matrix comparing the No Build alternative to each Build alternative is shown in **Table 24** below. Based on the information within the matrix, Alternative 2 or Alternative 3 provide a better technical solution than the No Build or Alternative 1.

Table 24 – Alternative Evaluation Matrix

	Evaluation Criteria	Alternative 0	Build Alternatives		
		No Build	Alt 1	Alt 2	Alt 3
Design	Meets SDDOT Design Criteria	No	Yes	Yes	Yes
	Meets SDDOT Access Spacing Criteria	Yes	Yes	Yes	Yes
	Meets City Access Spacing Criteria	No	No	No	No
	Access Closures	0	4	4	4
Impacts	Acquisitions - Residential	n/a	0	0	0
	Acquisitions - Business	n/a	0	0	0
	Total Acreage of ROW Required *	n/a	0.52 FEE 0.38 TLE	0.53 FEE 0.40 TLE	0.52 FEE 0.38TLE
	Wetlands (acres)	n/a	0.07	0.07	0.07
Traffic	Safety Improvement (2030 through 2050 Crashes)	No (933 crashes)	Yes (841 crashes)	Yes (797 crashes)	Yes (797 crashes)
	Operational Performance	Poor	Good	Good	Good
	Worst I-29 Performance 2050 (within Project Limits)	LOS C	LOS C	LOS C	LOS C
	Worst Ramp Terminal Performance 2050	LOS F	LOS C	LOS C	LOS B
	Interchange Failure Analysis (Time frame to reach LOS D)	2025-2030	2060	2070	2085
	Non-Motorized Facilities	Poor – no existing facilities.	Good - Sidewalk Provided; no free movement crossings.	Good - Sidewalk Provided; four free movement crossings.	Good - Sidewalk Provided; two free movement crossings.
	Maintenance of Traffic During Construction	n/a	Good	Fair	Good
	Allows for Phased Construction	n/a	Yes	Yes	Yes
Cost	Interchange Structure Costs ($M)	n/a	$5.90	$6.29	$5.09
	Interchange Roadway Costs ($M)	n/a	$4.49	$4.94	$4.62
	Arterial Roadway Costs ($M)	n/a	$1.99	$2.68	$2.24
	Arterial Roadway Costs - city portion ($M)	n/a	$0.00	$0.00	$0.00
	Miscellaneous Costs ($M)	n/a	$4.09	$4.24	$4.18
	Design Costs ($M)	n/a	$3.30	$3.63	$3.22
	Inflation (2025 Dollars)	n/a	$2.14	$2.36	$2.10
	Total Project Costs (Millions in 2025 dollars)	n/a	**$21.92**	**$24.15**	**$21.44**

7.7 Coordination

The Exit 86 interchange project is being developed in conjunction with FHWA, SDDOT, Minnehaha County, the Sioux Falls MPO, the City of Sioux Falls, and the City of Crooks.

The City of Sioux Falls project to reconstruct the 258th Street at 471st Avenue/N Marion Road intersection is ongoing and anticipated to open in 2023. The Minnehaha County Highway 130 (258th Street) study currently has no funding or anticipated constructed time frame. If funding becomes available prior to 2030, coordination between the County, Cities of Crooks and Sioux Falls, and SDDOT staff should begin and continue through the construction phase of both projects.

The 258th Street corridor, including the interchange with I-29, has been the subject of agency coordination and public involvement as part of both the Highway 130 Corridor Study and the current interchange study and NEPA process. Public meetings have been held for both the previous and current projects. Information regarding the current project can be found at the following web address:

I-29 Exit 86 Renner/Crooks Planning Study (i29exit86.com)

7.8 Alternative Recommendation

Based on the technical analysis contained in this Interchange Modification Justification Report (IMJR), and input from the Study Advisory Team, it was determined that **Alternative 1** will provide the best technical solution for the transportation needs in the study area and is recommended to move forward for FHWA approval.

The year of opening 2030 traffic forecasts rely heavily on the assumed development traffic, surrounding roadway connections, and assumed traffic routing patterns. The benefit for choosing Alternative 1 is the interchange can be constructed without initially requiring traffic signal control, though the design will accommodate traffic signal control. The interchange can initially be controlled with minor street stops, and a traffic signal can be installed when the traffic volumes reach the required thresholds. Alternatives 2 and 3 both require traffic signal control to function.

Alternative 1 is expected to provide acceptable traffic operations through the approximate forecast year of 2060; while Alternative 3 is expected to reach the forecast year of 2085. With both alternatives being of the diamond configuration, proposed modifications to Alternative 1 were made to allow a long-term future conversion to a diverging diamond interchange if traffic volumes exceed the capacity of the standard diamond interchange. The modification to the original Alternative 1 includes the following:

- Reducing the ramp terminal spacing to match the spacing for Alternative 3.
  - No queue storage issues are expected with the reduced spacing.
  - Improved intersection and control of access spacing on 258th Street.
  - Minimal cost difference with modifications.
- Accommodate bridge size for both Alternative 1 and 3
  - Alternative 1 bridge is larger and will accommodate Alternative 3 with no change.

In addition, the County currently has no plans to fund their portion of the project; therefore, the interchange will be constructed to taper to the existing roadway at Cottonwood Avenue on the west side of the interchange.

8 Funding Plan

The 2024-2027 Statewide Transportation Improvement Program (STIP) does not contain a project for reconstruction of the I-29 and 258th Street interchange.

The interchange reconstruction project is in the SDDOT's developmental program and anticipated to be constructed in 2029 and 2030. Current SDDOT budget estimates for interchange improvements are shown below.

Current construction cost estimates for the interchange and I-29 mainline work for Alternative 1 are $21.92 Million in 2025 dollars.

Table 25 – Anticipated Funding Allocation Breakdown

Project Number	State Category	Federal Category	Federal Funds ($ million)	State Funds ($ million)	City Funds ($ million)	Other Funds ($ million)	Total Funds ($ million)
IM 0293(115)86 PCN 08LT	Interstate	National Highway Performance Program (NHPP)	$27.333	$4.966	$0.00	$0.00	$32.299
X	County Capital Improvements Program	None	$0.00	$0.00	$0.00	$0.00	$0.00
		TOTALS	$27.333	$4.966	$0.00	$0.00	$32.299

Note: Funding in Table 25 is inflated to anticipated year of expenditure (2029). As funding is fluid, category breakdown may be different at the time of project authorization.

9 Recommendations

Section 111 of Title 23 USC provides that before proceeding with the modification of existing access or the addition of access to the Interstate System, it is necessary to gain approval from the U.S. Secretary of Transportation.

The authority to administer 23 USC 111 has been delegated to the FHWA pursuant to 49 CFR 1.48(b)(10). The FHWA published a policy statement in the Federal Reserve on October 22, 1990 (55 FR 42670), which was modified on February 11, 1998 (63 FR 7045) and on August 27, 2009 (74 FR 20679). The latest update to the policy statement was on May 22, 2017 (23 CFR 630C).

The FHWA Policy on Access to the Interstate System requires all requests for new or revised access points on completed Interstate highways must closely adhere to the planning and environmental review processes as required in 23 CFR 450 and 771.

In this statement of policy, two technical policy requirements were identified for use by FHWA to do a technical evaluation of new or revised access points to the Interstate System. The policy requirements and a discussion of the proposed project conformance to each requirement are discussed in the following sections.

The technical analysis contained in this Interchange Modification Justification Report (IMJR) has found that **Alternative 1** provides the best technical solution for the transportation needs in the study area.

9.1 Policy Number One

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)).

Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

An extensive safety and operations analysis was conducted for the study area, as previous sections of this report presented. The results show that the proposed build scenarios are not expected to adversely affect the safety or efficiency of the Interstate system. The proposed build alternative is expected to improve safety, operations, and access management on the crossroad in the interchange area.

Results indicate the freeway mainline segments of I-29 will not require capacity improvements by the design year 2050, regardless of any interchange design alternative. While traffic is expected to nearly double on some freeway segments of I-29, the current volumes are well below the capacity of the existing facility and all analysis resulted in LOS C or better for the urban interstate.

Figures 22 and 23 are repeated from Section 6 of this report representing the 2050 design year No Build and Build freeway operational results.

Arterial network operations analysis was conducted on the 8 intersections within the study area as previous sections have presented. The forecasted traffic volumes along 258th Street will overburden the existing lane configuration and minor street stop control at the majority of study intersections.

The proposed build alternatives will provide essentially the same capacity along 258th Street between Cottonwood Avenue and 472nd Avenue, with a 4-lane divided roadway planned. The following intersection changes are required to serve the future 2050 demands along 258th Street:

- 471st Avenue/N Marion Road intersection will require the westbound left turn lane to be extended from the 2023 construction project.
- Dawson Avenue will be a full access signalized intersection.
- Cottonwood Avenue will be converted to a RI/RO reduced access intersection.
- 472nd Avenue will be converted to a ¾-access intersection.
- Trade Avenue will remain unchanged.
- Kiwanis Avenue can remain unchanged after the year of opening but will need to be converted to an all-way stop controlled intersection prior to 2050. The City of Sioux Falls and Minnehaha County may monitor traffic levels at this intersection to determine the ultimate intersection mitigations as development occurs and traffic increases.

The interchange project limits on the west side of the interchange will taper down to match the existing roadway section at Cottonwood Avenue. The segment of 258th St from Cottonwood Avenue to the west will be part of a future separate project by others when needed.

Figure 24 represents the preferred Alternative 1 interchange design. The predictive crash modeling showed the proposed build alternative would provide approximately a 10% reduction in predicted crashes between 2030 and 2050.

A signing plan has been developed for the proposed interchange and interstate improvements which is provided in **Appendix J** and is represented in **Figure 25**.

Additionally, typical sections along 258th Street are provided in **Appendix J**. The typical sections represent the preliminary design widths for travel lanes, shoulders, sidewalks, and boulevard areas. Three typical sections were developed, including one for each side of the interchange and one on the bridge structure.

Figure 22 – 2050 No Build Freeway Summary

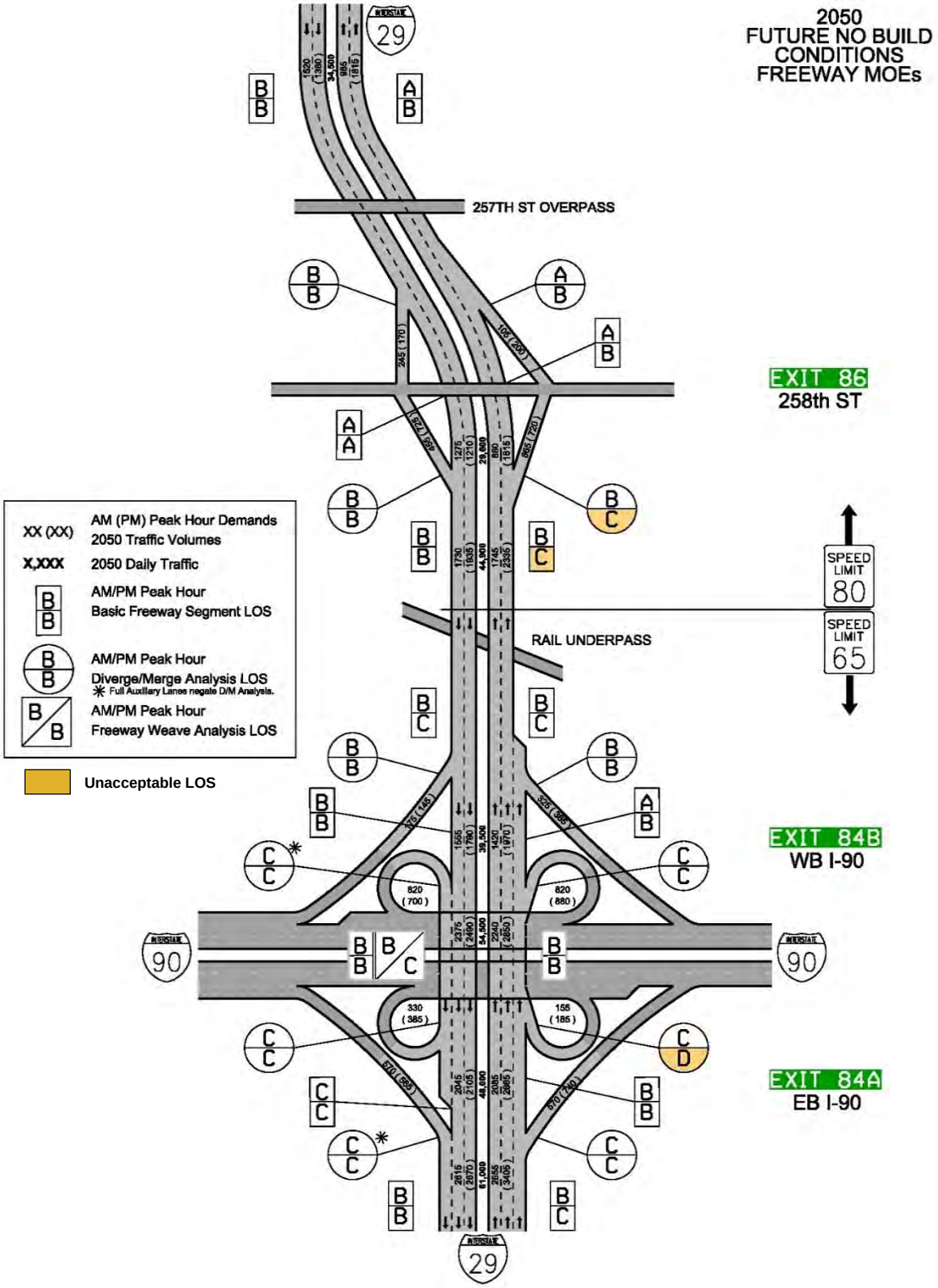


Figure 23 – 2050 Build Freeway Summary

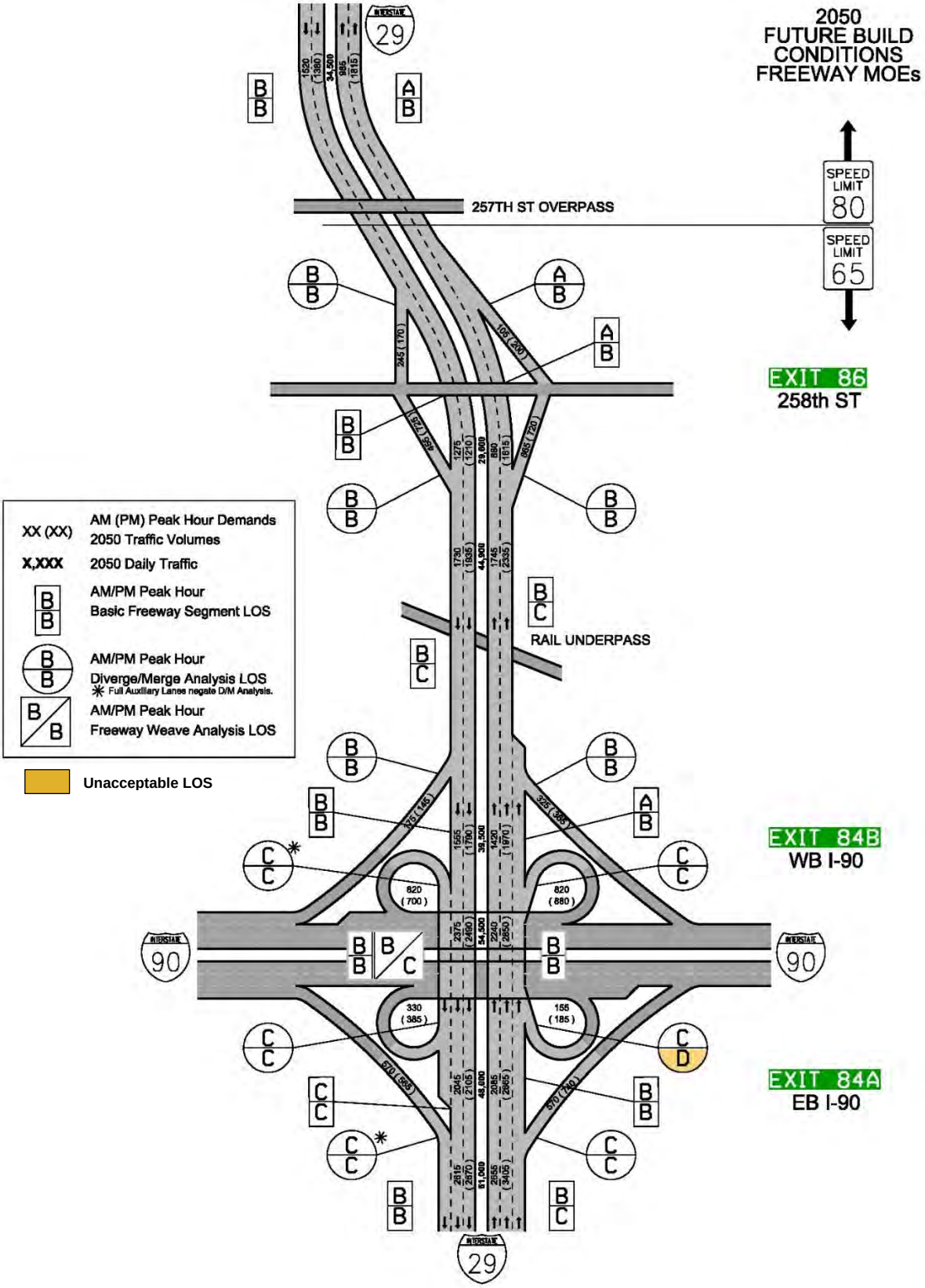


Figure 24 – Preferred Interchange Design – Alternative 1

Figure 25 – Alternative 1 – Conceptual Signing Plan

9.2 Policy Number Two

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

Upon completion, all connections associated with the project will connect to public roads and will provide for all traffic movements. The design geometrics have been developed in accordance with SDDOT and FHWA design standards for interchanges.

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