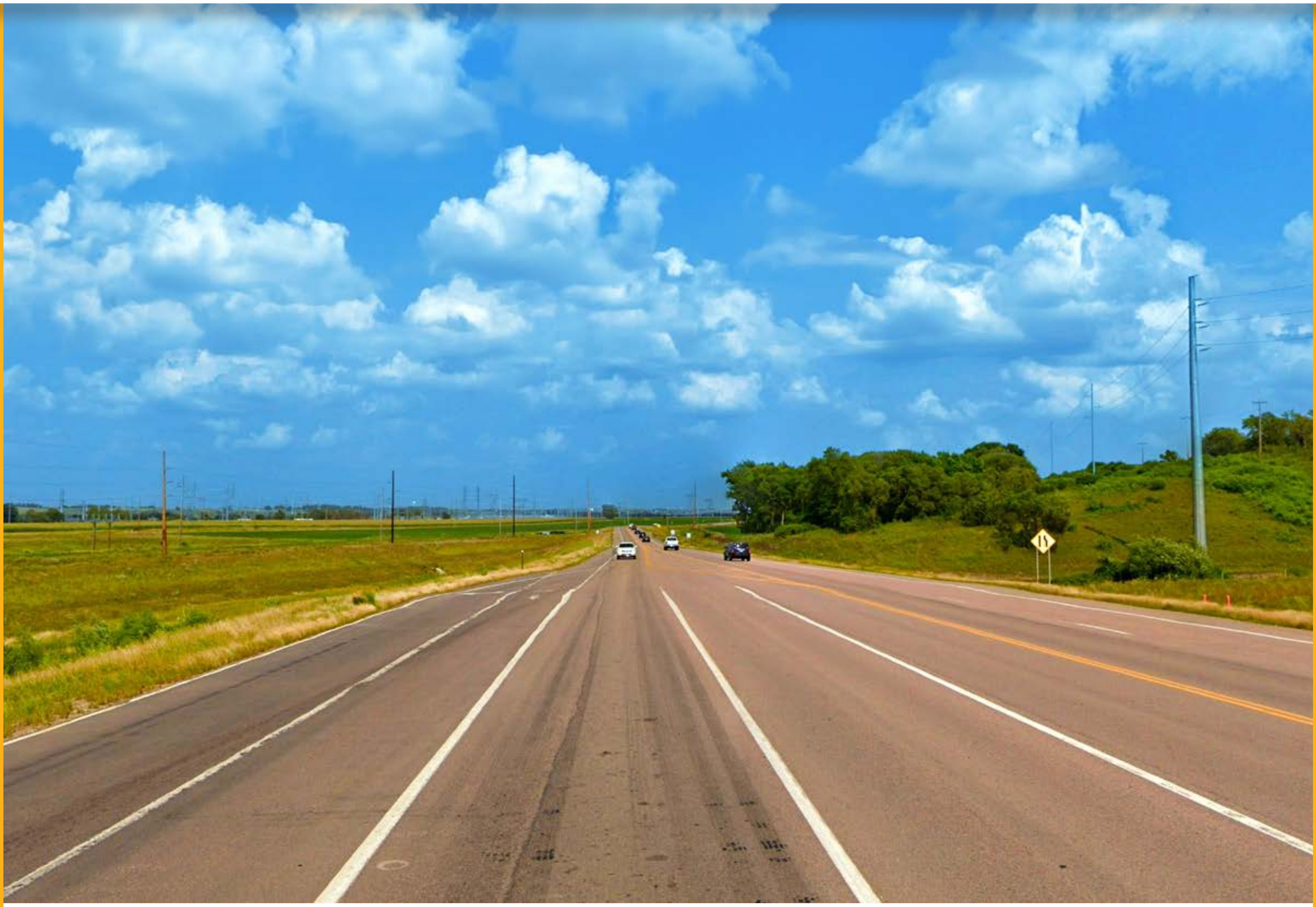
RICE STREET/HOLLY BOULEVARD

CORRIDOR STUDY



December 2024

Brandon South Dakota Building a Better Life

City of Sioux Falls

FHWA

SD DOT

Minnehaha County

SECOG

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INTRODUCTION

Rice Street / Holly Boulevard is an important route in the northeast area of the Sioux Falls Metropolitan Planning Organization (MPO) area and serves as a primary connection between the City of Brandon and City of Sioux Falls with links to regional routes including Interstate 229 (I-229), Veterans Parkway, and SD11 / Splitrock Boulevard. Current roadway jurisdiction is a mix of City of Sioux Falls, Minnehaha County, and City of Brandon within the study corridor. With continued growth of both communities and the diverse land uses (including industrial, residential, recreational, commercial/office, institutional, and utilities), the City of Brandon, City of Sioux Falls, and Minnehaha County jointly initiated a study in 2023 to develop a long-range plan for the corridor.

The Rice Street / Holly Boulevard corridor study focus area limits are shown in **Figure 1**, which extends approximately seven miles from the I-229 Exit 7 interchange to SD11 / Splitrock Boulevard. An expanded study area west of I-229 to Cliff Avenue was included in traffic analysis efforts to account for arriving traffic patterns and align with the study area in the *I-229 Major Investment Study*.

A Study Advisory Team (SAT) was organized to provide guidance and feedback at key milestones and included representatives from:

- SECOG/Sioux Falls Metropolitan Planning Organization (MPO)
- Minnehaha County
- City of Brandon
- City of Sioux Falls
- South Dakota Department of Transportation (SDDOT)
- Federal Highway Administration (FHWA)

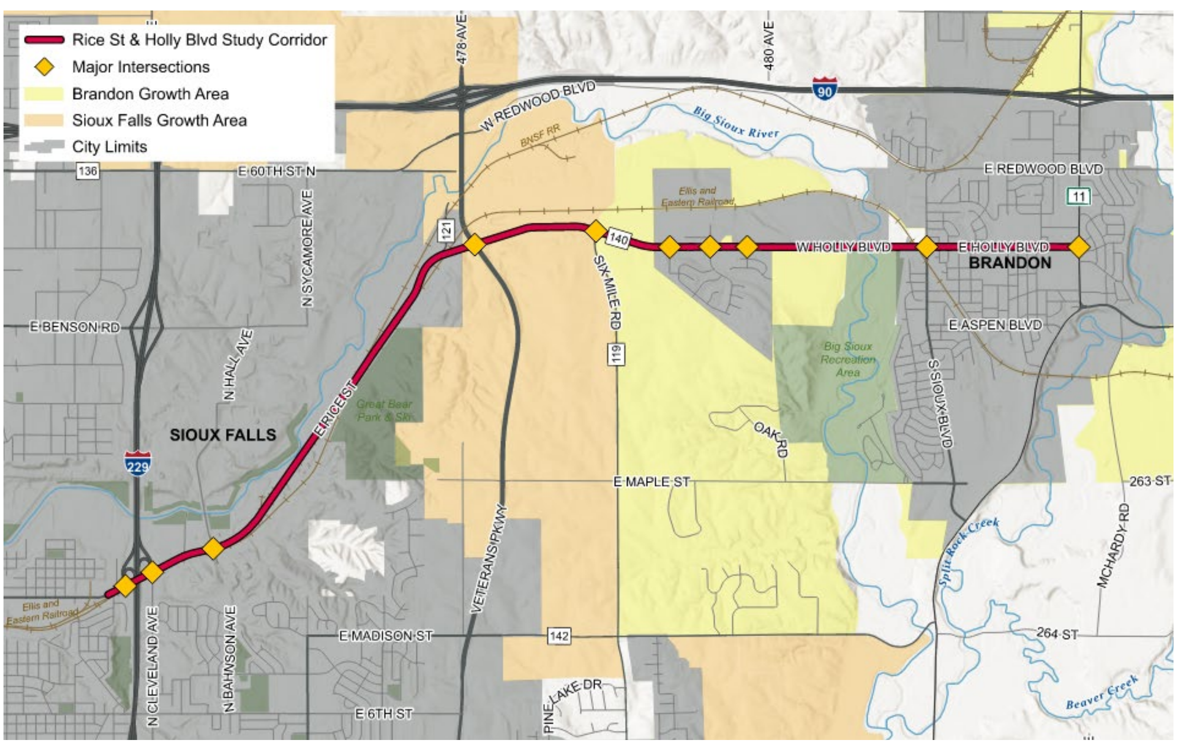


Figure 1: Study Area

Study Objectives

Rice Street / Holly Boulevard Corridor Study objectives include:

1. Determine potential intersection configurations for all arterial section line intersections.
2. Determine the need for additional through, turning, and/or passing lanes.
3. Develop a corridor land use and access management plan.
4. Create a high-level environmental review technical memorandum of known environmental issues.
5. Develop a long-range plan to help guide partnering agencies in implementation of recommended improvements.

Study Process

The study used a four-step process to develop long-range planning recommendations for the corridor:

1. Identify transportation issues and needs
2. Develop alternatives
3. Evaluate and refine alternatives
4. Develop recommendations

SAT, public, and stakeholder involvement were instrumental throughout the process, which included several SAT meetings, a land use planning meeting, and three sets of in-person public open houses and stakeholder meetings.

Methods and Assumptions

A *Methods and Assumptions* document was prepared at the onset of the study to serve as a historical record of analysis methodology. The final version is provided in **Appendix A**.

Prior Studies

The following planning documents were referenced to support this study:

- *Brandon Master Transportation Plan*
- *2045 Go Sioux Falls Long Range Transportation Plan (LRTP)*
- *Strategic Highway Safety Plan*
- *Shape Sioux Falls 2040 – Comprehensive Plan*
- *City of Brandon Comprehensive Plan 2035*
- *I-229 Major Investment Study*
- *SD11 Corridor Study*
- *Maple Street / Park Street Corridor Study*
- Area bicycle and pedestrian plans
- Area traffic impact studies

BASELINE CONDITIONS

Existing Road Conditions

A summary of existing roadway segment and intersection information is shown in **Figure 2**. Rice Street / Holly Boulevard maintains a cross-section ranging from a 2-lane section (near Veterans Parkway) to a 3-lane section with a center left turn lane (east of the I-229 interchange and within the Brandon core area) to a multilane section (within the I-229 interchange and a short segment east of the Big Sioux River bridge in Brandon). In addition to the variety of cross-sections, other features such as posted speed, intersection configuration, and intersection traffic control vary throughout the study corridor. There are a series of three at-grade railroad crossings between Bahnson Avenue and Veterans Parkway, as well as another at-grade railroad crossing near Sioux Boulevard in Brandon. Major, regional route intersections include the I-229 interchange, Veterans Parkway, and SD11.

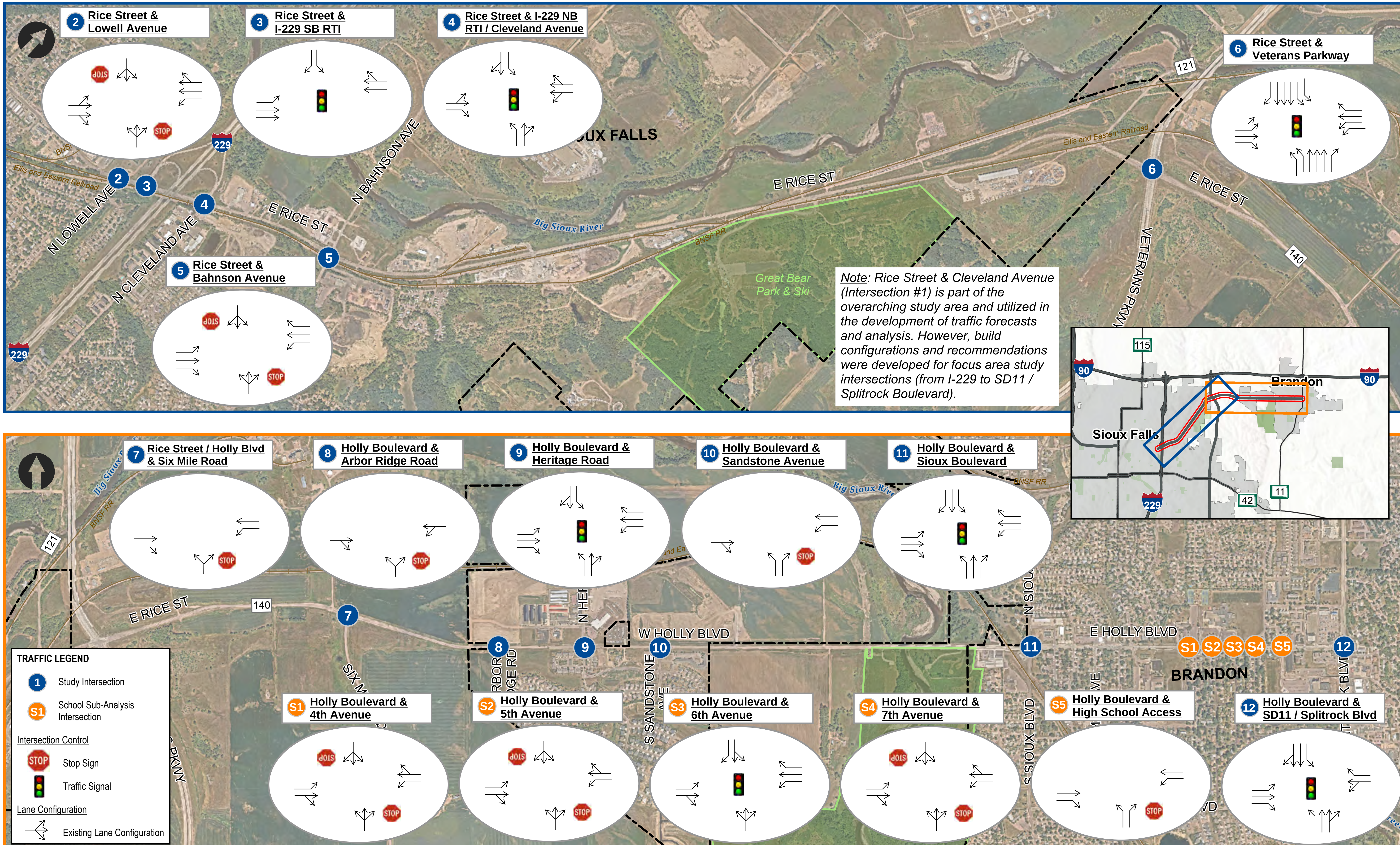
Corridor Growth Areas

The Sioux Falls MPO travel demand model (TDM) accounts for anticipated growth throughout the MPO area and was updated as part of the City of Sioux Falls Downtown Traffic Impact Study (TIS) to reflect the MPO area's Year 2050 land use. The Rice Street / Holly Boulevard corridor extends through the City of Sioux Falls and City of Brandon growth areas, with the boundary designated at Six Mile Road. Growth planning by both communities provides valuable context on when and where development is expected to occur, which translates to planning-level timelines of when transportation network improvements may be required.

West of Six Mile Road, the Rice Street corridor is primarily within existing City of Sioux Falls limits. The amended 2023 Sioux Falls growth tier map, shown in **Figure 3**, shows planned development west of Veterans Parkway and Tier 3 growth between Veterans Parkway and Six Mile Road. Sioux Falls growth areas are categorized into three tiers:

- Tier 1: City services available within the five-year CIP period
- Tier 2: City services are projected to be available for the development within 6 to 15 years
- Tier 3: City services are projected to be available for development within 16 to 25 years

East of Six Mile Road, the Holly Boulevard corridor includes City of Brandon growth area and existing city limits. The City of Brandon is currently updating their comprehensive plan which will include updates to their future land use and growth plans. An overview of the City of Brandon future land use is shown in **Figure 4**. The area between Six Mile Road and the Bluffs of Brandon / Encore Park-area (Arbor Ridge Road, Heritage Road, Sandstone Avenue area) was not included in the current comprehensive plan's growth area review.

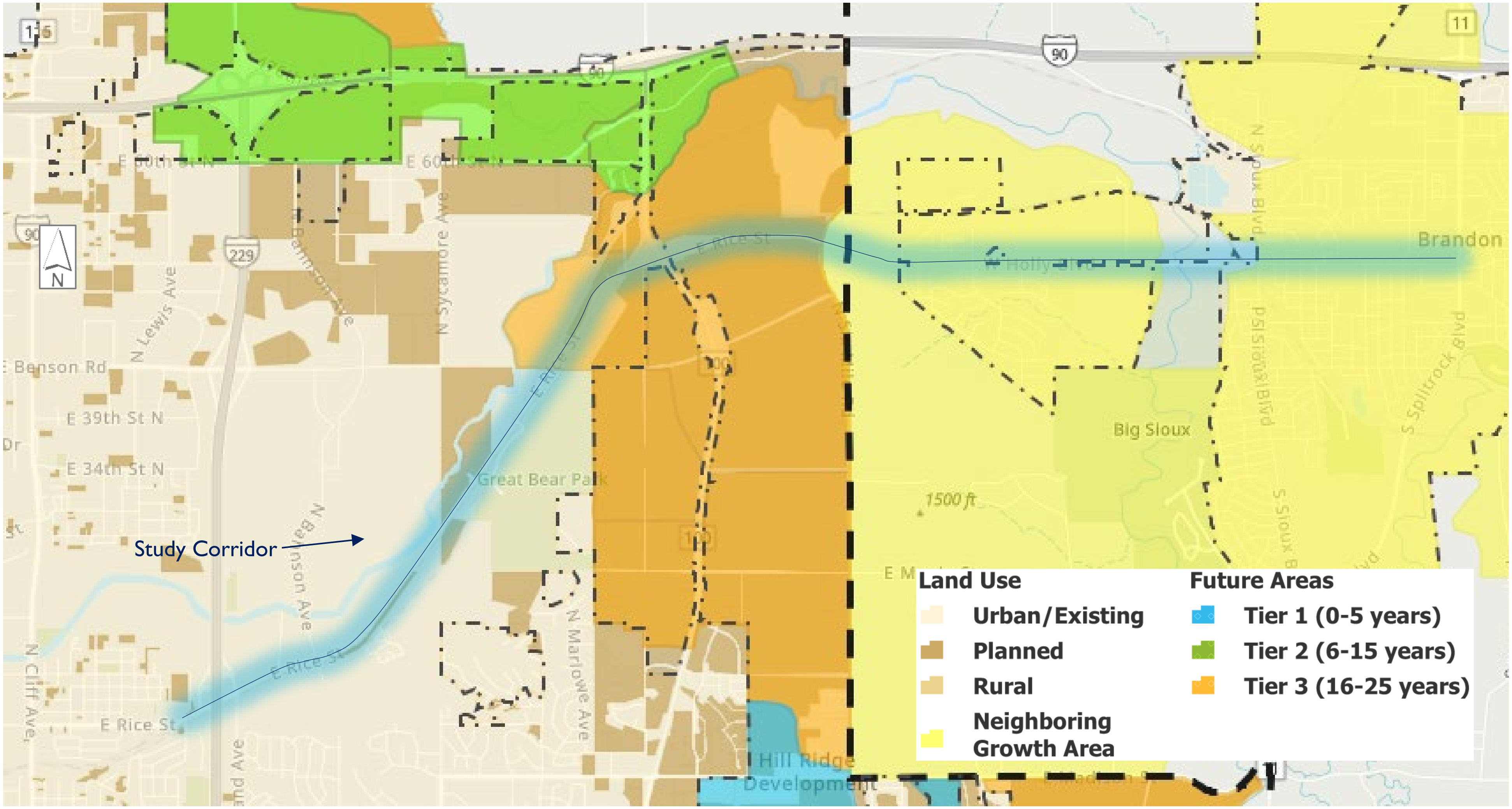


0 0.5 Miles

EXISTING INTERSECTION LANE CONFIGURATIONS AND TRAFFIC CONTROL

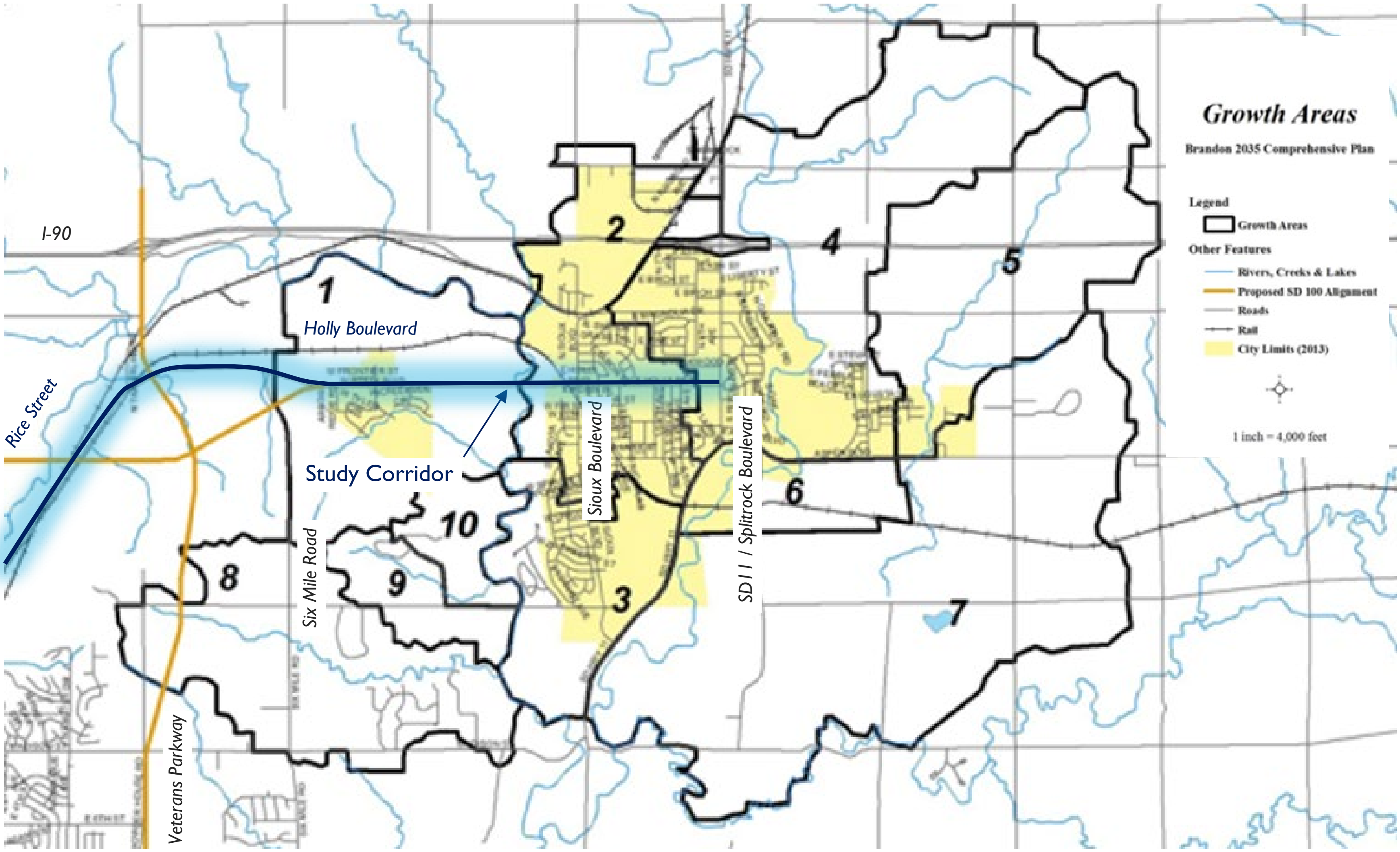
FIGURE 2

RICE STREET / HOLLY BLVD CORRIDOR STUDY



Source: Adapted from City of Sioux Falls (2023 Amendments)

Figure 3: City of Sioux Falls Growth Management Plan Development Areas



Source: Adapted from *2035 City of Brandon Comprehensive Plan*

Figure 4: Brandon Comprehensive Plan Growth Areas

Traffic Volumes

*See Traffic Forecasts Memo in **Appendix B** for additional information.*

2023 Existing Volumes

Existing condition traffic volumes are based on daily and peak hour traffic counts collected in May 2023. Other counts collected through City of Brandon, City of Sioux Falls, Minnehaha County, and SDDOT count programs were also reviewed. Similar traffic counts were collected for a school sub-area analysis along Holly Boulevard between Sioux Boulevard and SD11 / Splitrock Boulevard in September 2023.

Traffic Forecasts

Future-year traffic forecasts were developed to help assess future-year capacity and operational needs throughout the study area due to anticipated development, growth in traffic demand, and/or changes in traffic patterns. For this study, forecast years include:

- 2028: First Possible Year of Rice Street / Holly Boulevard Project Completion
- 2040: Interim Year
- 2050: Planning Horizon

Traffic forecasts were developed using the Sioux Falls MPO TDM and *NCHRP 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design* methodology. All forecasts assume Year 2050 land use (development), the *2045 Go Sioux Falls Long Range Transportation Plan* constrained roadway network, no arterial connection between Rice Street and Russell Street, and a Falls Park Drive to Minnesota Avenue collector connection. Future mid-segment intersections, between each north/south arterial intersection, were introduced in the 2028, 2040, and 2050 conditions to incorporate future development-generated traffic volumes on the corridor.

A comparison of 2023 existing condition, 2028, 2040, and 2050 Planning Horizon daily traffic volumes is shown in **Figure 5**. Daily and peak hour volumes for the 2023 existing condition and 2050 Planning Horizon traffic scenarios are provided in the *Traffic Forecasts Memo* in **Appendix B**.

Findings

Key findings in the forecast development process include:

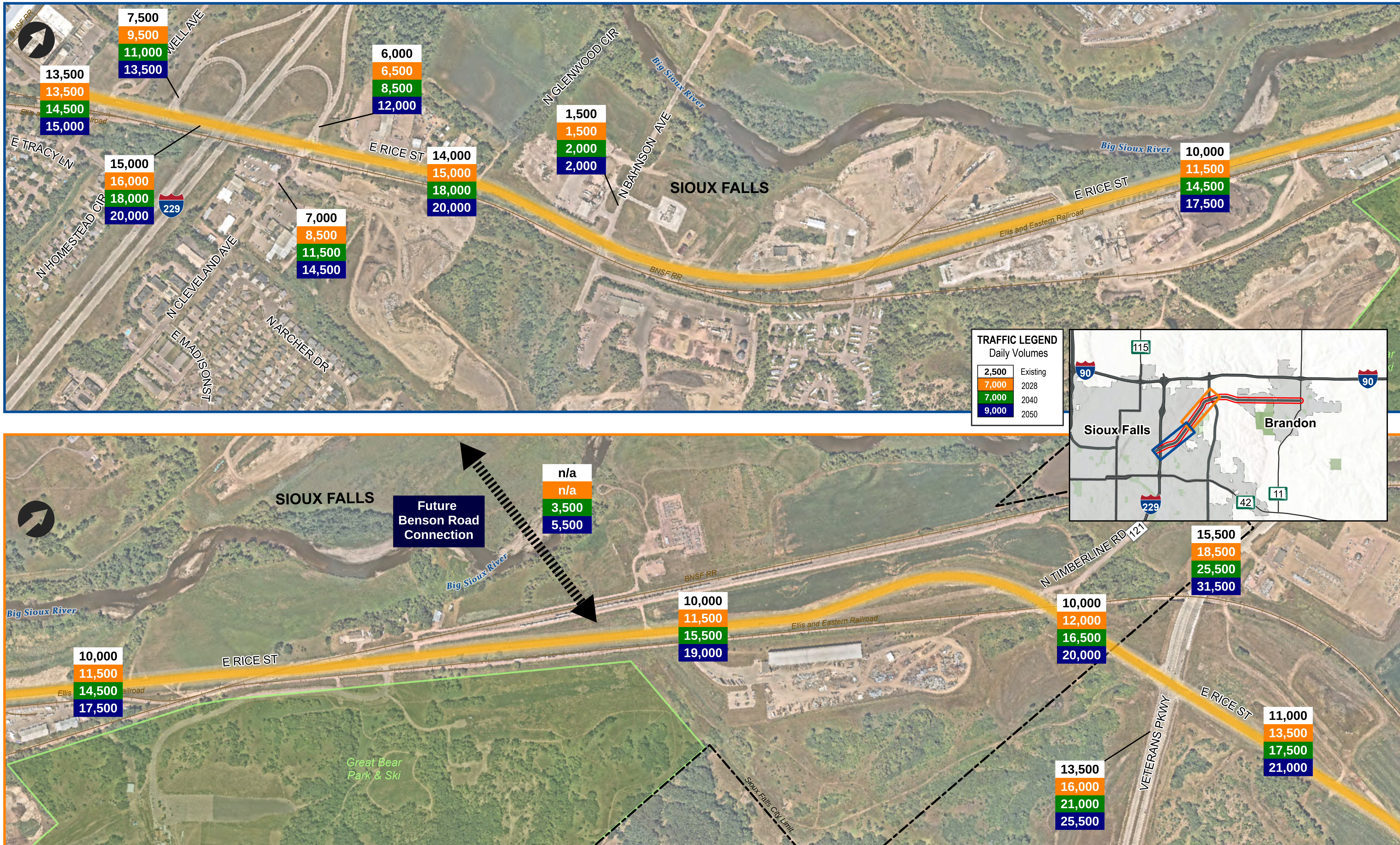
- Increased traffic on Rice Street tends to use the I-229 Exit 7 interchange and Cleveland Avenue in lieu of continuing to (or originating from) areas west of the interchange (e.g., Cliff Avenue)

- The Sioux Falls MPO TDM shows a notable shift in segment directional distribution east of I-229 Exit 7 interchange into Brandon, which accounts for:
    - A more balanced traffic flow along the corridor, where the currently highly directional commute traffic (westbound in a.m. and eastbound in p.m.) is less predominant in the overall volume
        - Forecasts reflect a reduction from 65-75% of the traffic traveling in the peak direction to 55-65% traveling in the peak direction

    - More local trips due to continued development along the corridor that do not correlate with traditional commute patterns, such as the planned grocery store west of Heritage Road
    - More 'reverse commute' traffic as employment continues to grow in Brandon and throughout the corridor, such as in the Bahnson Avenue, Veterans Parkway, and Heritage Road areas

- Forecasts in the Arbor Ridge Road (Lancer Avenue) / Heritage Road / Sandstone Drive area development incorporated a blend of TDM-derived growth, *Encore Park TIS* generated traffic, and potential accelerated development within undeveloped areas
    - TDM includes future area development, but not at level identified in the *Encore Park TIS*
        - Encore Park TIS generated trips were incorporated into the forecast, but adjusted within the intersection balancing process
    - Adjustment to future-year volumes incorporated higher levels of pass-by type trips, where existing or planned through traffic on the Rice Street / Holly Boulevard corridor will access the future development as part of their typical route
        - This does not increase the traffic on Holly Boulevard as these trips are not 'new' corridor trips, rather just increase in the turning traffic volumes to/from the potential development
        - Example includes the planned convenience store at the Heritage Road intersection
    - Future local network (internal) connectivity and intersection traffic control in this area will play a role in intersection volumes and route choice

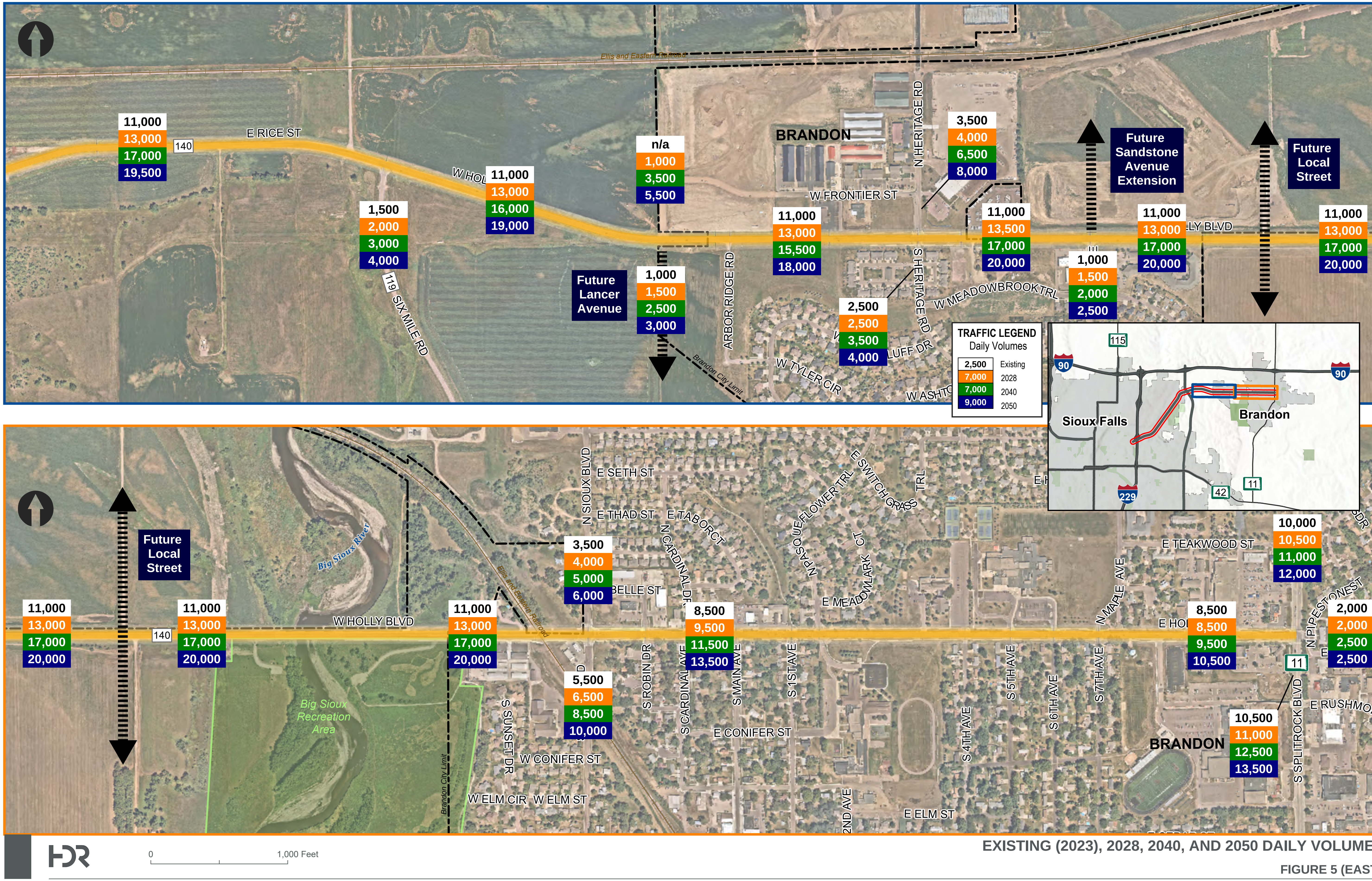
- Access to future development in the Six Mile Road area will play a notable role in long-range needs at the Six Mile Road intersection and whether, or to what extent, traffic passes through the intersection or exits the area without traversing on Rice Street / Holly Boulevard



0 1,000 Feet

EXISTING (2023), 2028, 2040, AND 2050 DAILY VOLUMES

FIGURE 5 (WEST)



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EXISTING (2023), 2028, 2040, AND 2050 DAILY VOLUMES

FIGURE 5 (EAST)

RICE STREET / HOLLY BLVD CORRIDOR STUDY

East/West Arterial Corridor Traffic Review

*See East/West Arterial Corridor Traffic Review Memo in **Appendix C** for additional information.*

In addition to the typical traffic forecasting process, a high-level screen line assessment of east/west arterial corridor daily traffic volumes was conducted between I-229 and Sioux Boulevard. Special scenarios were developed using the Sioux Falls MPO TDM to review how traffic patterns change with various combinations of corridor improvements. These differences were used to help guide and prioritize east/west corridor recommendations and future projects.

This assessment reviewed TDM-derived volumes on the following east/west corridors:

- Rice Street / Holly Boulevard
- Maple Street / Park Street
- Madison Street

Scenarios

Daily TDM volumes used in this assessment are based on the 2050 Planning Horizon TDM scenario that incorporates Year 2050 land use and the 2045 constrained network presented in the *2045 Go Sioux Falls Long Range Transportation Plan.* The presented 'model volumes' are used for illustrative purposes to indicate an order of magnitude change in travel patterns across the various east/west corridor scenarios. Daily model volumes utilized in this assessment, shown in **Figure 6**, are different than the post-processed daily volumes used in traffic forecast discussion and operations analysis.

This review includes a base scenario that reflects a multilane Rice Street / Holly Boulevard corridor west of Sioux Boulevard and then five supplemental scenarios that reflect changes to the base scenario. A summary of the base scenario's east/west corridor elements and each supplemental scenario's modifications to the base scenario is as follows:

A. Multilane Corridor, Constrained Network *(base scenario)*

   a. Rice Street / Holly Boulevard: multilane corridor (two lanes in each direction) west of Sioux Boulevard
   b. Benson Road: includes connection to Rice Street
   c. Maple Street / Park Street: paved 3-lane corridor (single through lane in each direction plus center left turn lane) east of Veterans Parkway
   d. Madison Street: Maintain existing corridor (no changes)

B. Multilane Corridor, No Benson Road Connection

   a. No Benson Road connection to Rice Street

C. 2-lane Corridor East of Benson Road

   a. Rice Street / Holly Boulevard:
      i. Multilane corridor west of Benson Road connection
      ii. 3-lane corridor east of Benson Road connection

D. Downgraded Rice Street

a. Rice Street corridor west of Veterans Parkway is downgraded in the TDM to account for more 'friction' for vehicles traveling through this segment. This replicates the potential for slow travel speeds, blocked railroad crossings, and large trucks turning to/from the industrial access points.

E. Maple Street Gravel / Park Street 3-lane

a. No improvements to the existing Maple Street/Park Street corridor, maintaining the existing township gravel road west of the Brandon city limits.

Findings

The scenarios show implications to incorporating, or omitting, future improvement to the area such as the Benson Road connection, multilane vs. 2-lane Rice Street / Holly Boulevard corridor, or Maple Street / Park Street corridor upgrades. Key findings across each of the scenarios include:

- **Benson Road Connection**
  - Benson Road / Rice Street traffic split at the Benson Road connection where approximately 33 percent of the Rice Street traffic just west of Veterans Parkway travels to/from Benson Road via the potential Benson Road connection (67 percent travels to/from Rice Street to the west)
  - Benson Road connection (included/not included) has negligible impact on Holly Boulevard traffic demand
  - If Benson Road connection is not constructed, Rice Street requires multilane section between I-229 and Veterans Parkway
  - If Benson Road connection is constructed, Rice Street volumes west of the connection are maintained within the upper range for 3-lane section capacity

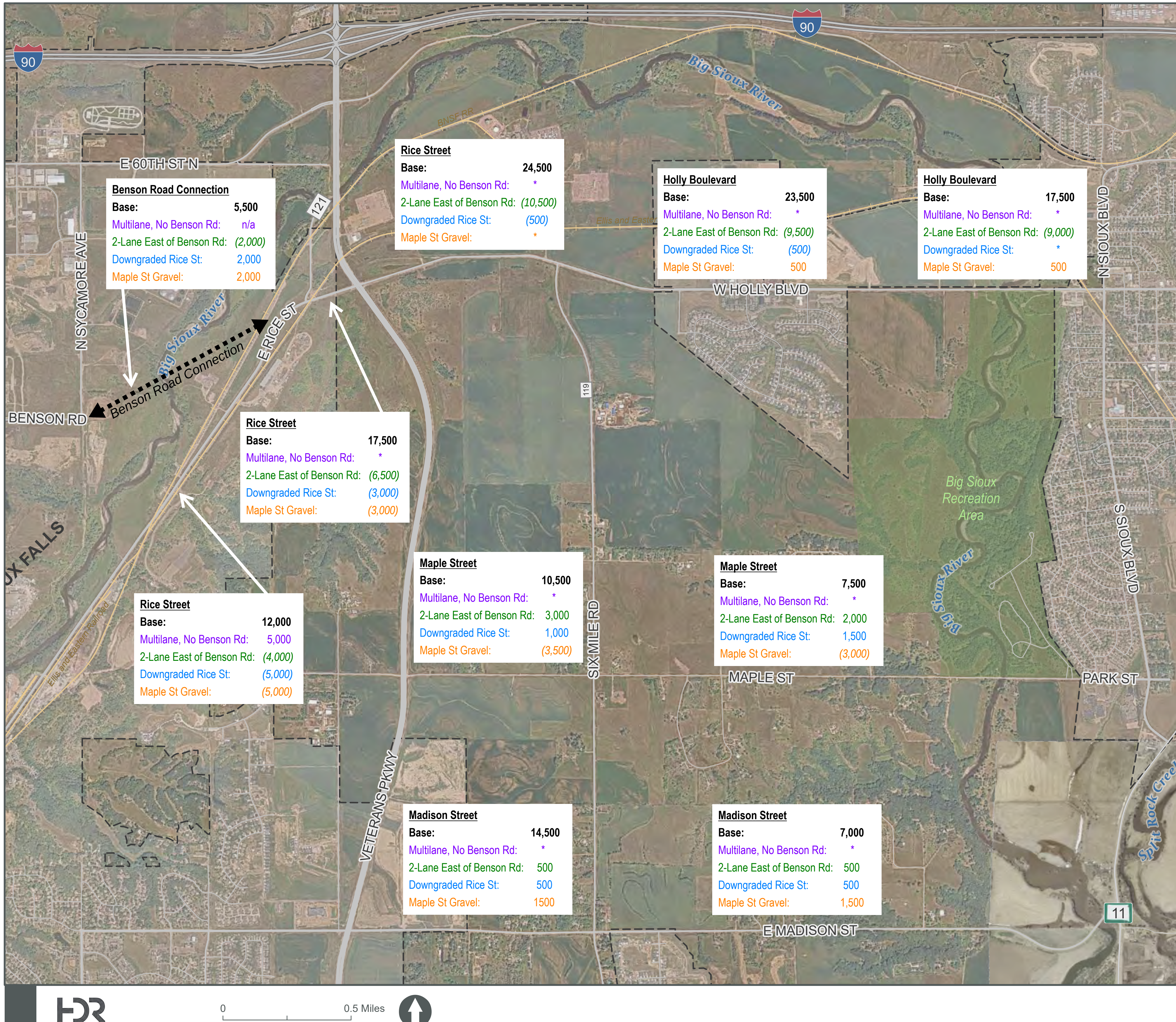
- **2-lane Corridor East of Benson Road**
  - If Rice Street / Holly Boulevard is maintained as a 3-lane section east of Veterans Parkway, the traffic volumes change from the base condition between Veterans Parkway and Sioux Boulevard depict:
    - Rice Street / Holly Boulevard: 40 to 50 percent decrease
    - Maple Street / Park Street: 25 to 35 percent decrease
    - Madison Street: 5 to 10 percent increase
  - Rice Street 3-lane section west of the Benson Road connection would be adequate to accommodate the lower traffic volumes

- **Downgraded Rice Street**
  - If Rice Street is downgraded in the TDM, changes to Benson Road and Rice Street traffic volumes west of the Benson Road connection entail:
    - Benson Road: 35 percent increase
    - Rice Street: 45 percent decrease

- Approximately 52 percent of the Rice Street traffic just west of Veterans Parkway travels to/from Benson Road via the potential Benson Road connection (a 32 percent increase from the base scenario)
- Scenario demonstrates benefits of the Benson Road connection when considering Rice Street reliability and traffic friction encountered by commuter type traffic
- Downgraded Rice Street also shifts traffic to:
  - Maple Street / Park Street: 10 to 20 percent increase
  - Madison Street: 5 percent increase

- **Maple Street Gravel / Park Street 3-lane**
  - 35 to 40 percent less traffic on Maple Street / Park Street than reconstructed corridor in base scenario
  - Volume shift to Madison Street and Holly Boulevard entails:
    - Madison Street: 15 to 20 percent increase
    - Holly Boulevard: 5 percent increase
  - Because traffic is dispersed to various east/west corridors beyond Holly Boulevard (I-90, Madison Street, and beyond), the overall traffic demand on Rice Street west of Veterans Parkway also drops
    - Only Holly Boulevard is feeding high traffic volumes to that corridor instead of Holly Boulevard and Maple Street both feeding high traffic volumes

- **General Observations**
  - The Rice Street / Holly Boulevard corridor segment consistently with the highest traffic volumes is between Veterans Parkway and Six Mile Road
    - Volumes stay elevated eastward through the Heritage Road area due to existing/future development adjacent to the corridor



ROADWAY SEGMENT	
Base:	**'Model Volume'**
Multilane, No Benson Rd:	Change in 'Model Volume'
2-Lane East of Benson Rd:	Change in 'Model Volume'
Downgraded Rice St:	Change in 'Model Volume'
Maple St Gravel:	Change in 'Model Volume'

Change in 'Model Volume': Increase or *(Decrease)*

** indicates 'Model Volume' change less than 500*

Scenario Descriptions

Summary of base scenario east/west corridor elements and changes to the base condition for the supplemental scenarios:

A. **Base:** Multilane Corridor, Constrained Network (base scenario)
- Rice St/Holly Blvd: multilane corridor west of Sioux Blvd
- Benson Rd: includes connection to Rice St
- Maple St/Park St: paved 3-lane corridor east of Veterans Pkwy
- Madison St: maintain existing corridor

B. **Multilane, No Benson Rd:** Multilane Corridor, No Benson Rd Connection
- No Benson Road connection to Rice Street

C. **2-Lane East of Benson Rd:** 2-Lane Corridor East of Benson Rd
- Multilane corridor west of Benson Rd connection
- 3-lane corridor east of Benson Rd connection

D. **Downgraded Rice St**
- Rice St west of Veterans Parkway was downgraded in the travel demand model to replicate the potential slow travel speeds, blocked railroad crossings, and large trucks turning to/from industrial access points.

E. **Maple St Gravel:** Maple Street Gravel / Park Street 2-Lane
- No improvements to Maple St/Park St corridor

'Model Volume' reflect 2-way daily volume output from the Sioux Falls travel demand model. These volumes have not been adjusted per standard travel demand model post-processing methodology. 'Model Volumes' are meant to illustrate an order of magnitude change in travel patterns across the various scenarios and are different than the post-processed daily volumes presented in the traffic forecast and operations analysis memos.

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EAST/WEST CORRIDOR SCENARIO SUMMARY

FIGURE 6

Traffic Operations Analysis

*See Existing and Future No Build Condition Intersection Traffic Operations Analysis Memo in **Appendix D** for additional information.*

Intersection and roadway operational performance is evaluated through a focus on quality of service, which describes how well a transportation facility operates from a traveler's perspective considering travel speeds and intersection delay. Quality of service is typically reported as a Level of Service (LOS), which is presented by a letter grade ranging from LOS A (free-flowing conditions) to LOS F (stopped / heavily delayed traffic). A description of LOS measures for intersections and roadway segments pertinent to this study are provided in **Figure 7**.

	Roadway
A	Free-flow operation
B	Reasonably free- flow operation; minimal restriction on lane changes and maneuvers
C	Near free-flow operation; noticeable restriction on lane changes and other maneuvers
D	Speed decline with increasing flows; significant restriction on lane changes and other maneuvers
E	Facility operates at capacity; very few gaps for lane changes and other maneuvers; frequent disruptions and queues
F	Unstable flow; operational breakdown

Levels Designation Scale:

LOS is presented through a familiar A to F scale, where "A" means the best operating condition and "F" the worst.

LOS Measures and Definitions: Highway Capacity Manual and SDDOT Road Design Manual

	Unsignalized Intersection	Signalized Intersection
A	Queuing is rare **Intersection Control Delay:** ≤10 seconds/vehicle	Very minimal queuing; excellent corridor progression and/or short cycle lengths **Intersection Control Delay:** ≤10 seconds/vehicle
B	Occasional queuing **Intersection Control Delay:** >10–15 seconds/vehicle	Some queuing; good corridor progression and/or short cycle lengths **Intersection Control Delay:** >10–20 seconds/vehicle
C	Regular queuing **Intersection Control Delay:** >15–25 seconds/vehicle	Regular queuing; not all demand may be serviced on some cycles (cycle failure) **Intersection Control Delay:** >20–35 seconds/vehicle
D	Queue lengths increased **Intersection Control Delay:** >25–35 seconds/vehicle	Queue lengths increased; routine cycle failures **Intersection Control Delay:** >35–55 seconds/vehicle
E	Significant queuing **Intersection Control Delay:** >35–50 seconds/vehicle	Long queues, congested conditions; majority of cycles fail **Intersection Control Delay:** >55–80 seconds/vehicle
F	Volume to capacity ratio approaches 1.0; very long queues **Intersection Control Delay:** >50 seconds/vehicle	Volume to capacity ratio near 1.0; very long queues, almost all cycles fail **Intersection Control Delay:** >80 seconds/vehicle

Note: Unsignalized intersection control delay shown in figure for overall (or weighted) intersection delay. Two-way stop-control delay (TWSC) is measured from the worst-case stop-controlled approach with the same average delay (seconds/vehicle) thresholds.

Figure 7: LOS Descriptions

Intersection and roadway segment peak hour LOS was calculated using Synchro/SimTraffic Version 11. Intersection LOS was reported from the HCM6 reporting module, based on methodology presented in the *Highway Capacity Manual (HCM)*. Guidelines for use of Synchro/SimTraffic Version 11 in this study are documented in the *Methods & Assumptions* document. Applicable LOS measures and minimum allowable LOS by facility type are summarized in **Table 1** and **Table 2**, respectively.

Table 1: LOS Measures

Roadway Feature	LOS Measure	Supporting Measures
Intersections	Total (overall) intersection delay	95th percentile queues Individual movement delay TWSC intersections: worst-case stop-control delay
Urban Street Segment / Facility	Travel speed	Travel time

TWSC: two-way stop-control

Table 2: Minimum Allowable LOS by Facility

Roadway Feature	Minimum Allowable LOS	Notes
Signalized Intersections	LOS C* LOS D**	* I-229 Exit 7 (Rice Street) ramp terminal intersections (RTIs) and Veterans Parkway intersection minimum allowable LOS: • LOS C • Individual movements allowed to operate at LOS D, but the overall intersection shall be LOS C or better ** City (existing and future) intersections minimum allowable LOS: • LOS D • Individual movements allowed to operate at LOS E, but the overall intersection shall be LOS D or better • Individual movements not allowed with a v/c ratio > 1.0 • Queue storage ratios not allowed to exceed 1.0
Unsignalized Intersections	LOS C	TWSC, AWSC, and roundabouts minimum allowable LOS: • LOC D* * TWSC LOS based on weighted average intersection delay. Worst-case stop-controlled (WCSC) approach delay and LOS may be lower than the minimum allowable LOS
Signalized Arterial Corridor Segment	LOS D	Measure for comparison of alternatives
Multimodal (Pedestrian and Bicycle)	N/A	Measure for comparison of multimodal elements

TWSC: two-way stop-control; AWSC: all-way stop-control

Existing and Future No Build Condition Analysis

Existing and future No Build condition traffic analyses were conducted to aid in the identification of short-term and long-range operational needs at study intersections. LOS results are summarized in the following tables and in **Figure 8**:

- **Table 3:** No Build Condition AM Peak Hour
- **Table 4:** No Build Condition PM Peak Hour

Locations that do not meet minimum allowable LOS thresholds for this study are noted in **Bold Orange** text. Additional analysis information, including output reports, is included in the *Existing and Future No Build Condition Intersection Traffic Operations Analysis Technical Memo* in **Appendix D**.

Table 3: Intersection LOS – No Build Condition AM Peak Hour

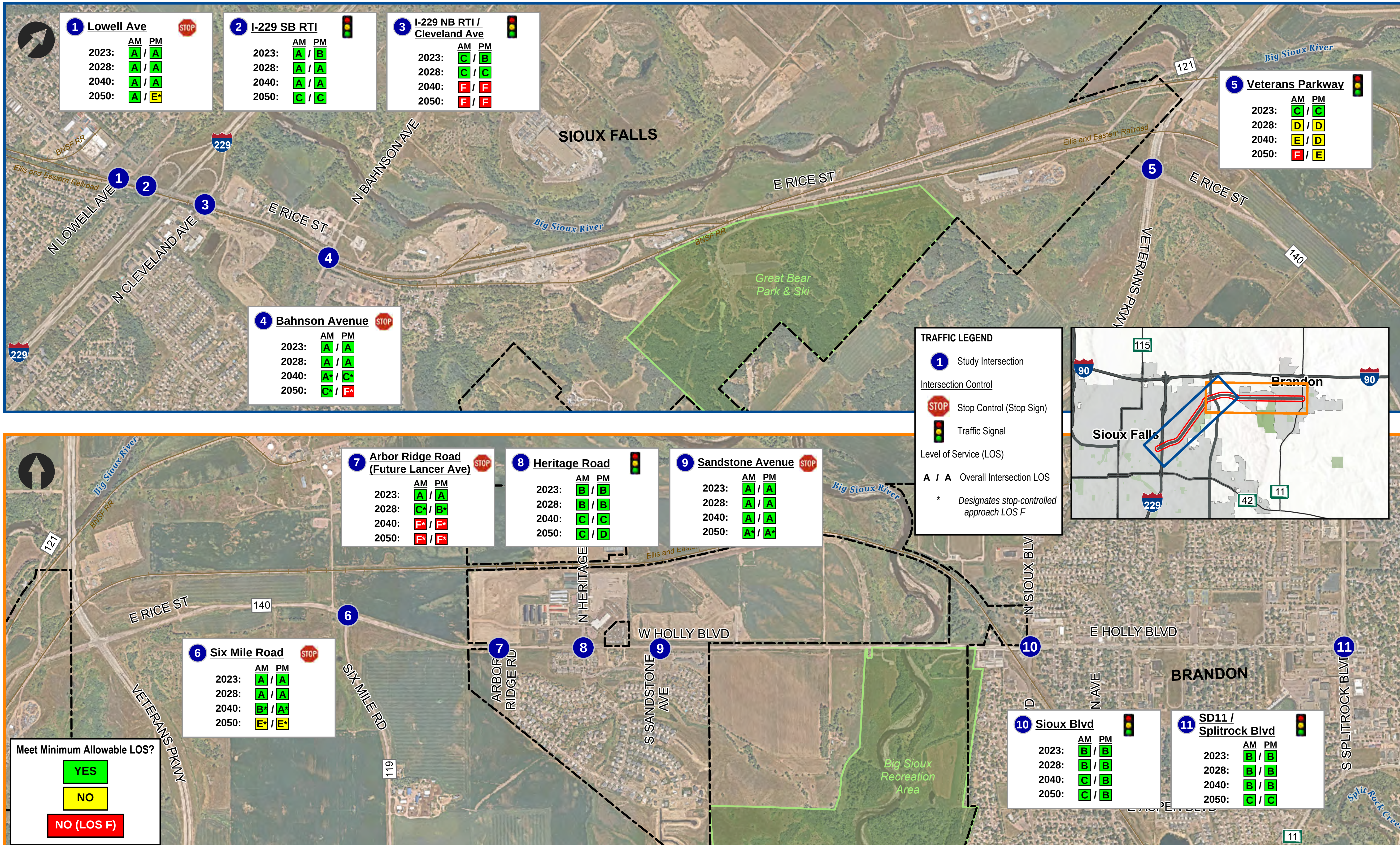
Analysis Year	Lowell Ave	I-229 SB RTI	I-229 NB RTI / Cleveland Ave	Bahnson Ave	Fut. Benson Rd Connection	Veterans Pkwy	Six Mile Rd	Arbor Ridge Rd / Fut. Lancer Ave	Heritage Rd	Sandstone Ave	Sioux Blvd	SD11 / Splitrock Blvd
Intersection Control	*TWSC*	*S*	*S*	*TWSC*	*TWSC*	*S*	*TWSC*	*TWSC*	*S*	*TWSC*	*S*	*S*
Existing (2023)	A	A	C	A	-	C	A	A	B	A	B	B
2028 No Build	A	A	C	A	A	**D**	A	C	B	A	B	B
2040 No Build	A	A	**F**	A	A	**E**	B	**F**	C	A	C	B
2050 No Build	A	C	**F**	C	**F**	**F**	**E**	**F**	C	A	C	C

TWSC: two-way stop-control; AWSC: all-way stop-control; S: traffic signal; R: roundabout
Locations not meeting minimum allowable LOS noted in **Bold Orange**

Table 4: Intersection LOS – No Build Condition PM Peak Hour

Analysis Year	Lowell Ave	I-229 SB RTI	I-229 NB RTI / Cleveland Ave	Bahnson Ave	Fut. Benson Rd Connection	Veterans Pkwy	Six Mile Rd	Arbor Ridge Rd / Fut. Lancer Ave	Heritage Rd	Sandstone Ave	Sioux Blvd	SD11 / Splitrock Blvd
Intersection Control	*TWSC*	*S*	*S*	*TWSC*	*TWSC*	*S*	*TWSC*	*TWSC*	*S*	*TWSC*	*S*	*S*
Existing (2023)	A	B	B	A	-	C	A	A	B	A	B	B
2028 No Build	A	A	C	A	A	**D**	A	B	B	A	B	B
2040 No Build	A	A	**F**	C	**E**	**D**	**A**	**F**	C	A	B	B
2050 No Build	A	C	**F**	**F**	**F**	**E**	**E**	**F**	D	A	B	C

TWSC: two-way stop-control; AWSC: all-way stop-control; S: traffic signal; R: roundabout
Locations not meeting minimum allowable LOS noted in **Bold Orange**



INTERSECTION LOS SUMMARY COMPARISON

FIGURE 8

RICE STREET / HOLLY BLVD CORRIDOR STUDY

Findings

Based on Existing and No Build condition findings in **Table 3** and **Table 4**, a planning-level timeline of intersection improvement needs is shown in **Figure 9**. This timeline reflects the approximate time for when intersection operations exceed the study's minimum allowable LOS.

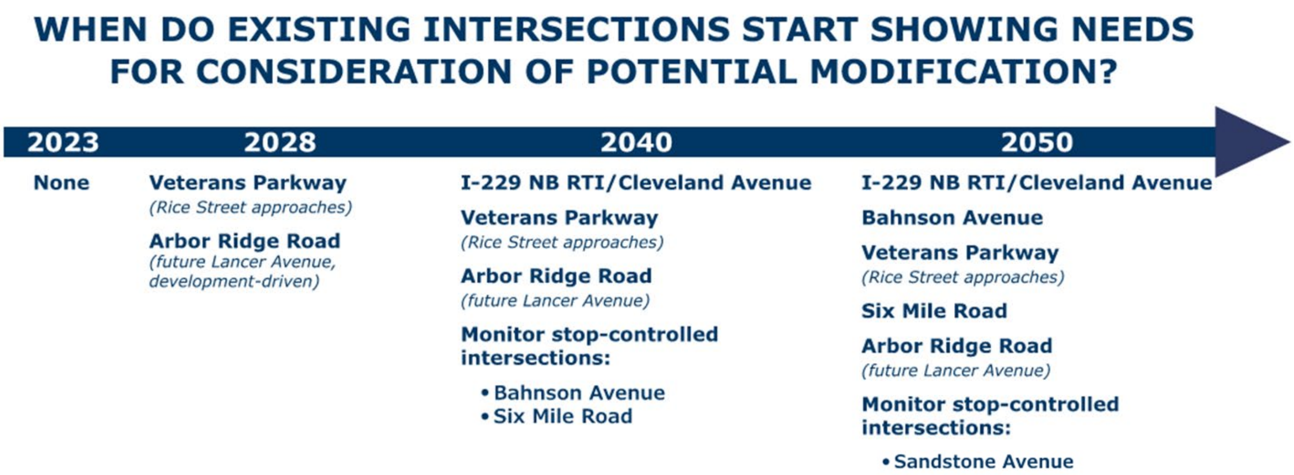


Figure 9: No Build Condition Intersection Needs Timeline

Key corridor-wide Existing and No Build condition findings include:

- East/west corridor volumes will increase with development surrounding the corridor
    - Pace and density of this development will be an important consideration when identifying the timeline and extent of future Rice Street / Holly Boulevard improvements
- Future volumes and operational needs indicate additional through lanes should be considered in the next steps
    - East/west corridor volumes impact future-year operations at the Rice Street & Veterans Parkway intersection due to the single through lane in the eastbound and westbound directions
- Increasing volumes at the Rice Street & I-229 NB RTI / Cleveland Avenue intersection impact future-year operations due to shared lanes and constrained traffic phasing
- Several TWSC intersections have side-street approaches with single combined lanes that impact future-year operations

Crash History Review

*See Crash History Review Memo in **Appendix E** for additional information.*

Crash history along the Rice Street / Holly Boulevard corridor was reviewed for years 2018 through 2022. Data for reported crashes in the statewide crash database were provided by SDDOT. Crash selection periods were adjusted for the Rice Street & Veterans Parkway intersection and the adjacent Rice Street corridor segments to include only crashes from 2021-2022, following the completion of the construction of Veterans Parkway from Rice Street to Interstate 90 (I-90). The density of reported crashes throughout the study corridor is shown in **Figure 10**.

Crashes were categorized as intersection and segment crashes based on location and reviewed for elevated crash rates and trends. Crash rates were calculated in terms of crashes per million entering vehicles (crashes/MEV) for intersections and crashes per million vehicle miles traveled (crashes/MVMT) for segments. Critical crash rates were calculated based on the statistical populations for each crash location (intersection or segment) using methods presented in the *Highway Safety Manual* (American Association of State Highway and Transportation Officials (AASHTO), 2010). A critical crash rate accounts for a desired level of confidence (95 percent used in this study), vehicle exposure, and similar facility types.

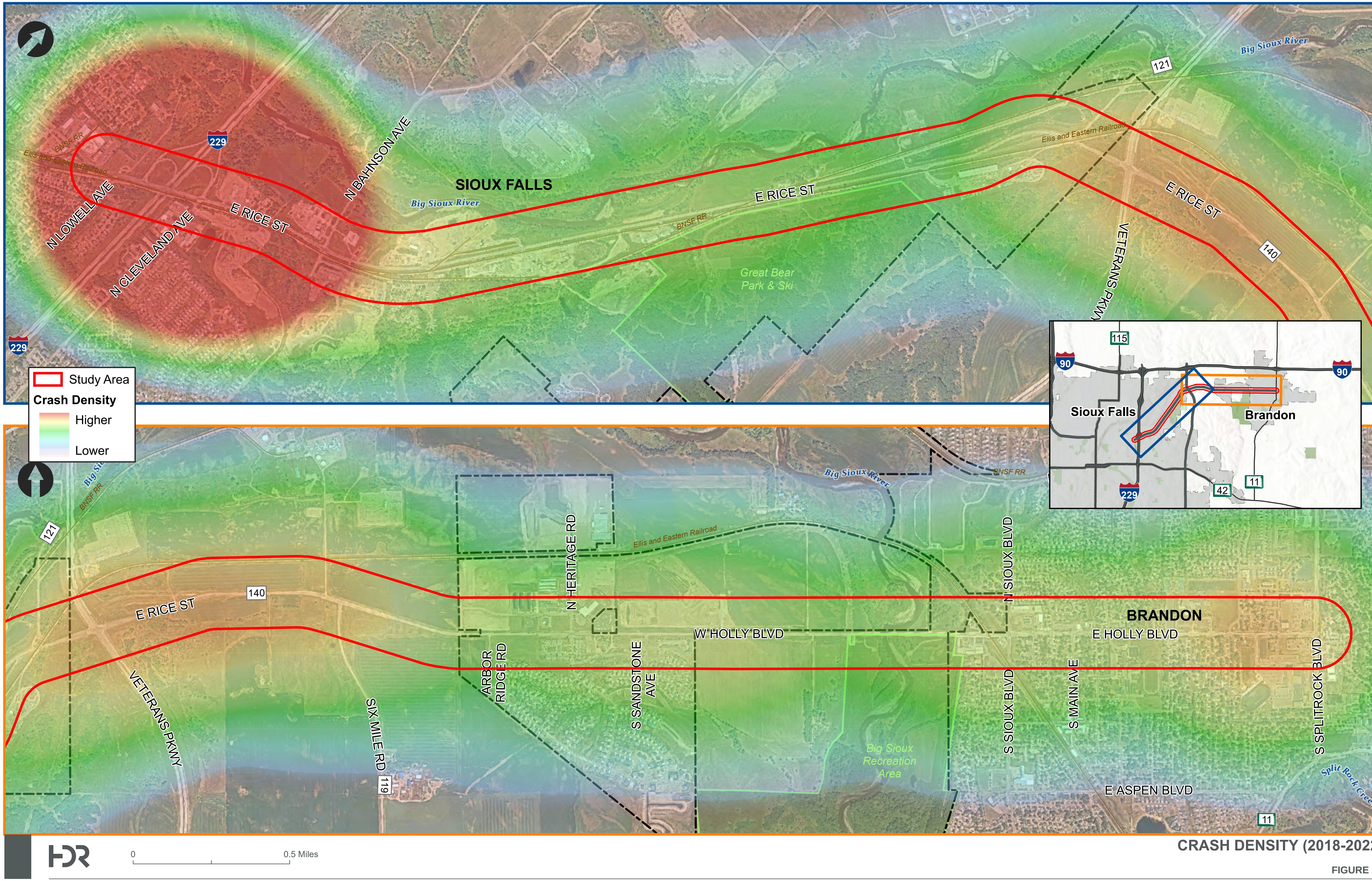
Summaries of intersection and segment crash rates are shown in **Table 5** and **Table 6**. Locations with an elevated crash rate when compared to the critical rate are noted. Crash characteristics for intersection and segment crashes are shown in **Table 7** and **Table 8**.

No fatal crashes occurred along the corridor in the analyzed timeframe, however, there were two serious injury crashes observed. The first was a 2022 angle crash where an eastbound driver failed to comply with a red light signal at the Rice Street & Veterans Parkway intersection. The second was a 2022 angle crash where a northbound driver suffered an incapacitating illness at the Holly Boulevard & High School driveway access.

Overarching trends from the crash review included:

- Locations with elevated crash rates when compared to the critical rate include:
  - Intersections: Lowell Avenue, I-229 SB RTI, I-229 NB RTI / Cleveland Avenue, and Veterans Parkway
  - Segments: I-229 SB RTI to I-229 NB RTI / Cleveland Avenue, I-229 NB RTI / Cleveland Avenue, and Sioux Boulevard to SD11 / Splitrock Boulevard
- Intersections
  - 66 percent of intersection crashes occurred at the I-229 SB RTI and I-229 NB RTI / Cleveland Avenue intersections
  - I-229 NB RTI / Cleveland Avenue intersection accounted for 40 percent of the study corridor intersection crashes and exhibited the highest crash rate
    - 45 percent angle crashes, 35 percent rear-end crashes, and 15 percent single vehicle crashes

    - I-229 SB RTI intersection accounted for 15 percent of the study corridor intersection crashes
        - 40 percent angle crashes and 33 percent rear-end crashes
    - Veterans Parkway intersection accounted for 11 percent of the study corridor intersection crashes
        - One serious injury crash
        - 45 percent rear-end crashes
- Segments
    - 55 percent of the non-vehicle-animal segment crashes occurred between I-229 SB RTI and Six Mile Road
    - Over 50 percent of study corridor segment crashes were vehicle-animal crashes
    - 39 percent of the non-vehicle-animal segment crashes were rear-end crashes and 36 percent were single vehicle crashes
    - Segments with elevated crash rates exhibited 38 percent of the non-vehicle-animal crashes occurring on snow/ice/slush/west roadway surfaces



CRASH DENSITY (2018-2022)

FIGURE 10

RICE STREET / HOLLY BLVD CORRIDOR STUDY

Table 5: Intersection Crash Rates (2018 – 2022)

Rice Street / Holly Blvd Intersection	Traffic Control Device	Total Crashes	Daily Entering Vehicles	Crash Rate (crashes/MEV)	Elevated Crash Rate#
Lowell Ave	TWSC	6	12,600	0.26	Yes
I-229 SB RTI	Signalized	15	15,400	0.54	Yes
I-229 NB RTI / Cleveland Ave	Signalized	40	18,100	1.21	Yes
Bahnson Ave	TWSC	0	10,700	0.00	-
Veterans Pkwy*	Signalized	11	19,000	0.72	Yes
Six Mile Rd	TWSC	2	9,300	0.12	-
Arbor Ridge Rd	TWSC	1	10,200	0.05	-
Heritage Rd	Signalized	3	12,200	0.14	-
Sandstone Ave	TWSC	3	10,200	0.16	-
Sioux Blvd	Signalized	9	12,600	0.39	-
SD11 / Splitrock Blvd	Signalized	8	13,700	0.32	-

Table 6: Segment Crash Rates (2018 – 2022)

Rice Street / Holly Blvd Segment	Segment Length (miles)	Total Crashes**	Daily Vehicles	Crash Rate (crashes/MVMT)	Elevated Crash Rate#
Lowell Ave to I-229 SB RTI	0.1	1	11,800	0.52	-
I-229 SB RTI to I-229 NB RTI / Cleveland Ave	0.2	6	13,800	1.26	Yes
I-229 NB RTI / Cleveland Ave to Bahnson Ave	0.4	10	10,900	1.17	Yes
Bahnson Ave to Veterans Pkwy*	2.7	15	8,300	0.37	-
Veterans Pkwy to Six Mile Rd*	0.8	7	8,000	0.60	-
Six Mile Rd to Arbor Ridge Rd	0.5	4	9,700	0.46	-
Arbor Ridge Rd to Heritage Rd	0.3	3	9,700	0.65	-
Heritage Rd to Sandstone Ave	0.2	0	9,700	0.00	-
Sandstone Ave to Sioux Blvd	1.2	12	9,900	0.57	-
Sioux Blvd to SD11 / Splitrock Blvd	1.0	11	6,800	0.90	Yes

Table notes for this page:

* Intersection and segment crashes 2021–2022; ** Crashes exclude vehicle-animal crashes for crash rate tabulations

\# Elevated crash rate based on a comparison to the critical crash rate (crash rate/critical crash rate ratio > 0.7); see *Crash History Review Memo* for additional information

Table 7: Intersection Crash Characteristics (2018 – 2022)

Rice Street / Holly Blvd Intersection	Total Crashes	Injury Severity					Manner of Collision				
		Fatal	Serious Injury	Minor Injury	Possible Injury	No Injury	Single Vehicle	Rear-End	Head-On	Angle	Sideswipe
Lowell Ave	6	0	0	0	0	5	2	1	0	3	0
I-229 SB RTI	15	0	0	1	3	11	1	5	1	6	2
I-229 NB RTI / Cleveland Ave	40	0	0	2	8	30	6	14	0	18	2
Bahnson Ave	0	0	0	0	0	0	0	0	0	0	0
Veterans Pkwy*	11	0	1	1	2	7	1	5	0	3	2
Six Mile Rd	2	0	0	0	1	1	1	0	0	0	1
Arbor Ridge Rd	1	0	0	0	1	0	0	1	0	0	0
Heritage Rd	3	0	0	0	1	2	0	1	0	2	0
Sandstone Ave	3	0	0	0	0	3	1	2	0	0	0
Sioux Blvd	9	0	0	1	1	7	1	2	0	4	2
SD11 / Splitrock Blvd	8	0	0	1	3	4	1	3	0	4	0
Totals:	98	0	1 (1%)	6 (6%)	20 (21%)	70 (72%)	14 (14%)	34 (35%)	1 (1%)	40 (41%)	9 (9%)

Table notes for this page:

* Intersection crashes from 2021–2022

Table 8: Segment Crash Characteristics (2018 – 2022)

Rice Street / Holly Blvd Segment**	Total Crashes	Injury Severity					Manner of Collision				
		Fatal	Serious Injury	Minor Injury	Possible Injury	No Injury	Single Vehicle	Rear-End	Head-On	Angle	Sideswipe
Lowell Ave to I-229 SB RTI	1	0	0	0	0	1	0	1	0	0	0
I-229 SB RTI to I-229 NB RTI / Cleveland Ave	6	0	0	0	0	6	2	1	0	1	2
I-229 NB RTI / Cleveland Ave to Bahnson Ave	10	0	0	1	0	9	3	6	0	1	0
Bahnson Ave to Veterans Pkwy*	15	0	0	1	0	14	6	4	0	3	0
Veterans Pkwy to Six Mile Rd*	7	0	0	1	1	5	4	2	0	1	0
Six Mile Rd to Arbor Ridge Rd	4	0	0	2	0	2	4	0	0	0	0
Arbor Ridge Rd to Heritage Rd	3	0	0	0	0	3	2	1	0	0	0
Heritage Rd to Sandstone Ave	0	0	0	0	0	0	0	0	0	0	0
Sandstone Ave to Sioux Blvd	12	0	0	2	0	10	4	6	0	2	0
Sioux Blvd to SD11 / Splitrock Blvd	11	0	1	0	2	8	0	6	0	4	1
Totals:	69	0	1 (1%)	7 (10%)	3 (4%)	58 (85%)	25 (36%)	27 (39%)	0	12 (17%)	3 (4%)

Table notes for this page:

* Intersection crashes from 2021–2022

** Crashes exclude vehicle-animal crashes for crash rate tabulations

Railroad Grade Separation Warrant Review

*See Grade Separation Warrant Review Memo in **Appendix F** for additional information.*

Several at-grade railroad crossings with BNSF Railway and Ellis and Eastern Railroad are located in the industrial area of Rice Street between Bahnson Avenue and Veterans Parkways (crossing numbers 186700W, 097870V, and 976220S). This study reviewed grade separation warrants for these crossings using City of Sioux Falls Railroad Overpass Policy guidelines documented in the *City of Sioux Falls Engineering Design Standards*. These guidelines consider Design Criteria of the roadway and five Analysis Factors, such as safety, vehicle and pedestrian accessibility, street connectivity, driver delay, and train noise, which are summarized in the following.

Design Criteria

- Roadway is designated as an arterial street on the City of Sioux Falls Major Street Plan: **Yes**
  - Type I Arterial
- The roadway design speed is at least 45 mph: **Yes**
  - Existing posted speed: 45 mph through crossings
  - Future speeds: 45 mph design speed with 40 mph posted speed through crossings
- The roadway has a projected average annual daily traffic (AADT) that exceeds 10,000 vehicles per day: **Yes**
  - Existing volumes (Year 2023) through the reviewed crossings are 10,000 vehicles per day
  - Future volumes at each crossing are estimated at between 17,500 and 20,000 vehicles per day
- The rail line has a design speed of at least 49 mph: **No**
  - Current maximum timetable speed ranges between 10 mph (crossings 186700W and 976220S) and 25 mph (crossing 097870V) with typical speed range is 5-10 mph (for crossings 186700W and 976220S) and 1-25 mph (for crossing 097870V)
- The rail line carries an average of three or more trains per day at the location under consideration: **No**
  - One to two movements per day, but subject to change based on railroad forecasts

Analysis Factors

- Safety
  - No reported vehicle train crashes between 2018 and 2022
  - Grade separation would eliminate vehicle-train and pedestrian/bicyclist-train conflicts, reduce secondary rear-end crashes due to queue spillback, and eliminate potential blocking of nearby access points
- Vehicle and Pedestrian Accessibility
  - Grade separation would benefit multimodal accessibility and connectivity along the Rice Street / Holly Boulevard corridor and with surrounding transportation facilities
- Street Connectivity
  - Grade separation would benefit street connectivity and travel reliability by providing an arterial roadway grade separation in the Brandon community and eastern Sioux Falls

- A potential Benson Road connection to Rice Street would significantly benefit from grade separated crossings. It should be noted that a proposed alternative with Benson Road as the priority east/west route, instead of Rice Street (going west into Sioux Falls), would likely reduce the need for grade separation at crossing 186700W due to commuter traffic utilizing Benson Road for travel to and from Sioux Falls.

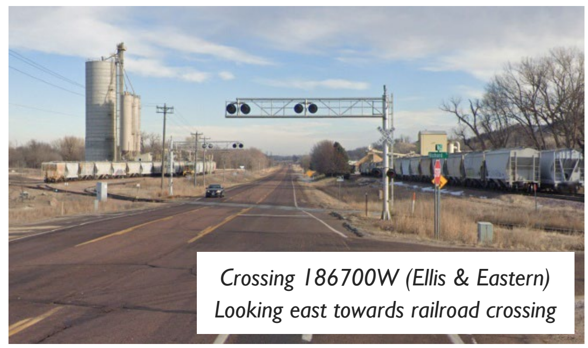
- Driver Delay
    - Grade separation would benefit roadway users by eliminating delay, and risk for delay, at each crossing location. Grade separation would also benefit Sioux Falls and Brandon-area emergency response and support City of Sioux Falls and City of Brandon officials when planning future locations for emergency response facilities.
- Train Noise
    - Residential and recreational areas near the crossing would benefit in quality of life by a reduction in train noise would benefit quality of life in the area.

Conclusions

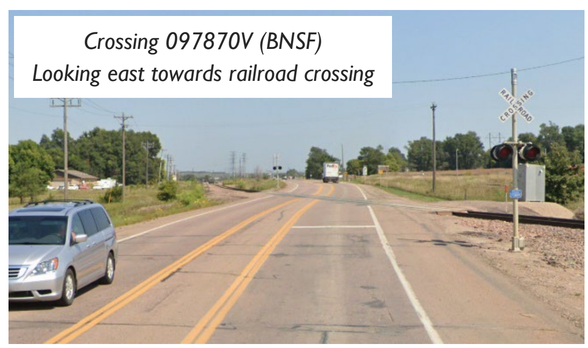
Through this review, it was found that the City of Sioux Falls Railroad Overpass Policy guideline's Design Criteria and Analysis Factors support consideration of future Rice Street / Holly Boulevard grade separation of the BNSF and Ellis & Eastern rail lines between Bahnson Avenue and Veterans Parkway. Development of conceptual layouts is recommended to illustrate potential configurations and impacts to adjacent property.

It should be noted that partial grade separation amongst the three study area crossings does not provide all benefits of total grade separation. Only the presence of grade separation at all crossings or a combination of the BNSF and eastern Ellis & Eastern crossings, if a priority route Benson Road connection is considered, will yield the greatest benefit to commuter traffic in this area. This study recommends a further in-depth feasibility review to weigh benefits and costs of these concepts.

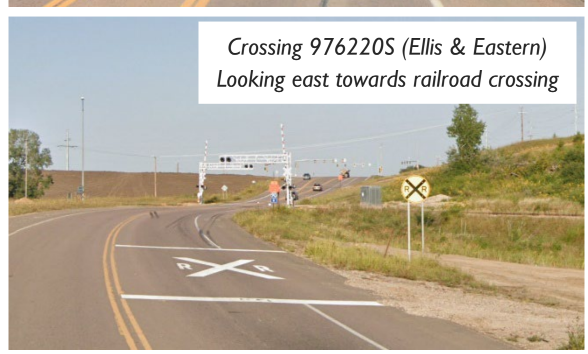
If grade separation is not implemented in the future, it is recommended that gate warning devices (active traffic control system) be installed due to the safety benefits and notable reduction in predicted crash frequency. If train frequency increases, the evaluation should be revisited to account for the additional impacts to crossing operations and safety.



Crossing 186700W (Ellis & Eastern)
Looking east towards railroad crossing



Crossing 097870V (BNSF)
Looking east towards railroad crossing



Crossing 976220S (Ellis & Eastern)
Looking east towards railroad crossing

Figure 11: Existing At-Grade Railroad Crossings (Between Bahnson Ave and Veterans Parkway)

Bicycle and Pedestrian Travel

While there are currently sidewalk and on-street bike lanes along portions of the study corridor, future pedestrian and bicycle facilities improvements are identified as part of this study and will guide multimodal elements and area connectivity.

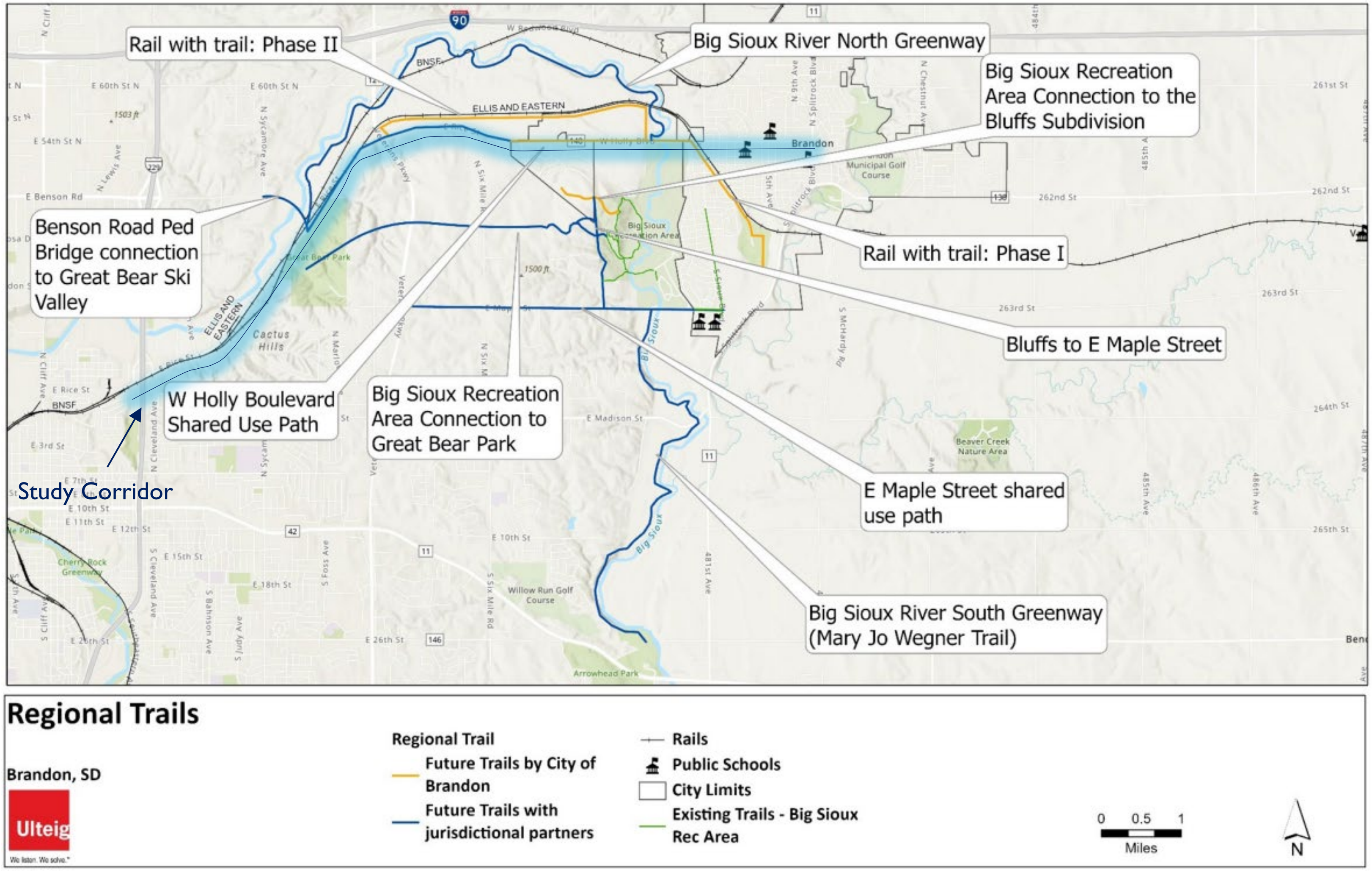
Bicycle and pedestrian planning recommendations from the *2023 Sioux Falls Bicycle Plan* (shown in **Figure 12**) and the *2022 City of Brandon Bike and Pedestrian Plan* (shown in **Figure 13**) were reviewed as part of this study.

The *2023 Sioux Falls Bicycle Plan* notes Rice Street as having existing on-street bike lanes between Bahnson Avenue and Veterans Parkway and the segment adjacent to I-229 as a side path corridor for further study. Existing or future side path connections with Rice Street are noted along Lowell Avenue, Bahnson Avenue, Veterans Parkway, and Six Mile Road. A future trail extension along the Big Sioux River is identified north of the study corridor.

City of Brandon future paved trails generally follow existing drainageways and railroad routes with pedestrian and bicycle enhancements to arterial corridors. Coordination of the future regional trail network east and west of Rice Street / Holly Boulevard will be beneficial as this area develops. The Rice Street / Holly Boulevard corridor is an opportune location to provide regional connectivity for trails and shared use paths extending to the east and west.

Source: Adapted from 2023 Sioux Falls Bicycle Plan, Appendix 2 (Map #8 – Bicycle Plan Map)
https://cms2.revize.com/revize/secogmpo/Document%20Center/Resources/Master%20Plans/Bicycle-Plan-2023-f.pdf

Figure 12: City of Sioux Falls Bicycle Plan Recommendations (2032)



Source: Adapted from *2022 City of Brandon Bike and Pedestrian Plan*, Figure 3.17
https://cityofbrandon.org/vertical/sites/%7B23CB10F0-8C35-4CA4-9AD1-B693F0F58E76%7D/uploads/22_1222_Bike_and_Ped_Plan_-_Final.pdf

Figure 13: City of Brandon Regional Trail Plan (Bike and Pedestrian Network)

PUBLIC OUTREACH SUMMARY

*See Public Open House #1, Public Open House #2, and Public Open House #3 summary memos in **Appendix G** for additional information.*

The study included several opportunities for the public and stakeholders to provide comments and feedback throughout the process, including:

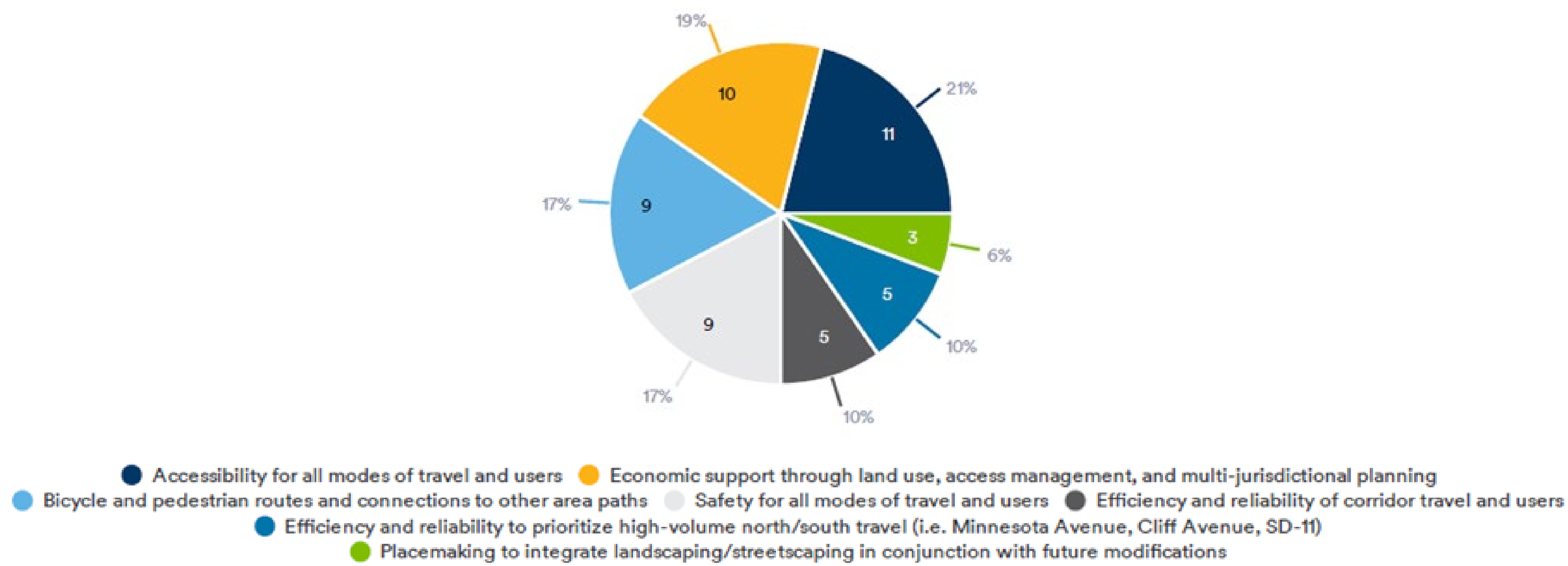
- Three public open houses
- Three sets of in-person stakeholder meetings
- Travel survey
- Study website

The first set of in-person public open house and stakeholder meetings introduced the study and provided an opportunity to gather feedback on transportation-related issues and needs to be addressed by the study. The public open house was held at the Great Bear Ski Lodge on Thursday, July 13, 2023, with approximately 35 attendees. A recorded presentation was played throughout the open house and attendees had the opportunity to review study information, discuss the study with the SAT, and provide comments via mark-up maps and comment cards. Small-group stakeholder meetings were also held the day before and day of the public open house. Stakeholders included adjacent landowners, developers, and representatives from other government agencies that may be impacted by future corridor improvements.

A travel survey was available in conjunction with the first public meeting open house and included questions on transportation safety, corridor vision, and study priorities. A snapshot of survey results is provided in **Figure 14**.

Overarching themes from the first public open house and stakeholder meetings centered on:

- **Identifying corridor needs**, such as noise reduction, safety for non-motorized traffic and increased separation of pedestrian and bicyclist facilities from vehicular traffic, railroad grade separation and improved route reliability, additional through lanes, pedestrian and bicycle routes and connections, wildlife protections, widening of Cleveland Avenue, Benson Road connection, turn lanes, speed, roadway lighting, and future access locations
- **Strong support for roundabouts and a separated shared use path** throughout the corridor
- **Recommendations of future corridor elements,** such as a shared use path, turn lanes, roundabouts, number of lanes (single through lane in each direction vs. two through lanes in each direction), balance of speed and access, and railroad grade separation



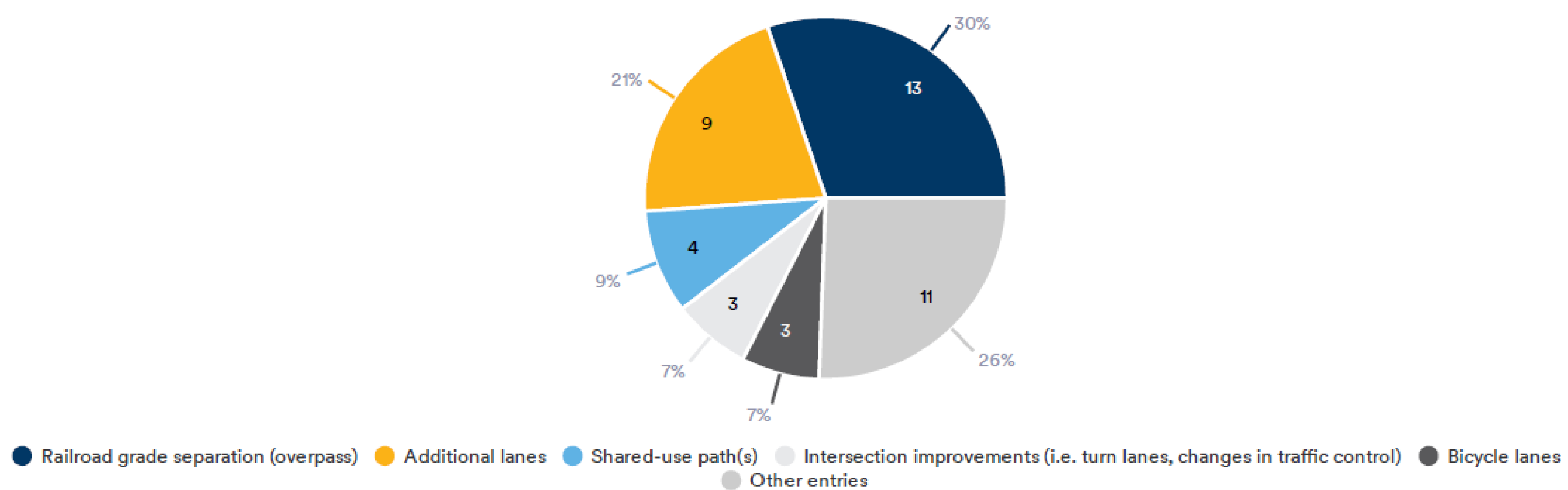


Figure 14: Issues and Needs Survey Results

The second set of in-person public open house and stakeholder meetings presented preliminary recommendations for feedback. The public open house was held at Great Bear Ski Lodge on Tuesday, December 5, 2023, with approximately 40 attendees. A recorded presentation was available throughout the open house. Preliminary recommendations were shown on table-top roll plots and display boards. Attendees provided comments and feedback through discussion with SAT members and comment cards. Virtual small-group stakeholder meetings were also held the day before and in-person day of the public open house to present preliminary recommendations.

The third set of in-person public open house and stakeholder meetings presented refined concepts and recommendations for public feedback. The public open house was held at the Brandon Valley Assembly of God church on Thursday, April 25, 2024. Similar to previous open houses, refined concepts and recommendations were displayed on boards and roll plots to allow for comments and discussion between attendees and the SAT. The stakeholder meeting was held prior to the public meeting and had an open house format.

Overall, attendees were largely supportive of the preliminary recommendations and provided several recommendations for enhancements, timing of future projects, and other considerations. All public open house information was provided on the study website, including a recording of the presentation, display boards, informational handouts, and study contact information for comments and questions.

SUMMARY OF NEEDS

Based on findings from the baseline conditions analysis and feedback from the SAT, stakeholder, and public, overarching needs to be addressed by the corridor study focus on the following:

- Intersection and corridor segment safety
- Corridor number of lanes and future cross-section
- Future intersection configurations and traffic control
- Planning-level timing for projects
- Future access locations for development
- Corridor land use and access plans
- Grade-separated crossings (between Bahnson Avenue and Veterans Parkway) concepts and review of impacts
- Potential route connections with Benson Road and Sycamore Avenue
- Bicycle and pedestrian facilities along the corridor, with a focus on increased separation from vehicular traffic, connectivity, and continuity

LAND USE PLAN

*See Rice Street / Holly Boulevard Corridor Land Use and Access Plan Memo in **Appendix H** for additional information.*

The recommended Rice Street / Holly Boulevard Corridor Land Use Plan, shown in **Figure 15**, was developed in collaboration with the SAT and area comprehensive plans. The following land uses were incorporated, with descriptions adapted from the *Shape Sioux Falls 2040 Future Land Use Map*:

Neighborhood Employment Center

- Serves immediate neighborhoods adjacent to intersections with convenience items and services
- Supports multimodal connectivity
- Node-based development primarily located at arterial/arterial intersections

Business Park

- Office/institutional parks and specialized employment areas with commercial support
- Provides noise buffer between regional highways and residential
- Node-based development typically located at major intersections along regional corridors

Commercial

- Compatible with Neighborhood Employment Center or Business Park through redevelopment
- Typically located adjacent to arterial intersection with good visibility and access
- Larger commercial areas also supported by collector streets

Industrial

- Industrial uses areas with access to arterial streets and rail, where applicable
- Typically separated from non-compatible land uses, such as residential, office, institutional, and planned or neighborhood commercial
- Portions of an industrial area may be compatible with Business Park node where light industrial type land use also correlates to Business Park Employment Center

Residential

- Higher density multifamily residential along arterial corridors
- Lower density single-family away from the arterial corridors

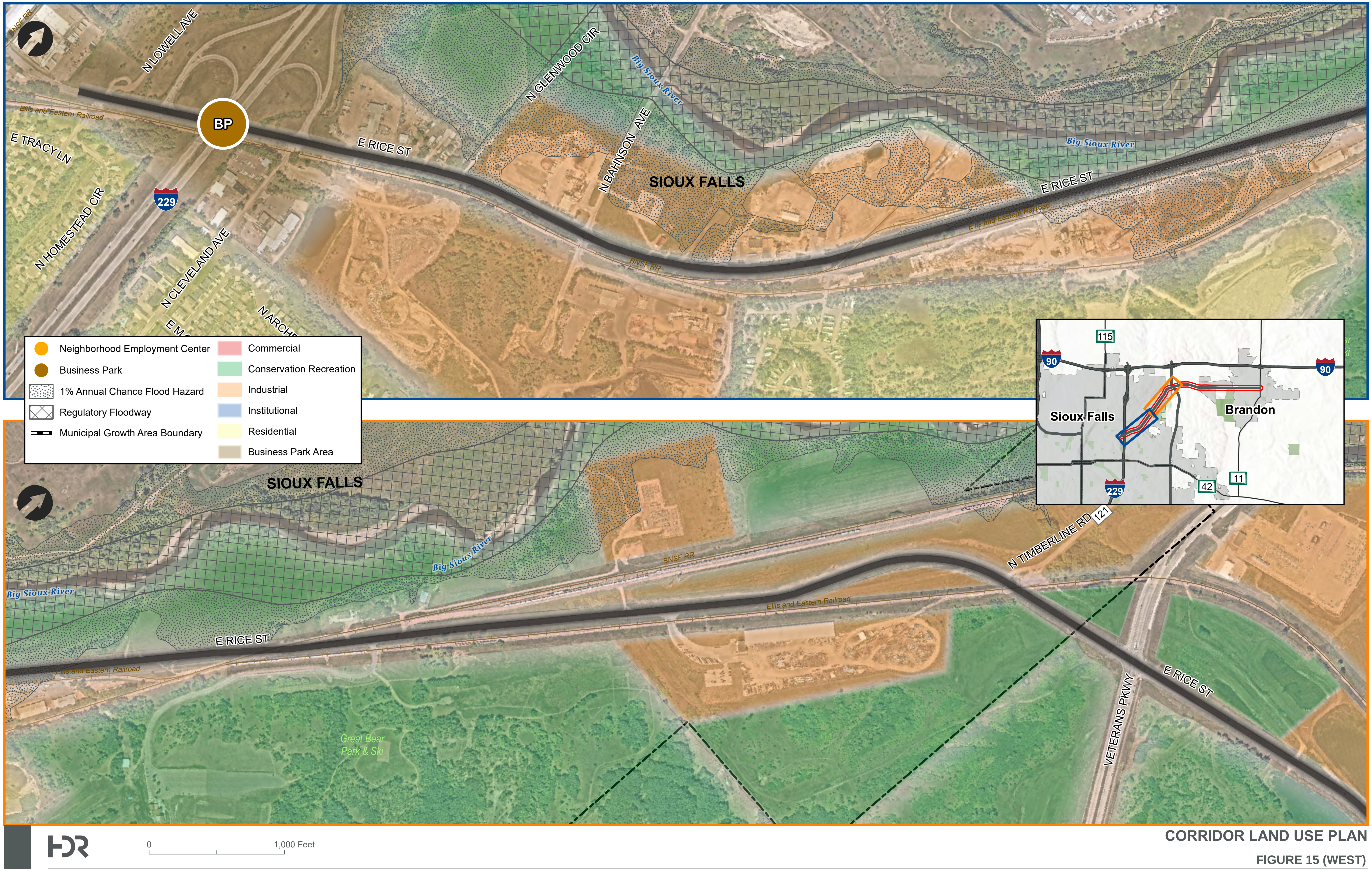
Institutional

- Civic uses, such as schools, government offices, hospitals, and places of worship

Recreational/Conservation

- Recreation (parks, bike trails, etc.) and nature conservation (drainageways, nature areas, etc.) areas

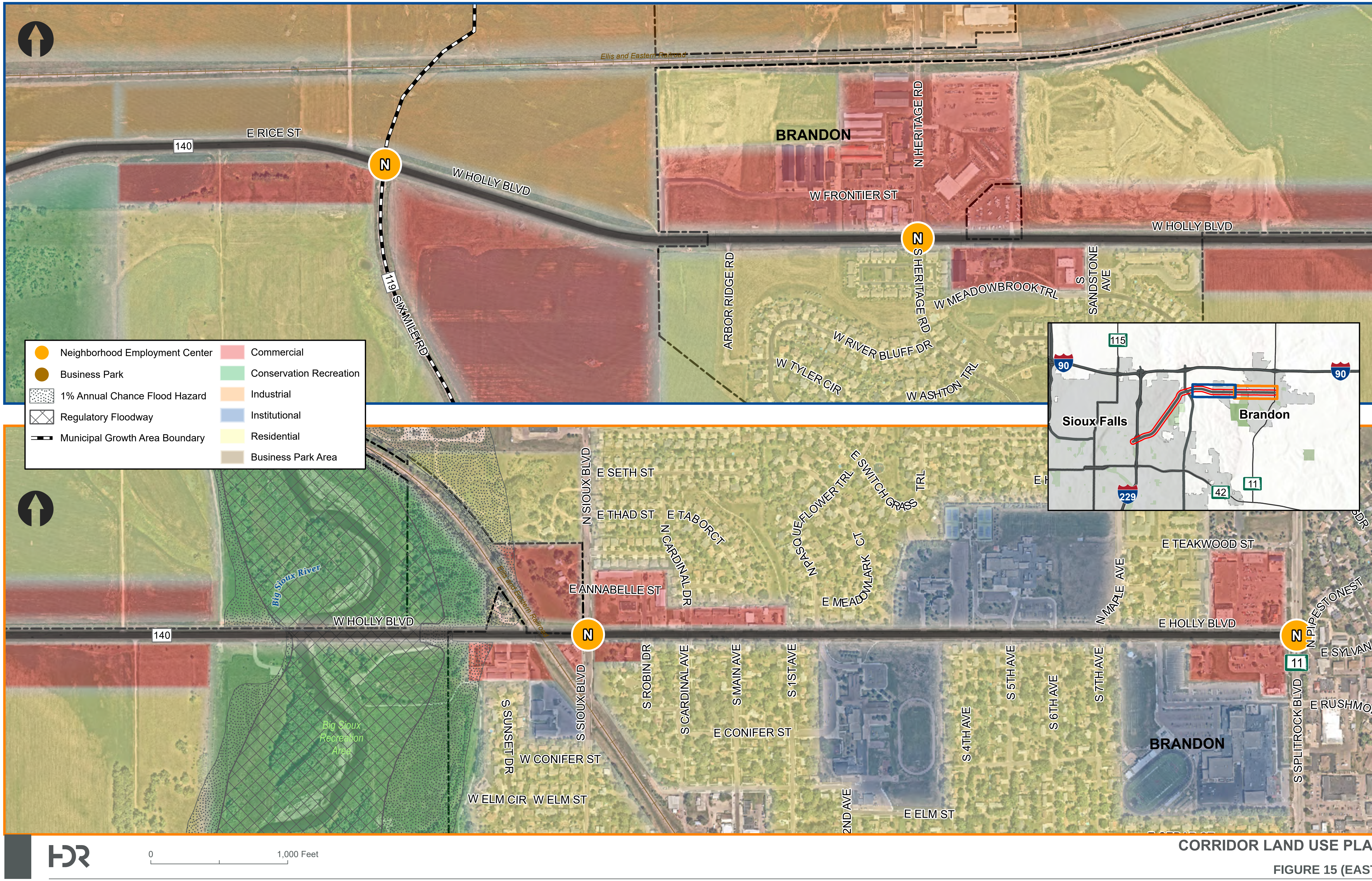
With concurrence of this study by the partnering agencies, this study establishes regional consistency of future land use within the study area. Comprehensive Plans for each participating entity shall reflect the land uses depicted in this study.



CORRIDOR LAND USE PLAN

FIGURE 15 (WEST)

RICE STREET / HOLLY BLVD CORRIDOR STUDY



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CORRIDOR LAND USE PLAN

FIGURE 15 (EAST)

RICE STREET / HOLLY BLVD CORRIDOR STUDY

ACCESS PLAN

*See Rice Street / Holly Boulevard Corridor Land Use and Access Plan Memo in **Appendix H** for additional information.*

The recommended Rice Street / Holly Boulevard Access Plan establishes the appropriate balance of access and mobility for the Rice Street / Holly Boulevard corridor and area land use. Access and mobility goals for this plan include:

1. Support network functional circulation system
2. Support area connectivity, east/west route continuity, and future development
3. Provide guidance for future development and transportation projects

In conjunction with the corridor Land Use Plan, the following recommended access guidelines were adapted from the *Sioux Falls Engineering Design Standards* for a Type I Arterial and *Brandon Master Transportation Access Management Standards* for Minor Arterials.

Corridor Description

Arterial street that provides continuity and serves high commercial and commuter need.

Access Spacing

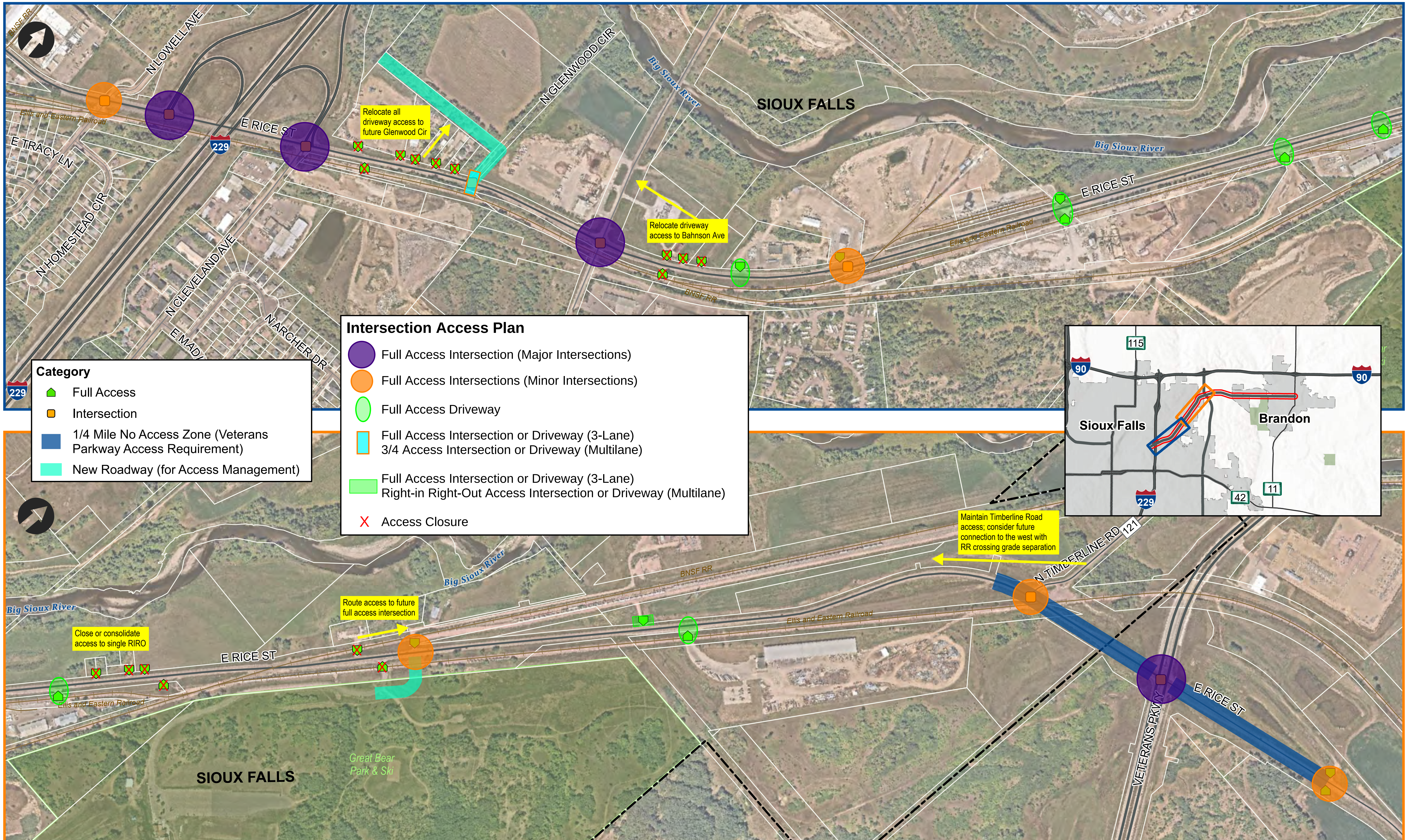
- Signalized intersections: ¼ mile
- Full movement access: ¼ mile
- Median opening: ¼ mile
- Unsignalized intersection 1,320 feet

Other types of unsignalized intersection spacing or an additional full movement access may be evaluated through a traffic analysis for consideration by agencies with jurisdiction of the applicable roadway segment. Turn lanes and intersection traffic control should be evaluated with an access request for each access point being added, or modified, through development or redevelopment. Traffic operations should be prioritized for east/west arterial travel at development access points.

Intersection Access Plan

Recommended framework for corridor intersection and access locations is provided in the Intersection Access Plan shown in **Figure 16**. This figure identifies locations for existing and future arterial, ¼-mile full access, and partial-access intersections. Future development requesting full access to Rice Street / Holly Boulevard shall tie into the identified ¼-mile full access intersection locations. Supporting notes and recommendations for individual access points are provided in the *Land Use and Access Plan Memo* in **Appendix G**. These recommendations served as a guide for alternatives developed in the **INTERSECTION ALTERNATIVES** section.

With concurrence of this study by the partnering agencies, this study will be the guiding regulation for access. If alternate access is proposed to deviate from this study by Minnehaha County, City of Brandon, or City of Sioux Falls, all parties will discuss any changes and agree upon what is ultimately changed and designated.



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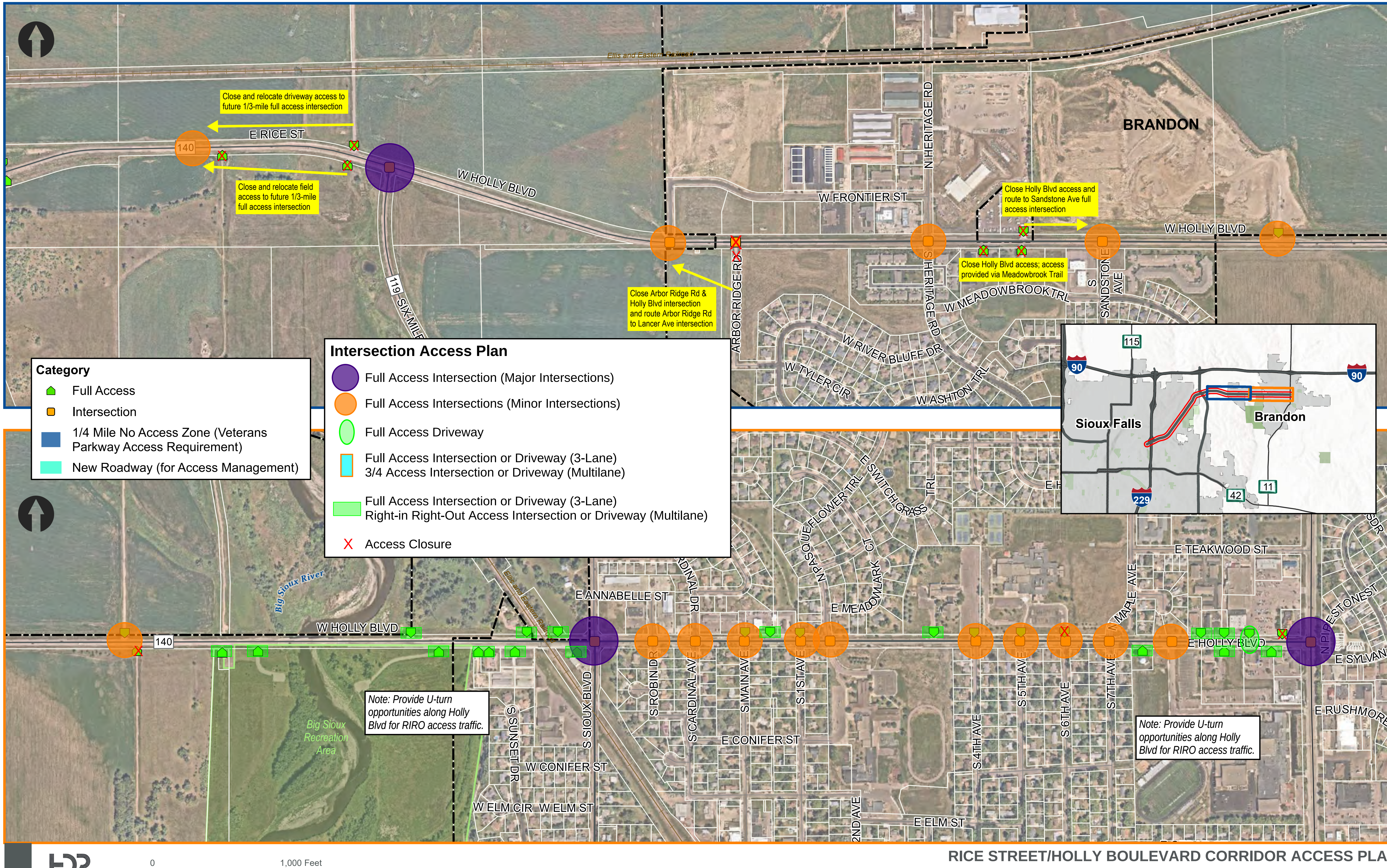
RICE STREET/HOLLY BOULEVARD CORRIDOR ACCESS PLAN

FIGURE 16 (WEST)



RICE STREET/HOLLY BOULEVARD CORRIDOR ACCESS PLAN

FIGURE 16 (EAST)

Recommendations to Manage Existing Access

Unless noted in the conceptual layouts, existing access to Rice Street / Holly Boulevard may be maintained until the parcel(s) develop or redevelop, the corridor or adjacent arterial intersection (as applicable) is reconstructed, or as access management opportunities arise. Recommendations to manage existing access are as follows:

Access located within major (arterial) intersection functional area

1. Close access and connect parcel to new ¼-mile intersection via frontage, rearage, or development road
2. Construct median and restrict access to right-in right-out
3. Consolidate access points

Segments with high access density (closely spaced access points)

1. Close access and connect parcel to new ¼-mile intersection via frontage, rearage, or development road
2. Construct median and restrict access to right-in right-out
3. Consolidate access points

Field access

1. Close and relocate to future ¼-mile intersection as part of development, redevelopment, or future transportation project

ALTERNATIVES INTRODUCTION

Based on issues and needs identified for the Rice Street / Holly Boulevard corridor, a series of alternatives were developed for typical sections, arterial/arterial (section-line) intersections, and corridor segments between the arterial intersections. Development, evaluation, and refinement feedback was gathered through a collaborative process with the SAT over the course of several meetings. Corridor stakeholders and the public also had an opportunity to review alternatives as part of the second set of stakeholder meetings and public open house.

Alternatives development assumptions include:

- 45 mph design speed (35-40 mph posted speed) between I-229 and Sioux Boulevard, typical of suburban arterial corridors in the Sioux Falls MPO area; 35 mph design speed (30 mph posted speed between Sioux Boulevard and SD11 / Splitrock Boulevard
- Rice Street / Holly Boulevard alignment centered within a 100-foot right-of-way (ROW)
- Arterial intersection alternatives and corridor segment alternatives are interchangeable to support agency flexibility in programming and order of future projects
- Intersection turn lanes reflect a 'typical' turn lane layout. A future design analysis as part of project design should be conducted to determine final turn lane geometrics.

TYPICAL SECTION ALTERNATIVES

Rice Street / Holly Boulevard typical sections were developed to guide future corridor improvements. These typical sections support multimodal route connectivity and continuity and provide a framework to incrementally implement future projects. The nine typical sections (three specific to Brandon and six specific to Sioux Falls) illustrate the long-range vision for the corridor, shown in **Figure 17** through **Figure 25**, include:

City of Brandon Typical Sections:

- **Urban 3-Lane Typical Section:** single through lane in each direction, center left turn lane, curb and gutter, and multimodal elements
- **Urban 4-Lane Divided Typical Section:** two through lanes in each direction, raised median that accommodates a left turn lane at intersections, curb and gutter, and multimodal elements
- **Urban 5-Lane Typical Section:** two through lanes in each direction, center left turn lane, curb and gutter, and multimodal elements

City of Sioux Falls Typical Sections:

- **Urban 3-Lane Typical Section:** single through lane in each direction, center left turn lane, curb and gutter, and multimodal elements
- **Hybrid 3-Lane Typical Section:** single through lane in each direction, center left turn lane, urban curb and gutter on one side, rural shoulders and slope on one side, and multimodal elements; reflects a combination of urban and rural elements due to environmental and drainage constraints
- **Urban 4-Lane Divided Typical Section:** two through lanes in each direction, raised median that accommodates a left turn lane at intersections, curb and gutter, and multimodal elements
- **Hybrid 4-Lane Divided Typical Section:** two through lanes in each direction, raised median that accommodates a left turn lane at intersections, curb and gutter on one side, rural shoulders and slope on one side, and multimodal elements; reflects a combination of urban and rural elements due to environmental and drainage constraints
- **Urban 5-Lane Typical Section:** two through lanes in each direction, center left turn lane, curb and gutter, and multimodal elements
- **Hybrid 5-Lane Typical Section:** two through lanes in each direction, center left turn lane, curb and gutter on one side, rural shoulders and slope on one side, and multimodal elements; reflects a combination of urban and rural elements due to environmental and drainage constraints

Key urban typical section elements incorporate:

ROW

- 100-foot width

Roadway

- Option to provide a single lane or multiple lanes in each direction
- Raised median and two-way left-turn lane (TWLTL) options
- 11-foot lanes

Bicycle/Pedestrian

- 10-foot shared use path on one or both sides
- Shared use path located along edge of ROW to maximize separation from Rice Street / Holly Boulevard vehicle lanes, increase bicycle and pedestrian comfort, and accommodate future expansion

Streetscape/Appurtenances

- Streetscape opportunities provided in the boulevard sections of all urban typical sections and within raised center median in Urban 4-Lane Divided typical section
- Roadway lighting

The Hybrid 3-Lane, 5-Lane, and 4-Lane Divided Typical Sections reflect a modification to the existing cross-section to help illustrate how various urban and rural elements may be incorporated at locations where environmental and drainage constraints are present. All Hybrid Typical Sections fit within a ROW of 100 feet. All typical sections developed as part of this study (including variations of typical section described above) are shown in **Appendix I**.

Design and Posted Speeds

Recommended design and posted speeds for proposed corridor typical sections are:

City of Brandon (Six Mile Road to Sioux Boulevard):

- Design Speed: 35 or 40 mph
- Posted Speed: 30 or 35 mph

City of Sioux Falls (I-229 to Six Mile Road):

- Design Speed: 45 mph
- Posted Speed: 40 mph

Design speeds should be discussed ahead of any major corridor reconstruction project within the City of Sioux Falls and City of Brandon growth areas.

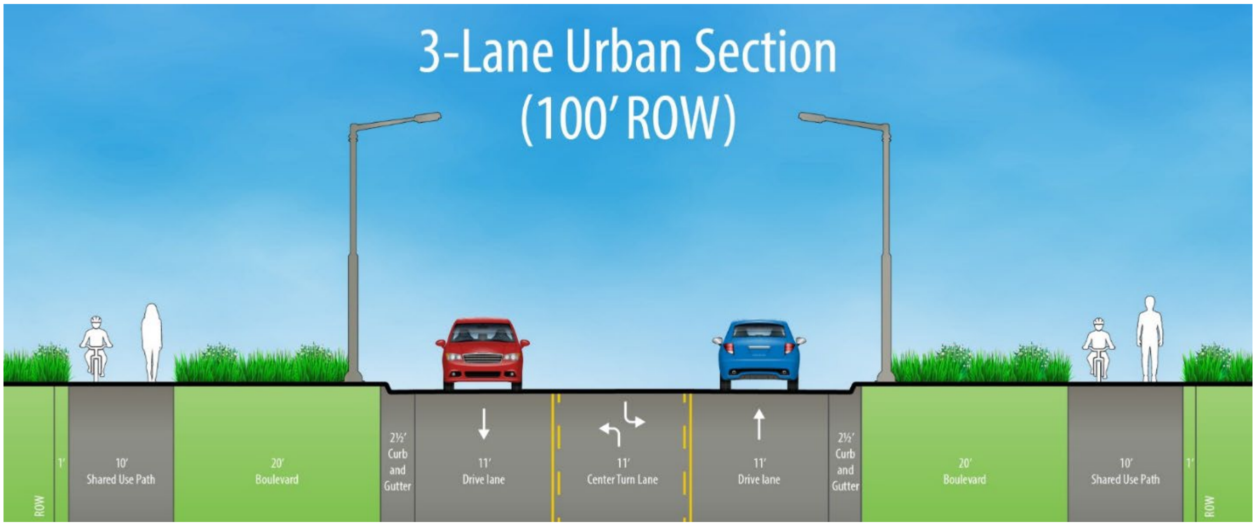


Figure 17: City of Brandon – Urban 3-Lane Typical Section

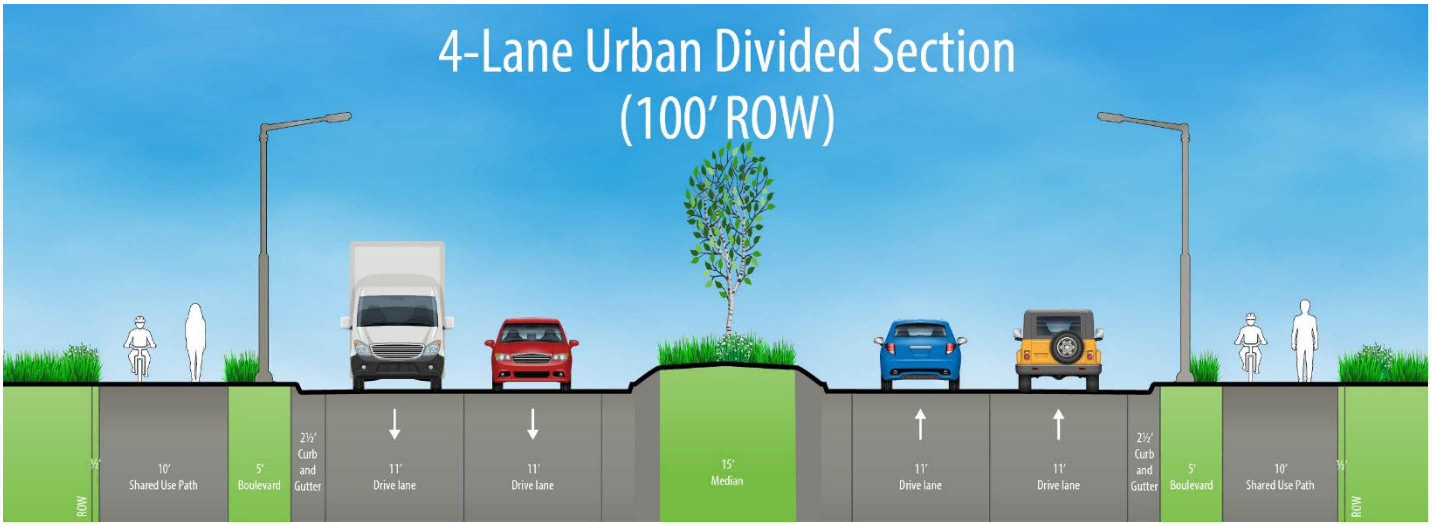


Figure 18: City of Brandon – Urban 4-Lane Divided Typical Section

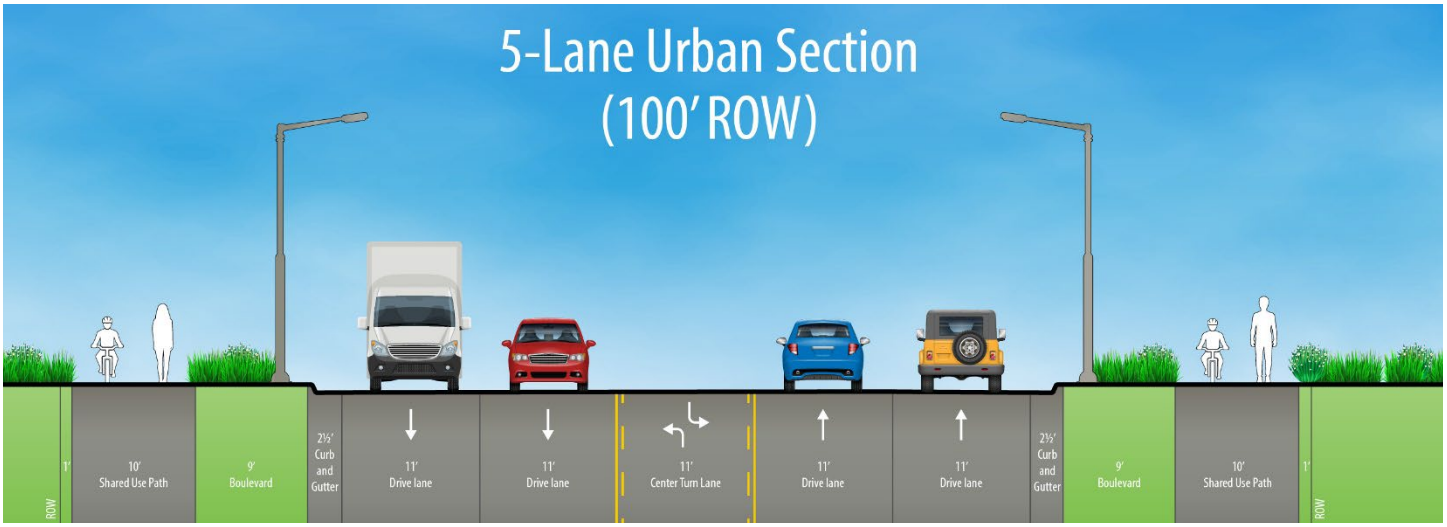


Figure 19: City of Brandon – Urban 5-Lane Typical Section

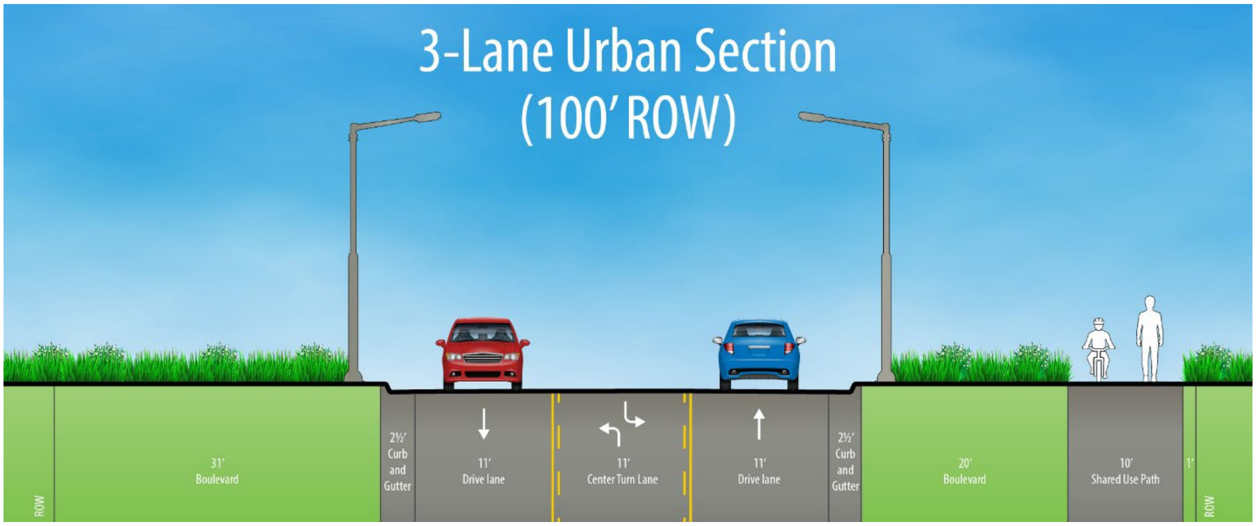


Figure 20: City of Sioux Falls – Urban 3-Lane Typical Section

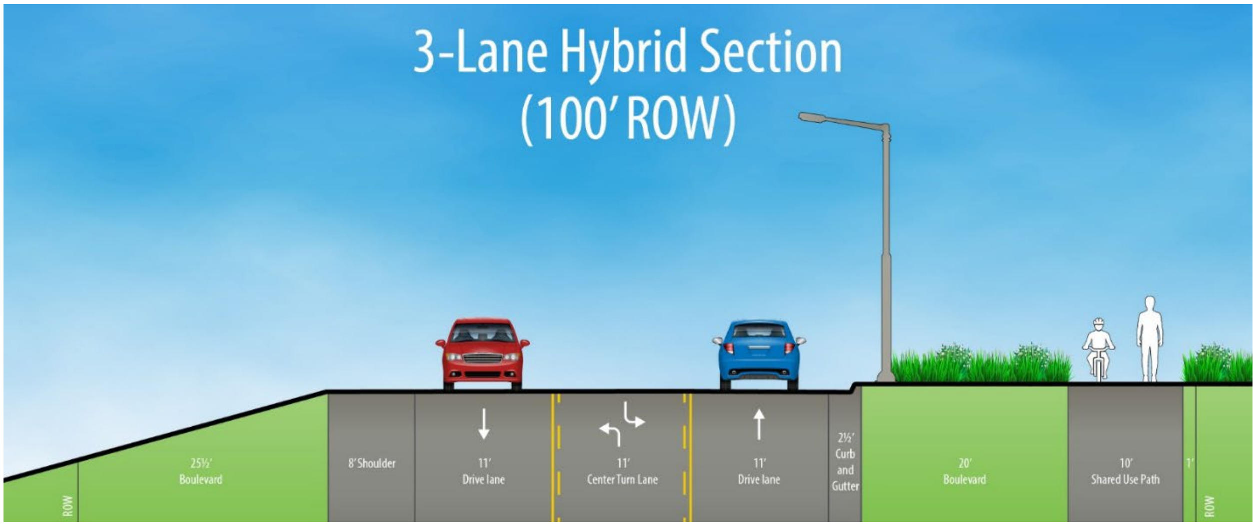


Figure 21: City of Sioux Falls – Hybrid 3-Lane Typical Section

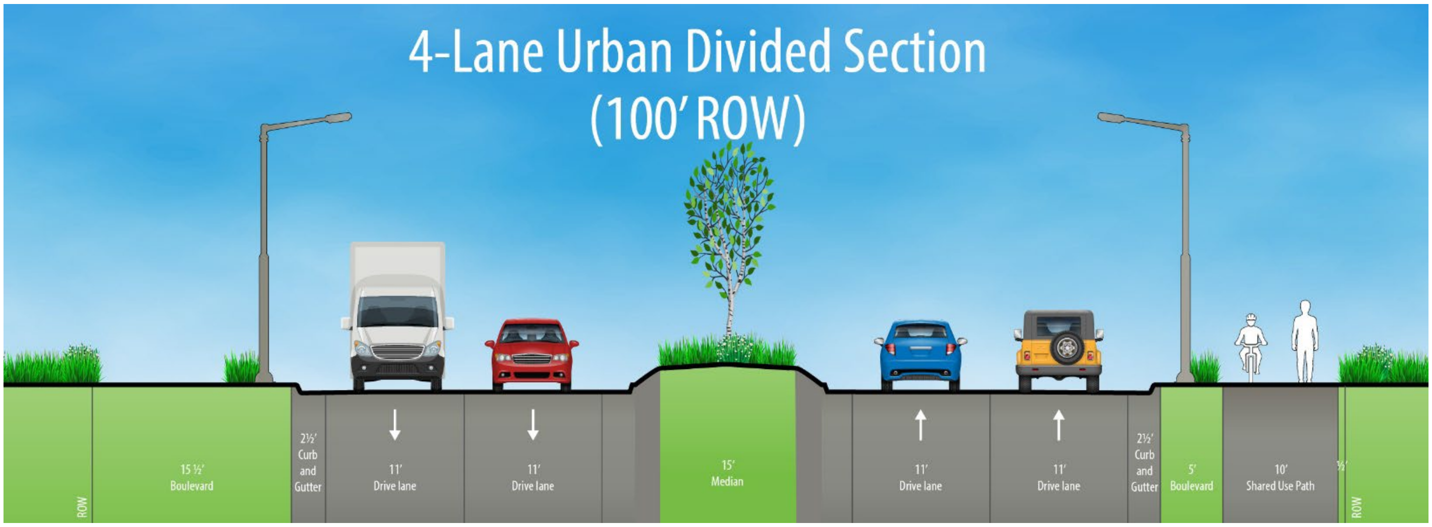


Figure 22: City of Sioux Falls – Urban 4-Lane Divided Typical Section

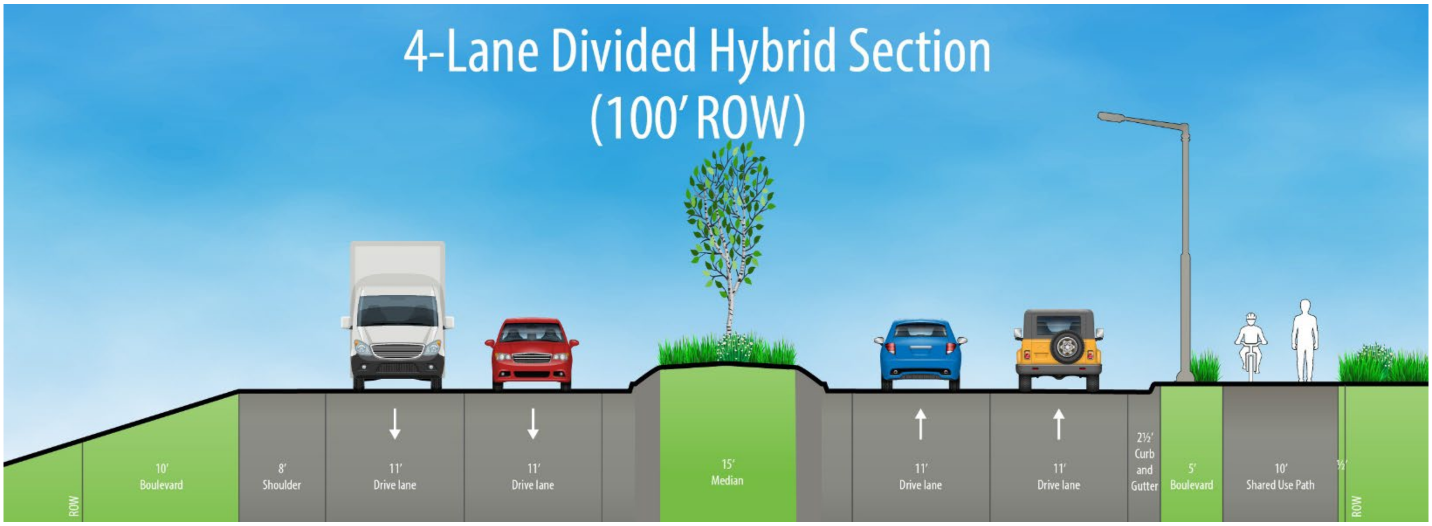


Figure 23: City of Sioux Falls – Hybrid 4-Lane Divided Typical Section

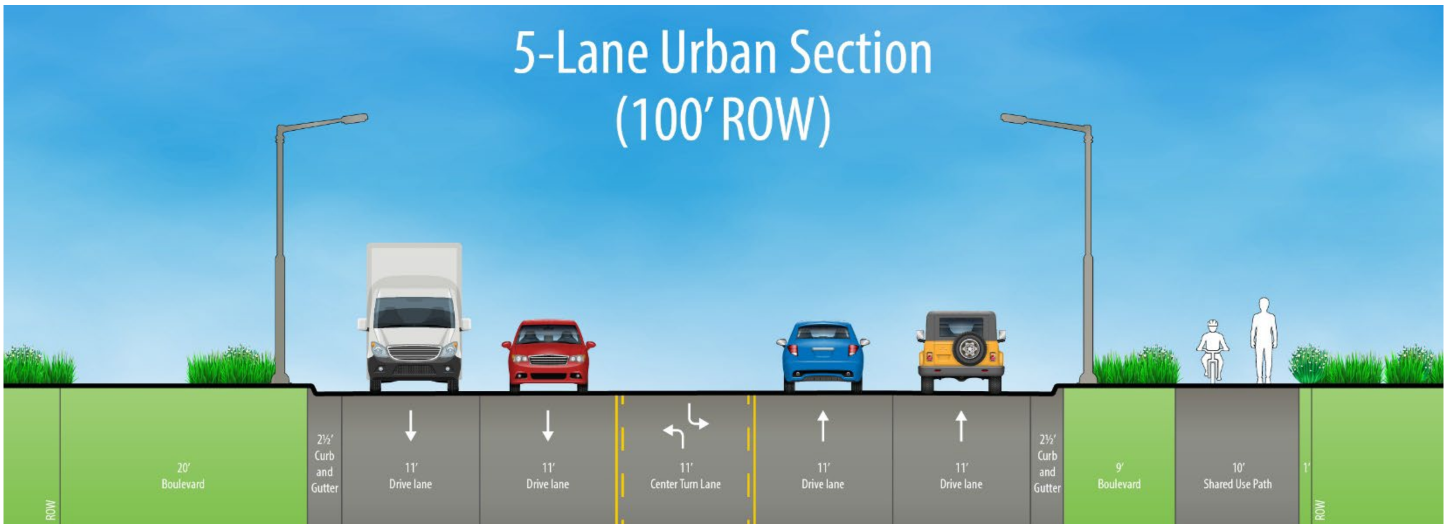


Figure 24: City of Sioux Falls – Urban 5-Lane Typical Section

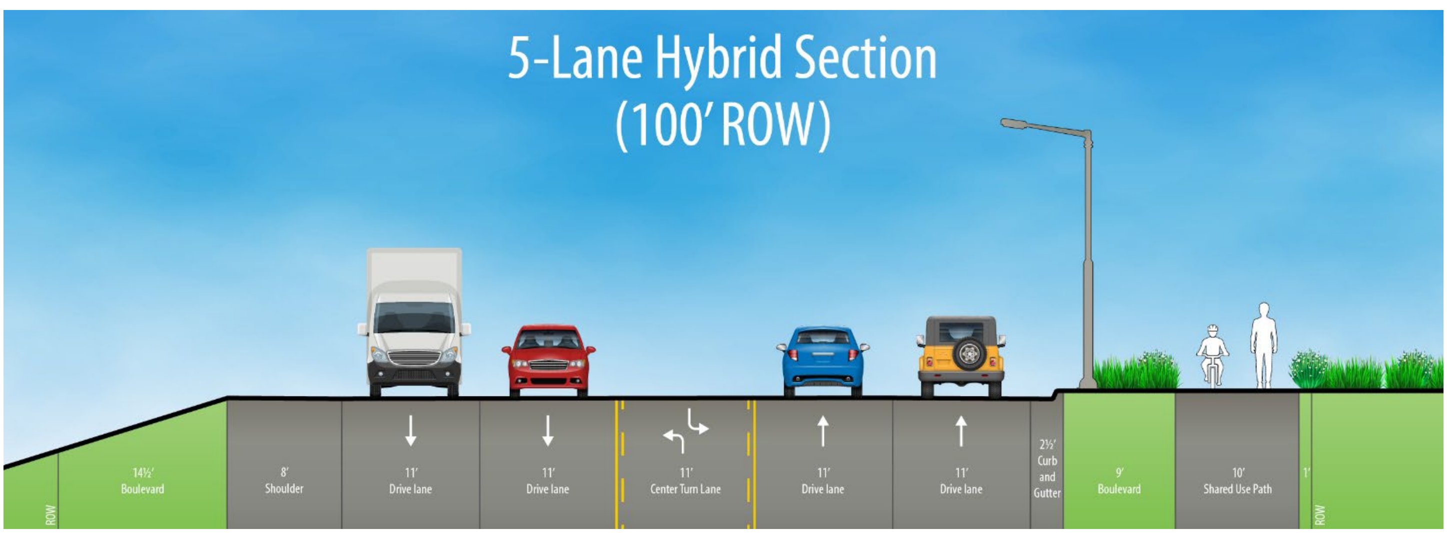


Figure 25: City of Sioux Falls – Hybrid 5-Lane Typical Section

INTERSECTION ALTERNATIVES

*Conceptual layouts of intersection alternatives developed for this study are provided in **Appendix J**.*

Intersection alternatives illustrate potential modifications to existing intersection configurations and address identified issues and needs. Intersection alternatives consist of three main intersection types:

1. Traditional intersection that can either be stop-controlled (stop signs) or signal-controlled (traffic signal)
2. Continuous Green T (CGT) intersection that can either be stop-controlled (stop signs) or signal-controlled (traffic signal)
3. Roundabout (single-lane or multilane)

Intersection traffic control needs (stop sign vs. traffic signal) are based on operational analysis. Existing unsignalized intersections would need to meet *Manual on Uniform Traffic Control Devices* (MUTCD) traffic signal warrants before being signalized. Left turn lanes were included in all traditional intersection alternatives. Right turn lanes were included in the 3-lane section traditional intersection alternatives only. While turn lanes were not required to meet operational goals in several instances, they were still included to reflect the long-range build-out of an arterial corridor where turn lanes provide operational and safety benefits to the transportation network.

Rice Street / Holly Boulevard typical sections tying into the intersection alternatives include a 3-lane section (e.g., Urban 3-Lane Typical Section) or multilane section (e.g., Urban 5-Lane Typical Section or Urban 4-Lane Divided Typical Section). Assumptions for north/south arterial number of lanes were based on other area studies and Sioux Falls MPO TDM constrained projects.

Assumptions incorporated into the alternatives development include:

- I-229 Exit 7 Interchange area recommendations from the *I-229 Major Investment Corridor Study* were incorporated for Rice Street, but this study refines recommendations along the study corridor and near Bahnson Avenue in terms of typical section elements and access locations. Revised concepts carried forward from that study include:
    - Alternative Rice 2A: 6-Lane Divided Typical Section (with left turn lanes)
    - Alternative Rice 3C: 6-Lane Divided Typical Section (with left turn lanes)
- SD11 recommendations from the *SD11 Corridor Study* were incorporated for the SD11 corridor, but this study refines recommendations for the west approach
- Multilane roundabouts are a hybrid configuration where only up to two legs have multiple through lanes

A summary matrix of intersection alternatives is provided in **Table 9**.

Table 9: Intersection Alternative Matrix

Rice Street / Holly Boulevard Intersection	Alternative	Intersection Type	Rice Street / Holly Boulevard Corridor Typical Section	
			3-Lane	Multilane
I-229 SB RTI	I-229 – 1	Traffic Signal		X
	I-229 – 2	Traffic Signal		X
I-229 NB RTI / Cleveland Avenue	I-229 – 1	Traffic Signal		X
	I-229 – 2	Traffic Signal		X
Bahnson Avenue	Bahnson 1*	Traffic Signal	X	
	Bahnson 2	Traffic Signal		X
Benson Road *(Future Extension)*	Benson Extension – 1 & 2	Stop-Control / Traffic Signal	X	X
Veterans Parkway	Veterans Pkwy – 1	Traffic Signal		X
Six Mile Road	Six Mile – 1	Single-Lane Roundabout	X	
	Six Mile – 2	Multilane Roundabout		X
	Six Mile – 3*	Stop-Control / Traffic Signal (existing intersection)	X	
	Six Mile – 4 & 5	Stop-Control / Traffic Signal		X
	Six Mile CGT – 1 & 2	Continuous Green T (CGT) Stop-Control / Traffic Signal		X
Lancer Avenue *(Future Intersection)*	Lancer – 1	Single-Lane Roundabout	X	
	Lancer – 2	Multilane Roundabout		X
	Lancer – 3*	Stop Control / Traffic Signal (existing intersection)	X	
	Lancer – 4 & 5	Stop-Control / Traffic Signal		X
Heritage Road	Heritage – 1	Single-Lane Roundabout	X	
	Heritage – 2	Multilane Roundabout		X
	Heritage – 3 & 4	Traffic Signal		X
Sandstone Avenue	Sandstone – 1	Single-Lane Roundabout	X	
	Sandstone – 2	Multilane Roundabout		X
	Sandstone – 3 & 4	Stop-Control / Traffic Signal	X	X
Development Intersections W & E	Development W & E – 1	Single-Lane Roundabout	X	
	Development W & E – 2	Multilane Roundabout		X
	Development W & E – 3	Stop-Control / Traffic Signal	X	X
Sioux Boulevard	Sioux – 1	Traffic Signal		X
SD11 / Splitrock Boulevard	SD11/Splitrock – 1 & 2	Traffic Signal		X

Rice Street / Holly Boulevard corridor tying into the intersection alternative:

- 3-Lane: Urban / Hybrid 3-Lane Typical Section
- Multilane: Urban / Hybrid 5-Lane Typical Section or Urban / Hybrid 4-Lane Divided Typical Section

Intersections anticipated to open as stop-control and transition to signalized when warranted indicated by 'Stop-Control (Traffic Signal)'

* No corresponding conceptual layout shown in Appendix I (based on existing conditions)

CORRIDOR SEGMENT ALTERNATIVES

*Conceptual layouts of corridor segment alternatives developed for this study are provided in **Appendix K**.*

Corridor segment alternatives illustrate potential modifications to the Rice Street / Holly Boulevard corridor between major intersections, including:

- Typical section elements
- Future ¼-mile access locations and minimum lane configurations
- Transition locations for number of lanes (lane add/drop) and raised medians

In the 4-Lane Divided multilane corridor alternatives, a raised median is proposed to extend to the adjacent ¼-mile intersection to preserve intersection capacity and maintain expected levels of safety by minimizing conflict points within the major intersection functional area. Deviations from this must be evaluated in accordance with the corridor's Access Plan.

Where multilane corridor alternatives were developed in conjunction with signalized bookend intersections, the multilane section was carried through the bookend signalized intersections and lanes were added or dropped at the adjacent ¼-mile intersection. This helps with lane utilization at major intersections by encouraging motorists to use both lanes through the signalized intersection and then providing a ¼-mile distance for lane changes. Lane add and drop locations should be further evaluated as part of future projects and development.

Where multilane corridor alternatives were developed in conjunction with multilane roundabout bookend intersections, lanes could be added/dropped at the roundabout through channelized turn lanes. This channelization aligns with forecasted traffic patterns and associated lane utilization and driver expectancy. Extending a multilane section to the ¼-mile intersection, beyond the bookend roundabout, was not needed with the roundabout alternatives.

The mid-segment ¼-mile intersections are meant to provide guidance for future development. Developers should use these locations as the foundation to develop their internal road network and corresponding land use. The corridor alternative layouts reflect the recommended minimum lane configuration at these mid-segment intersections. It is anticipated they will open as stop-controlled (from the side-street approaches) unless an engineering study shows a traffic signal will be warranted.

A summary matrix of corridor segment alternatives is provided in **Table 10**.

Table 10: Corridor Segment Alternative Matrix

Rice Street / Holly Boulevard Segment	Alternative	Rice Street / Holly Boulevard Corridor Typical Section
I-229 to Bahnson Avenue	I-229 to Bahnson – 1 – Signalized	Multilane
	I-229 to Bahnson – 2 – Signalized	Multilane
Bahnson Avenue to Sioux Boulevard	Bahnson to Sioux – Signalized	Multilane
	Bahnson to Sioux – Roundabout & Signalized	Multilane
Sioux Boulevard to SD11/Splitrock Blvd	Sioux to SD11/Splitrock – 4-Lane Divided	Multilane
	Sioux to SD11/Splitrock – 5-Lane	Multilane

BUILD CONDITION ANALYSIS

*See Build Condition Traffic Operations Analysis Memo in **Appendix L** for additional information.*

Intersection Traffic Operations

Build condition traffic operations were analyzed for all arterial intersections to assess feasibility, quantify traffic operational benefits, and aid in the evaluation and comparison of alternatives. Intersection LOS results are summarized in **Table 11** through **Table 16** for Years 2028, 2040, and 2050.

Key intersection traffic operations analysis findings include:

- Two through lanes plus intersection improvements under signalized or roundabout control were found to meet study operational goals at major intersections through this study's Planning Horizon. However, a single through lane in each direction plus intersection improvements under signal control largely meet operational goals through this study's Planning Horizon except for the Veterans Parkway intersection.

- Multilane Rice Street / Holly Boulevard (two through lanes in each direction) provides the most notable benefit at the Veterans Parkway intersection, where two eastbound/westbound through lanes reduce east/west green time needs and reallocates green time for the high-volume north/south through movements
    - The Veterans Parkway intersection does not meet overall or individual movement study operational goals under the multilane scenario through this study's Planning Horizon. However, the inclusion of two lanes in the eastbound/westbound directions notably improves overall intersection operations from LOS F (no build condition) to LOS D (multilane build condition) and worst-case individual movement operations from LOS F (no build condition) to LOS E (multilane build condition)

- Multilane roundabouts generally provide similar or less delay (better LOS) when compared to signalized intersections
    - Multilane roundabouts exhibit consistent operational benefits through the planning horizon at several analysis intersections, highlighting their adaptability to accommodate daily traffic volume variability and grow with development

- I-229 MICS alternatives Rice 2A and Rice 3C for the I-229 and Rice Street interchange and Bahnson Avenue both meet study intersection operational goals through this study's Planning Horizon

Table 11: Intersection LOS – 2028 AM Peak Hour

Intersection Type	I-229 SB RTI	I-229 NB RTI / Cleveland Ave	Bahnson Ave	Future Benson Rd Connection	Veterans Pkwy	Mid-Segment Intersection	Six Mile Rd	Future Lancer Ave	Heritage Rd	Sandstone Ave	Mid-Segment Intersection (1)	Mid-Segment Intersection (2)	Sioux Blvd	SD11 / Splitrock Blvd
No Build	*A*	*C*	*A*	*A*	*D*		*A*	*C*	*B*	*A*			*B*	*B*
Stop-Control														
3-Lane				A		A	A	A		A	A	A		
Multilane				A		A	A	A		A	A	A		
CGT (Multilane)							A							
Roundabout														
Single-Lane						B	B	B	C	B	B	B		
Multilane						A	A	A	A	A	A	A		
Signal														
I-229 MICS: Alternative Rice 2A	A	C	B											
I-229 MICS: Alternative Rice 3C	B	C	A											
3-Lane				A		A	B	A		A	A	A		
Multilane				A	C	A	A	A	C	A	A	A	B	B
CGT (Multilane)							A							

Table 12: Intersection LOS – 2028 PM Peak Hour

Intersection Type	I-229 SB RTI	I-229 NB RTI / Cleveland Ave	Bahnson Ave	Future Benson Rd Connection	Veterans Pkwy	Mid-Segment Intersection	Six Mile Rd	Future Lancer Ave	Heritage Rd	Sandstone Ave	Mid-Segment Intersection (1)	Mid-Segment Intersection (2)	Sioux Blvd	SD11 / Splitrock Blvd
No Build	*A*	*C*	*A*	*A*	*D*		*A*	*B*	*B*	*A*			*B*	*B*
Stop-Control														
3-Lane				**A**		**A**	**A**	**A**		**A**	**A**	**A**		
Multilane				**A**		**A**	**A**	**A**		**A**	**A**	**A**		
CGT (Multilane)							**A**							
Roundabout														
Single-Lane						**B**	**B**	**B**	**C**	**B**	**B**	**B**		
Multilane						**A**	**A**	**A**	**A**	**A**	**A**	**A**		
Signal														
I-229 MICS: Alternative Rice 2A	**A**	**C**	**B**											
I-229 MICS: Alternative Rice 3C	**B**	**C**	**B**											
3-Lane				**A**		**A**	**A**	**A**		**A**	**A**	**A**		
Multilane				**A**	**C**	**A**	**A**	**A**	**C**	**A**	**A**	**A**	**B**	**B**
CGT (Multilane)							**A**							

Table 13: Intersection LOS – 2040 AM Peak Hour

Intersection Type	I-229 SB RTI	I-229 NB RTI / Cleveland Ave	Bahnson Ave	Future Benson Rd Connection	Veterans Pkwy	Mid-Segment Intersection	Six Mile Rd	Future Lancer Ave	Heritage Rd	Sandstone Ave	Mid-Segment Intersection (1)	Mid-Segment Intersection (2)	Sioux Blvd	SD11 / Splitrock Blvd
No Build	*A*	*F*	*A*	*A*	*E*		*B*	*F*	*C*	*A*			*C*	*B*
Stop-Control														
3-Lane				**A**		**A**	**A**	**F**		**B**	**A**	**A**		
Multilane				**A**		**A**	**A**	**C**		**A**	**A**	**A**		
CGT (Multilane)							**A**							
Roundabout														
Single-Lane						**C**	**C**	**D**	**F**	**C**	**C**	**C**		
Multilane						**A**	**A**	**A**	**A**	**A**	**A**	**A**		
Signal														
I-229 MICS: Alternative Rice 2A	**B**	**C**	**B**											
I-229 MICS: Alternative Rice 3C	**B**	**C**	**A**											
3-Lane				**A**		**A**	**B**	**A**		**A**	**A**	**A**		
Multilane				**A**	**D**	**A**	**A**	**A**	**B**	**A**	**A**	**A**	**C**	**B**
CGT (Multilane)							**B**							

Table 14: Intersection LOS – 2040 PM Peak Hour

Intersection Type	I-229 SB RTI	I-229 NB RTI / Cleveland Ave	Bahnson Ave	Future Benson Rd Connection	Veterans Pkwy	Mid-Segment Intersection	Six Mile Rd	Future Lancer Ave	Heritage Rd	Sandstone Ave	Mid-Segment Intersection (1)	Mid-Segment Intersection (2)	Sioux Blvd	SD11 / Splitrock Blvd
No Build	*A*	*F*	*C*	*E*	*D*		*A*	*F*	*C*	*A*			*B*	*B*
TWSC														
3-Lane				**A**		**A**	**A**	**F**		**A**	**F**	**B**		
Multilane				**B**		**A**	**A**	**E**		**A**	**E**	**A**		
CGT (Multilane)							**A**							
Roundabout														
Single-Lane						**C**	**C**	**D**	**F**	**C**	**C**	**C**		
Multilane						**A**	**A**	**A**	**B**	**A**	**A**	**A**		
Signal														
I-229 MICS: Alternative Rice 2A	**B**	**C**	**B**											
I-229 MICS: Alternative Rice 3C	**B**	**C**	**A**											
3-Lane				**B**		**A**	**A**	**B**		**A**	**A**	**A**		
Multilane				**B**	**D**	**A**	**A**	**A**	**C**	**A**	**A**	**A**	**B**	**B**
CGT (Multilane)							**B**							

Table 15: Intersection LOS – 2050 AM Peak Hour

Intersection Type	I-229 SB RTI	I-229 NB RTI / Cleveland Ave	Bahnson Ave	Future Benson Rd Connection	Veterans Pkwy	Mid-Segment Intersection	Six Mile Rd	Future Lancer Ave	Heritage Rd	Sandstone Ave	Mid-Segment Intersection (1)	Mid-Segment Intersection (2)	Sioux Blvd	SD11 / Splitrock Blvd
No Build	*C*	*F*	*C*	*F*	*F*		*E*	*F*	*C*	*A*			*C*	*C*
TWSC														
3-Lane				A		F	A	F		E	C	A		
Multilane				D		B	B	F		B	A	A		
CGT (Multilane)							A							
Roundabout														
Single-Lane						E	E	F	F	D	D	D		
Multilane						A	A	A	B	A	A	A		
Signal														
I-229 MICS: Alternative Rice 2A	A	C	B											
I-229 MICS: Alternative Rice 3C	C	C	B											
3-Lane				B		A	B	B		C	A	A		
Multilane				A	D	A	B	B	C	B	A	A	C	C
CGT (Multilane)							B							

Table 16: Intersection LOS – 2050 PM Peak Hour

Intersection Type	I-229 SB RTI	I-229 NB RTI / Cleveland Ave	Bahnson Ave	Future Benson Rd Connection	Veterans Pkwy	Mid-Segment Intersection	Six Mile Rd	Future Lancer Ave	Heritage Rd	Sandstone Ave	Mid-Segment Intersection (1)	Mid-Segment Intersection (2)	Sioux Blvd	SD11 / Splitrock Blvd
No Build	*C*	*F*	*F*	*F*	*E*		*E*	*F*	*D*	*A*			*B*	*C*
TWSC														
3-Lane				C		E	A	F		E	F	F		
Multilane				F		C	B	F		C	F	E		
CGT (Multilane)							B							
Roundabout														
Single-Lane						E	D	F	F	E	F	E		
Multilane						A	A	B	C	A	B	A		
Signal														
I-229 MICS: Alternative Rice 2A	B	C	C											
I-229 MICS: Alternative Rice 3C	B	C	B											
3-Lane				B		A	A	B		B	B	A		
Multilane				B	D	A	A	B	C	A	B	A	C	C
CGT (Multilane)							B							

Corridor Traffic Operations

Rice Street / Holly Boulevard corridor segments were analyzed in terms of travel time and LOS. Travel time reflects the running time to traverse the respective segments plus arterial intersection delay. LOS is based on travel speeds.

Analysis results for the following 2050 Planning Horizon corridor scenarios are summarized in **Table 17** through **Table 24:**

Rice Street (I-229 to Six Mile Road)

- **'Signalized Corridor'** where traffic signals are incorporated at I-229 SB RTI, I-229 NB RTI / Cleveland Avenue, Bahnson Avenue, future Benson Road connection, Veterans Parkway, Six Mile Road, and mid-segment intersections
- Rice Street multilane section for both scenarios with sub-scenarios for alternatives Rice 2A and Rice 3C

Holly Boulevard (Six Mile Road to Sioux Boulevard)

- **'Signalized Corridor'** where traffic signals are incorporated at Six Mile Road, Future Lancer Avenue, Heritage Road, Sioux Boulevard, and mid-segment intersections
- **'Roundabout and Signalized Corridor'** where multilane roundabouts are incorporated at Six Mile Road, Future Lancer Avenue, Heritage Road, and mid-segment intersections. Sioux Boulevard is signalized.
- Holly Boulevard multilane section for both scenarios

Both scenarios analyzed a multilane Rice Street / Holly Boulevard corridor between I-229 and SD11. The travel time measure for a given segment reflects running time plus arterial delay of the downstream intersection. The differences between the two scenarios for segment and overall corridor travel times are directly related to differences in intersection delay of the roundabout and signalized intersections.

Key corridor segment traffic operations analysis findings include:

- The 'Signalized Corridor' scenario with alternative Rice 2A lane configurations provides a travel time savings of between 1 to 3 percent along Rice Street (I-229 to Six Mile Road).

- The segment directly west of Veterans Parkway does not meet study operational goals with an LOS E in the westbound direction in the AM peak hour.

- The 'Signalized Corridor' scenarios provide a travel time savings of between 4 to 13 percent along Holly Boulevard (Six Mile Road to Sioux Boulevard) compared to the 'Roundabout and Signalized Corridor'.

Table 17: Rice Street (I-229 to Six Mile Road) Travel Time and LOS – AM Eastbound (2050 Build)

Segment Measures	I-229 SB RTI	*Segment A*	I-229 NB RTI / Cleveland Ave	*Segment B*	Bahnson Ave	*Segment C*	Future Benson Rd Connection	*Segment D*	Mid-Segment Intersection	*Segment E*	Veterans Pkwy	*Segment F*	Mid-Segment Intersection	*Segment G*	Six Mile Rd	*Facility: I-229 to Six Mile Road*
Multilane Corridor (Rice 2A)																
Signalized Corridor																
Intersection Type	S		S		S		S		S		S		S		S	
Travel Time (sec)		42		44		170		41		86		45		43		**7 min, 51 sec**
Average Speed (mph)		16.7		34.6		38.8		35.2		18.2		33.9		30.6		
HCM6 LOS		D		A		A		A		D		A		B		
Multilane Corridor (Rice 3C)																
Signalized Corridor																
Intersection Type	S		S		S		S		S		S		S		S	
Travel Time (sec)		57		43		170		41		86		45		43		**8 min, 5 sec**
Average Speed (mph)		17.6		35.0		38.8		35.2		18.1		33.9		30.6		
HCM6 LOS		D		A		A		A		D		A		B		

S: signalized intersection

Table 18: Rice Street (I-229 to Six Mile Road) Travel Time and LOS – AM Westbound (2050 Build)

Segment Measures	I-229 SB RTI	*Segment A*	I-229 NB RTI / Cleveland Ave	*Segment B*	Bahnson Ave	*Segment C*	Future Benson Rd Connection	*Segment D*	Mid-Segment Intersection	*Segment E*	Veterans Pkwy	*Segment F*	Mid-Segment Intersection	*Segment G*	Six Mile Rd	*Facility: I-229 to Six Mile Road*
Multilane Corridor (Rice 2A)																
Signalized Corridor																
Intersection Type	S		S		S		S		S		S		S		S	
Travel Time (sec)		33		67		174		43		45		104		39		**8 min, 25 sec**
Average Speed (mph)		21.3		22.8		37.9		33.2		34.3		14.5		34.3		
HCM6 LOS		C		C		A		A		A		E		A		
Multilane Corridor (Rice 3C)																
Signalized Corridor																
Intersection Type	S		S		S		S		S		S		S		S	
Travel Time (sec)		42		66		174		43		45		104		39		**8 min, 33 sec**
Average Speed (mph)		24.1		23.1		37.9		33.2		34.3		14.5		34.3		
HCM6 LOS		B		B		A		A		A		E		A		

S: signalized intersection

Table 19: Rice Street (I-229 to Six Mile Road) Travel Time and LOS – PM Eastbound (2050 Build)

Segment Measures	I-229 SB RTI	*Segment A*	I-229 NB RTI / Cleveland Ave	*Segment B*	Bahnson Ave	*Segment C*	Future Benson Rd Connection	*Segment D*	Mid-Segment Intersection	*Segment E*	Veterans Pkwy	*Segment F*	Mid-Segment Intersection	*Segment G*	Six Mile Rd	*Facility: I-229 to Six Mile Road*
Multilane Corridor (Rice 2A)																
Signalized Corridor																
Intersection Type	S		S		S		S		S		S		S		S	
Travel Time (sec)		44		44		175		43		93		45		41		**8 min, 5 sec**
Average Speed (mph)		16.0		34.7		37.7		33.1		16.7		33.4		32.3		
HCM6 LOS		D		A		A		A		D		A		A		
Multilane Corridor (Rice 3C)																
Signalized Corridor																
Intersection Type	S		S		S		S		S		S		S		S	
Travel Time (sec)		51		44		175		43		93		45		41		**8 min, 12 sec**
Average Speed (mph)		19.8		34.8		37.7		33.1		16.6		33.4		32.3		
HCM6 LOS		D		A		A		A		D		A		A		

S: signalized intersection

Table 20: Rice Street (I-229 to Six Mile Road) Travel Time and LOS – PM Westbound (2050 Build)

Segment Measures	I-229 SB RTI	*Segment A*	I-229 NB RTI / Cleveland Ave	*Segment B*	Bahnson Ave	*Segment C*	Future Benson Rd Connection	*Segment D*	Mid-Segment Intersection	*Segment E*	Veterans Pkwy	*Segment F*	Mid-Segment Intersection	*Segment G*	Six Mile Rd	*Facility: I-229 to Six Mile Road*
Multilane Corridor (Rice 2A)																
Signalized Corridor																
Intersection Type	S		S		S		S		S		S		S		S	
Travel Time (sec)		33		66		176		47		46		93		39		**8 min, 20 sec**
Average Speed (mph)		20.9		23.0		37.5		30.5		33.3		16.4		33.7		
HCM6 LOS		C		C		A		B		A		D		A		
Multilane Corridor (Rice 3C)																
Signalized Corridor																
Intersection Type	S		S		S		S		S		S		S		S	
Travel Time (sec)		44		67		175		47		46		92		39		**8 min, 30 sec**
Average Speed (mph)		23.0		22.6		37.7		30.5		33.3		16.4		33.7		
HCM6 LOS		C		C		A		B		A		D		A		

S: signalized intersection

Table 21: Holly Boulevard (Six Mile Road to Sioux Boulevard) Travel Time and LOS – AM Eastbound (2050 Build)

Segment Measures	Six Mile Rd	Segment H	Future Lancer Ave	Segment I	Heritage Rd	Segment J	Sandstone Ave	Segment K	Mid-Segment Intersection (1)	Segment L	Mid-Segment Intersection (2)	Segment M	Sioux Blvd	Facility: Six Mile Road to Sioux Boulevard
Multilane Corridor (Six Mile Road to Sioux Boulevard)														
Signalized Corridor														
Intersection Type	S		S		S		S		S		S		S	
Travel Time (sec)		45		47		33		31		33		99		**4 min, 47 sec**
Average Speed (mph)		32.3		27.0		26.3		28.1		29.8		23.3		
HCM6 LOS		A		C		C		B		B		B		
Roundabout & Signalized Corridor														
Intersection Type	R		R		R		R		R		R		S	
Travel Time (sec)		48		45		35		35		37		99		**4 min, 59 sec**
Average Speed (mph)		30.0		28.9		28.9		25.6		26.0		23.3		
HCM6 LOS		B		B		B		C		C		B		

S: signalized intersection; R: roundabout

Table 22: Holly Boulevard (Six Mile Road to Sioux Boulevard) Travel Time and LOS – AM Westbound (2050 Build)

Segment Measures	Six Mile Rd	Segment H	Future Lancer Ave	Segment I	Heritage Rd	Segment J	Sandstone Ave	Segment K	Mid-Segment Intersection (1)	Segment L	Mid-Segment Intersection (2)	Segment M	Sioux Blvd	Facility: Six Mile Road to Sioux Boulevard
Multilane Corridor (Six Mile Road to Sioux Boulevard)														
Signalized Corridor														
Intersection Type	S		S		S		S		S		S		S	
Travel Time (sec)		42		41		42		34		35		62		**4 min, 15 sec**
Average Speed (mph)		34.7		31.0		20.6		25.7		27.7		37.6		
HCM6 LOS		A		B		C		C		B		A		
Roundabout & Signalized Corridor														
Intersection Type	R		R		R		R		R		R		S	
Travel Time (sec)		53		53		37		37		39		72		**4 min, 52 sec**
Average Speed (mph)		26.8		24.5		22.8		23.7		24.6		31.8		
HCM6 LOS		C		C		C		C		C		B		

S: signalized intersection; R: roundabout

Table 23: Holly Boulevard (Six Mile Road to Sioux Boulevard) Travel Time and LOS – PM Eastbound (2050 Build)

Segment Measures	Six Mile Rd	*Segment H*	Future Lancer Ave	*Segment I*	Heritage Rd	*Segment J*	Sandstone Ave	*Segment K*	Mid-Segment Intersection (1)	*Segment L*	Mid-Segment Intersection (2)	*Segment M*	Sioux Blvd	*Facility: Six Mile Road to Sioux Boulevard*
Multilane Corridor (Six Mile Road to Sioux Boulevard)														
Signalized Corridor														
Intersection Type	S		S		S		S		S		S		S	
Travel Time (sec)		48		53		29		36		37		97		**5 min, 0 sec**
Average Speed (mph)		30.1		24.1		29.5		24.1		26.3		23.8		
HCM6 LOS		B		C		B		C		C		B		
Roundabout & Signalized Corridor														
Intersection Type	R		R		R		R		R		R		S	
Travel Time (sec)		51		50		46		38		41		108		**5 min, 34 sec**
Average Speed (mph)		28.0		25.8		18.7		23.5		23.2		23.8		
HCM6 LOS		B		C		D		C		C		B		

S: signalized intersection; R: roundabout

Table 24: Holly Boulevard (Six Mile Road to Sioux Boulevard) Travel Time and LOS – PM Westbound (2050 Build)

Segment Measures	Six Mile Rd	*Segment H*	Future Lancer Ave	*Segment I*	Heritage Rd	*Segment J*	Sandstone Ave	*Segment K*	Mid-Segment Intersection (1)	*Segment L*	Mid-Segment Intersection (2)	*Segment M*	Sioux Blvd	*Facility: Six Mile Road to Sioux Boulevard*
Multilane Corridor (Six Mile Road to Sioux Boulevard)														
Signalized Corridor														
Intersection Type	S		S		S		S		S		S		S	
Travel Time (sec)		39		43		48		34		38		64		**4 min, 25 sec**
Average Speed (mph)		36.6		29.6		17.9		25.8		25.9		36.1		
HCM6 LOS		A		B		D		C		C		A		
Roundabout & Signalized Corridor														
Intersection Type	R		R		R		R		R		R		S	
Travel Time (sec)		51		48		36		37		38		72		**4 min, 42 sec**
Average Speed (mph)		28.3		26.9		23.6		23.7		25.2		32.0		
HCM6 LOS		B		C		C		C		C		B		

S: signalized intersection; R: roundabout

Bicycle and Pedestrian Operations

Existing bicycle and pedestrian elements (i.e. on-street bike lanes) along portions of the study corridor, were analyzed under existing configurations with 2023 existing condition and 2050 Build condition volumes to indicate the anticipated operational performance of the existing facility and to highlight the benefits of the proposed shared-use paths and sidewalks. Bicycle LOS (the main performance measure for on-street bicycle facilities) was analyzed separately in HCS, where multimodal corridor facility LOS analysis is supported by methodology and software.

The bicycle LOS is a score based on traveler perception and affected by the following variables:

- Average effective width of the outside through lane
- Motorized vehicle volumes
- Motorized vehicle speeds
- Heavy vehicle volumes
- Pavement condition

Multimodal corridor facility assumptions include:

- On-street bicycle facilities (bike lanes) in both directions with shoulders utilized in a similar fashion in some locations
- 45 mph posted speed limit on adjacent roadway
- Fair pavement condition on adjacent roadway

The bicycle LOS scores for the 2023 existing condition and 2050 Build condition analysis are summarized in **Table 25**. Two illustrative two-lane highway segments were reviewed, one east of Bahnson Avenue and one east of Veterans Parkway.

Table 25: Illustrative Corridor Segment Bicycle LOS Scores

Corridor Segment	Bicycle LOS							
	2023 Existing Conditions				2050 Build Conditions			
	EB		WB		EB		WB	
	AM	PM	AM	PM	AM	PM	AM	PM
½-mile east of Bahnson Avenue	F	F	F	F	F	F	F	F
½ mile east of Veterans Parkway	C	D	D	D	D	D	D	D

Based on this analysis, the bicycle LOS for existing on-street bicycle facilities ranged from LOS C to LOS F, depending upon segment location characteristics. Segment bicycle LOS scores with suboptimal performance are affected by higher truck volumes, greater access density, and narrow shoulders (indicated in the LOS results for the Bahnson Avenue segment). The Veterans Parkway segment performs slightly better due to fewer truck volumes, decreased access density, and wider shoulders. Elements that improve bicycle LOS scores, including separated facilities such as shared use paths and bike trails, have been incorporated into proposed concepts.

Intersection and Corridor Segment Safety Benefits

Planning-level crash modification factors (CMF)s were identified for a variety of intersection improvements using countermeasures from the *Highway Safety Manual* and *Crash Modification Factors Clearinghouse*. **Table 26** provides examples of expected crash reduction in terms of injury crashes and total crashes when converting one intersection type to a different intersection type. Presented CMFs are for illustrative purposes to provide an understanding of potential safety benefits associated with each overarching intersection type analyzed in this study. It should be noted that CMF values vary based on crash type, injury severity, roadway/area type, and research study.

Table 26: Potential Crash Reduction Comparison – Intersection Improvements

Treatment	CMF	Crash Reduction	Source
Conversion of a stop-control intersection to a…			
All-Way Stop-Control Intersection	0.30 (Injury) 0.32 (Total)	70% reduction (Injury) 68% decrease (Total)	HSM/CMF 314 CMF 3127
Signalized Intersection	0.64 (Injury) 0.95 (Total)	36% reduction (Injury) 5% decrease (Total)	CMF 319 HSM/CMF 322
Single-Lane Roundabout	0.22 (Injury) 0.22 (Total)	78% reduction (Injury) 78% decrease (Total)	HSM HSM
Multilane Roundabout	0.32 (Injury) 0.81 (Total)	68% reduction (Injury) 19% decrease (Total)	HSM HSM
Conversion of a signalized intersection to a…			
Continuous Green T (CGT) Intersection	0.85 (Injury) 0.96 (Total)	15% reduction (Injury) 4% decrease (Total)	CMF 8656 CMF 8655
Single-Lane Roundabout	0.45 (Injury) 0.74 (Total)	55% reduction (Injury) 26% decrease (Total)	HSM HSM
Multilane Roundabout	0.29 (Injury) 0.81 (Total)	71% reduction (Injury) 19% decrease (Total)	HSM HSM

Crash Modification Clearinghouse ID obtained from website https://www.cmfclearinghouse.org/

Roundabout safety benefits are demonstrated by extensive research across the United States. For example, the HSM shows an expected 55 percent reduction in injury crashes when a signalized intersection is converted to a single-lane roundabout. The expected reduction is 78 percent when a stop-control intersection is converted to a single-lane roundabout.

It should be noted that there is an expected crash reduction when unwarranted traffic signals are removed (0.76 CMF or 24 percent reduction of total crashes). This illustrates the importance of not installing traffic signals when MUTCD traffic signal warrants are not met.

Other elements incorporated into the alternatives with safety benefits (supported by CMFs) include:

- Roadway lighting
- Left and right turn lanes
- Access closures, consolidation, relocation, and/or restriction of turn/crossing movements
- Raised medians within major intersection functional areas
- Shared use paths (to separate pedestrians/bicyclists from vehicular traffic)

SCHOOL SUB-AREA ANALYSIS

*See the School Sub-Area conceptual layouts in **Appendix M** and the School Sub-Area Traffic Operations Analysis Memo in **Appendix N** for additional information.*

The Rice Street / Holly Boulevard corridor is in the northeastern Sioux Falls metropolitan area and serves as primary connection between the City of Brandon and City of Sioux Falls. The school sub-area portion of the corridor focuses on Holly Boulevard between Sioux Boulevard and SD11 / Splitrock Boulevard within the City of Brandon. This corridor sub-area encompasses the central area of the city, and, in addition to commuters, sees notable daily traffic due to adjacent commercial and institutional land uses along this segment (e.g. Brandon Lutheran Church and Brandon Valley School District facilities).

The school sub-area segment of the Rice Street / Holly Boulevard study corridor exhibits the following typical cross-section features and functional classification:

- Cross-section (Sioux Boulevard to SD11 / Splitrock Boulevard):
  - 2-lane (w/ left turn lane) urban cross-section
  - Sidewalk on both sides of the corridor
- Functional classification:
  - Urban Minor Arterial: Lowell Avenue to SD11 / Splitrock Boulevard

Traffic Volumes

Existing condition traffic volumes for the study school sub-area intersections reflect seasonally adjusted 24-hour daily and 13-hour peak hour traffic counts collected on September 12, 2023 (intersection counts) and September 12-15, 2023 (Holly Boulevard segment counts). Intersections included from the overall corridor traffic analysis were Holly Boulevard & Sioux Boulevard and Holly Boulevard & SD11 / Splitrock Boulevard. In addition to the typically analyzed AM and PM peak hours, a school dismissal peak hour was also analyzed. Overall corridor peak hours were well-defined within the new traffic counts and generally reflect:

- AM: 7:15 a.m. – 8:15 a.m.
- School Dismissal: 3:00 p.m. – 4:00 p.m.
- PM: 4:45 p.m. – 5:45 p.m.

Specific peak hours of individual intersections or corridor segments may vary by 15 minutes before or after the generalized study area peak hour. For the purposes of this study sub-area analysis, peak hour volumes specific to each intersection were used in the development of the existing volume data set (shown in **Figure 5**). Future-year traffic volumes were smoothed and balanced across study intersections. School dismissal peak hour volumes were not analyzed at the Holly Boulevard & Sioux Boulevard and Holly Boulevard & SD11 / Splitrock Boulevard intersections. It should be noted that daily traffic volumes may fluctuate upwards of 10 to 20 percent higher than the typical daily traffic volumes due to school-related events.

The existing conditions traffic volumes reflect seasonally adjusted 24-hour daily and 13-hour peak hour traffic counts collected on May 9-18, 2023 (intersection counts) and May 30-June 13, 2023 (Rice Street / Holly Boulevard segment counts).

Traffic forecasts were developed using the Sioux Falls MPO TDM reflective of a 2021 base year and 2050 planning horizon. Potential mid-segment intersections were added to the network along the main study corridor in future conditions to account for future development along the corridor, to load traffic onto the Rice Street/Holly Boulevard corridor between major intersections, and aid in balancing peak hour volumes across the study corridor.

For the study school sub-area, the 2050 planning horizon traffic volumes include two forecasting scenarios, one scenario that reflects no modifications to existing access locations (analyzed under the 2050 No Build and 2050 Build conditions scenarios) and a second scenario that reflects potential school access modifications along this segment (analyzed under the 2050 Build condition scenario only). These potential modifications include closing the north leg of the Holly Boulevard & 6th Avenue / School Access (Main) intersection and shifting traffic to the 7th Avenue / Maple Avenue intersection.

Existing and No Build Condition Scenarios

Operational analysis results of the Existing and No Build condition scenarios are provided in **Table 27** and **Table 29**.

Table 27: School Sub-Area Intersection LOS – No Build Condition AM Peak Hour

Analysis Year	Sioux Blvd	4th Ave / Church Access	5th Ave / School Access (Bus)	6th Ave / School Access (Main)	7th Ave / Maple Ave	High School Access	SD11 / Splitrock Blvd
Intersection Control	*Signal*	*TWSC*	*TWSC*	*Signal*	*TWSC*	*TWSC*	*Signal*
Existing (2023)	B	A	A	B	A	A	B
2050 No Build	C	A	A	B	A	A	C

TWSC: two-way stop-control; AWSC: all-way stop-control

Table 28: School Sub-Area Intersection LOS – No Build Condition School Dismissal Peak Hour

Analysis Year	Sioux Blvd	4th Ave / Church Access	5th Ave / School Access (Bus)	6th Ave / School Access (Main)	7th Ave / Maple Ave	High School Access	SD11 / Splitrock Blvd
Intersection Control	*Signal*	*TWSC*	*TWSC*	*Signal*	*TWSC*	*TWSC*	*Signal*
Existing (2023)	-	A	A	B	A	A	B
2050 No Build	-	A	A	B	A	A	-

TWSC: two-way stop-control; AWSC: all-way stop-control

Table 29: School Sub-Area Intersection LOS – No Build Condition PM Peak Hour

Analysis Year	Sioux Blvd	4th Ave / Church Access	5th Ave / School Access (Bus)	6th Ave / School Access (Main)	7th Ave / Maple Ave	High School Access	SD11 / Splitrock Blvd
Intersection Control	*Signal*	*TWSC*	*TWSC*	*Signal*	*TWSC*	*TWSC*	*Signal*
Existing (2023)	B	A	A	A	A	A	B
2050 No Build	B	A	A	B	A	A	C

TWSC: two-way stop-control; AWSC: all-way stop-control

School Sub-Area Alternatives

Intersection alternatives analyzed for the study school sub-area of the Holly Boulevard corridor include:

- Two-way stop-control (TWSC)
- Traffic signal
- Roundabout (single-lane)

Applicable generalized cross-sections include:

- 3-Lane section: single-lane in each direction (existing configuration)
    - Continuous left turn lane, or exclusive left turn lanes at major intersections
    - Right turn lanes at major intersections

- Multilane section:
  - 4-Lane divided section with left turn lanes at major intersections, or
  - 4-Lane divided/5-Lane hybrid section, or
  - 5-Lane section with continuous left turn lane

In addition, two school access scenarios were reviewed for both Holly Boulevard & 6th Avenue / School Access (Main) and Holly Boulevard & 7th Avenue / Maple Avenue. One scenario analyzes these intersections under existing access configurations, while the other scenario analyzes these intersections with potential access modifications. Potential modifications include closing the school access at 6th Avenue and shifting the primary school access and related traffic to 7th Avenue / Maple Avenue.

Future-year posted speed assumptions for the study school sub-area along Holly Boulevard were 30 mph (between Sioux Boulevard and SD11 / Splitrock Boulevard). This speed is typical for area urban arterial streets and allows for permitted left turn movements in the analysis.

Table 30: School Sub-Area Access Alternative Matrix

School Sub-Area Access Option	Alternative	Intersection / Corridor Types	Holly Boulevard Corridor Typical Section	
			3-Lane	Multilane
Holly Boulevard Corridor: 4-Lane Divided	Sioux-Splitrock 4-Lane Divided (A)	4-Lane Divided (highest level of access management)		X
Holly Boulevard Corridor: 4-Lane Divided/5-Lane Hybrid	Sioux-Splitrock 4-Lane Divided (B)	4-Lane Divided / 5-Lane Hybrid		X
Holly Boulevard Corridor: 5-Lane	Sioux-Splitrock 5-Lane	5-Lane (lowest level of access management)		X
Maple Ave connection	School – 1	Traffic Signal (7th Ave / Maple Ave) TWSC (others)	X	X
Maple Ave (with mini roundabout option)	School – 2	Traffic Signal (7th Ave / Maple Ave) TWSC (others)	X	X
Maple Ave connection	School – 3	Traffic Signal (7th Ave / Maple Ave) TWSC (others)	X	X
Maple Ave connection	School – 4	Traffic Signal (7th Ave / Maple Ave) TWSC (others)	X	X
High School Access (single-lane roundabout)	School – 5	Traffic Signal (7th Ave / Maple Ave) Roundabout (High School Access) TWSC (others)	X	
7th Ave / Maple Ave and High School Access (single-lane roundabouts)	School – 6	Roundabout (7th Ave / Maple Ave; High School Access) TWSC (others)	X	

Build Condition Scenarios

A summary of Build condition analysis results for the various intersection alternatives, organized by peak hour, is provided in **Table 31** through **Table 33**.

Key school sub-area intersection traffic operations analysis findings include:

- All school sub-area study intersections meet study LOS goals under existing conditions in the 2023 Existing Conditions and 2050 No Build Condition scenarios. With the exception of the intersections of Holly Boulevard & Sioux Boulevard and Holly Boulevard & SD11 / Splitrock Boulevard, all intersections meet or exceed LOS B.

- All proposed school sub-area study intersection configurations meet study LOS goal under 2050 Build conditions. With the exception of the intersections of Holly Boulevard & Sioux Boulevard and Holly Boulevard & SD11 / Splitrock Boulevard, all intersections meet or exceed LOS B.

- The potential access modification and re-directed school traffic at the intersections of Holly Boulevard & 6th Avenue and Holly Boulevard & 7th Avenue meet or exceed LOS B for each proposed configuration (TWSC at 6th Avenue; traffic signal or single-lane roundabout at 7th Avenue / Maple Avenue).

- While both combinations of a traffic signal and a single-lane roundabout or dual single-lane roundabouts at the revised 7th Avenue / Maple Avenue and High School access intersections meet or exceed LOS B through 2050, the dual roundabout intersection configuration is anticipated to better meter traffic and manage queues.

Table 31: School Sub-Area Analysis Intersection LOS – 2050 AM Peak Hour

Intersection Type	Sioux Blvd	4th Ave / Church Access	5th Ave / School Access (Bus)	6th Ave / School Access (Main)	6th Ave *(School Access Closed)*	7th Ave / Maple Ave	7th Ave / Maple Ave *(New Primary School Access)*	High School Access	SD11 / Splitrock Blvd
No Build	*C*	*A*	*A*	*B*		*A*		*A*	*C*
TWSC									
3-Lane		**A**	**A**		**A**	**A**			
4-Lane Undivided		**A**	**A**		**A**	**A**		**A**	
4-Lane Divided / 5-Lane		**A**	**A**		**A**	**A**		**A**	
Roundabout									
Single-Lane							**A**	**A**	
Signal									
3-Lane				**B**			**B**		
4-Lane Undivided	**C**			**B**			**B**		**C**
4-Lane Divided / 5-Lane				**B**			**B**		

Table 32: School Sub-Area Analysis Intersection LOS – 2050 School Dismissal Peak Hour

Intersection Type	Sioux Blvd	4^{th} Avenue / Church Access	5^{th} Avenue / School Access (Bus)	6^{th} Avenue / School Access (Main)	6^{th} Avenue *(School Access Closed)*	7^{th} Avenue / Maple Avenue	7^{th} Avenue / Maple Avenue *(New Primary School Access)*	High School Access	SD11 / Splitrock Blvd
No Build		*A*	*A*	*B*		*A*		*A*	
TWSC									
3-Lane		**A**	**A**		**A**	**A**			
4-Lane Undivided		**A**	**A**		**A**	**A**		**A**	
4-Lane Divided / 5-Lane		**A**	**A**		**A**	**A**		**A**	
Roundabout									
Single-Lane							**A**	**A**	
Signal									
3-Lane				**A**			**B**		
4-Lane Undivided				**A**			**A**		
4-Lane Divided / 5-Lane				**A**			**B**		

Table 33: School Sub-Area Analysis Intersection LOS – 2050 PM Peak Hour

Intersection Type	Sioux Blvd	4^{th} Avenue / Church Access	5^{th} Avenue / School Access (Bus)	6^{th} Avenue / School Access (Main)	6^{th} Avenue *(School Access Closed)*	7^{th} Avenue / Maple Avenue	7^{th} Avenue / Maple Avenue *(New Primary School Access)*	High School Access	SD11 / Splitrock Blvd
No Build	*B*	*A*	*A*	*B*		*A*		*A*	*C*
TWSC									
3-Lane		**A**	**A**		**A**	**A**			
4-Lane Undivided		**A**	**A**		**A**	**A**		**A**	
4-Lane Divided / 5-Lane		**A**	**A**		**A**	**A**		**A**	
Roundabout									
Single-Lane							**B**	**A**	
Signal									
3-Lane				**A**			**B**		
4-Lane Undivided	**C**			**A**			**A**		**C**
4-Lane Divided / 5-Lane				**A**			**A**		

Multimodal Considerations

For all proposed Holly Boulevard corridor Build condition typical sections, 10 ft. shared-use paths were included on both sides of the roadway. As detailed earlier, several Build condition scenarios include a potential access and traffic control reconfiguration at the 6th Avenue and 7th Avenue / Maple Avenue intersections. These scenarios include closing the north leg school access (main) at the Holly Boulevard & 6th Avenue intersection and re-directing school-related traffic to an access north of the Holly Boulevard & 7th Avenue / Maple Avenue intersection.

In association with these related potential changes, alternative traffic control was reviewed for the 7th Avenue / Maple Avenue, including under traffic signal and roundabout control. If the proposed single-lane roundabout option is considered at the 7th Avenue / Maple Avenue intersection, representatives from the Brandon Valley School District suggested during study stakeholder meetings that warrants for a pedestrian hybrid beacon or High Intensity Activated Crosswalk (HAWK) should be reviewed west of 7th Avenue to cross Holly Boulevard. This type of beacon is used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street at a marked crosswalk. In response to that suggestion, guidance for a potential pedestrian HAWK beacon installation were reviewed in accordance with the *11th Edition of the Manual on Uniform Traffic Control Devices (MUTCD)*.

Key findings include:

- Warrants for the installation of a pedestrian hybrid beacon or high intensity crosswalk (HAWK) were reviewed per suggestions provided during stakeholder meetings with representatives from the Brandon Valley School District.
    - This review considered only the proposed scenario where the Holly Boulevard & 7th Avenue / Maple Avenue intersection was reconstructed as a single-lane roundabout (which only applies to the 3-lane corridor scenario) with the 6th Avenue signal removal and access modifications were incorporated. Under this scenario, the signal removal would create a potential need for a signalized crossing for students crossing Holly Boulevard (west of 7th Avenue / Maple Avenue).
    - Based on MUTCD warrants which review potential applications by major street speed, major street vehicular volumes, and pedestrian volumes crossing the major street, a pedestrian hybrid beacon or HAWK meets warranted criterion in the 3-lane corridor and single-lane roundabout at 7th Avenue / Maple Avenue scenario.

CONCEPTUAL COSTS

Planning-level intersection and corridor segment alternative Construction + ROW cost estimates are summarized in the following tables. For consistency across intersection types, each planning-level intersection cost accounts for reconstructing the intersection physical area plus 800 feet east and west of the intersection on Rice Street / Holly Boulevard and 550 feet north and south of the intersection on the crossroad arterial. Rice Street / Holly Boulevard corridor segment costs are based on the segment length between the major intersection areas. Conceptual costs do not include preliminary and construction engineering costs and would be in addition to what is presented. A cost breakdown by generalized work item is provided in **Appendix O**.

Table 34: Rice Street / Holly Boulevard Intersection Conceptual Costs

Intersection Type	**Rice Street / Holly Boulevard Corridor Section**	**Crossroad Number of Lanes** (North/South)	**Construction + ROW Costs** ($M, 2024)
Single-Lane Roundabout	3-Lane	3-Lane	$4.4
Multilane Roundabout	Multilane	3-Lane	$6.1 - $6.7
Traffic Signal / Continuous Green T	Multilane	3-Lane	$6.7

Intersection limits reflect construction of intersection physical area (~100 feet) plus 800 feet east and west on Rice Street / Holly Boulevard and 550 feet north and south on crossroad major intersections

Table 35: Rice Street / Holly Boulevard Corridor Segment Conceptual Costs

Rice Street / Holly Boulevard Corridor Section	**Corridor Segment Length** (miles)	**Construction + ROW Costs** ($M, 2024)
I-229 Exit 7 (Rice Street) Interchange Reconstruction (including I-229 RTIs and Bahnson Avenue intersection)	~ 1 mile	$45 - $55
Rice Street: 4-Lane Divided (East of Bahnson Avenue to Veterans Parkway)	~ 2.5 miles	$35 - $45
Rice Street: 4-Lane Divided (Veterans Parkway to Six Mile Road)	~1 mile	$10 - $15
Holly Boulevard Reconstruction (East of Six Mile Road to West of Sioux Boulevard)	~ 2 miles	$30 - $35

Corridor segment limits reflect construction from 800 feet east and 800 feet west of crossroad major intersections

Table 36: Rice Street / Holly Boulevard Additional Alternatives Conceptual Costs

Rice Street / Holly Boulevard Additional Alternative	Construction + ROW Costs ($M, 2024)
Bahnson Avenue Extension	$2.6
Sycamore Avenue Extension	$4
Benson Road Extension	$78 - $115
Ellis & Eastern Grade Separation (East of Bahnson Avenue)	$18 - $22
BNSF Grade Separation (near Great Bear)	$45 - $55
Ellis & Eastern Grade Separation (West of Veterans Parkway)	$4 - $8
Holly Boulevard Multilane Corridor (East of Sioux Boulevard to West of Splitrock Boulevard, ~ 1 mile)	$16

RAILROAD GRADE SEPARATION

*A related Benson Road Extension and Rice Street Railroad Grade Separation Summary Memo are provided in **Appendix P** and conceptual corridor segment layouts illustrating potential railroad grade separation along Rice Street between Bahnson Avenue and Veterans Parkway are provided in **Appendix Q**.*

Route reliability is a key consideration along the Rice Street / Holly Boulevard corridor due to the three at-grade rail crossings between I-229 and Veterans Parkway. While the rail is connected through this area, each of the three crossings often exhibit independent operation due to rail yard switching and multiple operators (e.g. a train passing through the area would likely only cross Rice Street once, while all three crossings could be blocked at the same time by three different trains) and thus impact travel reliability as a major 'through' corridor for commuter traffic between Brandon and Sioux Falls.

Based on this consideration and the railroad grade separation warrants review, several concepts to provide railroad grade separation at three BNSF Railway and Ellis and Eastern Railroad at-grade crossings along Rice Street between Bahnson Avenue and Veterans Parkway were developed, applicable with an Urban / Hybrid 4-Lane Divided or 5-Lane typical section. Alternatives include grade separation of the respective rail crossing from tie-in point to tie-in point with existing grade. Several alternatives for each location include either a bridge or high-profile arch tunnel options along with lengths of retaining wall to assist in achieving grade separation.

While grade separation at individual crossings is useful, the full benefits of grade separation, particularly from a route reliability standpoint, will not be realized unless all three crossings are grade separated. Several challenges exist to grade separation at all three railroad crossings, including the structural costs, environmental and ROW constraints, and the accommodation of notable grade changes to proposed tie-in points, particularly for the Ellis and Eastern Railroad Crossing (West) and the BNSF Railway crossing (near Great Bear Ski Valley).

Ellis & Eastern Railroad Crossing (West) [east of Bahnson Avenue]:

- <u>Single Span Bridge alternative</u>: includes a single span roadway bridge spanning 220 feet with a 70-foot width and retaining walls that extend 535 feet to the west and 930 feet to the east (shown in **Figure 26**)
- <u>Long Span Structural Plate High Profile Arch alternative</u>: includes a high-profile arch railroad tunnel with a 255-foot length and retaining walls that extend 555 feet to the west and 930 feet to the east (shown in **Figure 27**)

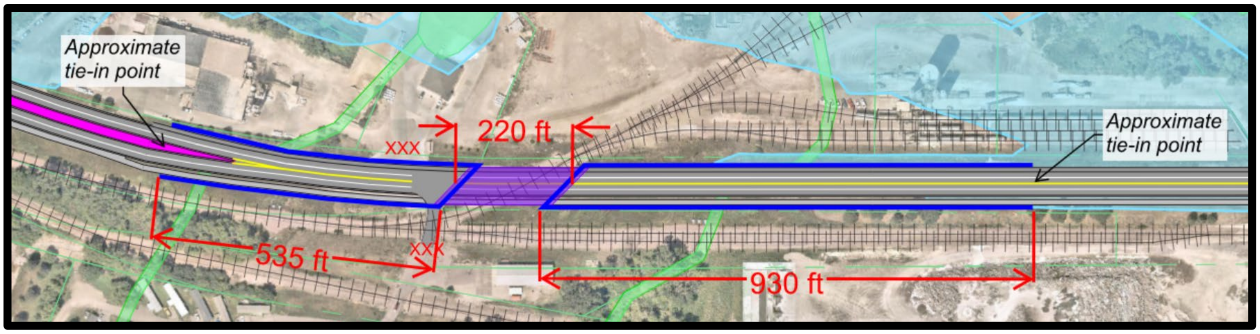


Figure 26: Ellis & Eastern Railroad Crossing (West) [east of Bahnson Avenue] – Single Span Bridge Railroad Grade Separation Alternative

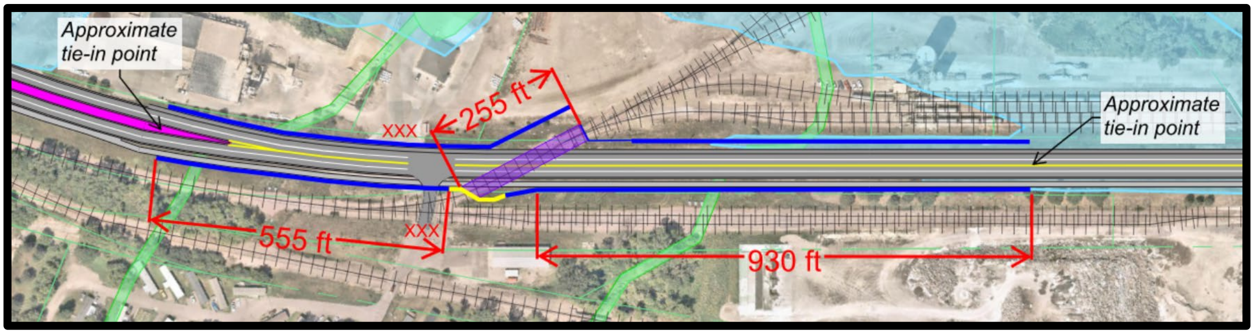


Figure 27: Ellis & Eastern Railroad Crossing (West) [east of Bahnson Avenue] – Long Span Structural Plate High Profile Arch Railroad Grade Separation Alternative

BNSF Crossing (near Great Bear Ski Valley):

- Single Span Bridge alternative: includes a single span railroad bridge spanning 785 feet with a 60-foot width and retaining walls that extend 590 feet to the west and 1,005 feet to the east (shown in **Figure 28**)
- Five Span Bridge alternative: includes five span roadway bridge spanning 900 feet and retaining walls that extend 720 feet to the east and west (shown in **Figure 29**)

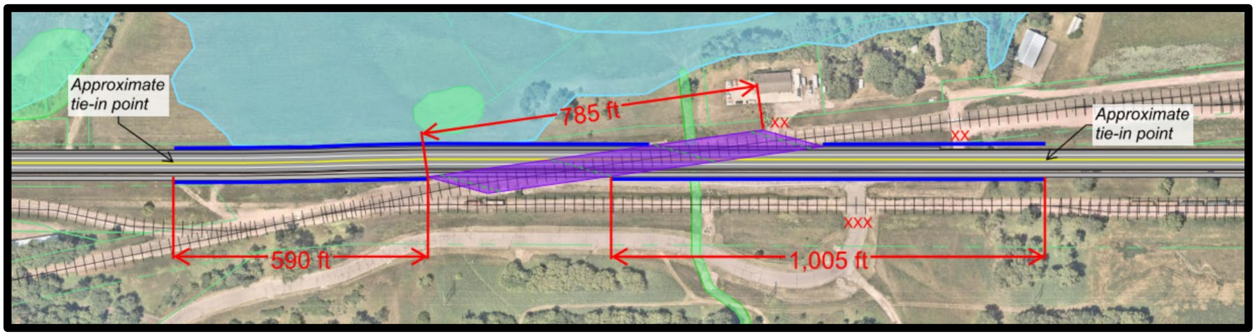


Figure 28: BNSF Railway Crossing (near Great Bear Ski Valley) – Single Span Bridge Railroad Grade Separation Alternative

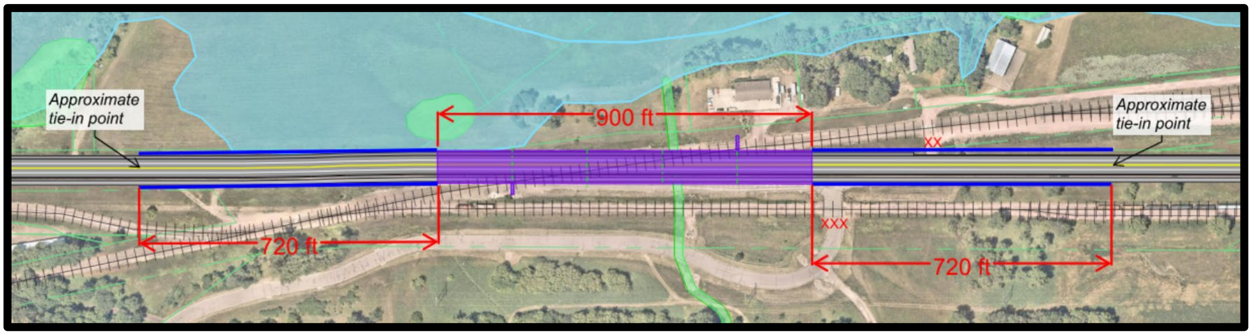


Figure 29: BNSF Railway Crossing (near Great Bear Ski Valley) – Five Span Bridge Railroad Grade Separation Alternative

Ellis & Eastern Railroad Crossing (west of Veterans Parkway):

- Long Span Structural Plate High Profile Arch alternative: includes a high-profile arch railroad tunnel with a 220 foot length and retaining walls that extend 110 feet in perpendicular directions from the tunnel entrances (shown in **Figure 30**)

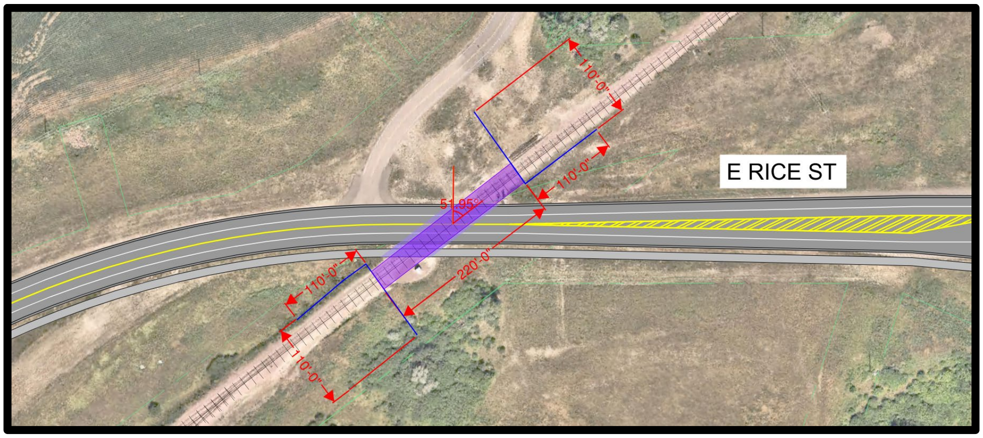


Figure 30: Ellis & Eastern Railroad Crossing (East) [west of Veterans Parkway] – Long Span Structural Plate High Profile Arch Railroad Grade Separation Alternative

BENSON ROAD EXTENSION

*A related Benson Road Extension and Rice Street Railroad Grade Separation Summary Memo are provided in **Appendix P** and conceptual corridor segment layouts and profiles illustrating a potential Benson Road extension between Sycamore Avenue and Veterans Parkway or Rice Street are provided in **Appendix Q**.*

Two alternatives were developed for a potential extension of Benson Road between Sycamore Avenue and Veterans Parkway or Rice Street, applicable with an Urban / Hybrid 4-Lane Divided or 5-Lane typical section on Benson Road and Rice Street. The alternatives are distinguished by a north and south alignment option. The north alignment (shown in **Figure 31**) would make Benson Road the primary east/west route between Sycamore Avenue and Veterans Parkway with a bridge across the Big Sioux River spanning upwards of 1,400 feet and create a 'T' intersection with Rice Street west of Timberline Avenue. The south alignment (shown in **Figure 32**) would maintain Rice Street as the primary east/west route between Sycamore Avenue and Veterans Parkway with a bridge spanning almost 2,200 feet with a 'T' intersection tie-in point approximately 700 feet southwest of the TJN Industrial access.

Benefits to both Benson Road extension alternatives include the improved east/west route connectivity and reliability as well as the reduced need for railroad grade separation at all existing at-grade crossing along this section of the corridor. Each alternative provides the opportunity for traffic to divert to Benson Road thereby making the Ellis & Eastern crossing (west of Veterans Parkway) the main location for grade separation to ensure route reliability. In particular, the north alignment provides the greatest benefit, in terms of reduced need for grade separation, due to the roadway priority to Benson Road instead of Rice Street allowing commuters to avoid the more industrial and heavy vehicle traffic areas with the other at-grade railroad crossings.

While each Benson Road extension alternative provides notable benefits, there are several key constraints that makes these concepts less feasible. First, environmental requirements and commitments will be a notable consideration as part of any Benson Road extension project that spans the Big Sioux River. Second, construction of a Benson Road extension would likely prove expensive due to the bridge and retaining wall structures needed to cross the Big Sioux River, tie-in to Rice Street, and to minimize impacts to the adjacent railroad tracks. In addition, construction costs may increase significantly depending upon outcomes and commitments from the environmental screening process. Finally, related to the costs, the latest Sioux Falls MPO TDM projections indicate only moderate demand for a Benson Road connection to Rice Street. Continued development throughout the area, generating traffic that would find significant travel benefits a connection, will be needed to further substantiate the investment.

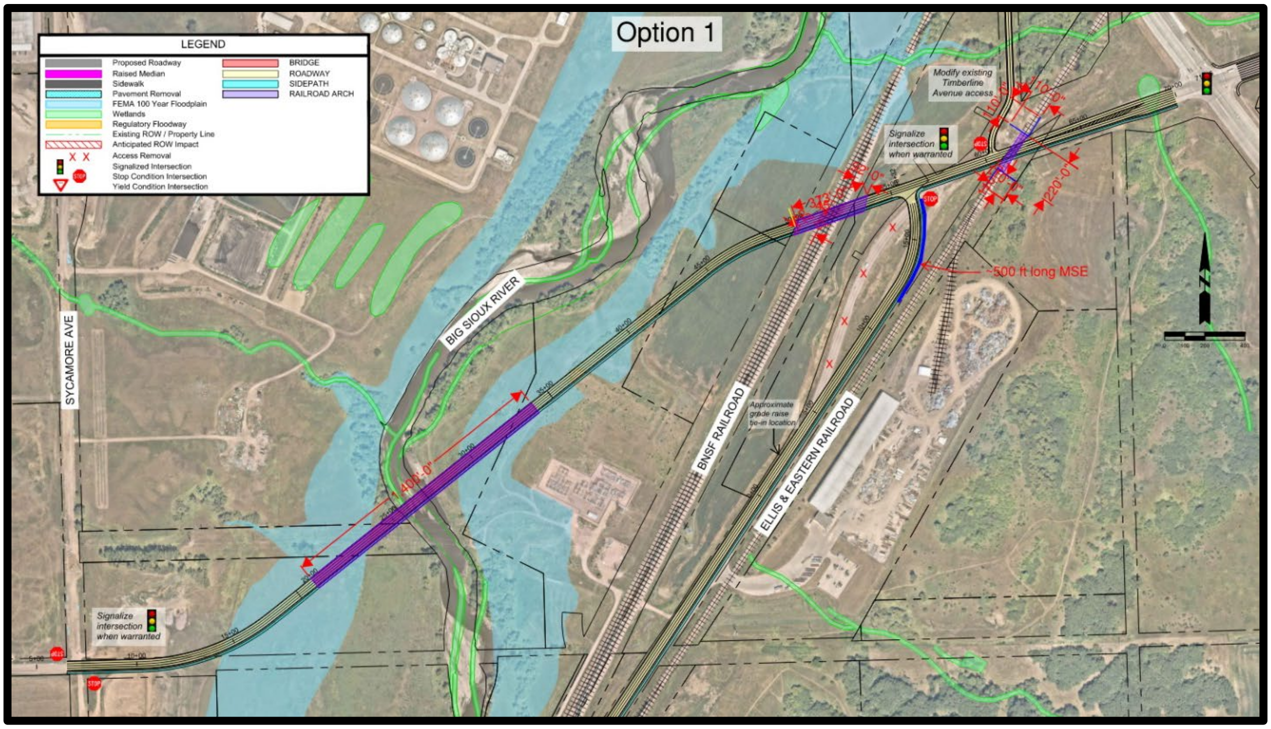


Figure 31: Benson Road Extension – Benson Road Prioritized Route Alternative (between Sycamore Avenue and Veterans Parkway)

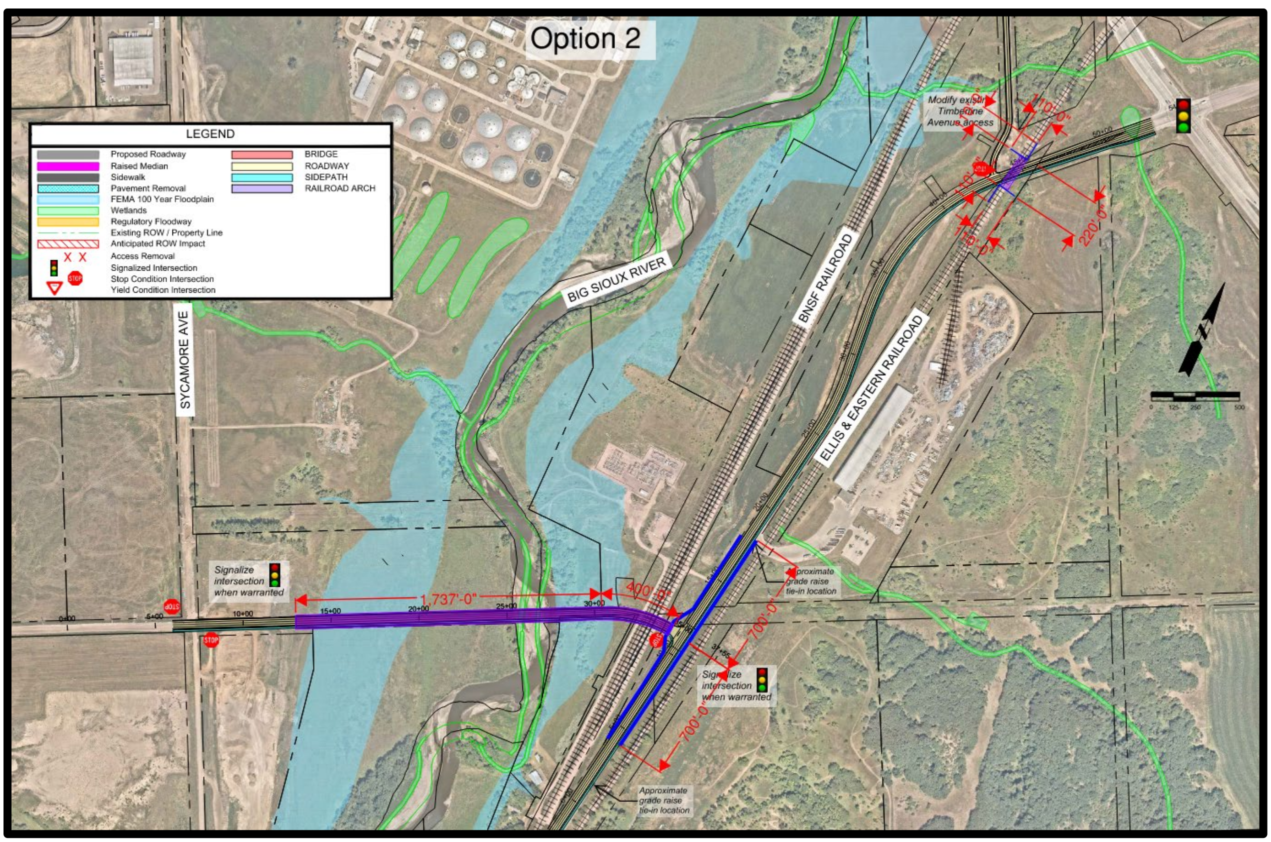


Figure 32: Benson Road Extension – Rice Street Prioritized Route Alternative (between Sycamore Avenue and Rice Street)

BAHNSON AVENUE EXTENSION

*Conceptual corridor segment layouts and profiles illustrating a potential Bahnson Avenue extension are provided in **Appendix R**.*

To improve multimodal street connectivity to north/south arterial and collector roadways along Rice Street, a Bahnson Avenue extension alternative was developed to connect Bahnson Avenue to the south (shown in **Figure 33**). This alternative connects Bahnson Avenue from Rice Street to East Broken Arrow Street (to the south) via a 3-lane typical section (primarily two-lane roadway with a left turn lane at the intersection with Rice Street) with 10 foot shared-use paths on each side (approximately 0.4 miles in length).

Figure 33: Bahnson Avenue Extension Alternative (Rice Street to Broken Arrow Street)

SYCAMORE AVENUE EXTENSION

*Conceptual corridor segment layouts and profiles illustrating a potential Sycamore Avenue extension are provided in **Appendix R**.*

Similar to the Bahnson Avenue extension concept, a Sycamore Avenue extension alternative (shown in **Figure 34**) was developed to provide additional north/south street connectivity to Rice Street. This alternative connects Sycamore Avenue, a Type 3 Arterial roadway, from Rice Street, at the existing Richard Place intersection, to Club View Drive (to the south) via a 3-lane typical section (primarily a two-lane roadway with a left turn lane at the intersection with Rice Street) [approximately 0.7 miles in length]. It should be noted that there are several key challenges with this roadway extension including the notable grade challenges and the existing mobile home park residential use.

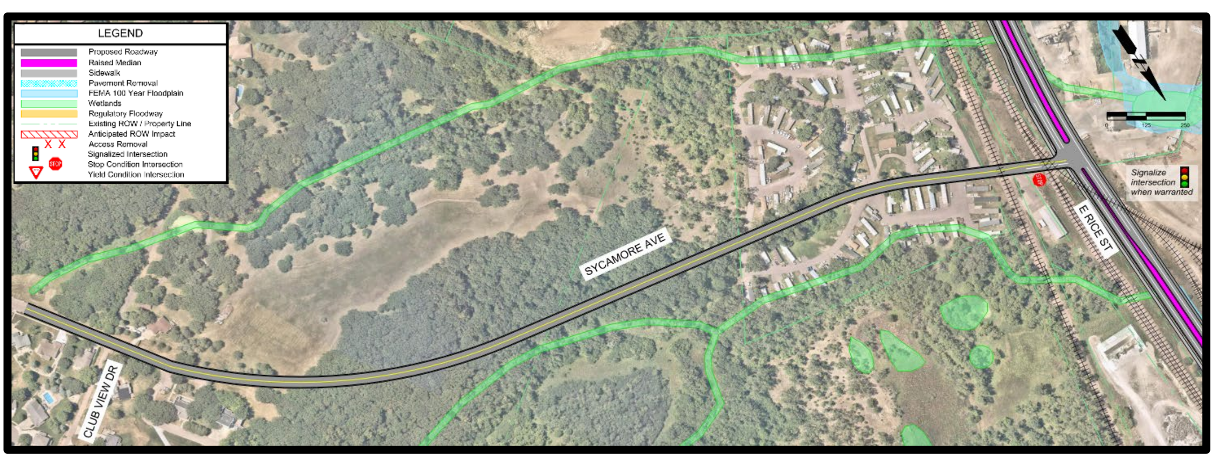


Figure 34: Sycamore Avenue Extension Alternative (Rice Street to Club View Drive)

RICE STREET TRANSLOAD FACILITY REALIGNMENT

*Conceptual corridor segment layouts and profiles illustrating a potential Rice Street realignment near the Rail to Road Transload Facility are provided in **Appendix R**.*

With the goal of improved route reliability along Rice Street and potential challenges with grade separation at the Ellis and Eastern Railroad (West) crossing, a potential Rice Street realignment alternative was developed to shift Rice Street to the north around the Rail to Road Transload Facility (shown in **Figure 35**), applicable with an Urban / Hybrid 4-Lane Divided or 5-Lane typical section. This alternative would eliminate the need for grade separation at the Ellis and Eastern Railroad (West) crossing since the Rice Street realignment avoids the existing crossing, thus improving route reliability. The existing 3-lane Rice Street would be retained to provide internal connectivity for existing businesses and connect to the proposed roadway realignment by two stop-controlled intersections at the east and west tie-in point back to the original alignment. While this alternative would aid route reliability and address a need for grade separation, most of the proposed realignment is within FEMA floodplain and wetland limits near the Big Sioux River which is a major constraint for implementation.

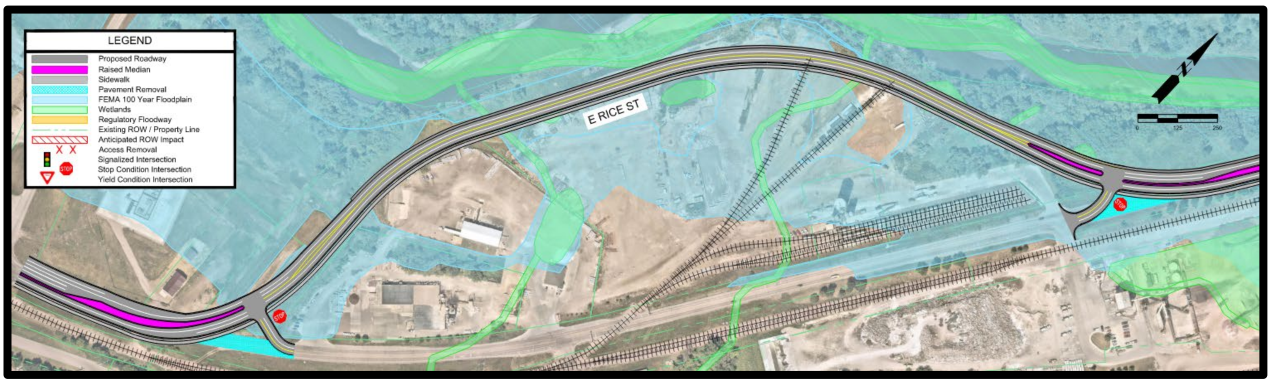


Figure 35: Rice Street Transload Facility Realignment

GREAT BEAR SKI VALLEY AREA ACCESS

*Conceptual layouts illustrating Great Bear Ski Valley area access alternatives are provided in **Appendix R**.*

Two alternatives were developed with revised access locations near the Great Bear Ski Valley access, and the BNSF Railway at-grade crossing. These alternatives are applicable to an Urban / Hybrid 4-Lane Divided or 5-Lane typical section with or without grade separation at the adjacent BNSF Railway crossing. Alternative 1 (shown in **Figure 36**) consolidates existing access north of Rice Street with a frontage road and a new access location that aligns with the existing access to Great Bear Ski Valley on the south side. Alternative 2 (shown in **Figure 37**) consolidates access on the north side of Rice Street and realigns the Great Bear Ski Valley access to the east. While both alternatives improve access management along this portion of Rice Street, Alternative 2 provides greater separation from the BNSF Railway crossing along Rice Street and side-street access crossing.

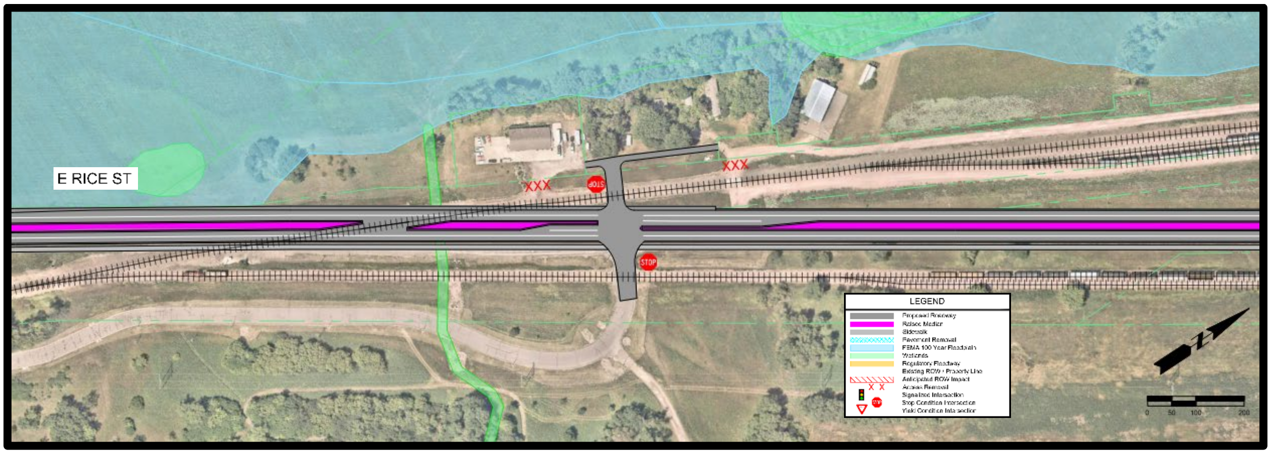


Figure 36: Great Bear Ski Valley Area Access – Alternative 1

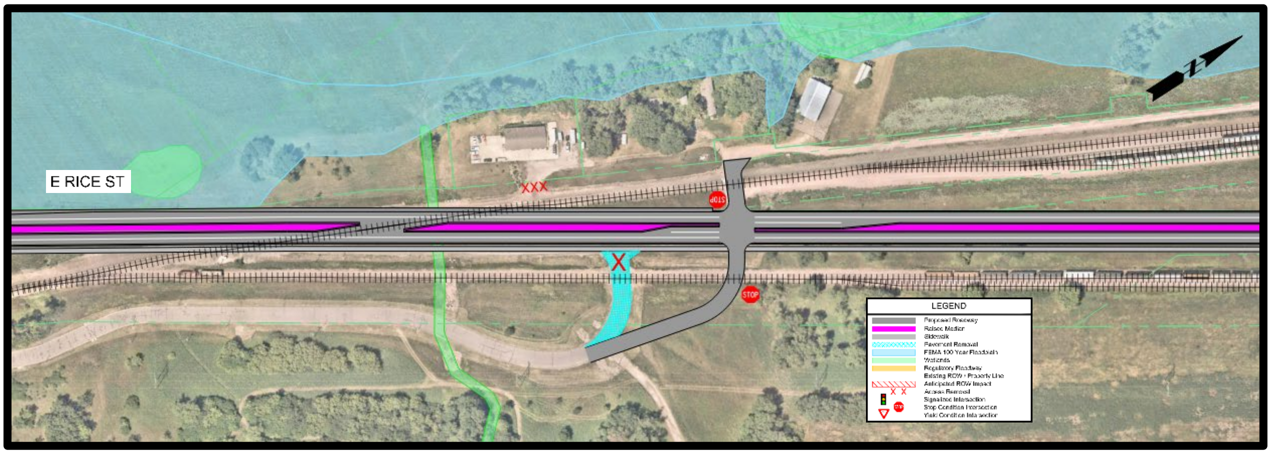


Figure 37: Great Bear Ski Valley Area Access – Alternative 2

HOLLY BOULEVARD PRIORITY IMPROVEMENTS

*Conceptual layouts illustrating Holly Boulevard priority improvements are provided in **Appendix R**.*

Based on existing and long-term needs, several priority improvements were developed to improve traffic flow and safety along Holly Boulevard between Sioux Boulevard and SD11 / Splitrock Boulevard through access management and traffic control changes. Concepts include:

- Installation of raised median west of Holly Boulevard & Sioux Boulevard intersection (shown in **Figure 38**)
  - Applicable to an Urban 4-Lane Divided Typical Section
  - Long-term traffic and safety improvement to limit gas station access along Holly Boulevard to right-in right-out access to avoid exiting left turn movement across 5-lanes

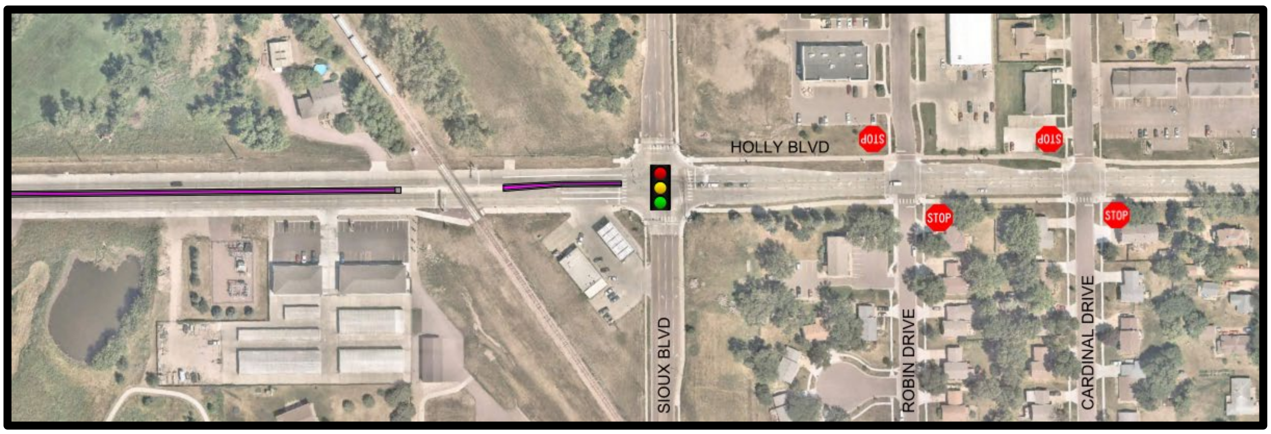


Figure 38: Raised Median West of Holly Boulevard & Sioux Boulevard Intersection

- Conversion to a Single-lane Roundabout at the Pasque Flower Trail intersection (shown in **Figure 39**)
  - Applicable to an Urban 3-Lane Typical Section
  - Near and mid-term traffic flow and safety improvements based on single-lane roundabout configuration and adjacent raised medians
  - Intersection replacement can occur when traffic signal upgrades or replacement are needed
- Access management treatments at business access and parking lots near Holly Boulevard & SD11 / Splitrock Boulevard intersection (shown in **Figure 40**)
  - Close north side access along Holly Boulevard approximately 200 feet west of SD11 / Splitrock Boulevard
  - Reconfigure access in adjacent parking lots to improve traffic flow to existing business in northeast quadrant
  - Applicable to all Typical Sections
  - Long-term traffic and safety improvement to shift business access traffic away from Holly Boulevard & SD11 / Splitrock Boulevard intersection functional area
- Attach a shared use path to the south side of the Big Sioux River bridge

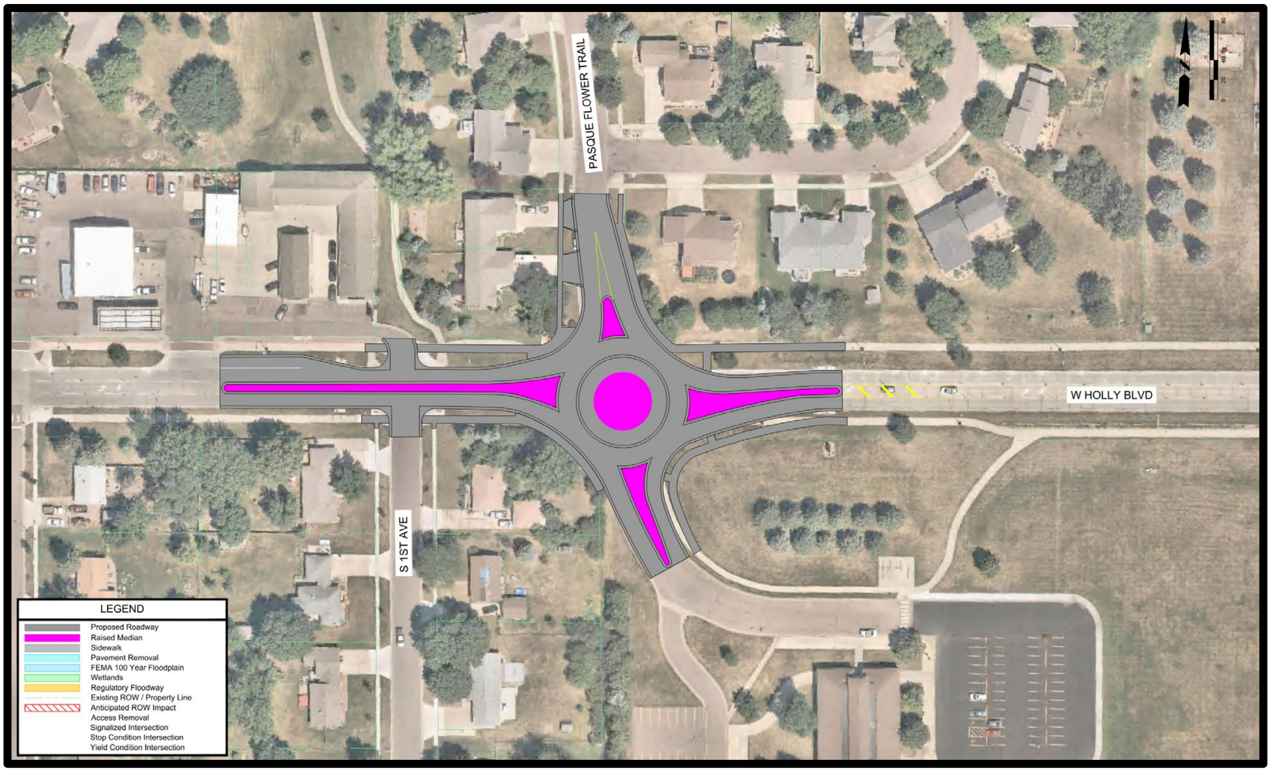


Figure 39: Pasque Flower Trail Single-Lane Roundabout Intersection

Figure 40: Access Management Treatments near Holly Boulevard & SD11 / Splitrock Boulevard Intersection

HOLLY BOULEVARD SCHOOL ACCESS

*Conceptual layouts illustrating Holly Boulevard School Access Options are provided in **Appendix M** and a related School Sub-Area Traffic Operations Analysis Memo is provided in **Appendix N**.*

As discussed earlier in the 'School Sub-Area Analysis' section, several concepts were developed to improve traffic operations and safety near access locations for the Brandon Valley School District along Holly Boulevard. Alternatives were developed to realign the connection to Maple Avenue (north of Holly Boulevard), revise intersection traffic control at 6th Avenue, 7th Avenue / Maple Avenue, and the High School Access, and close the 6th Avenue school access. These improvements will enhance traffic flow in and out of the Brandon Valley Middle School parking lot, Brandon Valley High School access, and along Holly Boulevard in this area. All School Access alternatives include revised traffic control at 7th Avenue / Maple Avenue, removing the traffic signal, westbound right turn lane and north leg school access at 6th Avenue, and constructing at westbound right turn lane at 7th Avenue / Maple Avenue.

Maple Avenue Connection Alternatives

Maple Avenue connection alternatives include four primary options that add an access roadway between the Brandon Valley Middle School parking lot and Maple Avenue with several variations existing and revised alignments of Maple Avenue to Teakwood Street. Each alternative includes the option for either a mini roundabout or stop-controlled intersection added where the new parking lot connection would tie into Maple Avenue. Maple Avenue connection alternatives are shown in **Figure 41**.

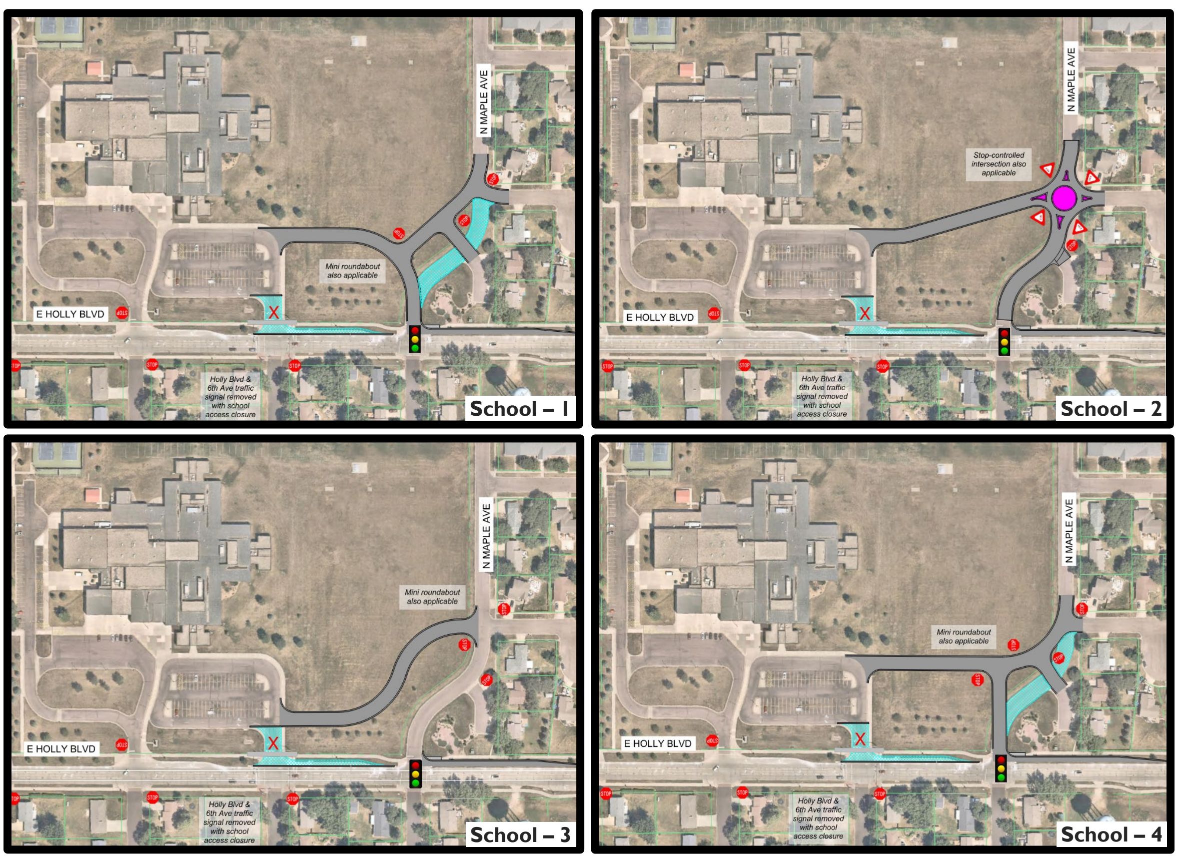


Figure 41: Holly Boulevard School Access – Maple Avenue Connection Alternatives

7th Avenue / Maple Avenue and High School Access Alternatives

In addition, two traffic control alternatives were developed for 7th Avenue / Maple Avenue and the High School Access intersections. Either alternative includes the revisions at 6th Avenue and making 7th Avenue / Maple Avenue the priority traffic intersection. One alternative (School – 5) is a combination of a traffic signal at 7th Avenue / Maple Avenue and a single-lane roundabout at the high school access, while the other alternative (School – 6) features single-lane roundabouts at both intersections. Both alternatives were observed to perform at LOS B or better through 2050, however, the dual roundabout configuration is anticipated to better meter traffic and manage queues through the study planning horizon. The 7th Avenue / Maple Avenue and High School Access alternatives are shown in **Figure 42**.

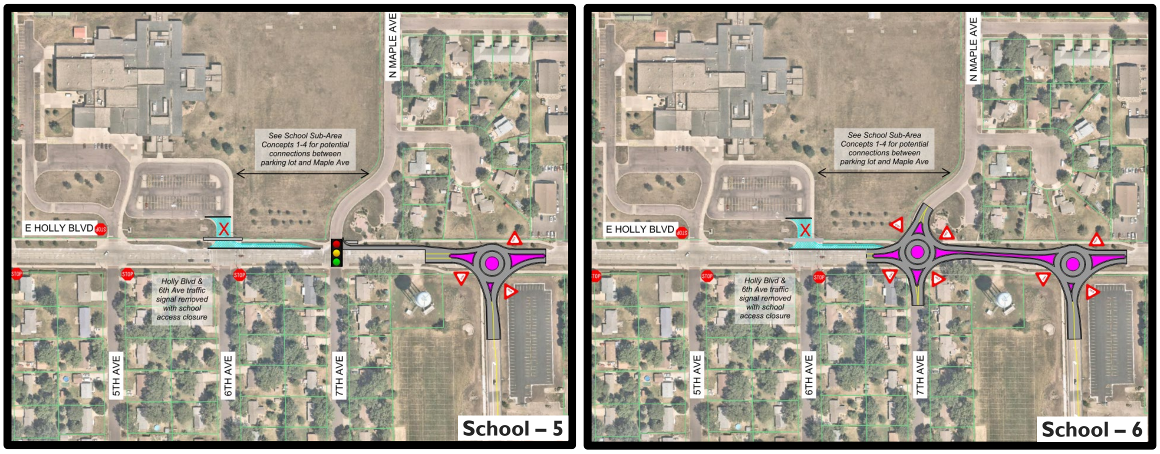


Figure 42: Holly Boulevard School Access – 7th Avenue / Maple Avenue and High School Access Alternatives

UTILITY COORDINATION

*See Utility Coordination Memo in **Appendix S** for additional information.*

Planning-level utility coordination was conducted as part of the corridor study to help identify utilities that are:

- Currently in the corridor
- Planning to be in the corridor and/or planning improvements to existing utilities in the corridor
- Not in the corridor and no plans to locate in the corridor

A survey was sent to local utility contacts in Spring 2024. For utilities in the corridor, a follow-up question was also asked about the type and location of the utility within the corridor.

Responding utilities are noted in **Table 37**. The utility type, location, and supporting notes are provided in the *Utility Coordination Memo*.

Table 37: Responding Utilities Located in the Rice Street / Holly Boulevard Corridor

AT&T	NuStar Pipeline	Midcontinent Communications
Bluepeak/Vast	Southeastern Electric Cooperative	Northwestern Energy
East River Electric Coop.	Sprint/Nextel/T-Mobile/ Cogent Communications CO	Verizon / MCI
Lewis & Clark Regional Water	Xcel Energy	Minnehaha Comm. Water Corp.
LUMEN	Lincoln County Rural Water System	Western Area Power Company (WAPA)
MidAmerican Energy	Magellan Pipeline Company L.P.	
Northern Natural Gas	SDN Communications	

ENVIRONMENTAL REVIEW

*See Environmental Technical Memo in **Appendix T** for additional information.*

An environmental overview of the study area was conducted to identify environmental resources, potential for impacts, and future actions needed as part of the project. The *Environmental Technical Memo* documents findings from the review. Figures illustrating environmental resources can also be found with the memo. The following resources likely to be impacted by the project and require further review are summarized below.

Wetlands and Other Waters of the U.S.

A desktop delineation found 69 wetlands within the study area, shown in **Figure 43**. Three crossings of the Big Sioux River may be impacted by build options. Impacts to wetlands or other waters are likely and field delineations should be completed to determine full extent of all wetlands, and their boundaries, once further project details are known. If impacts occur to wetlands or streams, a U.S. Army Corps of Engineers (USACE) Section 404 Permit may be required.

Threatened and Endangered Species

Trees that serve as habitat for the endangered northern long-eared bat and proposed endangered tricolored bat and the endangered Topeka shiner are present within the study area. A field habitat review will need to be completed and consultation with the U.S. Fish and Wildlife Service should be conducted. In addition, the monarch butterfly, a candidate for the threatened and endangered species list, was present in the study area.

Archaeological / Historical Properties

Several archaeological and historic properties listed or eligible for listing on the National Register of Historic Places (NRHP) exist within the study area. Many sites have not been evaluated for eligibility for the NRHP. Build options along Rice Street between Veterans Parkway and Bahnson Avenue may impact several rail bridges. A field survey was not conducted for archaeological/historical properties within the study area. A survey should be conducted to determine if there are any unidentified archaeological / historic properties within the area. Consultation with SD State Historic Preservation Office should occur once impacts to these properties are known.

Floodplain

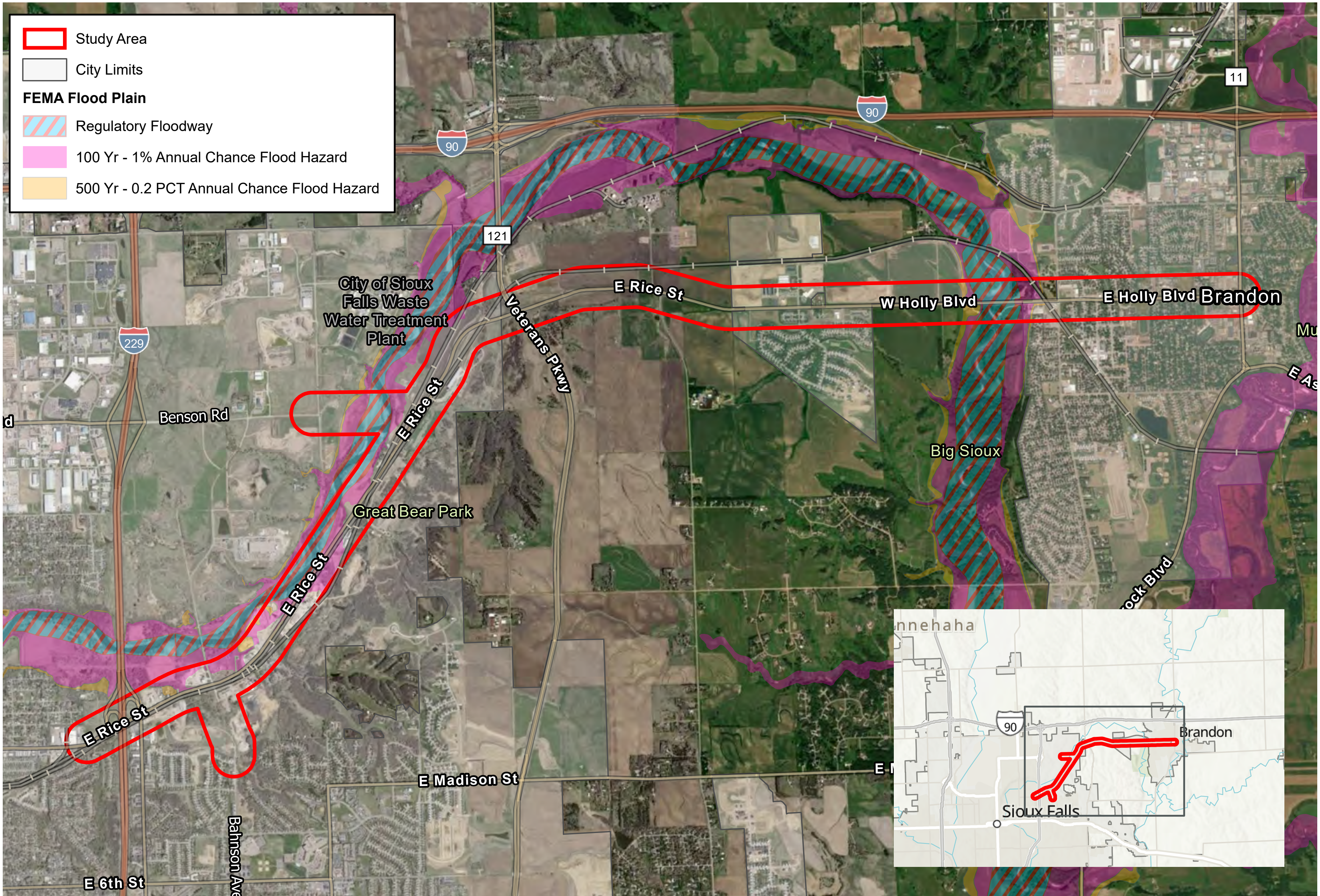
FEMA floodplain exists within the study area, previously shown in **Figure 43**. Once details for planned projects are developed, a review of the plan sets to determine if impacts to the floodplain would occur. Additional coordination with the floodplain administrator or FEMA may be required.

Rice Street / Holly Boulevard Alternatives and Environmental Impacts

Some differences in anticipated impacts would occur between build options along Rice Street / Holly Boulevard, particularly for the segment of Rice Street between the I-229 (Exit 7) interchange and Veterans Parkway due to the proximity to the Big Sioux River and related floodplain and wetlands. Notably, both Benson Road extension alternatives, which extend Benson Road over the Big Sioux River to connect with Rice Street, would prove challenging to construct because of the roadway and bridge structure impacts to the floodplain and wetlands in this area.

For general corridor intersection concepts, the roundabout options have a larger footprint and may impact slightly more wetland than intersections with a traffic signal or stop control. However, these differences are not anticipated to be significant.

Cultural surveys must be completed within project limits once recommendations are known to determine full impacts to archaeological and historic properties. Threatened and endangered species habitat in the area is limited, and build options are not anticipated to remove significant habitat for those species.



FLOODPLAIN MAP

FIGURE 43

ALTERNATIVES EVALUATION

This section provides a summary of Build condition evaluation measures for the various alternatives, focusing on:

- 2050 Planning Horizon traffic operations
- Safety (intersection type crash reduction)
- Long-range compatibility with intersection expansion and/or corridor build-out
- Cost

A description of intersection evaluation measures and considerations is provided in **Table 38**. Evaluation summaries are provided in **Table 39** through **Table 49**.

Each alternative addresses a need established as part of this study. These tables are meant to compare alternatives with consideration to long-range needs. However, there are instances where an alternative may score poorly with respect to these long-range needs, but the alternative addresses a short-term need and may be the best option for an interim measure.

Table 38: Alternatives Evaluation Description

Category	Considerations	Measure		
		+	*Blank*	—
2050 Planning Horizon traffic operations	How well does the alternative address Year 2050 traffic operation needs?	LOS A-B	LOS C-D	LOS E-F
Safety	Comparison of safety based on intersection type CMFs and expected crash reduction	Best safety performance	Maintain or slight improvement	No safety improvement
Long-Range Compatibility	Long-range compatibility with: • Intersection expansion and/or corridor build-out needs (if applicable) • Other area planned improvements (e.g., I-229 and SD11 study recommendations, crossroad arterial reconstruction) If an interim improvement, can it be expanded or does it need reconstructed?	Best addresses long-range needs	Requires modification, but expandable	Reconstruction required
Benefits / Drawbacks	What are the notable benefits and/or drawbacks of an alternative?	*Differentiating benefit*	*Measure supports study objectives and is a benefit to the corridor*	*Differentiating drawback*
Cost	Construction + ROW costs (2024$)			

Table 39: Alternatives Evaluation – I-229 Rice Street (Exit 7) Interchange Area

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
I-229 – 1	Traffic Signals	+		+	$43.7
I-229 – 2	Traffic Signals	+		+	$54.0

Table 40: Alternatives Evaluation – Bahnson Avenue

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Bahnson – 1 (existing configurations)	Traffic Signals	–		–	$6.7*
Bahnson – 2 (I-229 – 1 / I-229 – 2)	Traffic Signals	+		+	$43.7-$54.0

*Signalization of existing Bahnson Avenue intersection

Table 41: Alternatives Evaluation – Benson Road (future extension)

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Benson Extension – 1	Traffic Signal	+		+	$78
Benson Extension – 2	Traffic Signal	+			$112

Table 42: Alternatives Evaluation – Veterans Parkway Intersection

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Veterans – 1	Traffic Signal (Multilane)			+	~$7.3*

*Cost is indicative of the initial construction to a multilane traffic signal. The Veterans – 1 alternative will mainly require a multilane expansion on Rice Street which is reflected in the 'Rice Street: 4-Lane Divided' corridor conceptual costs in ***Appendix O***.

Table 43: Alternatives Evaluation – Six Mile Road Intersection

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Six Mile – 1	Roundabout (Single-lane)	–	+		$4.4
Six Mile – 2	Roundabout (Multilane)	+	+	+	$6.1
Six Mile – 3 (existing configurations)	Stop-Control / Traffic Signal	+		–	$0.5
Six Mile – 4 & 5	Stop-Control / Traffic Signal (Multilane)	+		+	$6.7
Six Mile CGT – 5 & 6	Continuous Green T (CGT) Stop-Control / Traffic Signal (Multilane)	+	+	+	$6.7

Table 44: Alternatives Evaluation – Lancer Avenue Intersection

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Lancer – 1	Roundabout (Single-Lane)	–	+		$4.4
Lancer – 2	Roundabout (Multilane)	+	+	+	$6.1
Lancer – 3 (existing configurations)	Stop Control / Traffic Signal			–	$0.5
Lancer – 4 & 5	Stop Control / Traffic Signal (Multilane)	+		+	$6.7

Table 45: Alternatives Evaluation – Heritage Road Intersection

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Heritage – 1	Roundabout (Single-Lane)	–	+		$4.4
Heritage – 2	Roundabout (Multilane)		+	+	$6.1
Heritage – 3 & 4	Traffic Signal (Multilane)			+	$6.7

Table 46: Alternatives Evaluation – Sandstone Avenue Intersection

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Sandstone – 1	Roundabout (Single-Lane)	−	+		$4.4
Sandstone – 2	Roundabout (Multilane)	+	+	+	$6.1
Sandstone – 3 & 4	Traffic Signal (Multilane)	+		+	$6.7

Table 47: Alternatives Evaluation – Development W & E Intersections

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Development W & E – 1	Roundabout (Single-Lane)	−	+		$4.4
Development W & E – 2	Roundabout (Multilane)	+	+	+	$6.1
Development W & E – 3	Traffic Signal (Multilane)	+		+	$6.7

Table 48: Alternatives Evaluation – Sioux Boulevard

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
Sioux – 1	Traffic Signal (Multilane)			+	$6.7

Table 49: Alternatives Evaluation – SD11 / Splitrock Boulevard

Alternative	Intersection Type	2050 Traffic Operations	Safety	Long-Range Compatibility	Costs ($M, 2024)
SD11 – 1	Traffic Signal (Multilane)			+	$6.7

RECOMMENDATION METHODOLOGY

Recommendations were developed through a collaborative process with the SAT, analysis, and public and stakeholder input. The recommendation framework follows a Long-Range Vision process that supports agency flexibility with programming projects as needs and opportunities arise. It also fosters coordination amongst agencies to maximize investment and avoid constructing something twice in a short timeframe. This vision framework is supported through recommendations that provide options for:

- Incremental and/or ultimate build-out
- Intersection type (roundabout or traffic signal)
- Corridor number of lanes on Rice Street / Holly Boulevard and crossroads (3-lane or multilane)
- Incorporating planned improvements for I-229 interchange and arterial crossroads

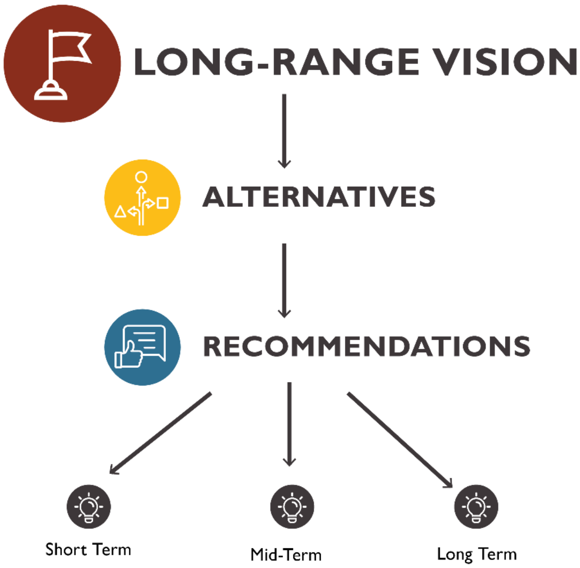
Ultimately, the timeframe for long-range improvement needs is highly dependent on type, pace, and density of future development along the Rice Street / Holly Boulevard corridor. When a project is identified, this vision process lays the foundation for future design-level evaluation and detailed analysis.

Recommendation Framework

Long-Range Vision: illustrates the overarching, long-range recommendations for the corridor and provides guidance on elements to incorporate in future planning and projects.

Supporting Alternatives: specific modifications that may be implemented individually or collectively when working towards the long-range vision.

Alternatives Recommendations: short-term, mid-term, and long-term recommendations align with anticipated development along the Rice Street / Holly Boulevard corridor based on the three City of Sioux Falls Growth Management Plan development tiers and City of Brandon growth area.



Recommendation Timelines

Recommendation timelines are shown in **Table 50**.

Table 50: Recommendation Timeline

Recommendation Timeframe		Years
Short-Term	Present – 2029	0 to 5 years
Mid-Term	2030 – 2039	6 to 15 years
Long-Term	2040+	15+ years

RECOMMENDATIONS

Typical Sections

Long-Range Vision: Urban and Hybrid Multilane typical sections; Urban 3-Lane typical section (in select locations)

City of Sioux Falls Recommended Typical Sections:

- **Urban 4-Lane Divided Typical Section:** two through lanes in each direction, raised median that accommodates a left turn lane at intersections, curb and gutter, and multimodal elements
- **Hybrid 4-Lane Divided Typical Section:** matches Urban 4-Lane Divided typical section with the exception of curb and gutter on one side and rural shoulders and slope on one side; reflects a combination of urban and rural elements due to environmental and drainage constraints

A combination of urban or hybrid multilane typical sections are recommended in for this corridor to minimize ROW impacts, provide flexibility for locations with environmental and drainage challenges, and incorporate the desired multimodal transportation elements.

For short-term spot improvements to intersections or short segments not requiring full reconstruction, maintaining or revising the existing section is recommended.

City of Brandon Recommended Typical Sections:

- **Urban 4-Lane Divided Typical Section:** two through lanes in each direction, raised median that accommodates a left turn lane at intersections, curb and gutter, and multimodal elements
- **Urban 5-Lane Typical Section:** two through lanes in each direction, center left turn lane, curb and gutter, and multimodal elements

Design and Posted Speeds

Recommended design and posted speeds for proposed corridor typical sections are:

City of Brandon (Six Mile Road to Sioux Boulevard):

- Design Speed: 35 or 40 mph
- Posted Speed: 30 or 35 mph

City of Sioux Falls (I-229 to Six Mile Road):

- Design Speed: 45 mph
- Posted Speed: 40 mph

Design speeds should be discussed ahead of any major corridor reconstruction project within the City of Sioux Falls and City of Brandon growth areas.

Corridor Number of Lanes

Long-Range Vision:

- **Multilane corridor: I-229 Rice Street (Exit 7) Interchange Area to Sioux Boulevard**
- **Existing 3-Lane corridor: Sioux Boulevard to SD11 / Splitrock Boulevard**

The 2050 Planning Horizon volumes developed for this study largely indicate a need for a multilane Rice Street / Holly Boulevard corridor, particularly between I-229 and Six Mile Road. Future development along the corridor between Six Mile Road and Sioux Boulevard will highly influence future corridor needs and build out timing, however, a multilane corridor would maintain corridor consistency/expectancy. Thus, it is recommended a multilane corridor be considered along Rice Street / Holly Boulevard west to I-229 and east to Sioux Boulevard. These intersections reflect the bookend major intersections within the primary City of Sioux Falls and the west Brandon growth areas.

It should be noted that 2050 Planning Horizon volumes did not reflect a need for a multilane corridor between Sioux Boulevard and SD11 / Splitrock Boulevard. Thus, it is recommended that the existing urban 3-lane typical section be maintained although the need for future corridor expansion should continue to be monitored.

Short-Term Recommendation:

- Mill and overlay existing section and re-configure as a 2-lane corridor with intersection turn lanes: I-229 to west of Veterans Parkway

Mid-Term Recommendation: Urban Multilane corridor

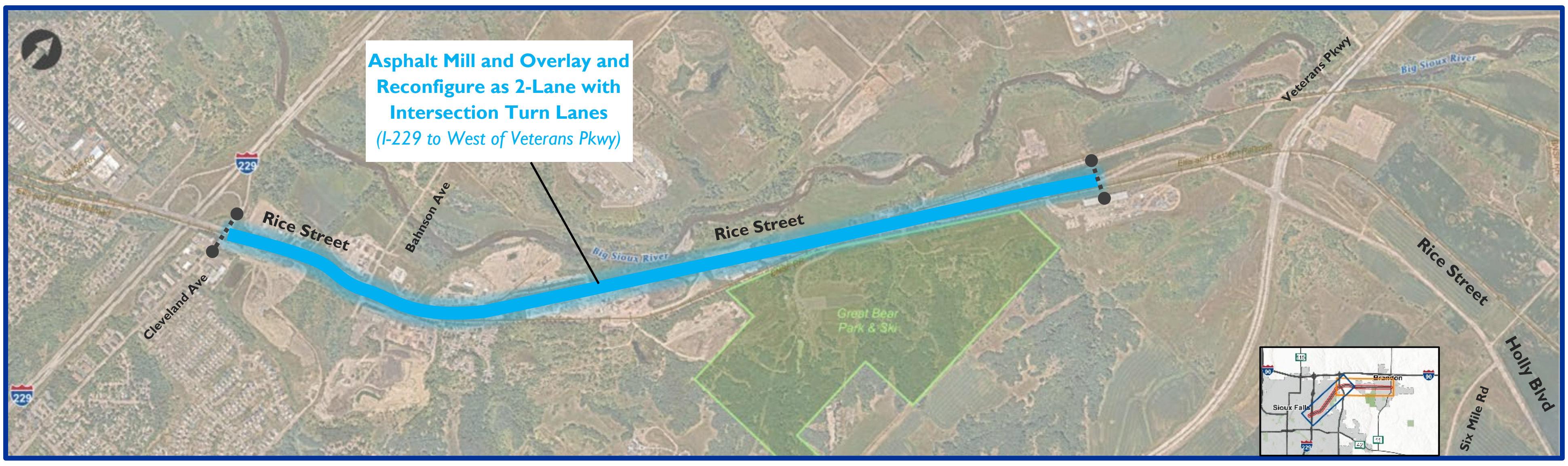
- Reconstruct as multilane section within Sioux Falls growth area:
    1. I-229 to Bahnson Avenue (4-Lane / 6-Lane Divided Multilane Section)
    2. Veterans Parkway Intersection Area
    3. East of Bahnson Avenue to West of Veterans Parkway (consider hybrid section through floodplain)
    4. West of Veterans Parkway to Six Mile Road
- Reconstruct as multilane section within Brandon growth area:
    1. Six Mile Road to West of Sioux Boulevard
- Maintain 3-Lane Corridor: Sioux Boulevard to SD11 / Splitrock Boulevard

Long-Term Recommendation: Urban Multilane corridor

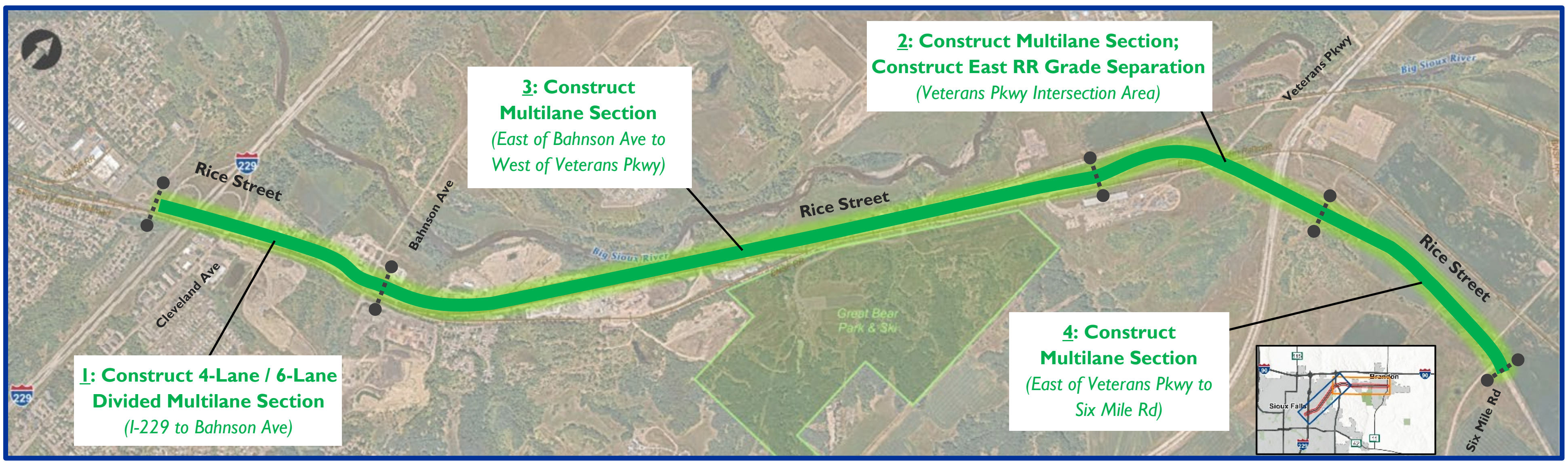
- Multilane section: I-229 to Sioux Boulevard
    - Continue Mid-Term Recommendations *(if not already implemented)*
- Monitor need for additional lanes: Sioux Boulevard to SD11 / Splitrock Boulevard

City of Sioux Falls Growth Area

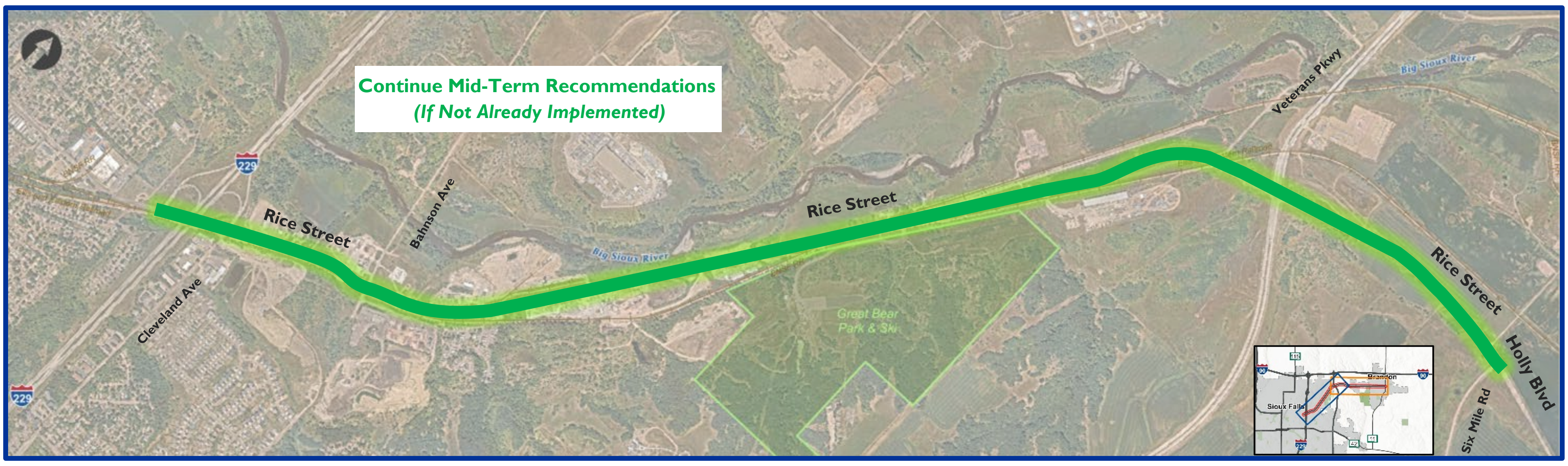
Short-Term Recommendations:



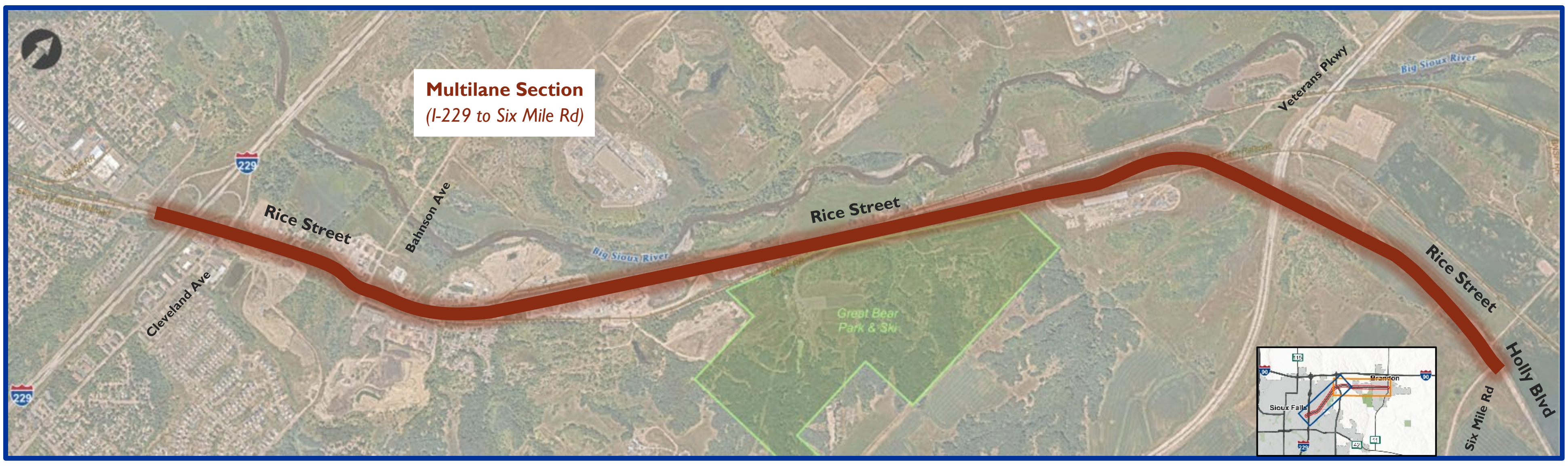
Mid-Term Recommendations:



Long-Term Recommendations:



Long-Range Vision:



ROAD SEGMENTS:

Urban 4-Lane Divided Multilane Section:

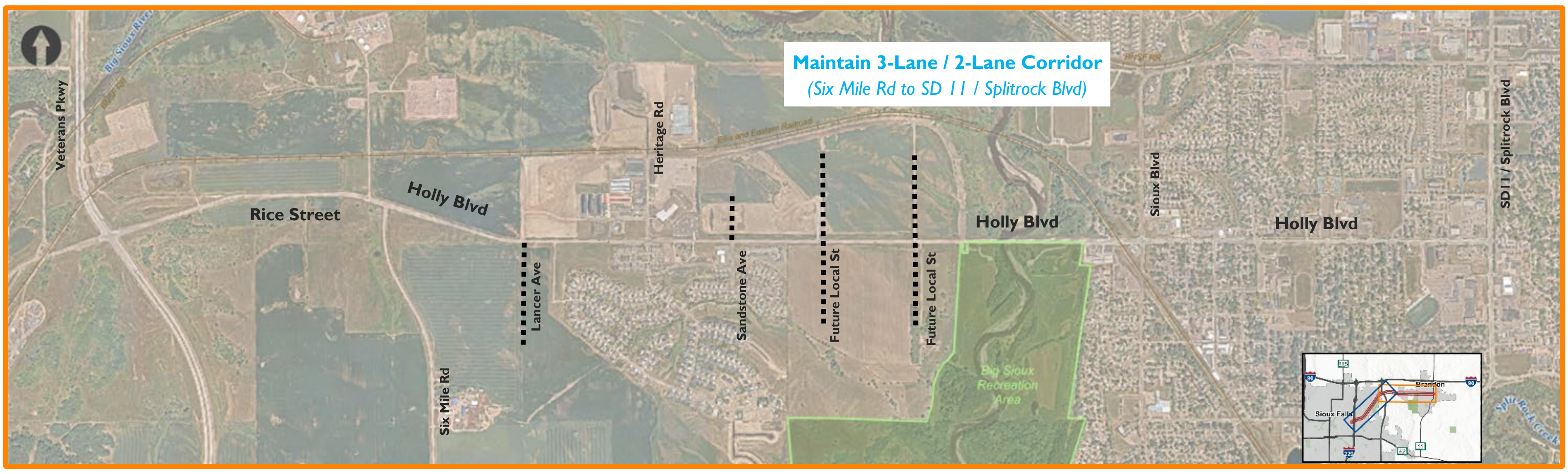
2 lanes each direction plus center left turn lane or raised median and multimodal elements

See 'City of Brandon Growth Area' for recommendations east of Six Mile Road

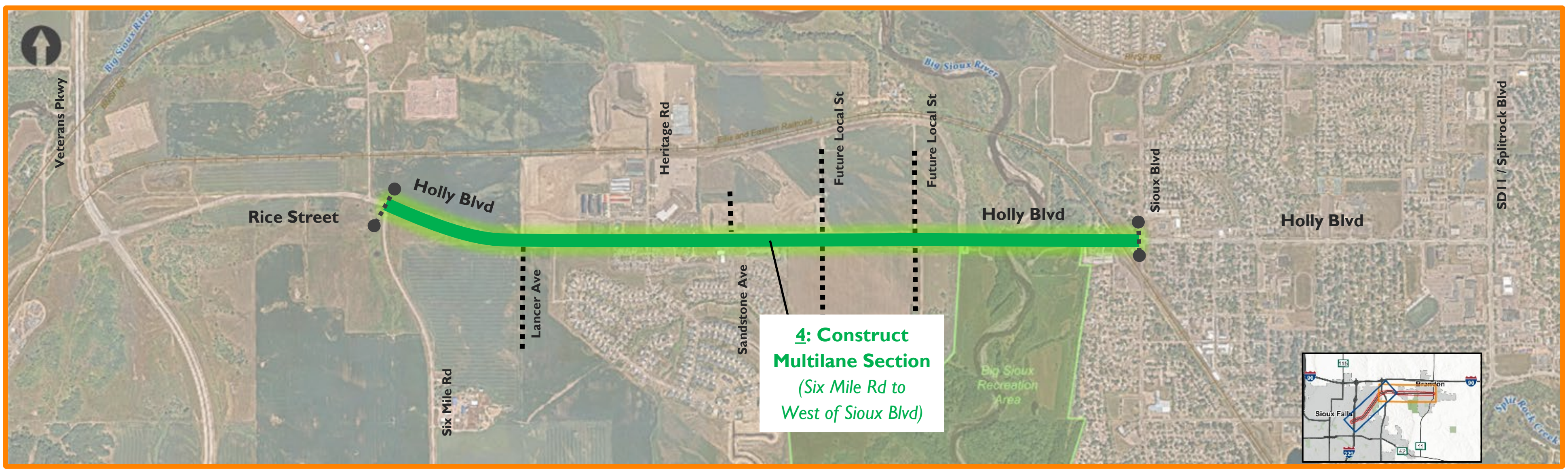
Figure 44: Rice Street / Holly Boulevard Corridor Number of Lanes Recommendations (City of Sioux Falls Growth Area)

City of Brandon Growth Area

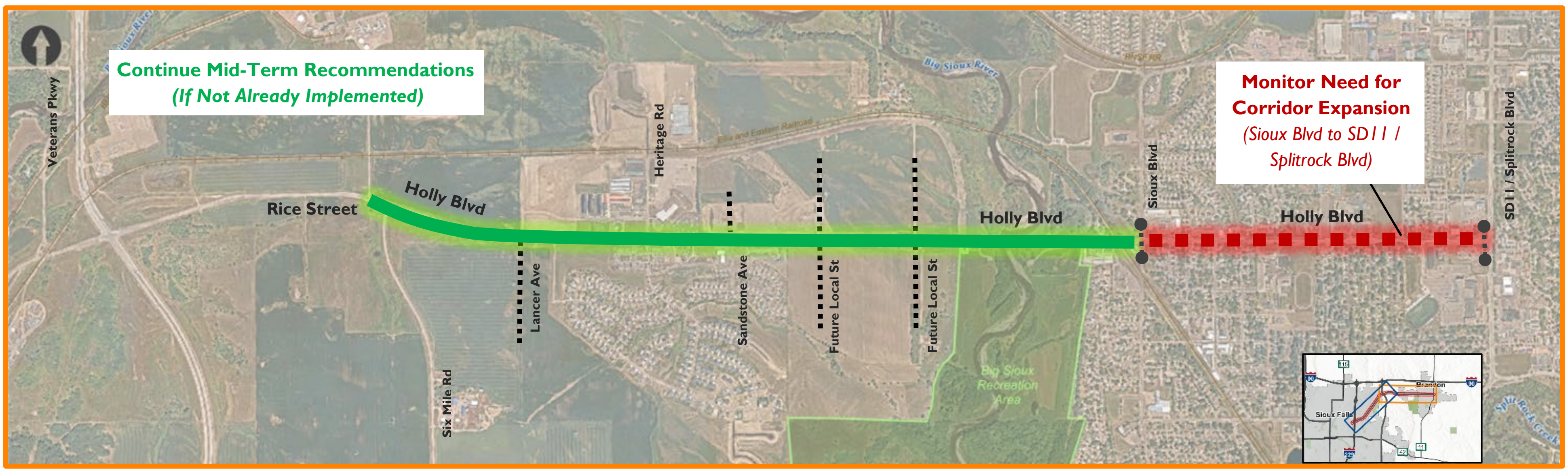
Short-Term Recommendations:



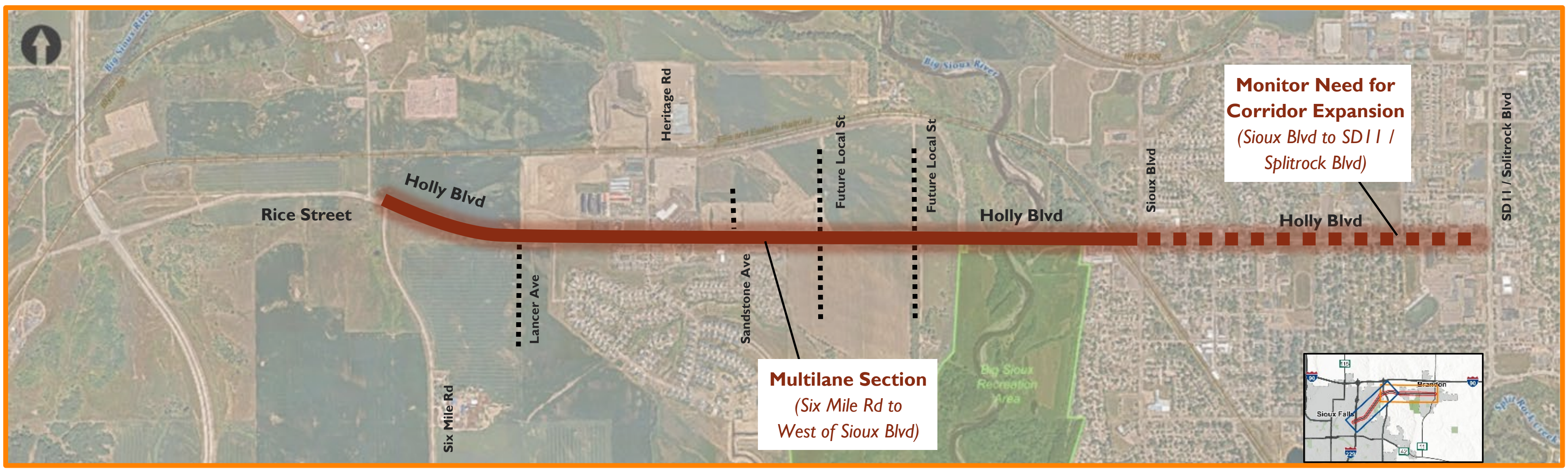
Mid-Term Recommendations:



Long-Term Recommendations:



Long-Range Vision:



ROAD SEGMENTS:

Urban 4-Lane Divided Multilane Section:

2 lanes each direction plus center left turn lane or raised median and multimodal elements

See 'City of Sioux Falls Growth Area' for recommendations west of Six Mile Road

Figure 45: Rice Street / Holly Boulevard Corridor Number of Lanes Recommendations (City of Brandon Growth Area)

Long-Range Multimodal Connectivity

Multimodal connectivity was a key consideration during the development of Rice Street / Holly Boulevard Corridor alternatives. The recommended typical sections include either for a 10-foot shared use path on both sides of the Holly Boulevard for the City of Brandon typical sections or a 10-foot shared use on one side of Rice Street for the City of Sioux Falls typical sections. This provides route continuity along the corridor and a framework for multimodal connectivity between City of Brandon, City of Sioux Falls, and adjacent development.

City of Sioux Falls long-range bicycle planning focuses shared use paths along arterial roadways with connections to the existing Veterans Parkway shared use path and potential trails along the Big Sioux River (moderate to high priority) and a Great Bear connection (need to study priority). City of Brandon long-range planning has a similar approach with shared use paths recommended along both sides of Holly Boulevard. Continuous shared use paths along the Rice Street / Holly Boulevard corridor will provide connectivity for these approaches and potential future trail connections within the study area.

It is recommended adjacent development extend sidewalk to the Rice Street / Holly Boulevard shared use path at mid-segment intersections. Additional connectivity to shared-use paths is encouraged to minimize out of the way travel by bicyclists and pedestrians and support multimodal connectivity between and within Neighborhood Employment Center and Residential land uses. Recommendations to provide multimodal connectivity along the Rice Street / Holly Boulevard corridor include:

Short-Term Improvements

- Maintain Rice Street bike lanes and evaluate opportunities for buffered bike lanes with future mill and overlay project
- Construct shared-use path on existing Big Sioux River bridge to provide a dedicated facility for pedestrians and bicyclists ahead of constructing a multilane section west of the bridge

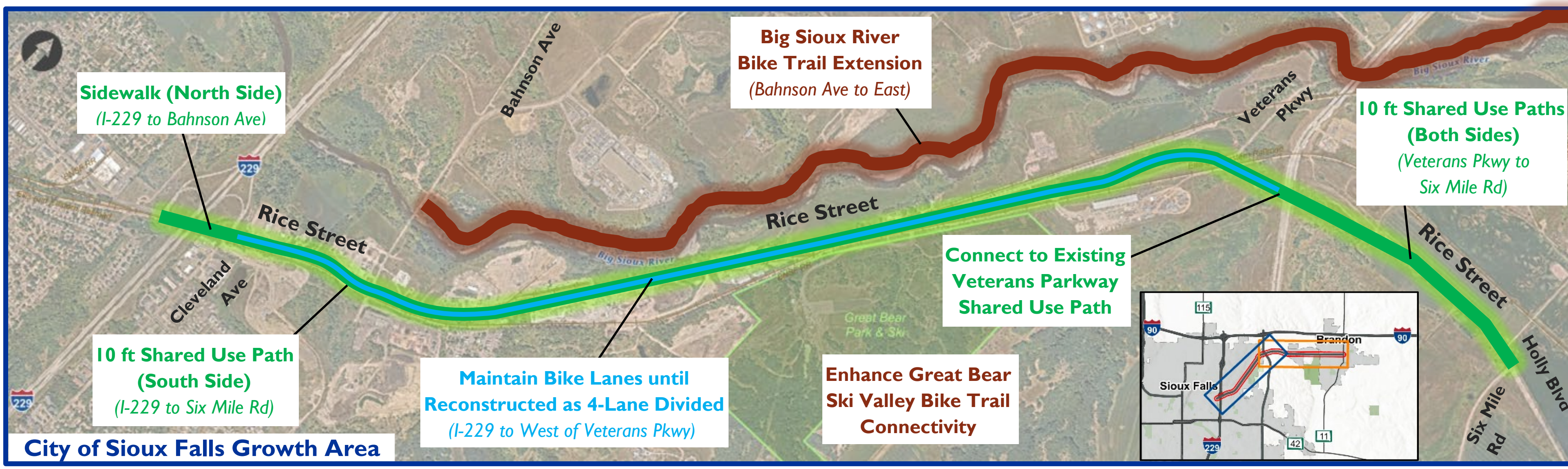
Mid-Term Improvements

- **Rice Street (between I-229 interchange and Six Mile Road):**
    - Construct a 10 ft shared-use path along the south side of Rice Street
        - Connect to existing shared use path along Veterans Parkway
    - Construct sidewalk on the north side of Rice Street (between I-229 and Bahnson Avenue)
    - Consider a 10 ft shared-use path along the north side of Rice Street (between Veterans Parkway and Six Mile Road)
- **Holly Boulevard (between Six Mile Road and Sioux Boulevard):** Construct 10 ft shared-use paths on both sides of Holly Boulevard

Long-Range Vision

- Connections with future roadway extensions such as Benson Road, Sycamore Avenue, and Bahnson Avenue
- Additional area bicycle and pedestrian projects in the area identified by other plans include:
    - Bike trail extension along the Big Sioux River to Bahnson Avenue
    - Connections to Great Bear Ski Valley

LONG-RANGE MULTIMODAL CONNECTIVITY



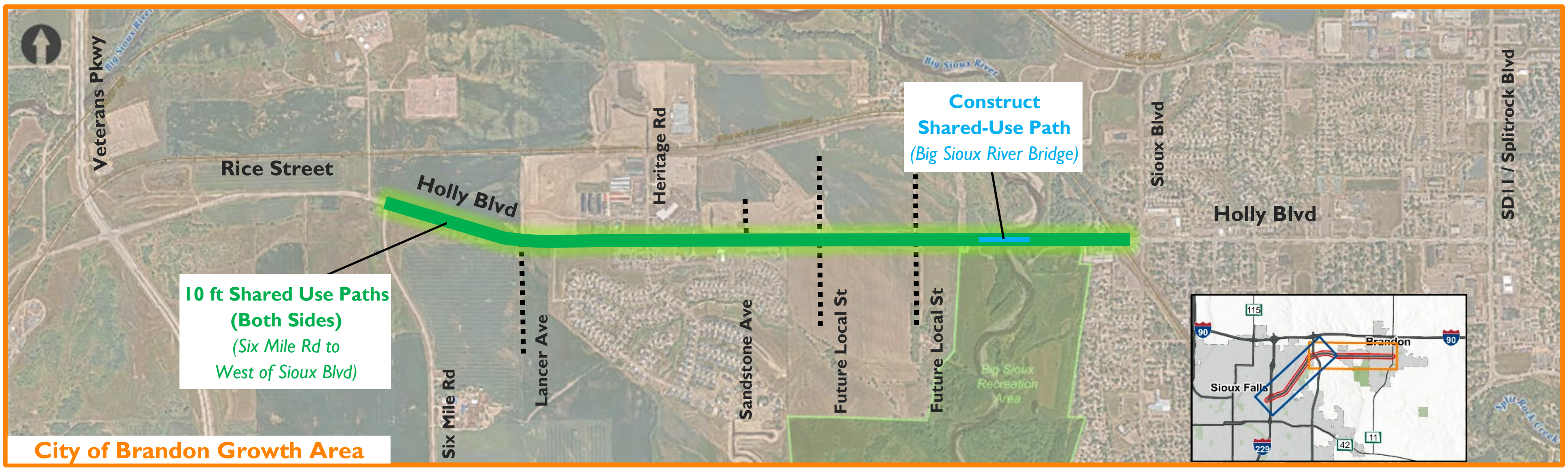


Figure 46: Long-Range Multimodal Connectivity along Rice Street / Holly Boulevard Corridor

Intersection Considerations

Key considerations with the intersection recommendations include:

- Rice Street / Holly Boulevard corridor operational needs, future traffic patterns, and route continuity
- Roundabouts provide the greatest benefits with traffic operations, safety, and public and received very strong stakeholder support
- Continuous Green T (CGT) intersection benefits with traffic operations and safety
- Planned projects in the area and recommendations from other studies
- Potential for incremental build-out of intersections and corridor segments
- Minimize the risk of duplicate work or rework between short/mid/long-term needs

All multilane roundabout alternatives are a 'hybrid' multilane roundabout where only up to two legs of the roundabout are complete multilane sections. All short-term, mid-term, and long-term intersection reconstruction recommendations are for urban intersections, unless otherwise noted.

I-229 Rice Street Interchange (Exit 7) through Bahnson Avenue

The operational and safety analysis findings at the I-229 Rice Street Interchange (Exit 7) ramp terminal intersection highlight the benefits of corridor expansion/reconfiguration to a 4-lane / 6-lane divided multilane section and additional intersection improvements. Traffic operations indicate capacity will exceed demand at approximately year 2040. Prior studies have indicated a similar need, however, along different timelines with the *I-229 Corridor Major Investment Study* indicating an operational need at the interchange around 2035 and approximately 2050 in the *2020 Decennial Interstate Corridor Study*. In terms of crash history, the I-229 NB RTI/Cleveland Avenue, I-229 SB RTI, and Lowell Avenue intersections were found to have elevated critical crash ratios compared to other study area intersections. In addition, the Rice Street segment between the I-229 interchange and Bahnson Avenue exhibited the highest segment crash rates along the study corridor and an elevated critical crash ratio.

Improvements in this area may be needed and would be beneficial for Rice Street operations prior to reconstruction of Rice Street east of Bahnson Avenue to a multilane typical section due to the anticipated earlier demand of capacity improvements near the interchange. Also, the pavement condition along Rice Street near the interchange and on the west side of the study corridor will require improvement in the short-term. In addition, existing Rice Street configurations does not include sidewalk on either side so multimodal improvements would improvement bike/pedestrian route connectivity in this area.

Already planned improvement for the interchange include a SDDOT interchange study followed by a construction project anticipated to occur in 2032 based on needs identified in the *2020 Decennial Interstate Corridor Study*. City of Sioux Falls is also tentatively planning for major street construction along Rice Street between Cliff Avenue and Cleveland Avenue when traffic volumes increase on this segment. City of Sioux Falls would like to address Rice Street improvements in this area at the same time as a potential interchange construction project.

Rice Street Corridor: I-229 Rice Street Interchange (Exit 7) Area

Short-Term Recommendation: Temporary Signal (Bahnson – 1)

- Construct temporary signal at Bahnson Avenue if/when warranted

Mid-Term Recommendation: 4-Lane / 6-Lane Divided Rice Street Corridor (I-229-1, I-229-2) (*between I-229 Rice Street Interchange and Bahnson Avenue*)

- Reconstruct Rice Street corridor as an urban 4-Lane / 6-Lane Divided Corridor (based on I-229-1 or I-229-2 alternative concepts) between I-229 Rice Street Interchange and Bahnson Avenue
    - I-229-1: Expanded multilane corridor with intersection improvements (I-229 MIS Rice 2/2A)
    - I-229-2: Expanded multilane corridor with intersection improvements and realigned I-229 SB RTI with Lowell Avenue (I-229 MIS Rice 3)
    - Note: Cleveland Avenue realignment (shown in I-229 MIS Rice 3C) was eliminated due to feasibility and recent development
- Reconstruct Bahnson Avenue intersection and signalize when warranted
- Maintain ramp terminal intersections as signalized intersections
- Construct 10 ft shared-use path on south side
- Construct sidewalk on north side
- Incorporate access management treatments as opportunities arise

Bahnson Avenue Extension

Long-Term Recommendation: 3-Lane Corridor (two lanes with left turn lanes at major intersections)

- Bahnson Avenue extension (Bahnson Extension – 1) between Rice Street and Broken Arrow Street to improve north/south collector connectivity with Rice Street

Rice Street – East of Bahnson Avenue to West of Veterans Parkway

Between Bahnson Avenue and Veterans Parkway, Rice Street currently features free-flow traffic with well-managed access that includes turn lanes. Congestion and impacts to reliability are generally associated with the Ellis & Eastern Railroad and BNSF Railway crossings and slow industrial truck traffic. Speed was stated as a concern among motorists using the TWLTL as a passing lane. The primary operational need in the short to mid-term is the demand for additional eastbound and westbound through lanes at the Veterans Parkway intersection starting in 2028 based on directional AM and PM peak hour commuter traffic volumes (westbound travel into Sioux Falls in the AM and eastbound travel out of Sioux Falls in the PM). Based on this, the urban 4-Lane divided multilane typical section is recommended in the mid-term timeframe. In areas with floodplain, the hybrid 4-Lane divided multilane typical section can be utilized.

In the short-term, additional improvements such as build out of turn lanes at major driveway access points along this segment of Rice Street are not currently needed since they have already been constructed via an exclusive turn lane or center two-way left turn lane. Existing pavement condition on this segment needs replacement due to bad joints and high truck traffic in the interim prior to reconstruction as a multilane section. Access management treatments near the Great Bear Ski Valley access should be considered in the interim prior to Rice Street reconstruction as a multilane corridor to consolidate access and provide greater spacing from the adjacent BNSF Railway at-grade railroad crossing.

In this area, one major long-term operational concern was route reliability along Rice Street due to the three existing Ellis & Eastern Railroad (two crossings) and BNSF Railway (one crossing) at-grade railroad crossings. Both railroads, in particular for Ellis & Eastern Railroad, indicated that train traffic is only anticipated to increase which represents a major concern for route reliability. Due to the notable costs and environmental constraints, it is recommended that the proposed grade separation alternatives for the Ellis & Eastern (west) and BNSF Railway crossings be further investigated for their feasibility, particularly in conjunction with a potential Benson Road extension which may reduce the need for grade separation at those crossings.

Long-range route priority and network connectivity are important factors in the discussion surrounding the Benson Road extension alternatives between Sycamore Avenue and Veterans Parkway or Rice Street. The current Sioux Falls MPO TDM indicates a moderate demand for a Benson Road extension and increases somewhat if Benson Road is extended as the priority east/west route to Veterans Parkway. However, there are potentially significant costs and environmental impacts associated with either extension alternative due to the bridge and related structures needed to cross the Big Sioux River, grade changes along Rice Street, and concerns with the proximity to railroad ROW. Given those considerations, it is recommended that both Benson Road extension alternatives be further reviewed for feasibility and how those concepts would affect the need for additional railroad grade separation.

Additional street extension and realignment alternatives should be re-evaluated for feasibility and constructed as opportunities arise. The Sycamore Avenue extension alternative between Rice Street and Club View Drive should be constructed if the surrounding area redevelops and the grade of the proposed alignment is feasible. The Rice Street Transload Facility realignment alternative, which shifts Rice Street to the north near the Big Sioux River and away from the Ellis & Eastern (west) crossing should be reviewed for feasibility due to the notable impacts the alignment would have on floodplain and wetlands in this area. In addition, such a feasibility review should consider the impacts on the need for grade separation along the Rice Street corridor if the realignment concept is feasible.

Rice Street Corridor: East of Bahnson Avenue to West of Veterans Parkway

Short-Term Recommendation: Asphalt mill and overlay of existing 3-lane section and reconfigure as a 2-lane section with intersection turn lanes (*between I-229 and west of Veterans Parkway*)

- Mill and overlay existing Rice Street section (between I-229 and west of Veterans Parkway) as an interim measure prior to reconstruction as a multilane corridor
- Reconfigure roadway as a 2-lane section with intersection turn lanes
- Maintain bike lanes and evaluate opportunities for buffered bike lanes with future mill and overlay project
- Incorporate access management treatments as opportunities arise

Mid-Term Recommendation: Reconstruct as an Urban / Hybrid 4-Lane Divided Multilane Corridor (*between east of Bahnson Avenue to West of Veterans Parkway*)

- Reconstruct as Urban 4-Lane Divided Multilane Corridor with stop control / signalized intersections
    - Hybrid 4-Lane Divided Multilane corridor segment recommended through floodplain
- Shared-use path included on south side
- Incorporate access management treatments as opportunities arise

Railroad Grade Separation

Long-Term Recommendation: Evaluate feasibility of railroad grade separation at Ellis & Eastern (west) and BNSF Railway (near Great Bear Ski Valley) railroad crossings

- Evaluate feasibility of railroad grade separation alternatives with consideration to floodplain and wetlands constraints near the Big Sioux River, ROW constraints, and related costs
    - Ellis & Eastern (west) crossing with Single Span Bridge or Long Span Structural Plate High Profile Arch alternatives with retaining walls
    - BNSF Railway crossing (near Great Bear Ski Valley) with Single Span or Five Span Bridge alternatives with retaining walls

Benson Road Extension

Long-Term Recommendation: Evaluate feasibility of a Benson Road Extension between Sycamore Avenue and Rice Street

- Evaluate feasibility of Benson Road extension alternatives as part of the next Long Range Transportation Plan (LRTP) with consideration to long-range traffic demand, floodplain and wetlands constraints near the Big Sioux River, ROW constraints, and related costs

Sycamore Avenue Extension

Long-Term Recommendation: 3-Lane Corridor (two lanes with left turn lanes at major intersections)

- Sycamore Avenue extension (Sycamore Extension – 1) between Rice Street and Club View Drive to improve north/south collector connectivity with Rice Street

Rice Street Transload Facility Realignment

Long-Term Option: Urban Multilane Corridor (realignment of Rice Street north of Transload Facility and Ellis & Eastern (west) crossing)

- Review feasibility of the Rice Street Transload Facility Realignment as an option to eliminate a crossing in lieu of railroad grade separation
    - Challenges include potential floodplain and wetlands constraints near the Big Sioux River and required ROW acquisition
    - Hybrid 4-Lane Divided Multilane corridor segment recommended through the floodplain

Great Bear Ski Valley Access Alternatives

Short-Term Recommendation: Construct Great Bear Ski Valley Access – Alternative 2

- Shifts Great Bear Ski Valley access to the east to increase separation from railroad crossing
- Incorporates access management on north side and realigns driveway with south side access

Rice Street – Veterans Parkway Intersection Area

The primary Veterans Parkway intersection operational need in the short to mid-term is the traffic demand for additional eastbound and westbound through lanes starting in 2028 based on directional AM and PM peak hour commuter traffic volumes (westbound travel into Sioux Falls in the AM and eastbound travel out of Sioux Falls in the PM). Based on this, the urban 4-Lane divided typical section is recommended in the mid-term timeframe.

In this area, one major long-term operational concern was route reliability along Rice Street due to the three existing Ellis & Eastern Railroad and BNSF Railway at-grade railroad crossings. Based advantageous topography and associated structure type/length needs, it is recommended that the grade separation of the Ellis & Eastern (east) crossing near Veterans Parkway be constructed in conjunction with build out of the additional eastbound and westbound through lanes.

Rice Street Corridor: Veterans Parkway Intersection Area

Mid-Term Recommendation: Reconstruct as an Urban 4-Lane Divided Multilane Corridor (*Veterans Parkway Intersection Area*)

- Reconstruct as Urban 4-Lane Divided Multilane Corridor
- Shared-use path included on south side (west of Veterans Parkway) and on the north side (east of Veterans Parkway) and connect to existing Veterans Parkway shared-use path

Veterans Parkway Intersection

Mid-Term Recommendation: Signalized Intersections with improvements (Veterans – 1)

- Construct additional eastbound and westbound through lanes to improve capacity in conjunction with railroad grade separation at the Ellis & Eastern (east) railroad crossing

Railroad Grade Separation

Mid-Term Recommendation: Construct grade separation Ellis & Eastern (east) railroad crossing in conjunction with Veterans Parkway intersection improvements (Long Span Structural Plate High Profile Arch, Veterans – 1)

- Construct grade separation at Ellis & Eastern (east) railroad crossing
- Coordinate grade separation with Veterans Parkway intersection improvements and the build-out of additional eastbound and westbound through lanes along Rice Street (Veterans – 1)

Rice Street – East of Veterans Parkway through Six Mile Road

Rice Street between Veterans Parkway and Six Mile Road is anticipated to have the highest future traffic volumes along the study corridor with upwards of 21,000 vehicles per day traveling along this segment by 2050. This traffic growth is primarily development driven, both along this segment and elsewhere within the Brandon growth area to the east. Development between Veterans Parkway and Six Mile Road is likely limited to the south side due to limitations with Xcel Energy's operations on the north side.

To address this traffic growth, the mid-term recommendation for this area is to construct an urban 4-lane divided multilane corridor along Rice Street. Build-out recommendations also include a Rice Street alignment shift to the south to avoid having the new roadway being built over the existing City of Brandon force main and establishing 1/3-mile access points between Veterans Parkway and Six Mile Road. This includes closing the existing Xcel Energy access and routing to the 1/3-mile access west of Six Mile Road.

Following completion of Veterans Parkway, Six Mile Road saw a significant drop in traffic. Future daily traffic volumes along Six Mile Road near Rice Street / Holly Boulevard are anticipated to increase to 4,000 vehicles per day by 2050, likely driven by local development and build out of access locations. A Continuous Green T (CGT) intersection configuration is recommended for the Rice Street / Holly Boulevard & Six Mile Road intersection. This configuration improves safety and traffic flow by allowing westbound through traffic to continue through the intersection without stopping and providing an acceleration lane for northbound left turning movements to merge into westbound traffic downstream. The CGT configuration provides opportunities to add or drop lanes at the intersection which allows for the intersection build-out to occur as an individual intersection or as part of a corridor reconstruction. In addition, the CGT intersection can open unsignalized and then be signalized when warrants are met.

Rice Street Corridor: East of Veterans Parkway through Six Mile Road

Mid-Term Recommendation: Reconstruct as an Urban 4-Lane Divided Multilane Corridor

- Reconstruct as Urban 4-Lane Divided Multilane Corridor
- Shift roadway south to not conflict with City of Brandon force main
- Establish future full access points along corridor at 1/3-mile spacing
- Close existing Xcel Energy access and route to the 1/3-mile access west of Six Mile Road
- Construct 10 ft shared-use path on both sides

Six Mile Road Intersection

Mid-Term Recommendation: Continuous Green T Intersection (Six Mile CGT – 1)

- Reconstruct as Continuous Green T (CGT) intersection
  - Can open unsignalized and then signalize when warranted
- Construction can occur as an isolated intersection or with a corridor segment
  - If Rice Street is a 2-lane section east and/or west of the intersection, lanes can be added or dropped with the CGT intersection configuration

Holly Boulevard – East of Six Mile Road to West of Sioux Boulevard

Between Six Mile Road and Sioux Boulevard, long-term operational needs and corridor improvements along Holly Boulevard will be development driven. Daily traffic volumes are anticipated to increase to 20,000 vehicles per day by 2050. With these volumes, Lancer Avenue is anticipated to reach unacceptable levels of service and delay by around 2040 with the current roadway and intersection configurations.

Based on anticipated needs, it is recommended that Holly Boulevard be reconstructed as an Urban 4-Lane Divided Multilane Corridor with Multilane Roundabout intersections. The Multilane Roundabout configurations allow for phased implementation along the corridor where single-lane roundabouts can be constructed with the existing 2-lane / 3-lane Holly Boulevard corridor and then expanded when the corridor is reconstructed to a multilane section.

The study demonstrates multilane roundabout intersections provide the greatest long-range benefits in terms of traffic operations, safety, corridor compatibility, and associated construction costs. Through the 2050 Planning Horizon, the multilane roundabout traffic operations perform optimally in terms of LOS and overall delay and typically match and often exceed the performance of a signalized multilane intersection. A multilane roundabout can reduce injury crashes by upwards of 68 percent and total crashes by approximately 19 percent. By comparison, when a stop-controlled intersection is converted to a traffic signal, injury and total crashes are only reduced by 36 percent and 5 percent, respectively. In addition, the multilane roundabout configurations are readily compatible with the recommended Urban 4-Lane Divided Multilane corridor due to the available space along this developing portion of the corridor and side-street needs. Finally, construction costs of a multilane roundabout represent a savings of upwards of $0.6 million ($6.1 million for a multilane roundabout vs. $6.7 million for a traffic signal).

The corridor segment exhibits a variety of land use and corridor uses, leading to a diverse mix of vehicle types including passenger vehicles (local and pass-thru commuter traffic), large trucks and trailers, and bicycles and pedestrians. While passenger vehicles are the primary contributor to the high projected traffic growth, the large vehicles pose geometric challenges within the developed areas. Previously, modular homes were constructed north of the corridor and their routing used the Heritage Parkway intersection. The recommended multilane roundabout at Holly Boulevard & Heritage Road intersection will need to be further evaluated for feasibility with ROW constraints and adjacent property impacts.

A shared use path is recommended along both sides of the corridor with crossings at major intersections. Mid-block crossings may also be considered to enhance connectivity along bicycle and pedestrian desire paths.

Holly Boulevard Corridor: East of Six Mile Road to West of Sioux Boulevard

Short-Term Recommendation: Construct shared-use path on existing Big Sioux River bridge

- Construct shared-use path on existing Big Sioux River bridge to provide a dedicated facility for pedestrians and bicyclists ahead of constructing a multilane section west of the bridge

Mid-Term Recommendation: Reconstruct as an Urban 4-Lane Divided Multilane Corridor

- Reconstruct as Urban 4-Lane Divided Multilane Corridor with Multilane Roundabouts
    - Reconstruction to progress from east to west, starting west of the Big Sioux River bridge
    - Restripe existing Big Sioux River bridge for multilane section when the multilane segment is constructed west of the bridge
    - Construct 10 ft shared-use paths on both sides
- Incorporate access management treatments

Lancer Avenue Intersection

Mid-Term Recommendation: Multilane Roundabout Intersection (Lancer – 2)

- Reconstruct as Multilane Roundabout (Lancer – 2)

Heritage Road Intersection

Mid-Term Recommendation: Multilane Roundabout Intersection (Heritage – 2)

- Reconstruct as Multilane Roundabout
    - If the multilane roundabout intersection footprint is constrained, consider reconstructing as a Multilane Signalized Intersection (Heritage – 3 & 4)

Sandstone Avenue Intersection

Mid-Term Recommendation: Multilane Roundabout Intersection (Sandstone – 2)

- Reconstruct as Multilane Roundabout (Sandstone – 2)

Development Intersections (West and East)

Short-Term Recommendation: Single-Lane Roundabout Intersections (Development W & E – 1)

- Construct Single-Lane Roundabouts at proposed West and East Development intersections along existing Holly Boulevard corridor

Mid-Term Recommendation: Multilane Roundabout Intersections (Development W & E – 2)

- Expand Single-Lane Roundabouts to Multilane Roundabouts at proposed West and East Development intersections (Development W & E – 2)

Holly Boulevard – Sioux Boulevard to SD11 / Splitrock Boulevard

Between Sioux Boulevard and SD11 / Splitrock Boulevard, the existing Holly Boulevard corridor and study intersections meet LOS goals through the 2050, indicating that corridor expansion is not anticipated through the study planning horizon. Based on the Sioux Falls MPO TDM, long-range future traffic growth is highest near Sioux Boulevard and lowest near SD11 / Splitrock Boulevard with 2050 traffic volumes gradually decreasing west to east from 13,500 to 10,500 vehicles per day. No intersection operational improvements were identified, however, any improvements to the SD11 / Splitrock Boulevard intersection should be coordinated with planned improvements from the SD11/Splitrock Boulevard Corridor Study.

Although 2050 planning horizon traffic volumes did not warrant a Holly Boulevard corridor expansion, multilane corridor conceptual layouts for variations of an Urban 4-Lane Divided and 5-Lane corridors were developed primarily to gauge fit within available ROW and illustrate long-range vision elements. The multilane corridor scenarios represent feasible concepts ranging from high levels of access management with the 4-lane divided corridor, a 4-lane divided/5-lane hybrid corridor, and the lowest level with the 5-lane corridor. While analyzed capacity needs did not include a multilane corridor in the 2050 planning horizon, Holly Boulevard should be monitored for a potential corridor expansion need.

All corridor scenarios (either existing or multilane concepts) also reflect several priority improvements that can be constructed individually or part of larger projects as opportunities arise. These projects include the installation of a raised median west of Sioux Boulevard within the existing 5-lane section, a Pasque Flower Trail single-lane roundabout and raised median, and driveway access and parking lot modifications for the business access in the northeast quadrant at the Holly Boulevard & SD11 / Splitrock Boulevard intersection. In addition, several concepts related to the Middle School Access / 6th Avenue, Maple / 7th Avenue, and High School Access intersections which should be reviewed further with the Brandon Valley School District to determine the appropriate long-range configurations. Concepts include roundabout or signal options which can be used interchangeably for mixed corridors.

Holly Boulevard Corridor: Sioux Boulevard to SD11 / Splitrock Boulevard

Short-Term, Mid-Term, and Long-Term Recommendation (Opportunistic): Implement Holly Boulevard Priority Improvements and School Access Reconfigurations

- Implement Holly Boulevard priority improvements and school access reconfiguration

Long-Term Recommendation: Maintain Existing 3-Lane Corridor, Monitor Need for Corridor Expansion

- Monitor need for additional lanes

Sioux Boulevard Intersection

Short-Term Recommendation (Opportunistic): Implement Priority Improvements

- Install raised median between Big Sioux River bridge and Sioux Boulevard
    - Segment 1: Big Sioux River to railroad crossing
    - Segment 2: railroad crossing to Sioux Boulevard
    - If not yet completed, construct with multilane segment west of Big Sioux River bridge

Long-Term Recommendation: Maintain Existing Signalized Intersection, Monitor Need for Intersection Improvements

- Maintain existing signalized intersection
- Monitor need for intersection improvements

Pasque Flower Trail Intersection

Short-Term Recommendation (Opportunistic): Implement Priority Improvements

- Construct Single-Lane Roundabout intersection at Pasque Flower Trail
    - Evaluate opportunity when existing traffic signal needs replaced

6th Avenue, Maple / 7th Avenue, & High School Access Intersections

Short-Term Recommendation (Opportunistic): Implement School Access Reconfigurations

- Modify school access to Holly Boulevard
    - Close existing access at 6th Avenue and relocate to Maple / 7th Avenue to increase driveway length and internal vehicle storage
    - Remove traffic signal at 6th Avenue
    - Consider roundabout or traffic signal at Maple / 7th Avenue
    - Consider roundabout at High School access
    - Consider mini-roundabout options

SD11 / Splitrock Boulevard Intersection

Short-Term Recommendation (Opportunistic): Implement Priority Improvements

- Close driveway access west of SD11 / Splitrock Boulevard, north side of Holly Boulevard, and route traffic to existing access approximately 445 feet west of SD11 / Splitrock Boulevard
    - Relocate sign and revise parking configurations to enhance east/west route within development
    - Construct internal parking lot connection to larger parking area on north side of parcel
    - If not yet completed, implement access management as part of SD11 / Splitrock Boulevard reconstruct project

Mid-Term Recommendation: Coordinate Implementation of Planned Improvements from SD11 / Splitrock Boulevard Corridor Study

- Coordinate implementation of planned improvements from SD11 / Splitrock Boulevard Corridor Study

Long-Term Recommendation: Maintain Existing Signalized Intersection, Monitor Need for Intersection Improvements

- Maintain existing signalized intersection
- Monitor need for intersection improvements

Jurisdictional Transfer

Jurisdictional transfer of Rice Street / Holly Boulevard segments not already within either City of Brandon or City of Sioux Falls jurisdiction is recommended in conjunction with each corridor segment major investment (reconstruction) and/or annexation.

Short-Term and Mid-Term Recommendations Summary

An overview of short-term and mid-term corridor and intersection recommendations is shown in **Figure 47** and **Figure 48**, respectively. Conceptual layouts of the mid-term recommendations (which also cover the short-term layouts) are shown in **Figure 49**.

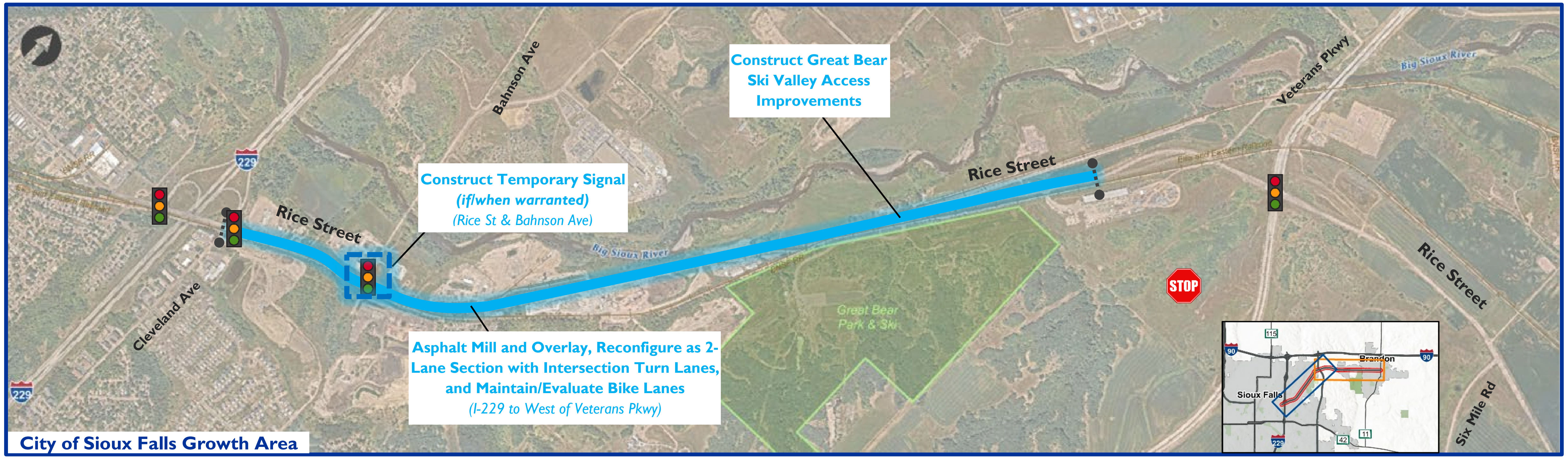
Long-Term Recommendations and Considerations Summary

An overview of long-term recommendations and the long-range vision for the corridor and related intersections is shown in **Figure 50**Figure 50: Long-Term Recommendations and Considerations Overview. Conceptual layouts of the recommended long-term corridor are shown in **Figure 51**.

Long-Range Vision Summary

An overview of long-term recommendations and the long-range vision for the corridor and related intersections is shown in **Figure 52**. Conceptual layouts of the recommended long-range corridor vision are shown in **Figure 53**.

SHORT-TERM RECOMMENDATIONS



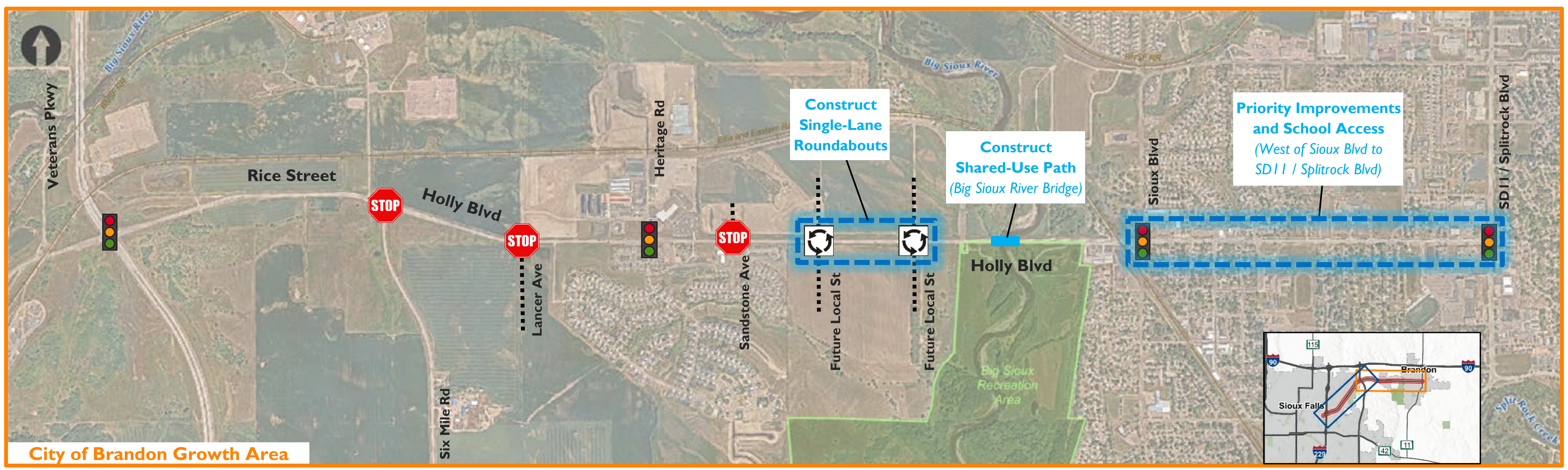


Figure 47: Short-Term Recommendations Overview

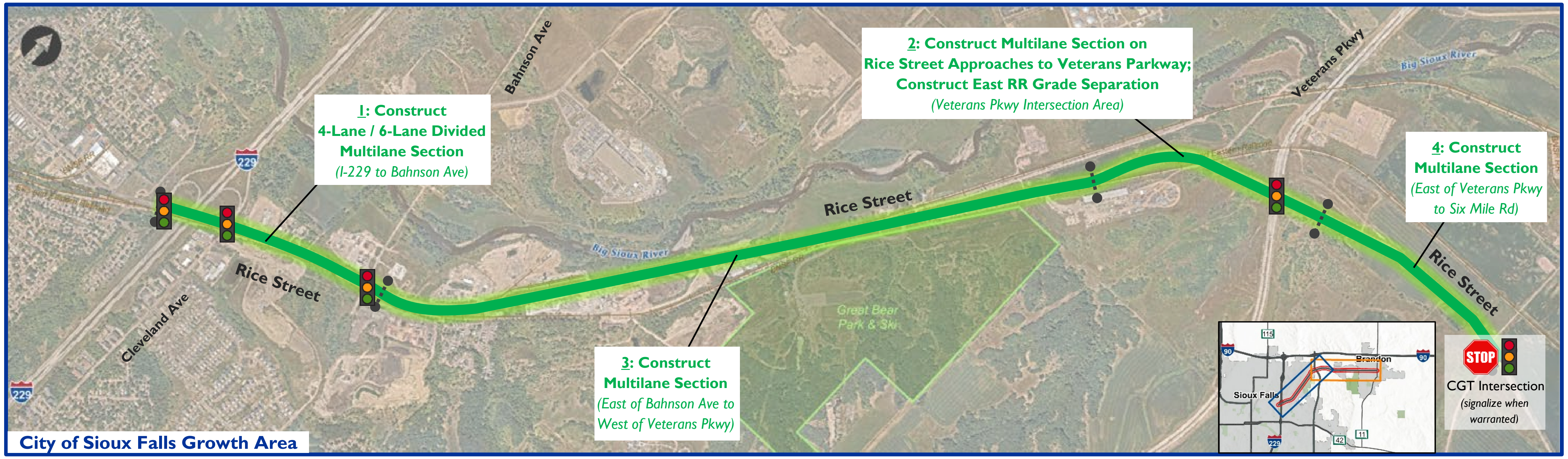
INTERSECTIONS:

- Roundabout
- Traffic Signal
- Stop Signs

ROAD SEGMENTS:

Urban 4-Lane Divided Multilane Section:
2 lanes each direction plus center left turn lane or raised median and multimodal elements

MID-TERM RECOMMENDATIONS



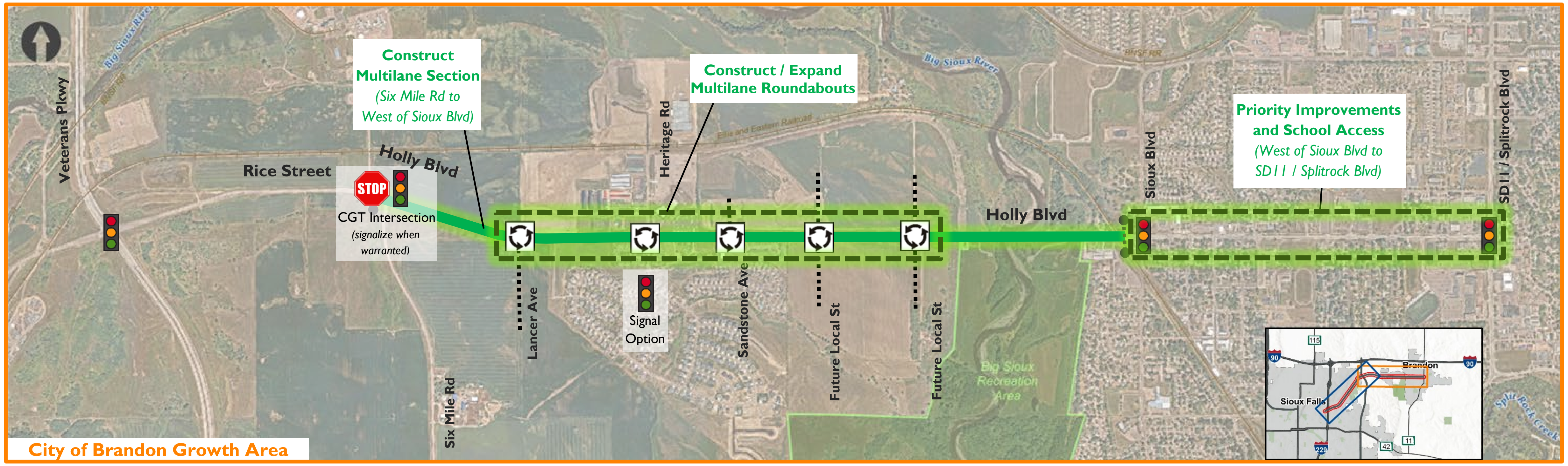


Figure 48: Mid-Term Recommendations Overview

INTERSECTIONS:

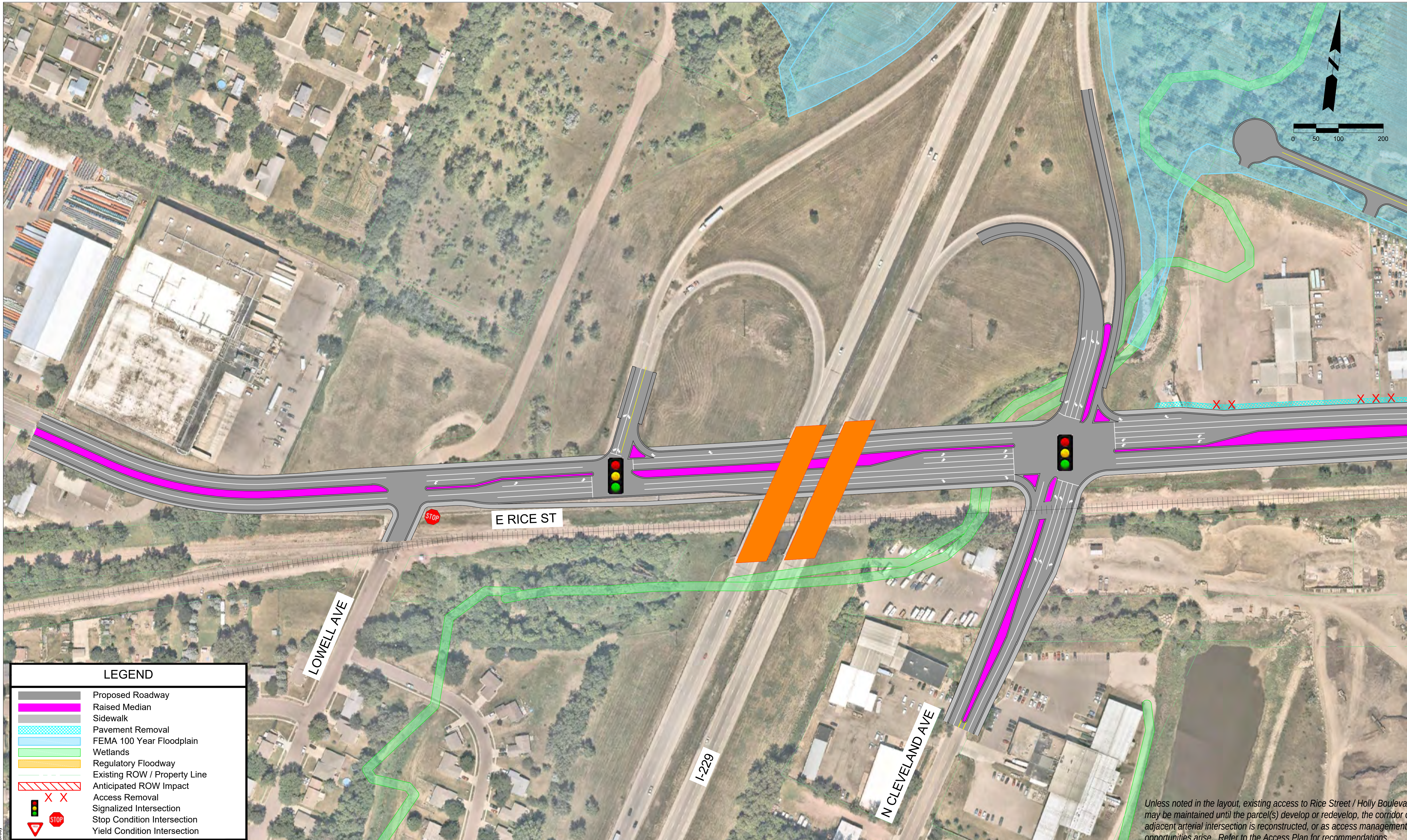
- Roundabout
- Traffic Signal
- Stop Signs

ROAD SEGMENTS:

Urban / Hybrid Multilane Section:
2 lanes each direction plus center left turn lane or raised median and multimodal elements

City of Sioux Falls Growth Area Mid-Term Project Prioritization:

1. I-229 to Bahnson Ave
2. Veterans Pkwy Intersection Area
3. East of Bahnson Ave to West of Veterans Pkwy
4. East of Veterans Pkwy to Six Mile Rod



Unless noted in the layout, existing access to Rice Street / Holly Boulevard may be maintained until the parcel(s) develop or redevelop, the corridor or adjacent arterial intersection is reconstructed, or as access management opportunities arise. Refer to the Access Plan for recommendations.

Recommended Mid-Term Corridor Option

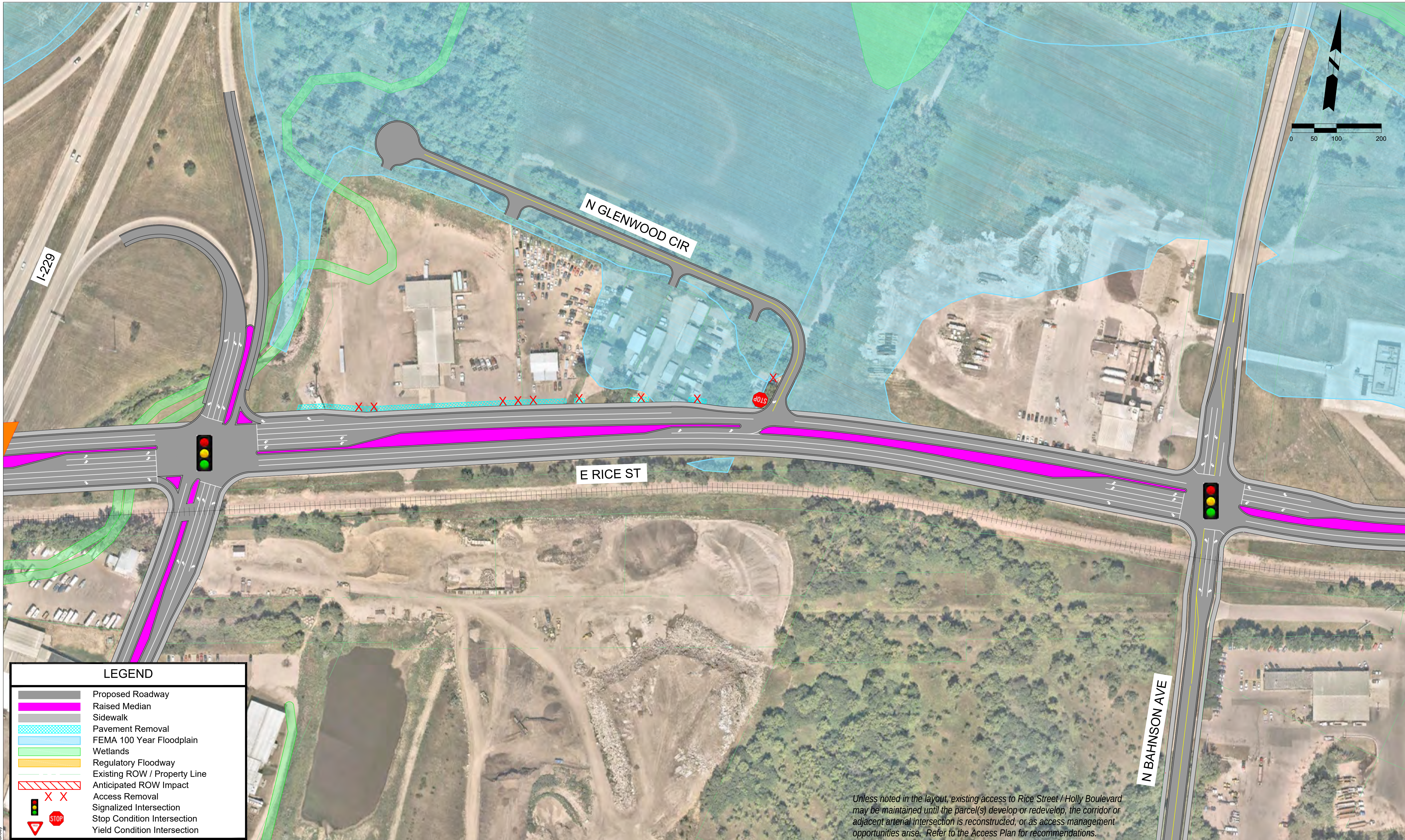
I-229 Exit 7 (Rice Street) Interchange

Reconstruct Existing Configuration *Rice Street Corridor Section: Multilane*

Concept I-229 - 1

Figure 49.a

Rev: 3/8/2024



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Recommended Mid-Term Corridor Option

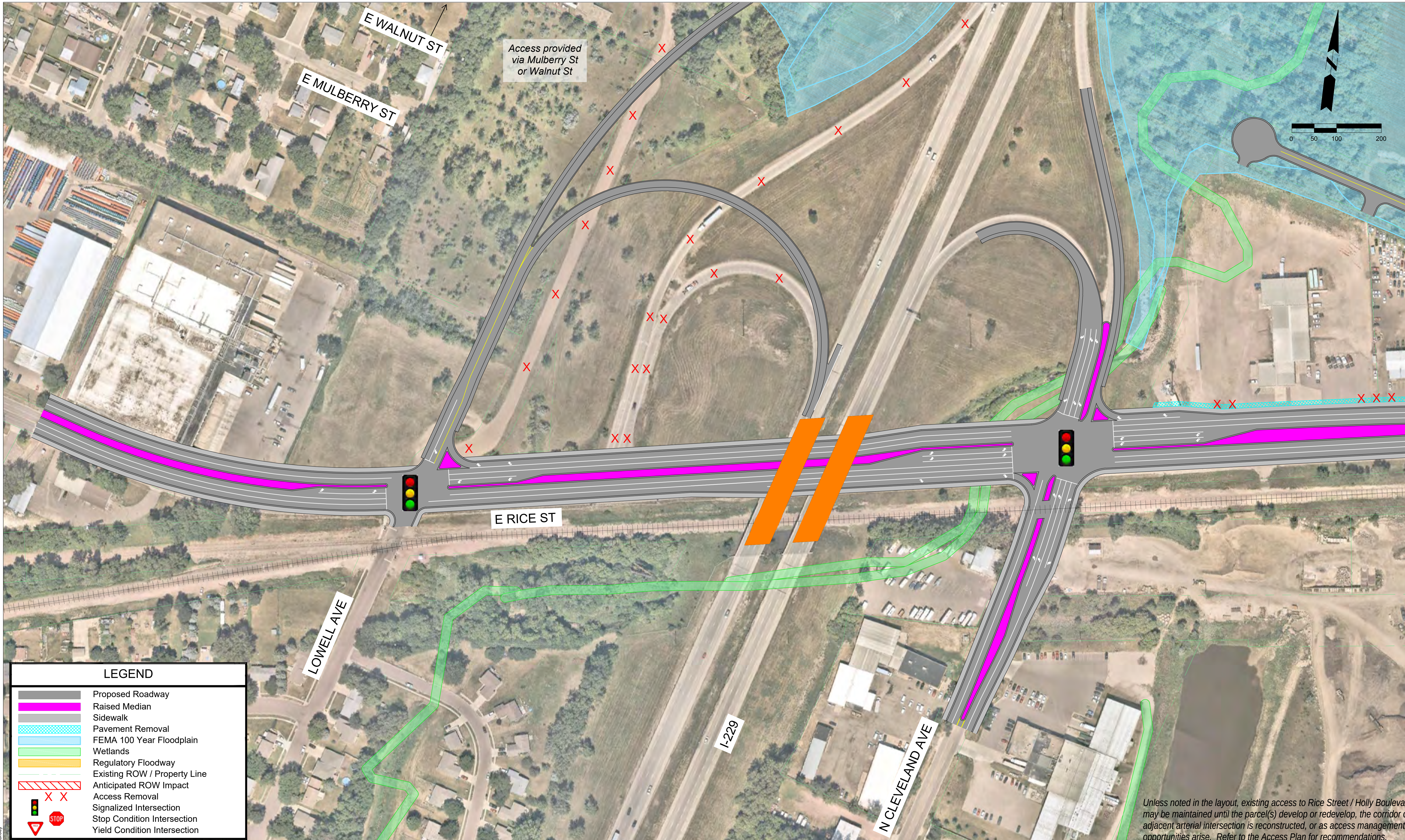
I-229 Exit 7 (Rice Street) Interchange

Reconstruct Existing Configuration *Rice Street Corridor Section: Multilane*

Concept
I-229 - 1

Figure
49.b

Rev: 3/8/2024



Recommended Mid-Term Corridor Option

I-229 Exit 7 (Rice Street) Interchange

Reconstruct with Lowell Avenue Direct Connection *Rice Street Corridor Section: Multilane*

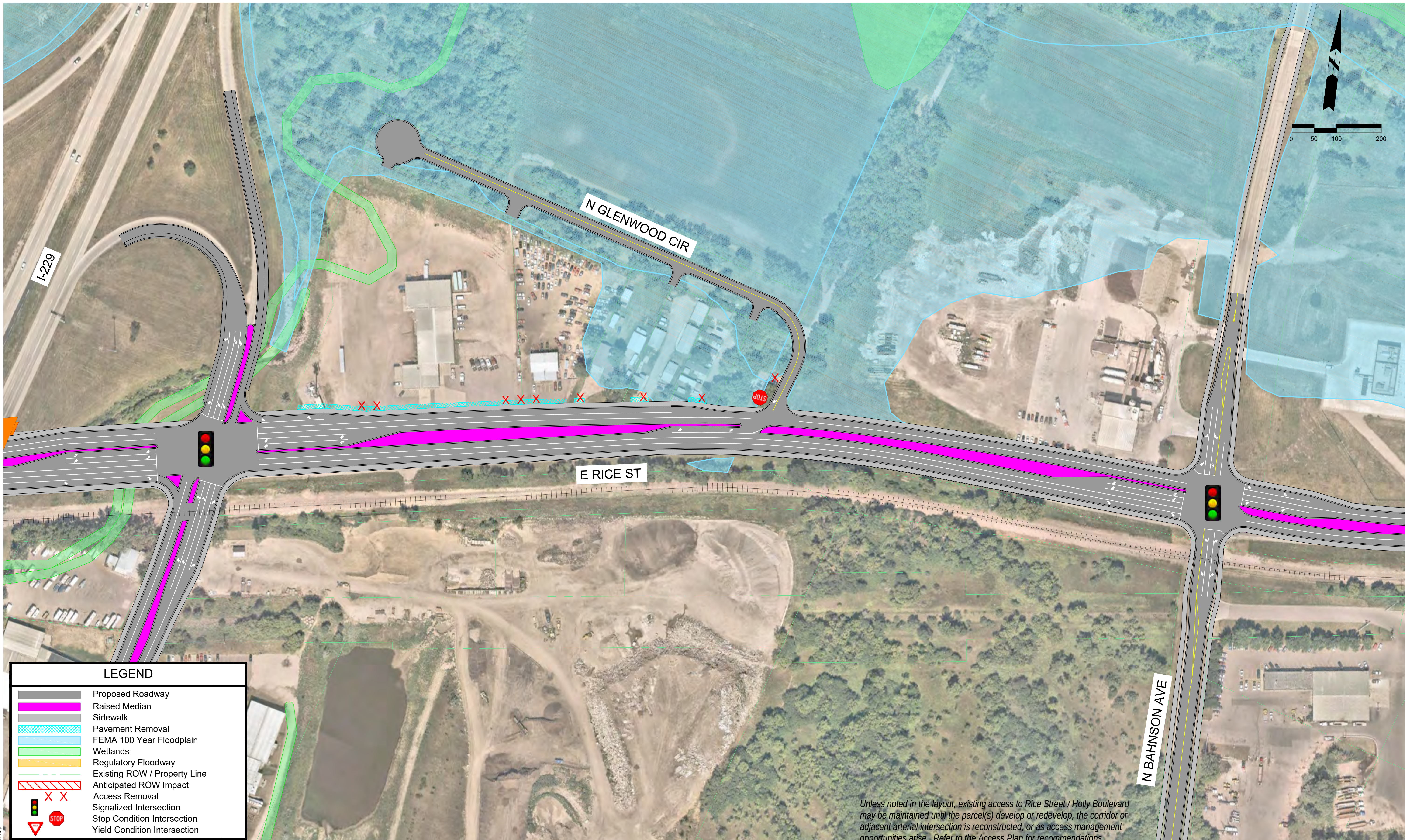
Concept

I-229 - 2

Figure

49.c

Rev: 3/8/2024



Recommended Mid-Term Corridor Option

I-229 Exit 7 (Rice Street) Interchange

Reconstruct with Lowell Avenue Direct Connection *Rice Street Corridor Section: Multilane*

Concept

I-229 - 2

Figure

49.d

Rev: 3/8/2024

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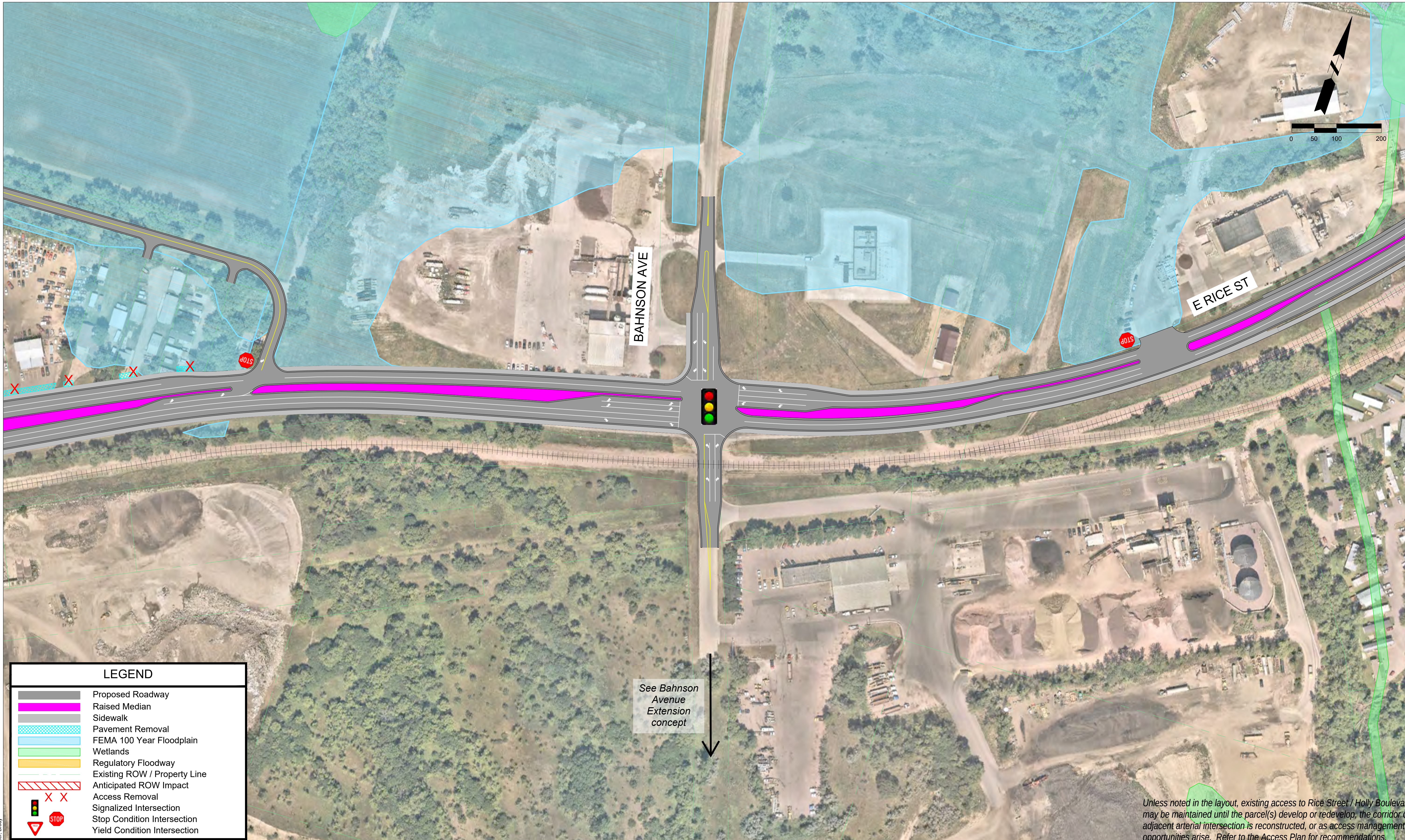

Unless noted in the layout, existing access to Rice Street / Holly Boulevard may be maintained until the parcel(s) develop or redevelop, the corridor or adjacent arterial intersection is reconstructed, or as access management opportunities arise. Refer to the Access Plan for recommendations.

Recommended Mid-Term Corridor

Bahnson Avenue & Rice Street Intersection

Intersection Type:Traffic Signal *Rice Street Corridor Section: Multilane*

Concept
Bahnson to Sioux Signalized

Figure
49.e

Rev: 11/29/2023

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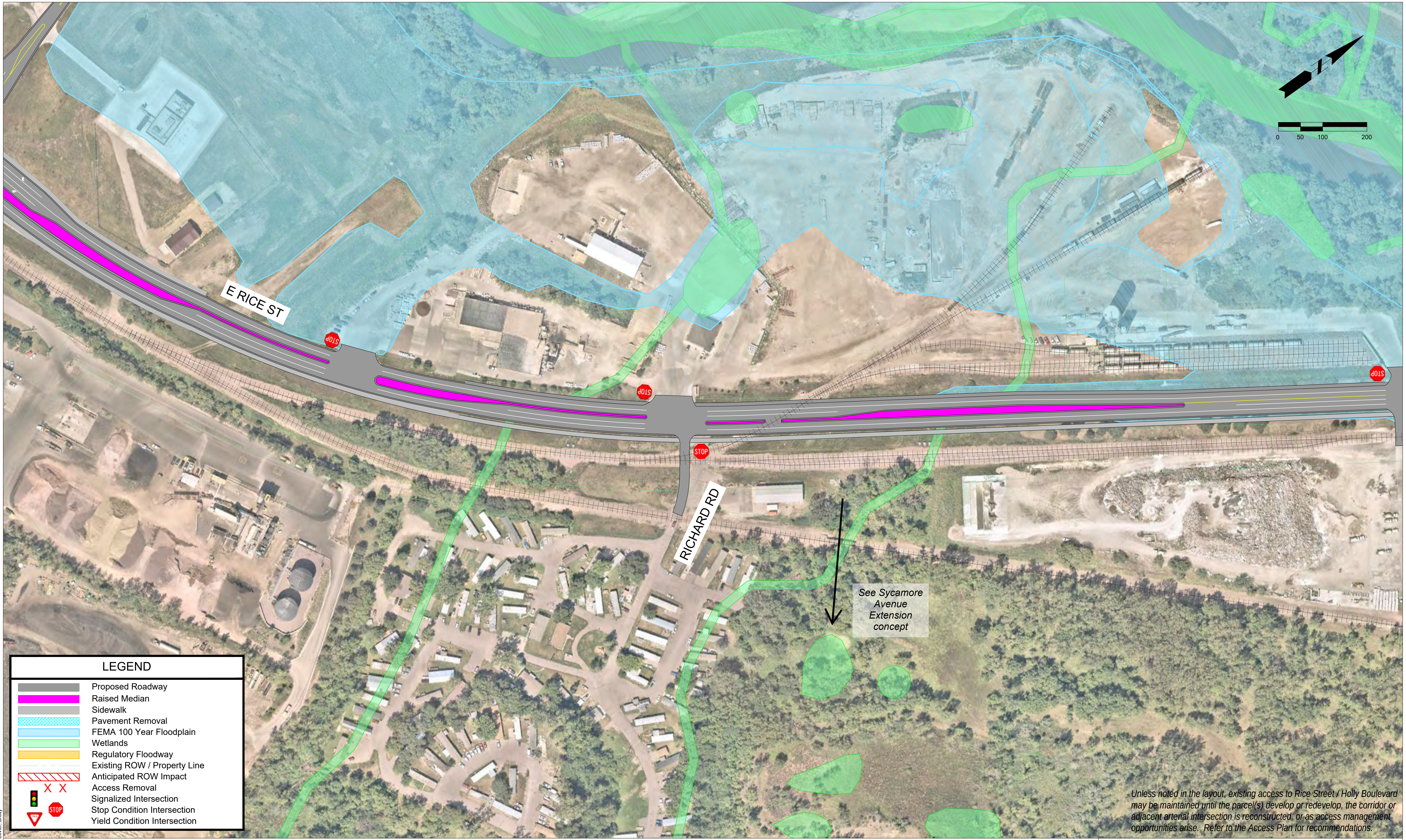

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Recommended Mid-Term Corridor

Richard Road & Rice Street Intersection Area

Intersection Type: Stop Control *Rice Street Corridor Section: Multilane*

Concept
Bahnson to Sioux Signalized

Figure
49.f

Rev: 11/29/2023

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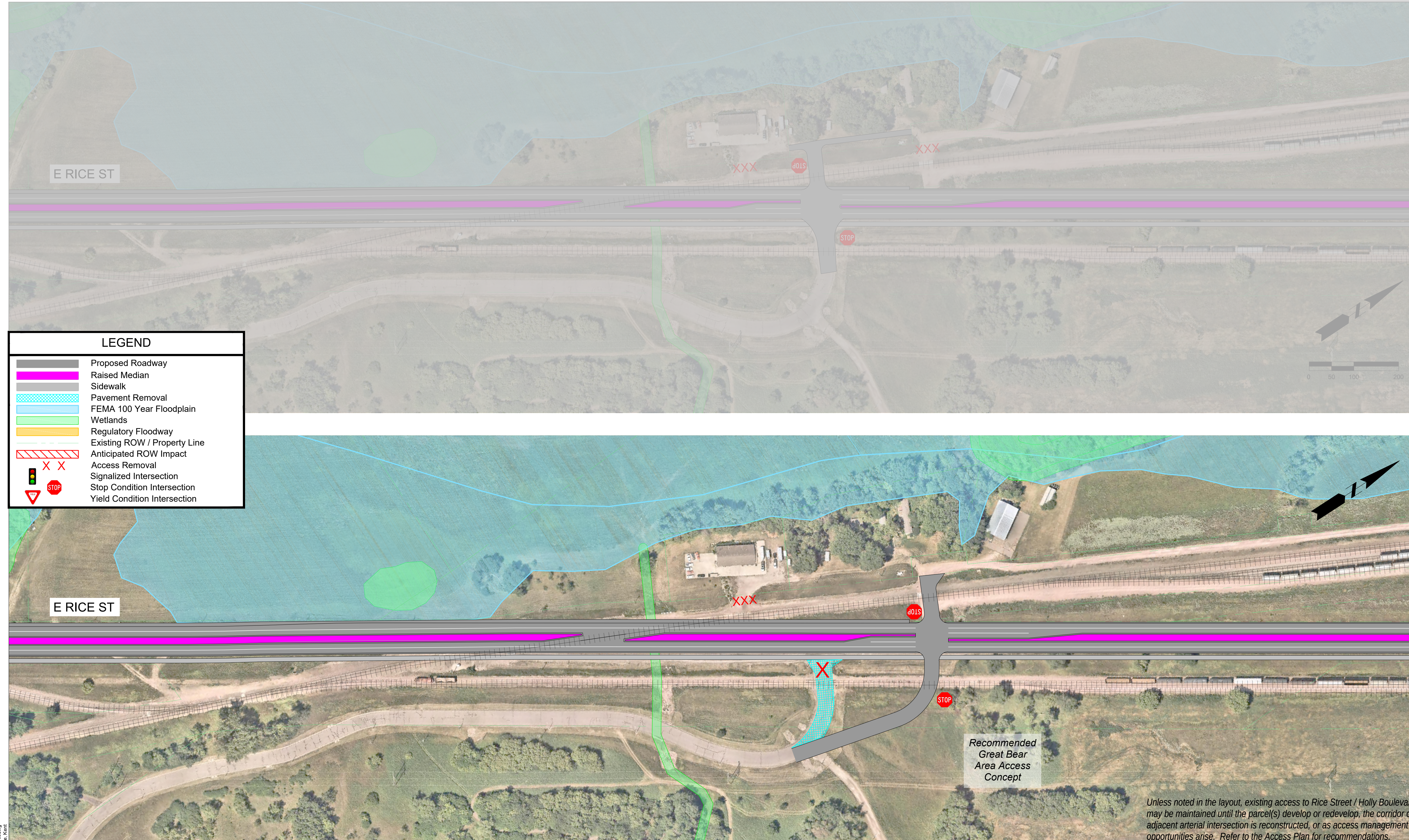

Recommended Short-Term and Mid-Term Corridor

Rice Street: Great Bear Area Access

Rice Street Corridor Section: 4-Lane Divided

Concept

Great Bear Area Access 2

Figure 49.g

Rev: 11/28/2023

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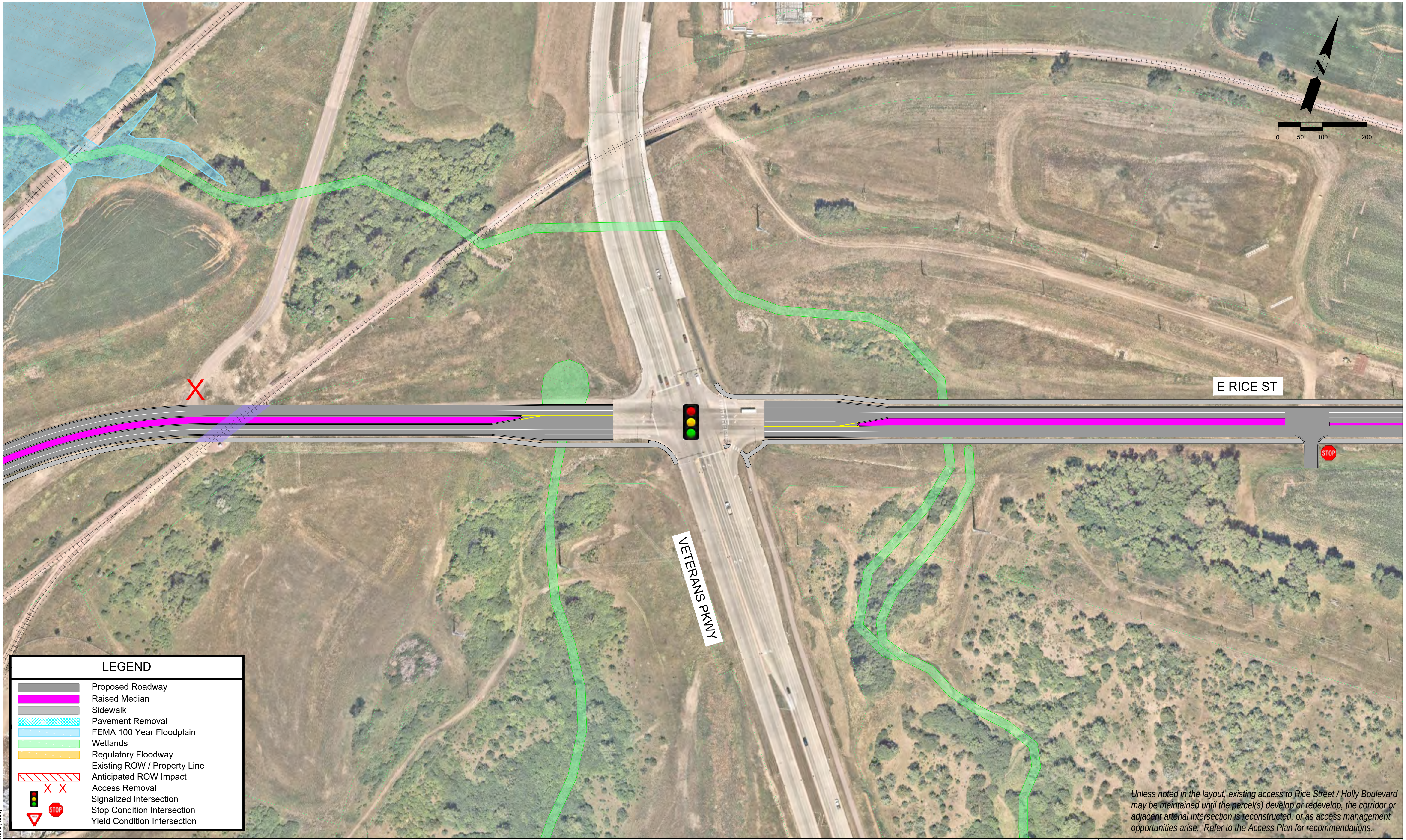

Unless noted in the layout, existing access to Rice Street / Holly Boulevard may be maintained until the parcel(s) develop or redevelop, the corridor or adjacent arterial intersection is reconstructed, or as access management opportunities arise. Refer to the Access Plan for recommendations.

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Recommended Mid-Term Corridor

Veterans Parkway & Rice Street Intersection

Intersection Type: Traffic Signal *Rice Street Corridor Section: Multilane*

Concept

Bahnson to Sioux Signalized

Figure 49.h

Rev: 11/29/2023

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Recommended Mid-Term Corridor

Six Mile Road & Rice Street/Holly Boulevard Intersection

Intersection Type: Continuous Green T *Rice Street/Holly Blvd Corridor Section: 4-Lane Divided*

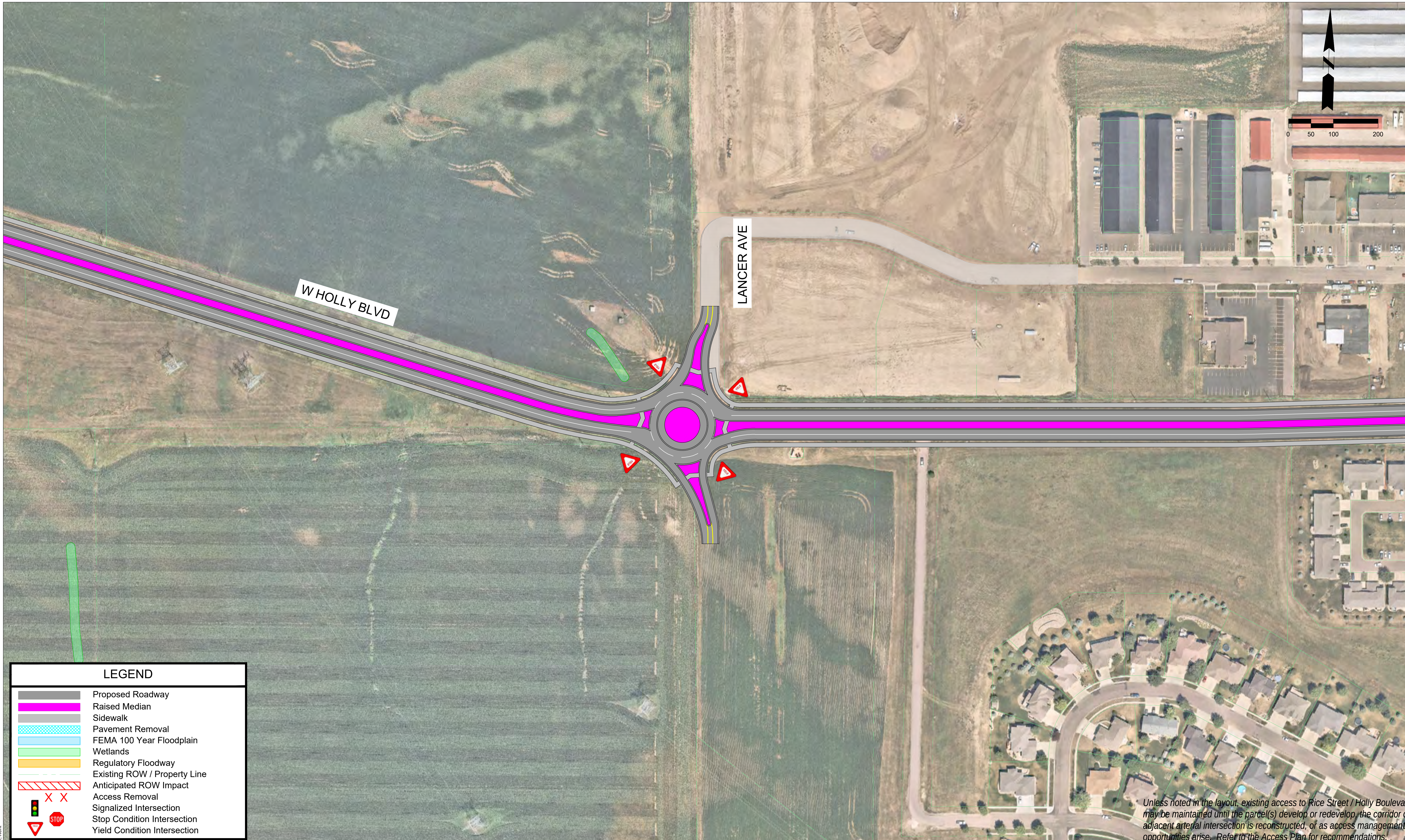
Concept

Six Mile CGT - 1

Figure

49.i

Rev: 4/2/2024



Recommended Mid-Term Corridor

Lancer Avenue & Holly Boulevard Intersection

Intersection Type: Multilane Roundabout *Holly Blvd Corridor Section: Multilane*

Concept
Lancer - 2

Figure
49.j

Rev: 11/29/2023

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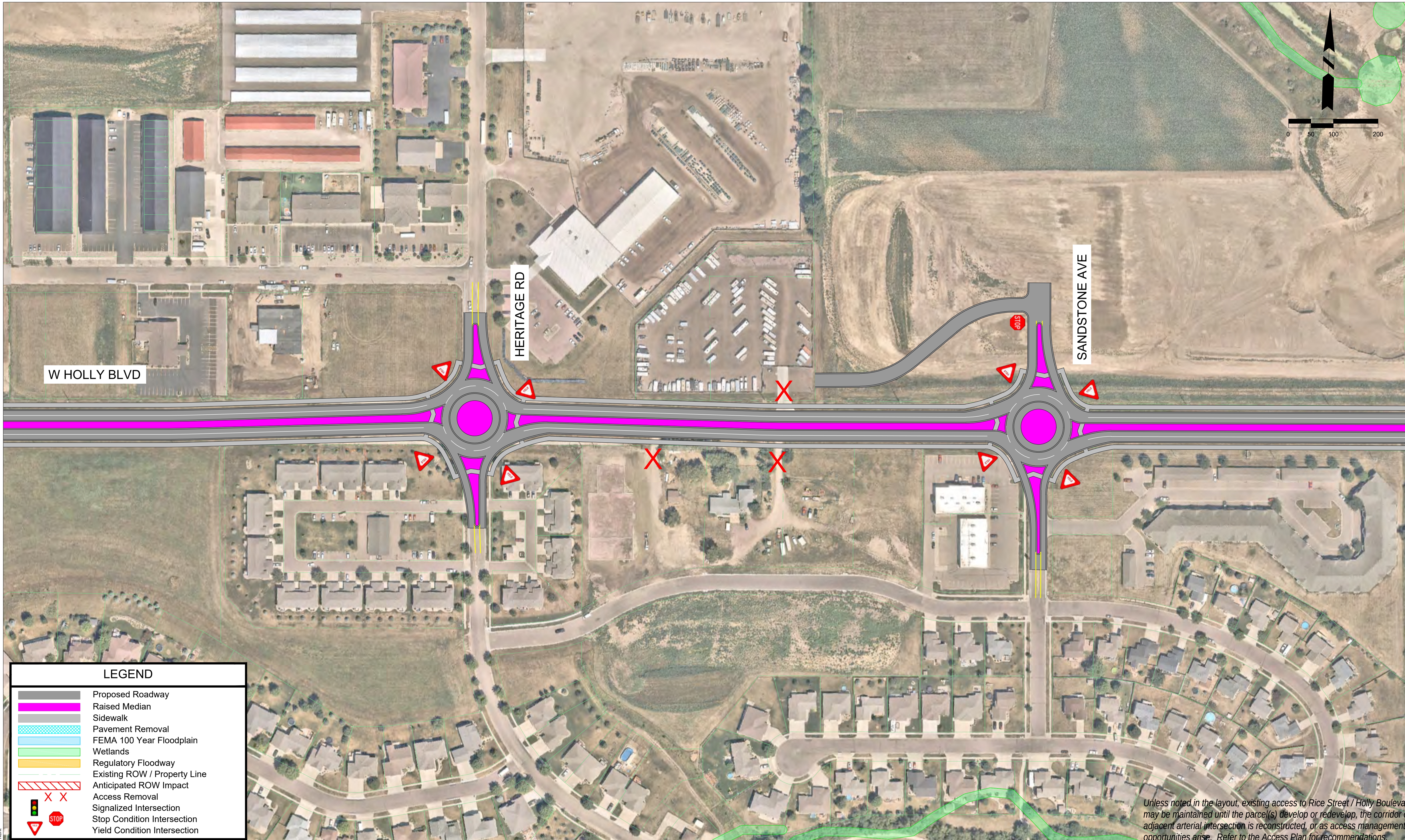

LEGEND	
	Proposed Roadway
	Raised Median
	Sidewalk
	Pavement Removal
	FEMA 100 Year Floodplain
	Wetlands
	Regulatory Floodway
	Existing ROW / Property Line
	Anticipated ROW Impact
X X	Access Removal
	Signalized Intersection
STOP	Stop Condition Intersection
	Yield Condition Intersection

Unless noted in the layout, existing access to Rice Street / Holly Boulevard may be maintained until the parcel(s) develop or redevelop, the corridor or adjacent arterial intersection is reconstructed, or as access management opportunities arise. Refer to the Access Plan for recommendations.

Recommended Mid-Term Corridor

Heritage Road, Sandstone Avenue & Holly Boulevard Intersections

Intersection Type: Multilane Roundabout *Holly Blvd Corridor Section: Multilane*

Concept
Heritage - 2
Sandstone - 2

Figure
49.k

Rev: 11/29/2023

Unless noted in the layout, existing access to Rice Street / Holly Boulevard may be maintained until the parcel(s) develop or redevelop, the corridor or adjacent arterial intersection is reconstructed, or as access management opportunities arise. Refer to the Access Plan for recommendations.

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Recommended Short-Term Corridor

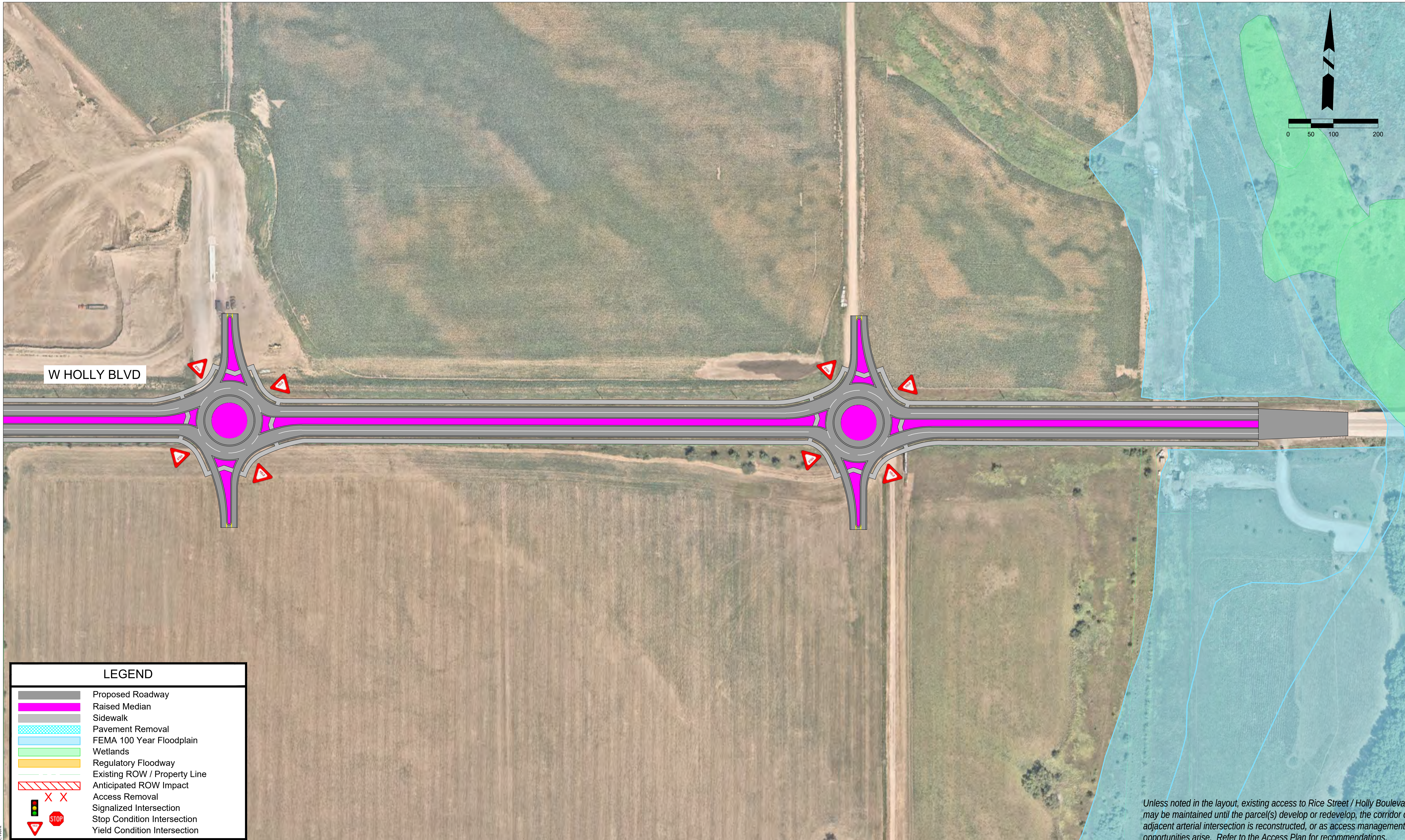
Future Development Street & Holly Boulevard Intersections

Intersection Type: Single Lane Roundabout *Holly Blvd Corridor Section: 3-Lane*

Concept
Development West - 1
Development East - 1

Figure
49.I

Rev: 11/28/2023



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Recommended Mid-Term Corridor

Future Development Street & Holly Boulevard Intersections

Intersection Type: Multilane Roundabout *Holly Blvd Corridor Section: Multilane*

Concept

Bahnson to Sioux Roundabout & Signalized

Figure

49.m

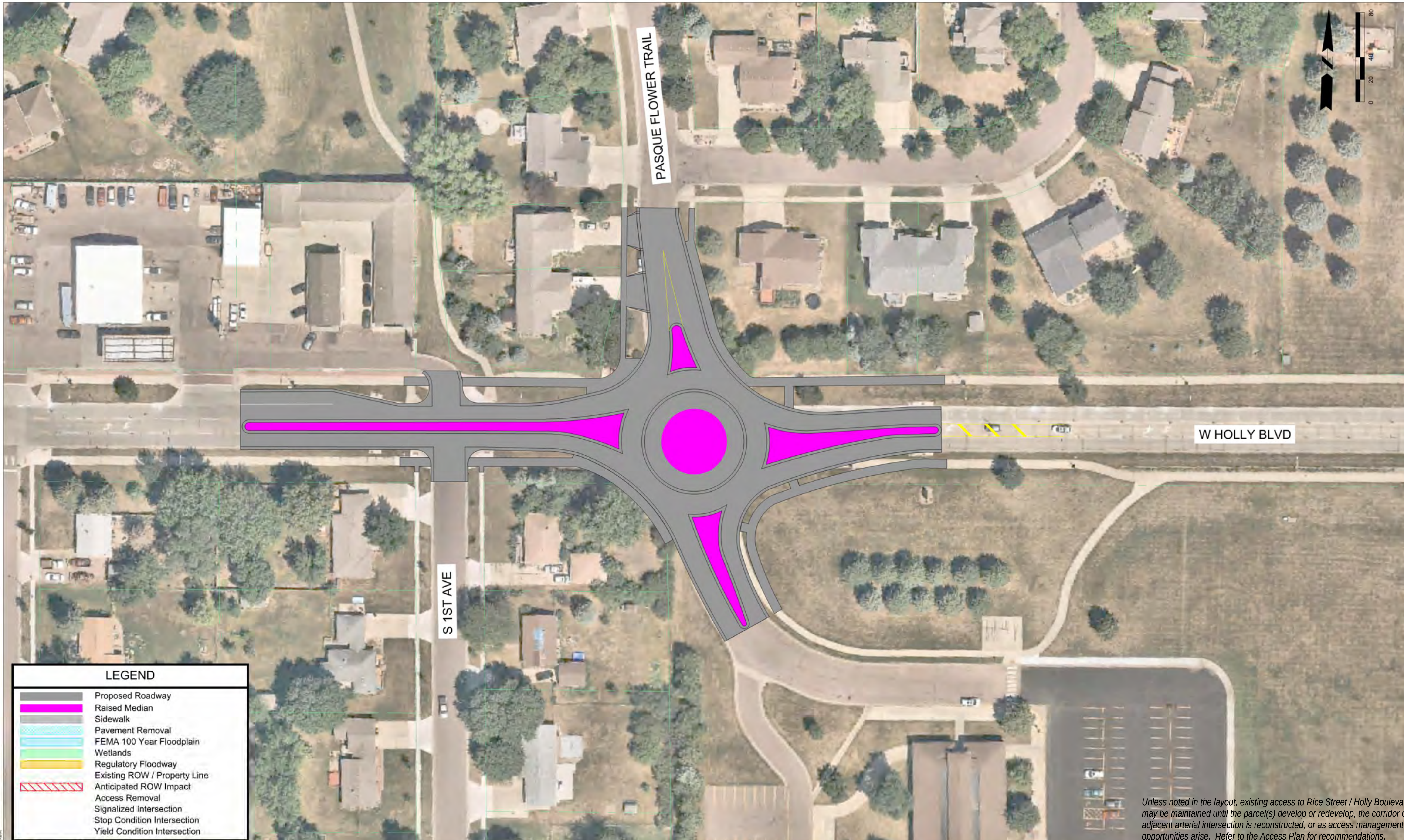
Rev: 11/29/2023

Recommended Rice Street / Holly Boulevard Corridor: Sioux Boulevard to SD11 / Splitrock Boulevard

Recommended Short-Term, Mid-Term, and Long-Term Corridor

Rice Street Corridor Section: Existing 3-Lane Corridor with Priority Improvements

Figure 49.n



Recommended Short-Term, Mid-Term and Long-Term Corridor Option

Holly Boulevard / Pasque Flower Trail

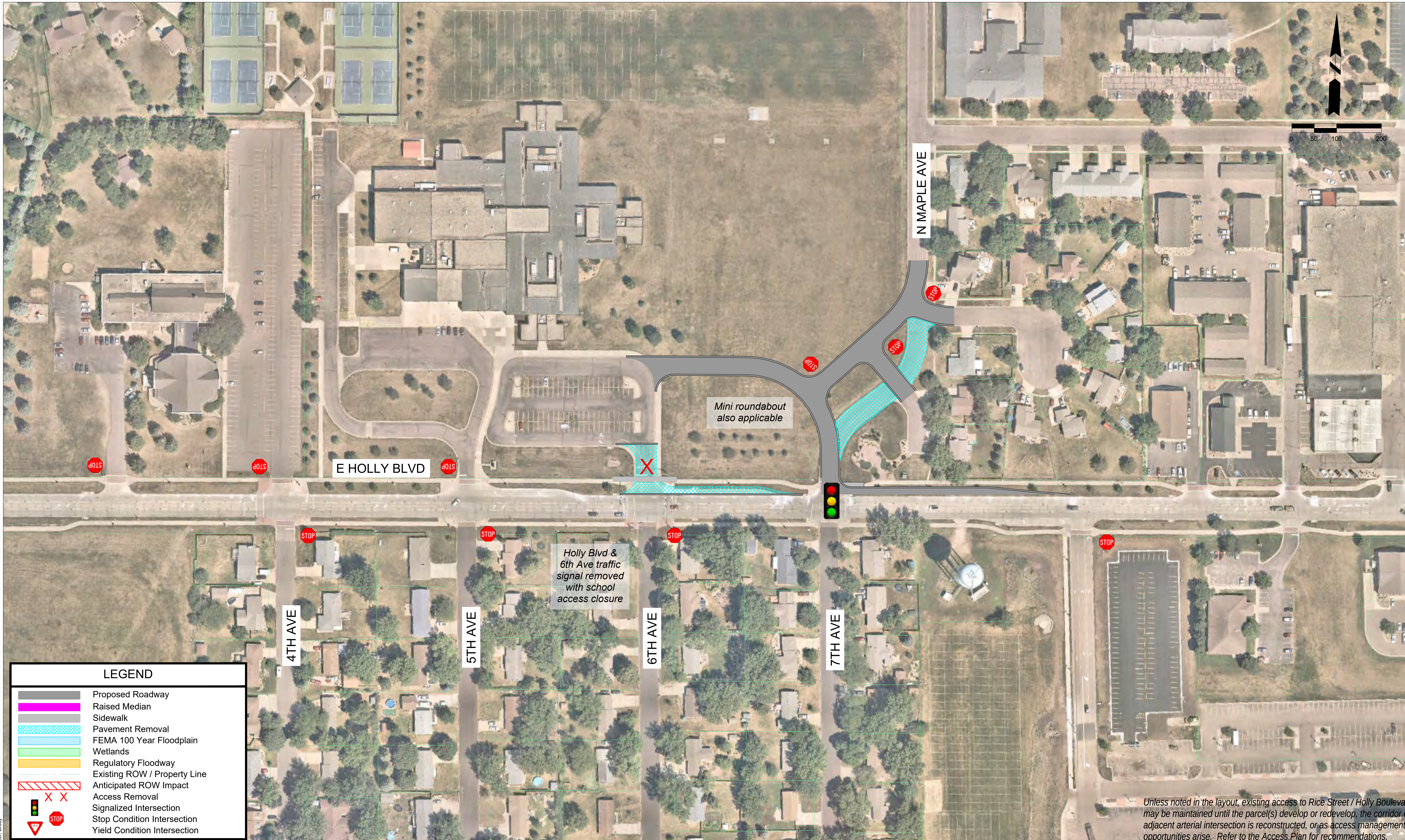
Single-Lane Roundabout

Concept

Pasque Flower Trail Roundabout

Figure

49.o



Recommended Short-Term, Mid-Term, and Long-Term Corridor Option

Holly Boulevard / Maple Avenue / School Sub-Area

Maple Avenue Connection

Concept

School - 1

Figure

49.p

Rev: 11/28/2023

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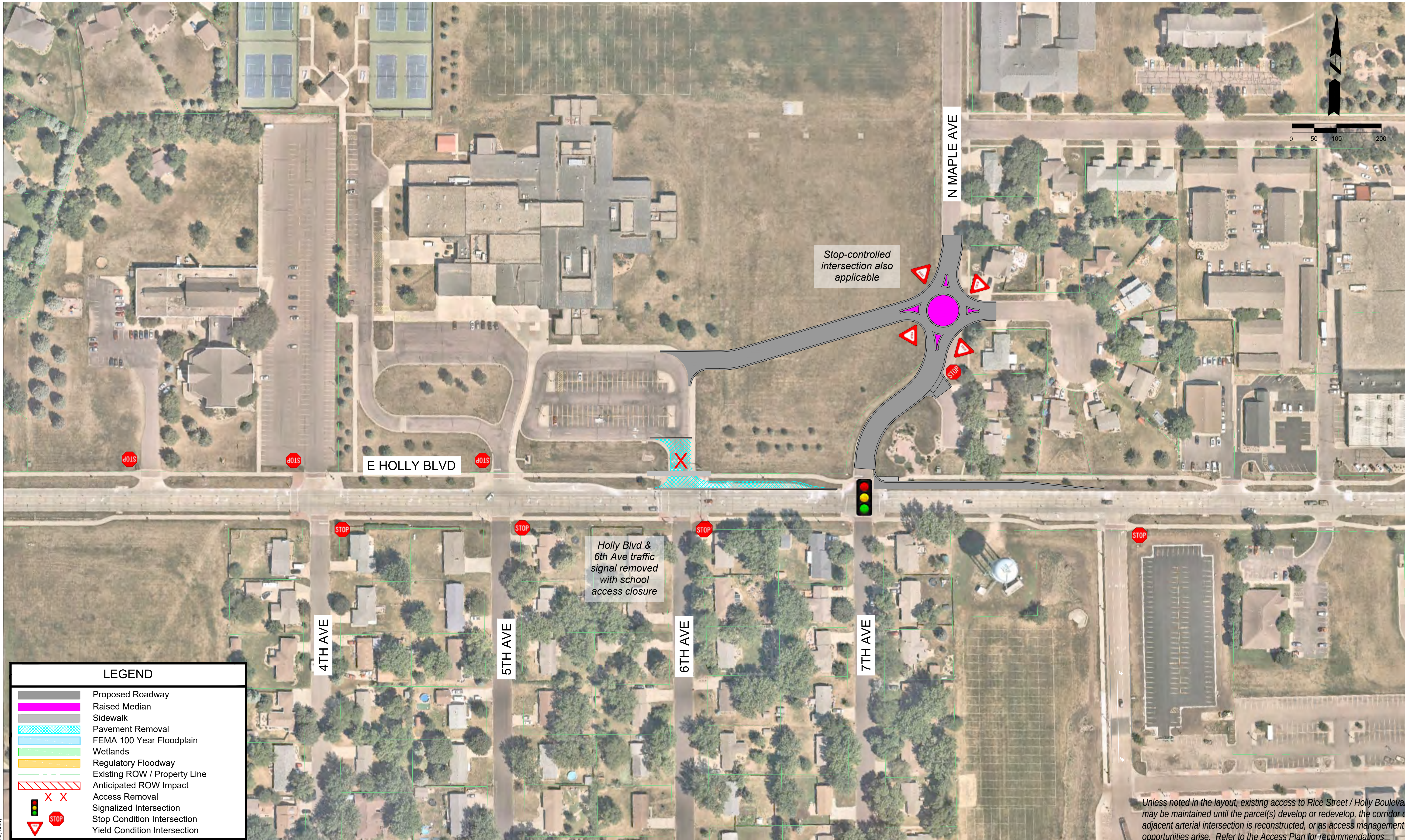


Recommended Short-Term, Mid-Term, and Long-Term Corridor Option

Holly Boulevard / Maple Avenue / School Sub-Area

Maple Avenue Connection

Concept

School - 2

Figure

49.q

Rev: 11/28/2023

Recommended Short-Term, Mid-Term, and Long-Term Corridor Option

Holly Boulevard / Maple Avenue / School Sub-Area

Maple Avenue Connection

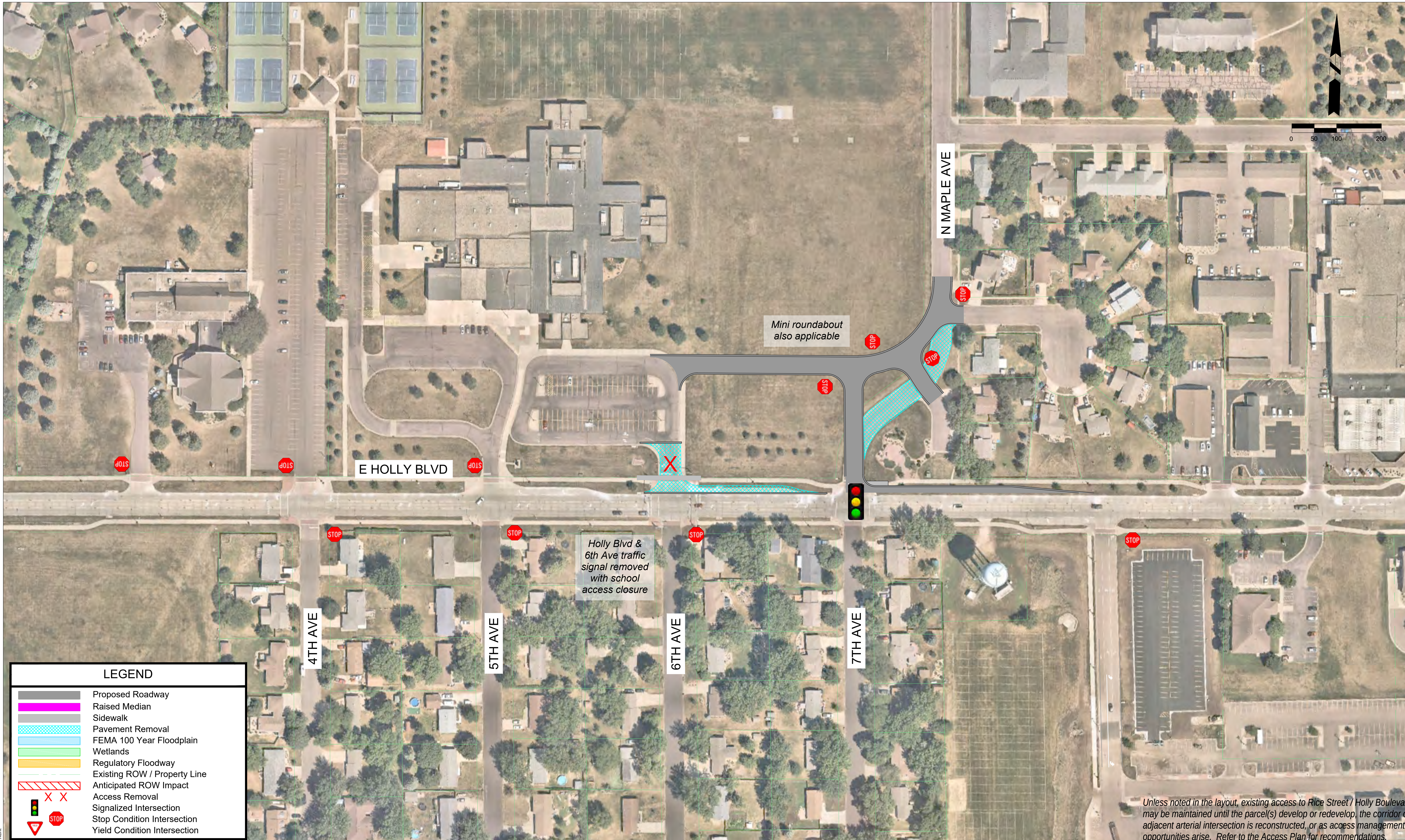
Concept

School - 3

Figure

49.r

Rev: 11/28/2023



Recommended Short-Term, Mid-Term, and Long-Term Corridor Option

Holly Boulevard / Maple Avenue / School Sub-Area

Maple Avenue Connection

Concept	Figure
School - 4	49.s
	Rev: 11/28/2023

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Recommended Short-Term, Mid-Term, and Long-Term Corridor Option

Holly Boulevard / Maple Avenue / School Sub-Area

Holly Boulevard Single Lane Roundabout (High School Access)

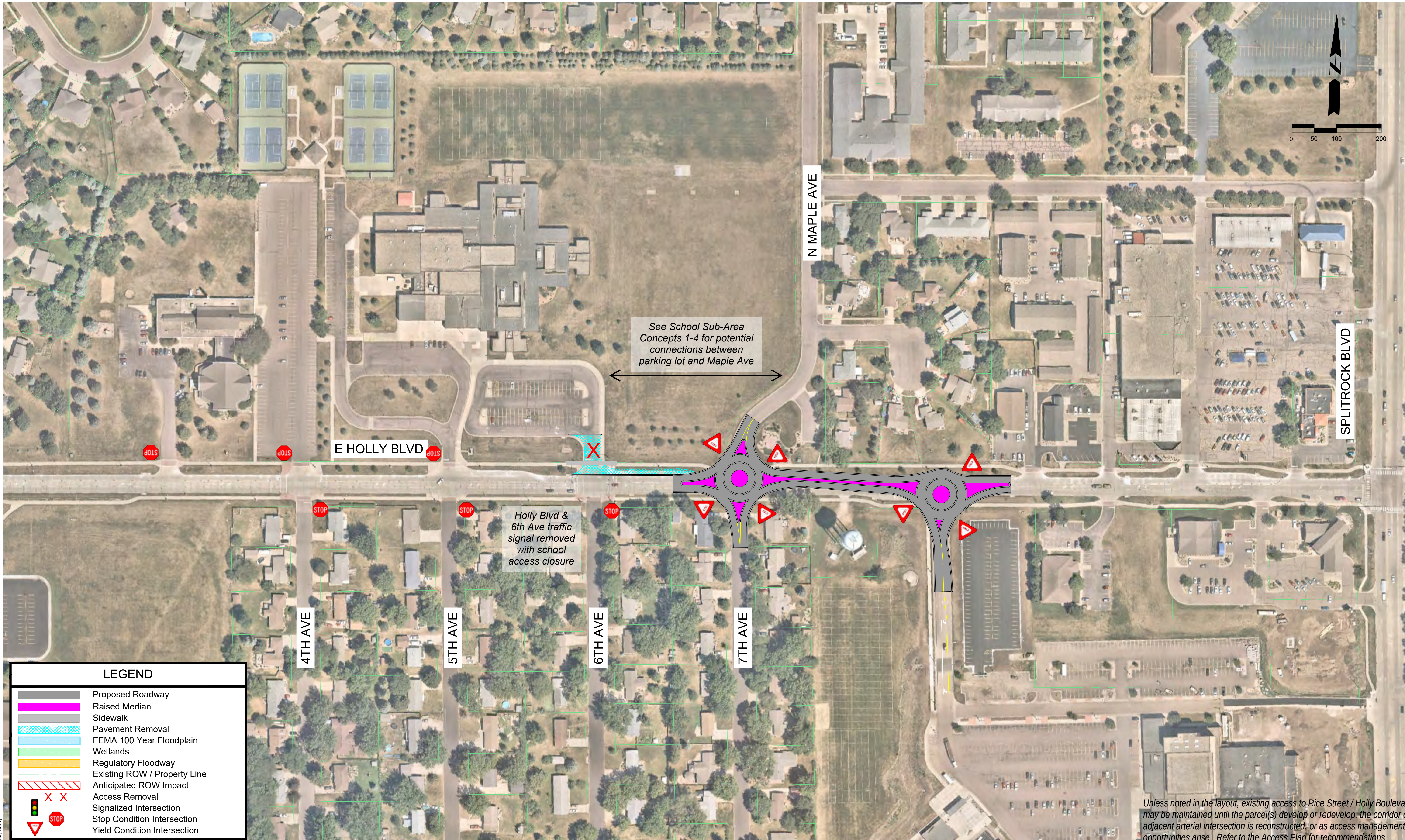
Concept

School - 5

Figure

49.t

Rev: 11/28/2023



Recommended Short-Term, Mid-Term, and Long-Term Corridor Option

Holly Boulevard / Maple Avenue / School Sub-Area

Holly Boulevard Single Lane Roundabouts (7th Ave/Maple Ave and High School Access)

Concept

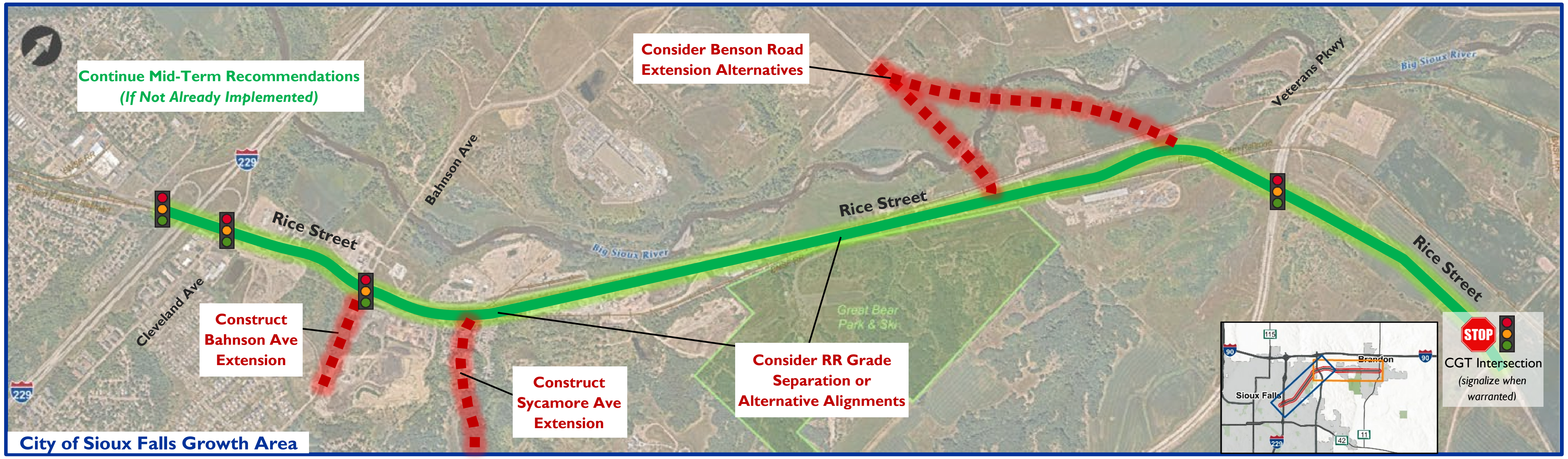
School - 6

Figure

49.u

Rev: 11/28/2023

LONG-TERM RECOMMENDATIONS AND CONSIDERATIONS



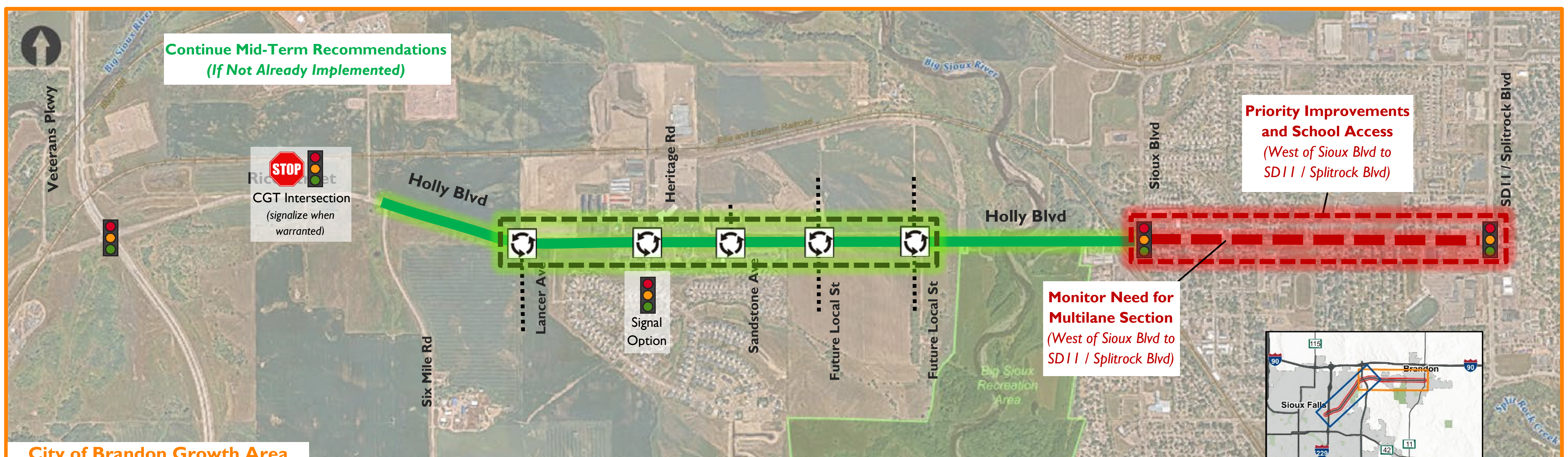


Figure 50: Long-Term Recommendations and Considerations Overview

INTERSECTIONS:

Roundabout

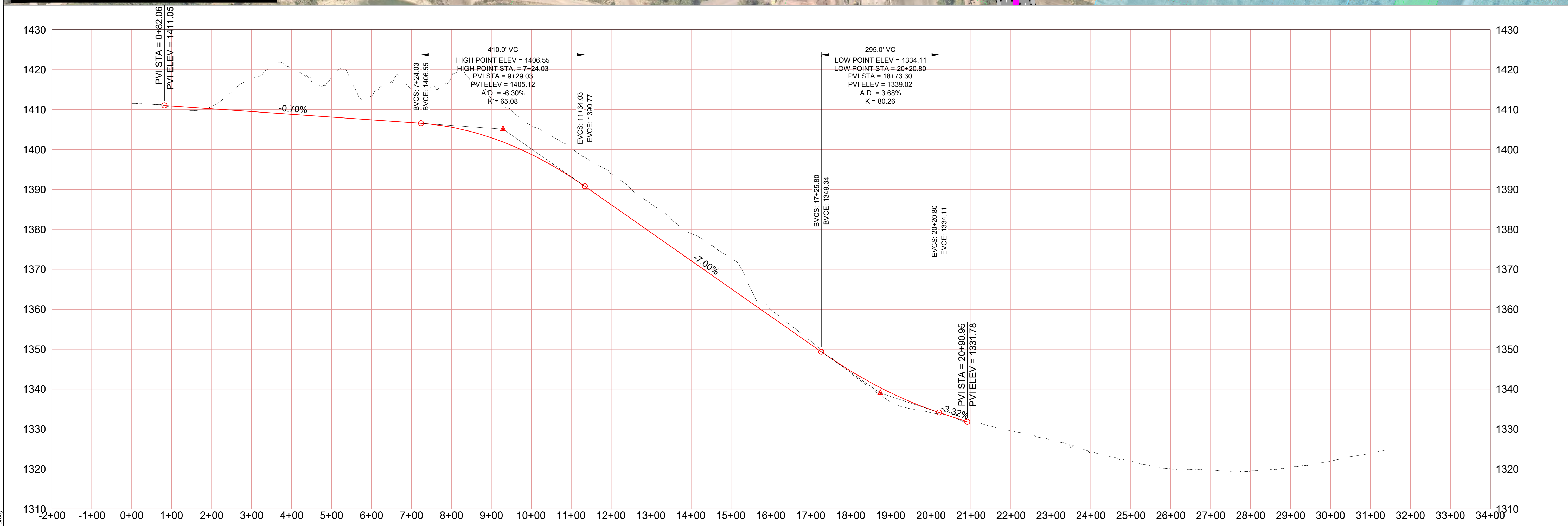
Traffic Signal

Stop Signs STOP

Future Roads

ROAD SEGMENTS:

Urban 4-Lane Divided Multilane Section:
2 lanes each direction plus center left turn lane or raised median and multimodal elements



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Recommended Long-Term Corridor

Bahnson Avenue Extension

Bahnson Avenue Section: 3-Lane

Concept

Bahnson Extension - 1

Figure

51.a

Rev: 3/8/2024

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Recommended Long-Term Corridor

Sycamore Avenue Extension

Sycamore Avenue Corridor Section: 3-Lane

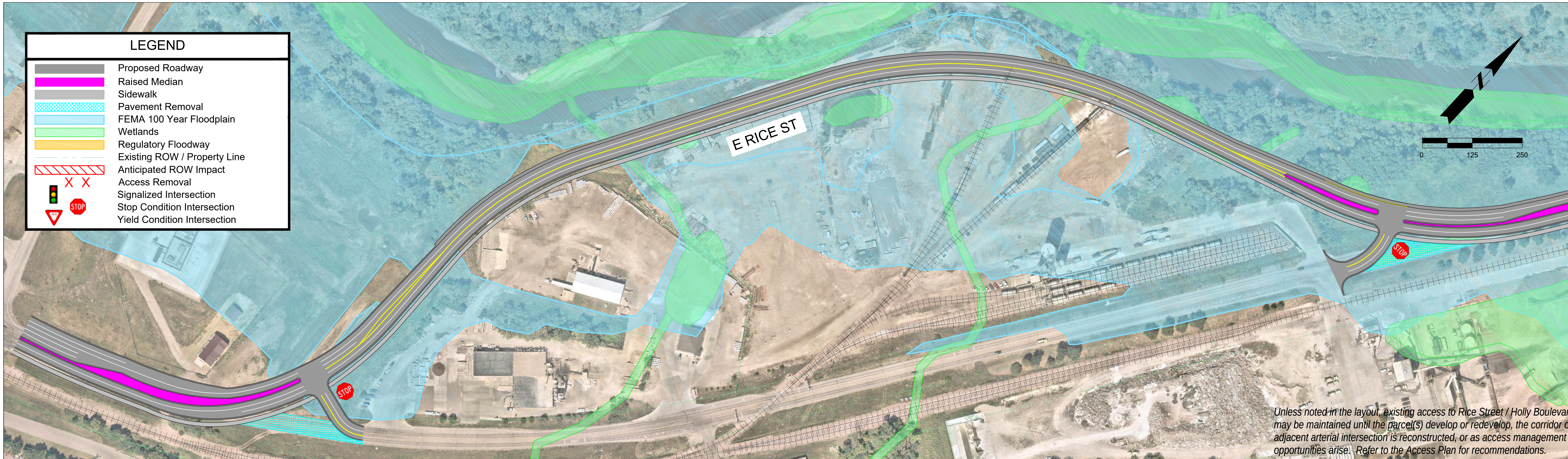
Concept

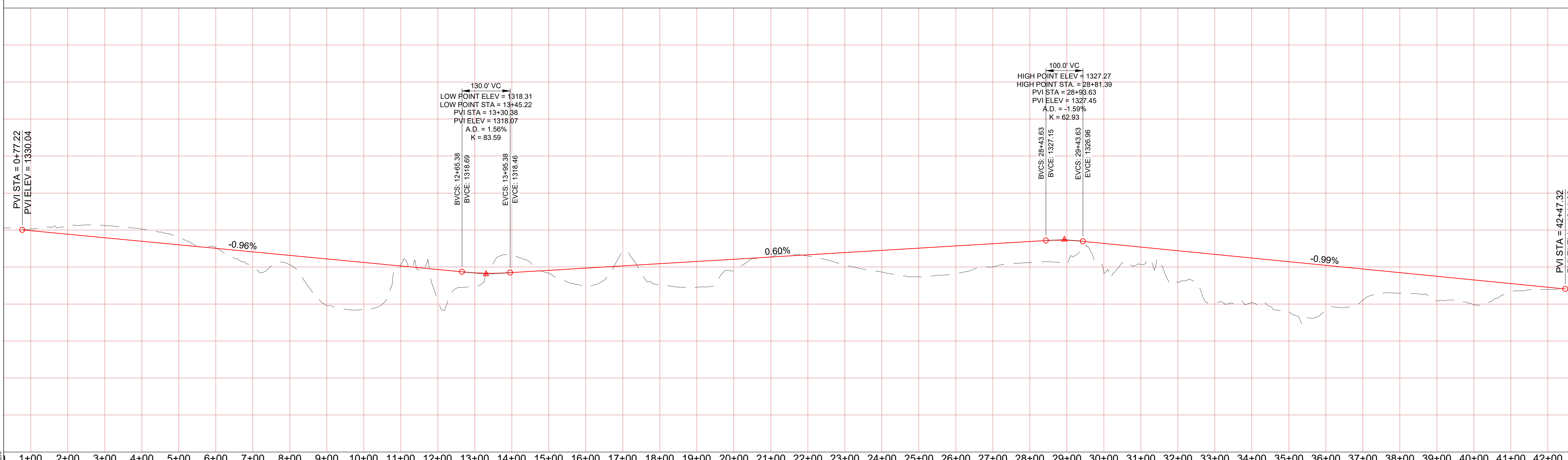
Sycamore Extension - 1

Figure

51.b

Rev: 3/8/2024





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Long-Term Corridor Option

Rice Street Realignment

Rice Street Corridor Section: 3-Lane or Multilane

Concept

Rice Transload - 1

Figure

51.c

Rev: 11/28/2023

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Long-Term Corridor Option

Ellis & Eastern Crossing (east of Bahnson Avenue) [Site 1]

Railroad Grade Separation Alternative - Single Span Bridge (Option 1)

Concept

Site 1 - Option 1

Figure

51.d

Rev: 3/27/2024

Long-Term Corridor Option

Ellis & Eastern Crossing (east of Bahnson Avenue) [Site 1]

Railroad Grade Separation Alternative -

Long Span Structural Plate High Profile Arch (Option 2)

Concept

Site 1 - Option 2

Figure

51.e

Rev: 3/27/2024

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Long-Term Corridor Option

BNSF Crossing (near Great Bear) [Site 2]

Railroad Grade Separation Alternative - Single Span Bridge (Option 1)

Concept

Site 2 - Option 1

Figure

51.f

Rev: 3/27/2024

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PLOT DATE: 11/21/2023 10:09 AM Ode, Kent

Long-Term Corridor Option

BNSF Crossing (near Great Bear) [Site 2]

Railroad Grade Separation Alternative - Five Span Bridge (Option 2)

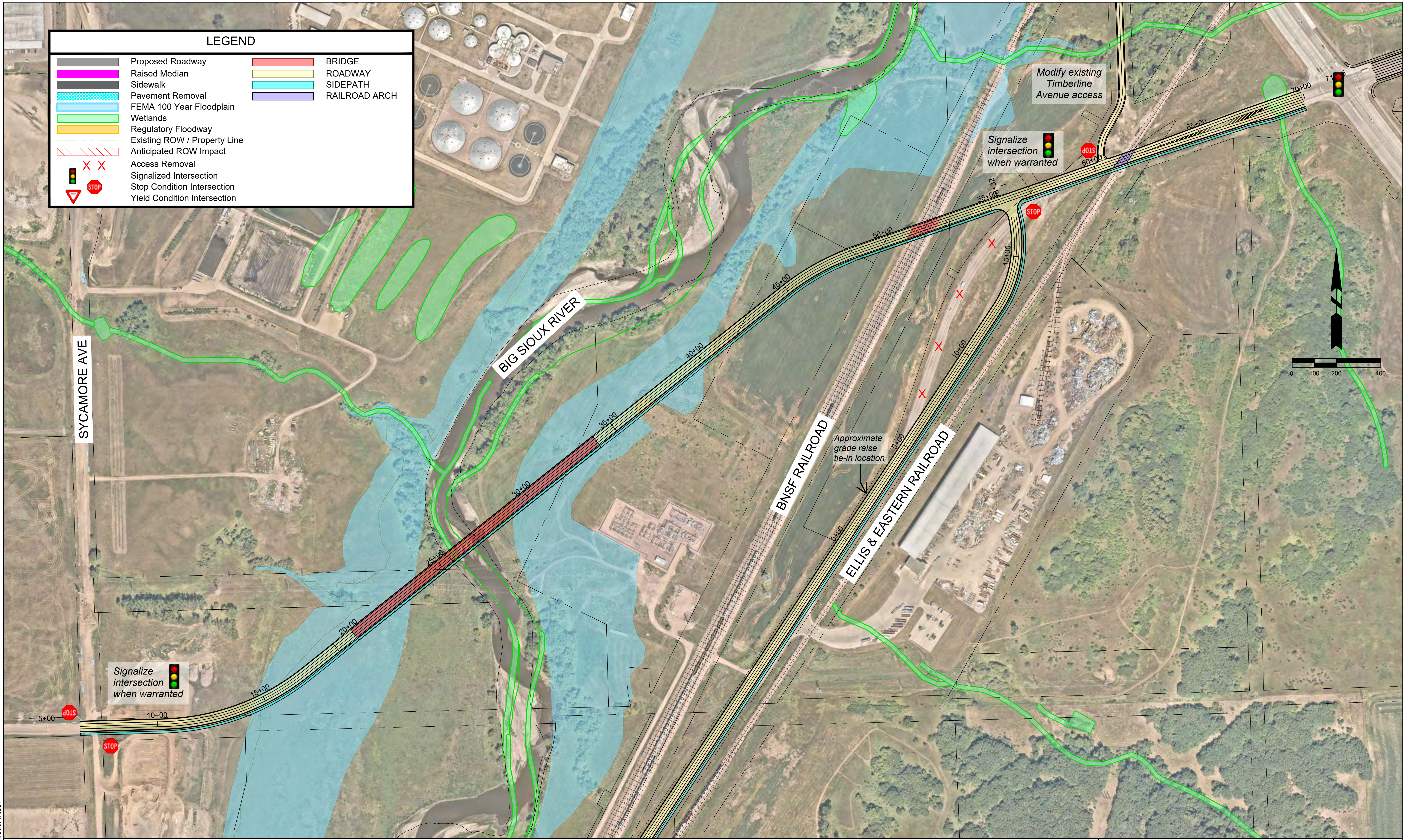
Concept

Site 2 - Option 2

Figure

51.g

Rev: 3/27/2024



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Long-Term Corridor Option

Benson Road Extension - North Alignment

Rice Street Intersection Type: Traffic Signal *Benson Road Corridor Section: Multilane*

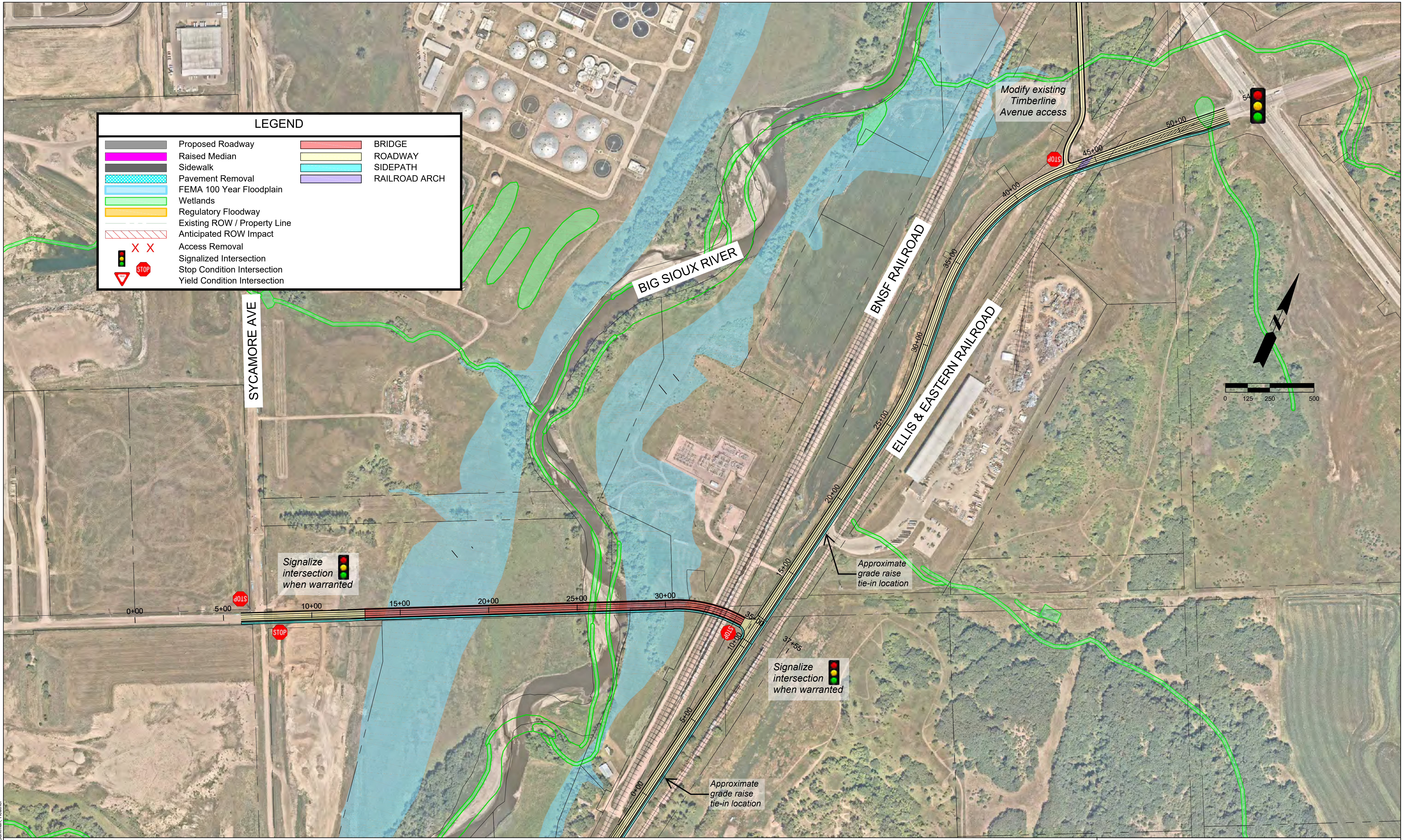
Concept

Benson Extension - 1

Figure

51.h

Rev: 3/27/2024



Long-Term Corridor Option

Benson Road Extension - South Alignment

Rice Street Intersection Type: Traffic Signal *Benson Road Corridor Section: Multilane*

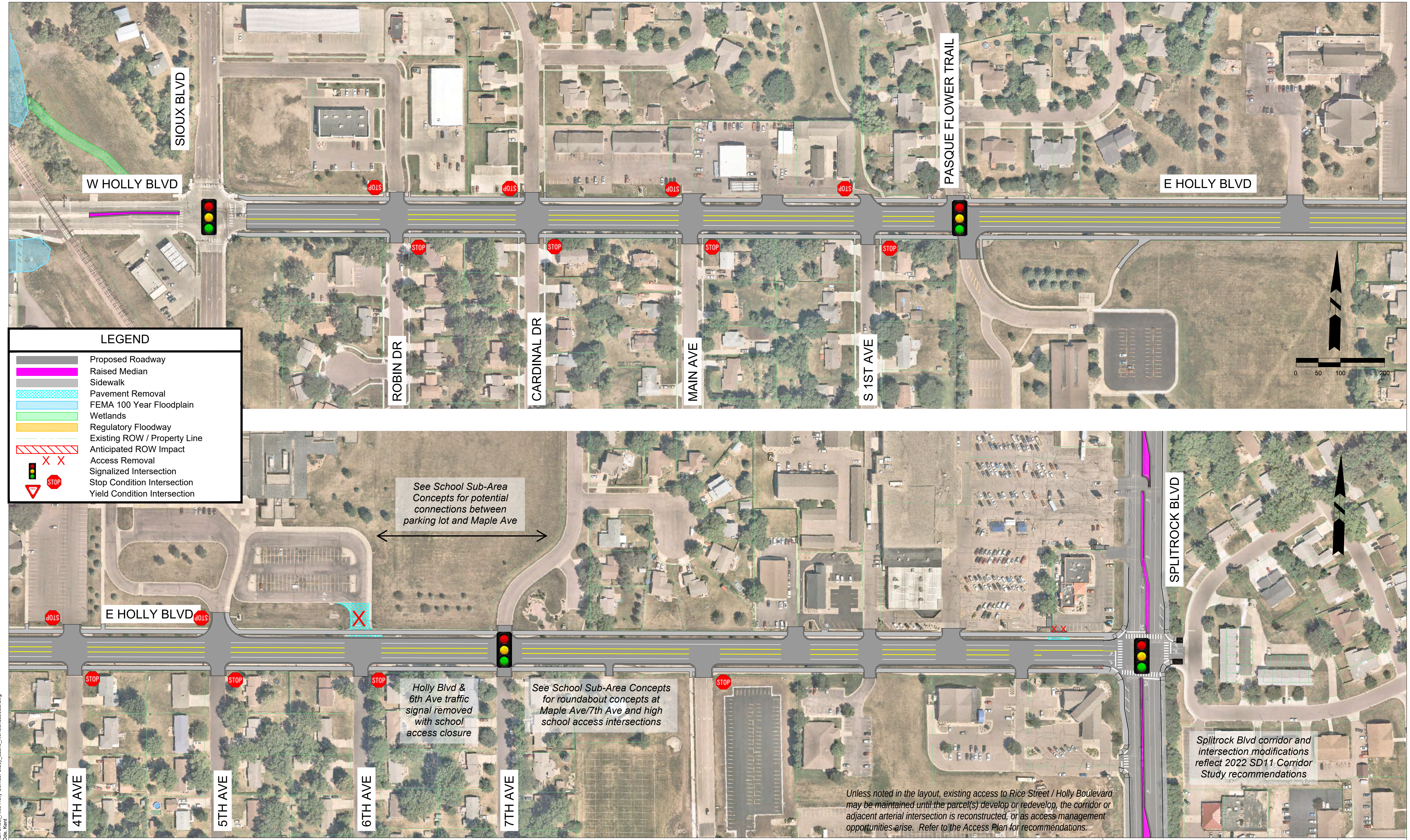
Concept

Benson Extension - 2

Figure

51.i

Rev: 3/27/2024



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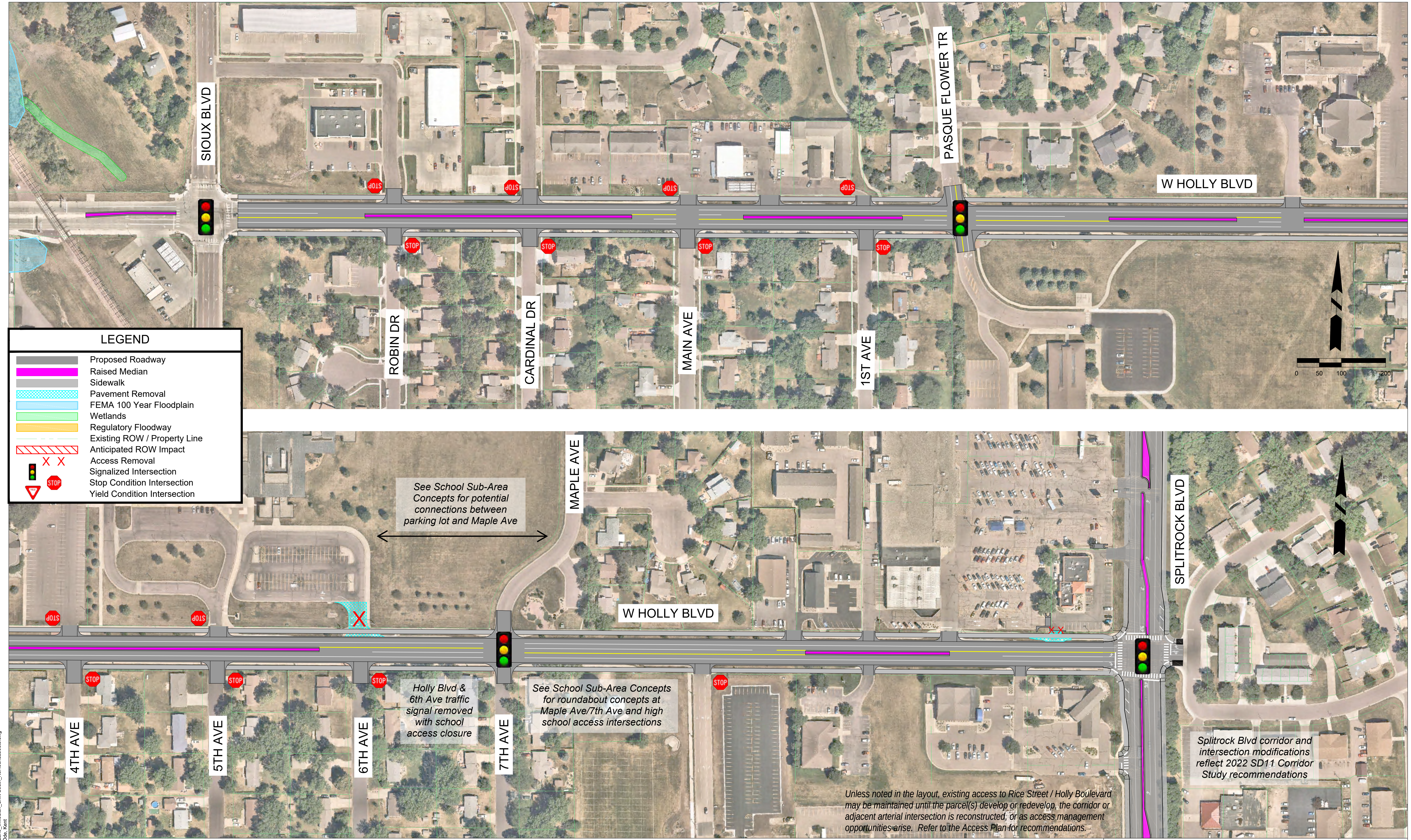
Long-Term Corridor Option

Holly Blvd: Sioux Blvd to Splitrock Blvd (SD11)

Holly Boulevard Corridor Section: 5-Lane

Concept
Sioux-Splitrock 5-Lane

Figure
51.j
Rev: 11/28/2023



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Long-Term Corridor Option

Holly Blvd: Sioux Blvd to Splitrock Blvd (SD11)

Holly Boulevard Corridor Section: 4-Lane Divided

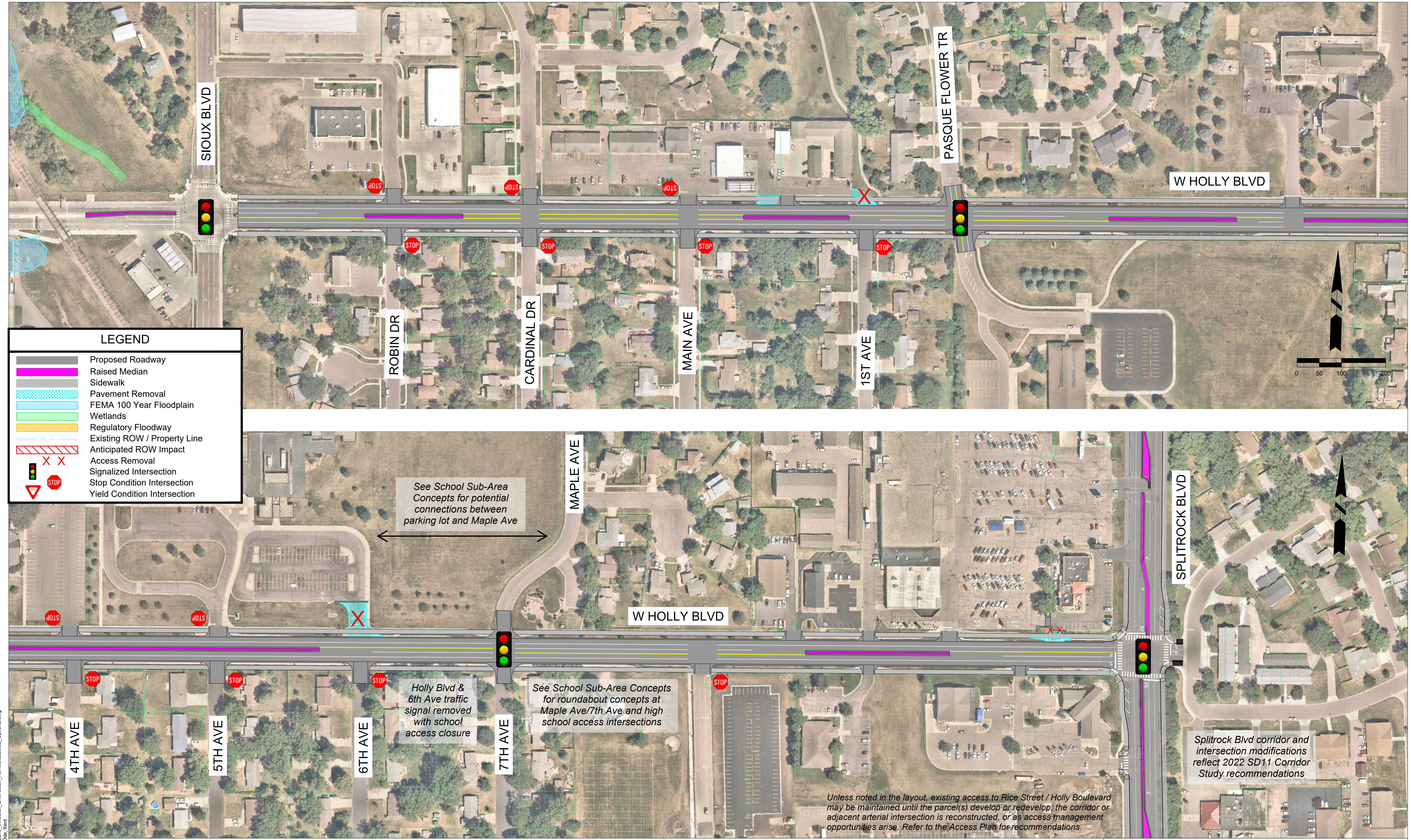
Concept

Sioux-Splitrock 4-Lane Divided (A)

Figure

51.k

Rev: 11/28/2023



Long-Term Corridor Option

Holly Blvd: Sioux Blvd to Splitrock Blvd (SD11)

Holly Boulevard Corridor Section: 4-Lane Divided

Concept

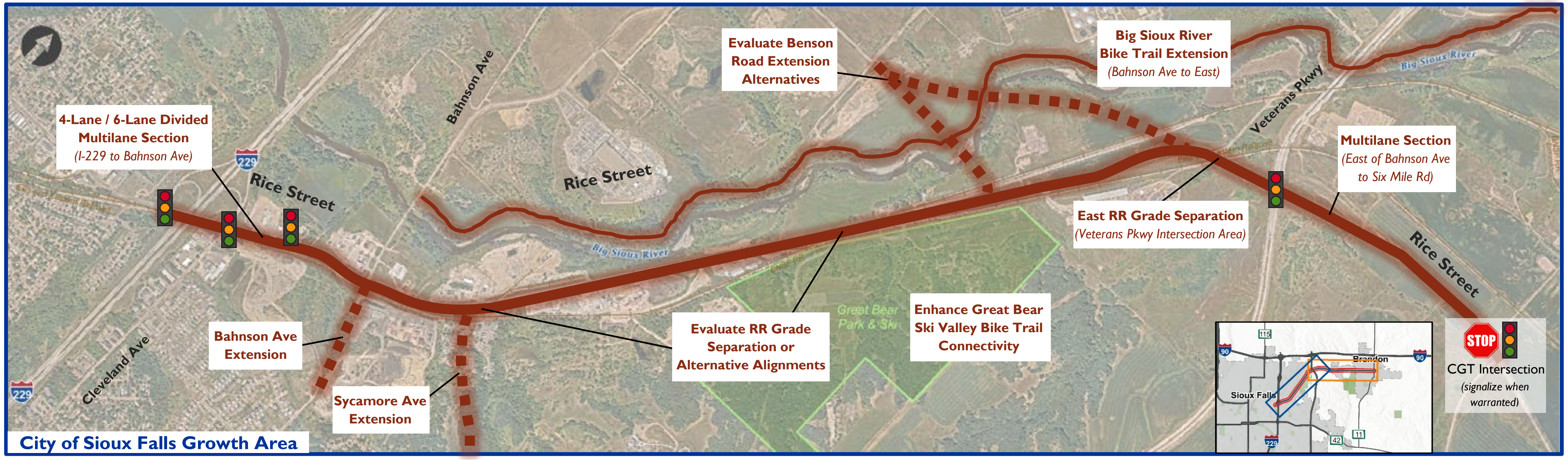
Sioux-Splitrock 4-Lane Divided (B)

Figure

51.I

Rev: 11/28/2023

LONG-RANGE VISION



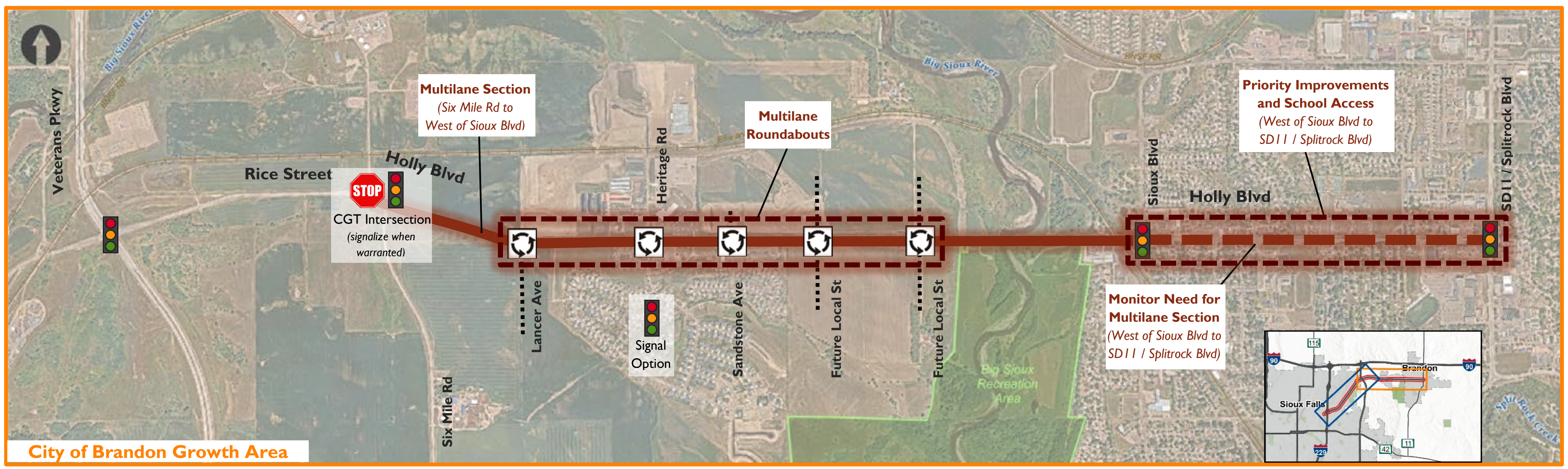


Figure 52: Long-Range Vision Overview

INTERSECTIONS:

Roundabout

Traffic Signal

Stop Signs

Future Road

ROAD SEGMENTS:

Urban 4-Lane Divided Multilane Section:
2 lanes each direction plus center left turn lane or raised median and multimodal elements

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Recommended Long-Range Vision Corridor

Recommended Rice Street / Holly Boulevard Corridor: I-229 to Six Mile Road

Intersection Type: Signalized

Rice Street Corridor Section: Multilane

Figure 53.a

Recommended Long-Range Vision Corridor

Recommended Rice Street / Holly Boulevard Corridor: I-229 to Six Mile Road

Intersection Type: Signalized

Rice Street Corridor Section: Multilane

Figure 53.b

Recommended Long-Range Vision Corridor

Recommended Rice Street / Holly Boulevard Corridor: Six Mile Road to Sioux Boulevard

Intersection Type: Roundabouts & Signalized

Rice Street Corridor Section: Multilane

Figure 53.c

Recommended Long-Range Vision Corridor

Recommended Rice Street / Holly Boulevard Corridor: Sioux Boulevard to SD11 / Splitrock Boulevard

Rice Street Corridor Section: Existing 3-Lane Corridor with Priority Improvements

Figure 53.d

Long-Range Vision Corridor Option

Rice Street / Holly Boulevard Corridor Option: Sioux Boulevard to SD11 / Splitrock Boulevard

Rice Street Corridor Section: Multilane Corridor Options with Priority Improvements

Figure 53.e

APPENDIX

A. METHODS AND ASSUMPTIONS DOCUMENT

B. TRAFFIC FORECASTS MEMO

C. EAST/WEST ARTERIAL CORRIDOR TRAFFIC REVIEW MEMO

D. EXISTING AND FUTURE NO BUILD CONDITION INTERSECTION TRAFFIC OPERATIONS ANALYSIS MEMO

E. CRASH HISTORY REVIEW MEMO

F. RAILROAD GRADE SEPARATION WARRANT REVIEW MEMO

G. PUBLIC OPEN HOUSE SUMMARY MEMOS

H. RICE STREET / HOLLY BOULEVARD LAND USE AND ACCESS PLAN MEMO

I. URBAN AND HYBRID TYPICAL SECTIONS

J. INTERSECTION ALTERNATIVES

K. CORRIDOR SEGMENT ALTERNATIVES

L. BUILD CONDITION TRAFFIC OPERATIONS ANALYSIS MEMO

M. SCHOOL SUB-AREA ACCESS ALTERNATIVES

N. SCHOOL SUB-AREA ANALYSIS INTERSECTION TRAFFIC ANALYSIS MEMO

O. CONCEPTUAL COSTS

P. BENSON ROAD EXTENSION AND RICE STREET RAILROAD GRADE SEPARATION PLANNING-LEVEL TRAFFIC BENEFITS AND PROJECT COSTS SUMMARY MEMO

Q. BENSON ROAD EXTENSION AND RAILROAD GRADE SEPARATION ALTERNATIVES

R. OTHER ROADWAY EXTENSION, ALIGNMENT, AND ACCESS ALTERNATIVES

S. UTILITY COORDINATION MEMO

T. ENVIRONMENTAL TECHNICAL MEMO

U. RECOMMENDED CORRIDOR ROLL PLOTS