

Technical Memo

Date: April 12, 2017

Project: I-29 Exit 77 (41st Street) Interchange Modification Justification Report,
Project # PL0100(84) 3616P, PCN 05MH

To: Study Advisory Team

From: HDR

Subject: 41st Street Alternatives East of I-29 Evaluation and Recommendation

1. Background

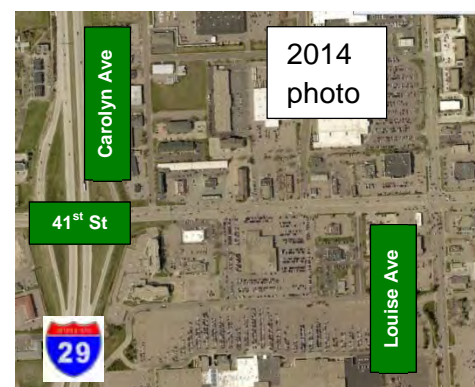
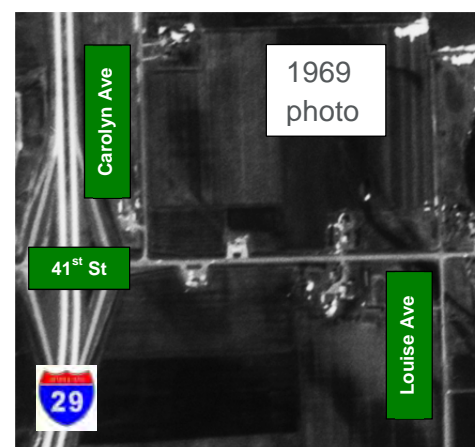
The photos at right show the progression of land use along 41st Street east of I-29 from 1958 (upper photo) to 1969 (center photo) to 2014 (lower photo). During that time, 41st Street transformed from a two-lane rural gravel road into the 7-lane urban arterial street that it is today. I-29 and the interchange at 41st Street were completed by 1962.

Adjacent land use changed from farm fields to fully-developed high-intensity commercial properties such as the Empire Mall.

Prior to I-29 completion, 41st Street west of Louise Avenue was a low traffic volume rural roadway. 41st Street traffic volumes between I-29 and Louise Avenue peaked at 46,500 vehicles per day in 1996. In 2016, 27,000 to 32,000 vehicles per day used this section of 41st Street. The reason for the traffic volume decline from 1996 to 2016 is that the City increased the capacity on parallel arterial streets such as 12th Street, 49th Street, and 57th Street.

While traffic volume projections do not warrant additional through lanes on 41st Street between I-29 and Louise Avenue, additional and longer turning lanes and intersection improvements, as well as median treatments are warranted to reduce crash rates that are above critical rates.¹

The 41st Street/Louise Avenue intersection is one of the busiest and largest (in terms of traffic lanes) in South Dakota. Traffic levels of service at this intersection have historically been below acceptable criteria, especially during P.M. peak hour and Saturday afternoon periods. Several improvement options were developed and analyzed in the 2012 Corridor Study.² However, the currently proposed 41st Street improvements would end just east of Shirley Avenue and would not include any improvements to the 41st Street/Louise Avenue intersection.



¹ HDR, April 2017. Technical Memo 2 Crash Analysis for I-29 Exit 77

² HDR, June 2012. I-29 Exit 77 (41st Street) Crossroad Corridor Study

2. Purpose

As part of the current I-29 Exit 77 (41st Street) interchange study, three build alternatives for 41st Street from the I-29 interchange to east of Shirley Avenue are proposed. The features common to these alternatives are:

- 3 through lanes on 41st Street in each direction (same as the existing conditions)
- 2 through lanes in each direction on Shirley Avenue north of 41st Street
- Signalized intersections at:
 - W Empire Place
 - Shirley Avenue
- A raised center median within the limits of the I-29/41st Street interchange
- Any required widening for turning lanes or raised median would be on the south side of 41st Street to coincide with re-development of the Sioux Falls Ford property and to avoid major impacts to the existing commercial properties on the north side of 41st Street.

Specific differences in the alternatives are:

- Alternative A – 41st Street raised center median with 3/4 access movement configuration at W Empire Place and full signalized expanded intersection at Shirley Avenue. This alternative also provides two-way traffic on the Shirley Avenue Empire Mall access.
- Alternative B – This alternative is identical to Alternative A except that the Shirley Avenue Empire Mall access is for outbound (northbound) traffic only.
- Alternative C – Center two-way left turn lane beginning just east of Carolyn Avenue; a two-way Empire Mall access at Shirley Avenue is also proposed with this alternative.

Attachment A to this memo provides a graphic of the existing conditions and the proposed build alternatives. Reduced size versions of the alternatives are also provided with the discussion of each alternative.

The purpose of this memo is to provide a brief evaluation of each of the build alternatives and provide recommendations on:

- Which alternative(s) to carry forward for further evaluation.
- Which alternative(s) to eliminate from further evaluation.

Each of the alternatives evaluated assumes closure of Carolyn Avenue at 41st Street. A separate technical memorandum has been prepared regarding Carolyn Avenue access alternatives.³ The evaluation and recommendation of 41st Street alternatives is not dependent on the Carolyn Avenue alternatives.

Each of the alternatives evaluated are the same for either the Single Point or Diverging Diamond interchange alternatives. A separate technical memorandum has been prepared regarding I-29/41st Street interchange alternatives.⁴ The evaluation and recommendation of 41st Street alternatives is not dependent on the interchange alternatives.

³ HDR, April 2017. Technical Memo 5 Carolyn Avenue Alternatives Evaluation I-29 Exit 77

⁴ HDR, April 2017. Technical Memo 6 Interchange Alternatives Evaluation I-29 Exit 77

3. Evaluation Criteria

The main criteria used to evaluate the 41st Street alternatives east of I-29 are:

3.1 Fulfillment of the Project Purpose and Need ⁵

For each item, the evaluation is either yes or no.

- For traffic capacity, is an acceptable LOS provided at signalized intersections?
- Is vehicular safety improved? The basis for this evaluation are the crash comparisons for similar roadways with and without a raised median. This was discussed in the 2012 Corridor Study. ⁶
- Are safe pedestrian facilities provided that comply with the Americans with Disabilities Act?
- Does the alternative meet SDDOT and City Design Policy? Both SDDOT and the City of Sioux Falls design policies state that a raised center median should be used for the a facility like the proposed 41st Street build alternatives. This was also documented in the 2012 Corridor Study. ⁷

3.2 Traffic Operations

Year 2023 (year of opening to traffic) and year 2045 (horizon year) level of service ⁸ is a measurement of traffic conditions at these signalized intersections:

- 41st Street and W Empire Place
- 41st Street and Shirley Avenue
- 41st Street and Louise Avenue

Although the 41st Street/Louise Avenue intersection is not within the limits of the current project, analysis of the intersection operations is shown to determine if improvements made at other locations negatively impact traffic operations at the 41st Street/Louise Avenue intersection.

The traffic operations at the 41st Street and I-29 ramp terminals are considered in the interchange alternatives evaluation memo. ⁹

3.3 Property Impacts

3.3.1 What are the property acquisitions?

- Since none of the proposed 41st Street alternatives result in total acquisition of properties, only partial acquisitions have been quantified for each of the alternatives.
- Based on recent similar property purchases along 41st Street and Louise Avenue, property acquisition costs are estimated at \$30 per square foot. Future appraisals will identify the cost more precisely.

⁵ HDR, April 2017. Purpose and Need Memo for I-29 Exit 77

⁶ HDR, June 2012. I-29 Exit 77 (41st Street) Crossroad Corridor Study, pages 25 and 26

⁷ HDR, June 2012. I-29 Exit 77 (41st Street) Crossroad Corridor Study, page 26

⁸ HDR, April 2017. Technical Memo 3 Future Traffic Conditions I-29 Exit 77

⁹ HDR, April 2017. Technical Memo 6 Interchange Alternatives Evaluation I-29 Exit 77

3.3.2 Traffic circulation at the Empire Mall and adjacent properties is a critical consideration. The City of Sioux Falls has historically worked closely with the Empire Mall management to determine optimum circulation patterns and the resultant impact of mall traffic on adjacent streets like Louise Avenue and 41st Street.

- A poor rating indicates that the Empire Mall management (with concurrence of the City) is not in favor of the traffic circulation provided with an alternative.
- A good rating indicates that the Empire Mall management (with concurrence of the City) is in favor of the traffic circulation provided with an alternative.

It should be noted that the Sioux Falls Ford site is in the process of redevelopment planning since the Sioux Falls Ford dealership is moving to another site. The City of Sioux Falls Planning and Engineering departments have been working closely with the developer of the site to ensure that proposed 41st Street improvements are accounted for in the redevelopment planning process.

3.3.3 What is the acceptance level of affected businessowners and landowners to the access and acquisition impacts of each of the alternatives? This evaluation is based on public meeting written comments and landowner meeting documentation from the 2012 Corridor Study ¹⁰.

- A poor rating indicates that landowners have been strongly opposed to the alternative.
- A moderate rating indicates that landowners have not been totally supportive of the alternative but have indicated some level of acceptance.
- A good rating indicates that landowners have expressed acceptance of the alternative.

Attachment B to this memo provides a list of written comments from the 2012 Corridor study. This list also documents responses to those concerns. No written comments were submitted for this segment of 41st Street as part of the 2016 public meeting and follow-up landowner meetings.

3.4 Costs

The various major considerations for costs are:

- ROW acquisitions
- Roadway construction
- Addition of ROW acquisition and construction costs

¹⁰ HDR, June 2012. I-29 Exit 77 (41st Street) Crossroad Corridor Study, Appendix B – Public Involvement

3.5 Environmental Impacts

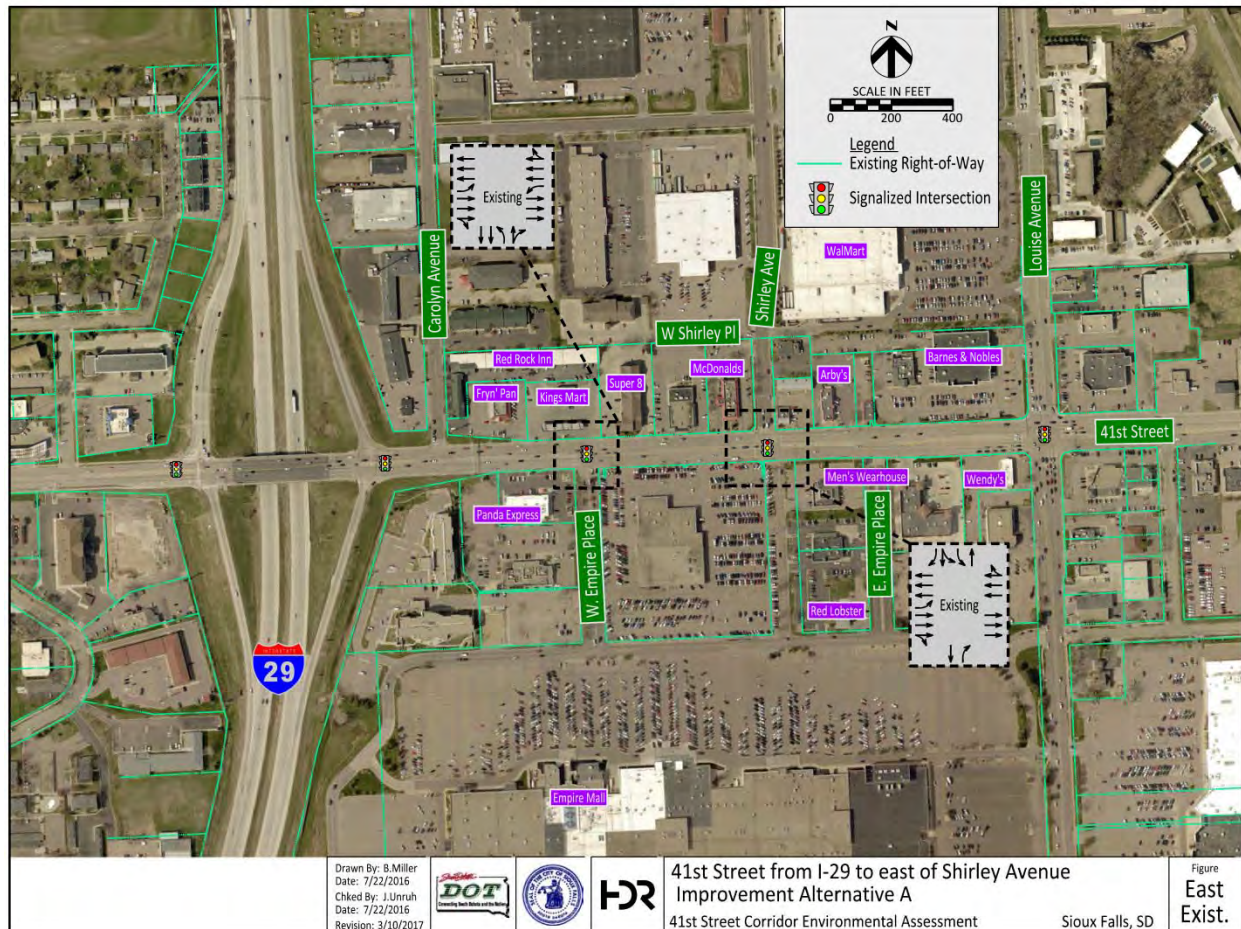
The environmental impacts applicable in this analysis are:

- Number of impacted structures that meet the criteria for historic structures
- Number of impacted properties that meet Section 4(f) criteria
- Number of property acquisitions that have environmental justice implications
- Number of property acquisitions where contaminated materials are known to exist

4. No-Build Alternative

The No-Build Alternative (**Figure East-Exist**) will be carried forward as a base-line comparison for the build alternatives. However, as noted in the Alternatives Comparison Matrix, the No-Build Alternative does not meet the Project Purpose and Need for:

- Improving safety
- Improving pedestrian facilities
- Meeting SDDOT and City design policy



5. Build Alternatives Evaluation

Alternative A – Raised median with 3/4 access at W Empire Place and two-way Empire Mall access at Shirley Avenue

Alternative A (**Figure East A**) provides three 41st Street through lanes in each direction and a raised center median with a 3/4 access at W Empire Place. The 41st Street/Shirley Avenue intersection would be expanded to allow for dual left turn lanes on all approaches. The Empire Mall entrance would be realigned to match Shirley Avenue on the north side of the intersection and would provide for two-way traffic.

Main benefits of Alternative A include:

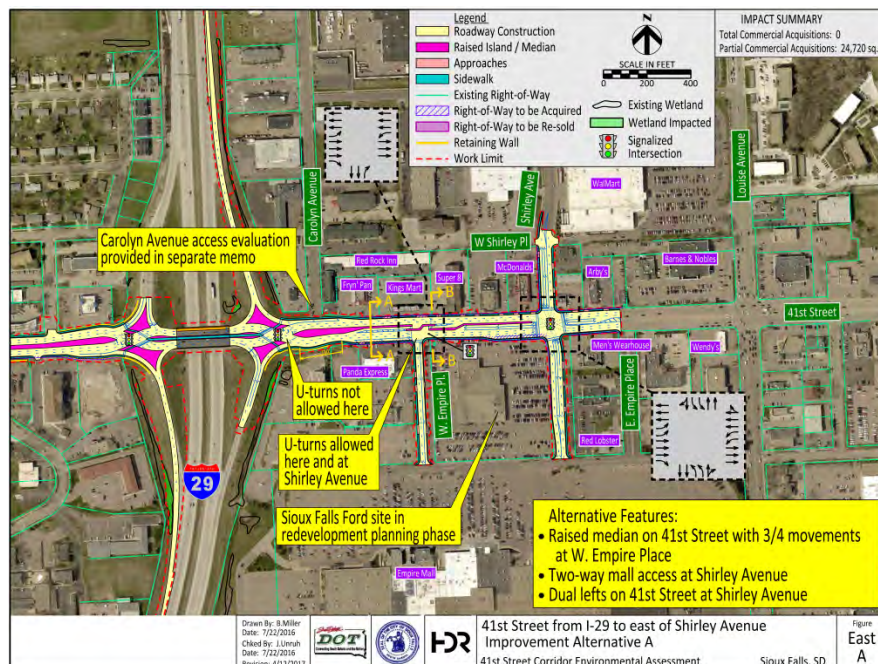
- Level of service criteria are met at the signalized intersections.
- The raised median provides safety benefits.
- SDDOT and City design policies for application of raised medians are met.
- 3/4 access at W Empire Place addresses landowner access concerns.
- Empire Mall access roadways are satisfactory to Empire Mall management and to the City of Sioux Falls.

Main drawbacks of Alternative A include:

- Partial commercial acquisitions are slightly greater than for Alternatives B and C.

It is recommended that Alternative A be carried forward for further evaluation because it meets all Purpose and Need criteria and provides reasonable access to adjacent properties.

Attachment B to this memo provides a list of concerns that have been raised by participants in the various public and business/landowner meetings and how Alternative A specifically addresses those concerns.



Alternative B – Raised median with 3/4 access at W Empire Place and one-way Empire Mall access at Shirley Avenue

Alternative B (**Figure East B**) is the same as Alternative A except the Empire Mall access at Shirley Avenue is limited to one-way outbound movements. This alternative was originally developed to balance the traffic volumes on W Empire Place and the Shirley Avenue mall access road.

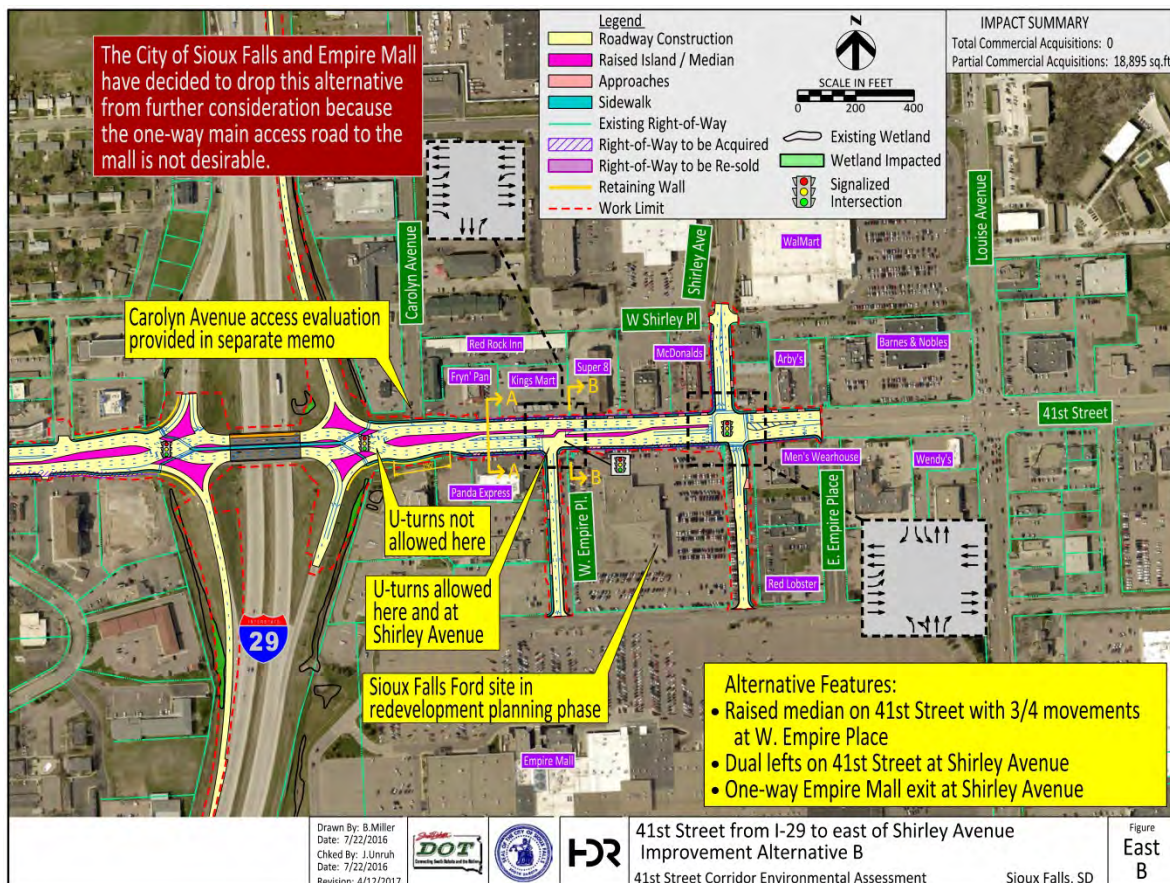
Main benefits of Alternative B include:

- Level of service criteria are met at the signalized intersections.
- The raised median provides safety benefits.
- SDDOT and City design policies for application of raised medians are met.
- 3/4 access at W Empire Place addresses landowner access concerns.

Main drawbacks of Alternative B include:

- The one-way outbound Empire Mall access at Shirley Avenue limits access to Men's Wearhouse and Red Lobster properties.
- After consideration, Empire Mall management and the City of Sioux Falls preferred two-way traffic on the Shirley Avenue mall access road.

It is recommended that Alternative B be eliminated from further evaluation mainly because the one-way mall entrance at Shirley Avenue is not desired by the property owner (Empire Mall); the City of Sioux Falls concurs with the property owner.



Alternative C – Center two-way left turn lane

Alternative C (**Figure East C**) provides 3 through lanes in each direction on 41st Street and a center two-way left turn lane.

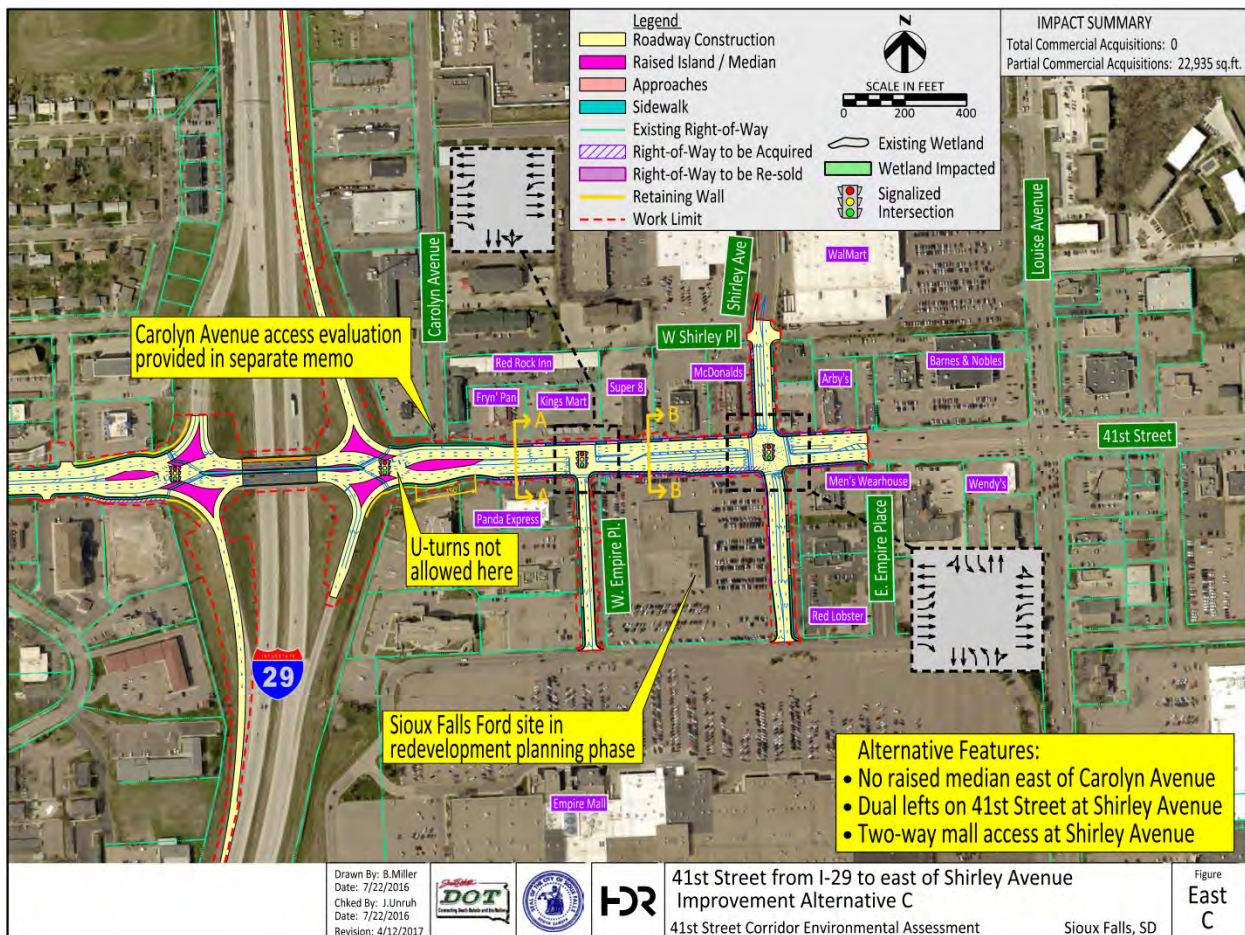
Main benefits of Alternative C include:

- Level of service criteria are met at the signalized intersections.
- Business/landowners were generally supportive of this alternative.

Main drawbacks of Alternative C include:

- Project Purpose and Need for improving safety is not met.
- SDDOT and City design policies for application of raised medians are not met.

It is recommended that Alternative C be eliminated from further evaluation because safety is not improved and SDDOT and City design policies are not met.



6. Build Alternatives Recommendations Summary

Alternatives recommended to be carried forward for further consideration:

Alternative	Description	Main reason(s) for carrying forward
A	Raise center median with 3/4 access at W Empire Place and two-way mall access at Shirley Avenue	<ul style="list-style-type: none">• Provides safety benefits of raised median• Meets SDDOT and City design policies• Provides reasonable access to properties

Alternatives recommended to be eliminated from further consideration:

Alternative	Description	Main reason(s) for elimination
B	Raise center median with 3/4 access at W Empire Place and one-way mall access at Shirley Avenue	<ul style="list-style-type: none">• One-way mall access road is not desired by the property owner (Empire Mall); the City of Sioux Falls concurs with the property owner.
C	Center two-way left turn lane	<ul style="list-style-type: none">• Does not provide safety improvements.• SDDOT and City design policies for application of raised medians are not met.

Comparison Matrix
41st Street East of I-29 Alternatives

I-29 Exit 77 (41st Street) Interchange Study
Project # PL0100(84) 3616P, PCN 05MH

4/12/17

Alternative	Description	Purpose and Need				Traffic Operations (2)						Property Impacts				Costs			Applicable Environmental Impacts			
		Meets City LOS Criteria	Safety Improvement	Pedestrian Facilities Improvement	Meets SDDOT and City Design Policy	Year 2023			Year 2045			Total commercial acquisitions	Partial commercial acquisitions	Empire Mall Access Circulation	Affected Business / Landowner Acceptance for Access and Impacts	ROW Acquisition	Construction	Total	Historic Structures	Section 4(f) Properties	Environmental Justice	Contaminated Materials
						41st St/W Empire Pl Intersection	41st St/Shirley Ave Intersection	41st St/Louise Ave Intersection (3)	41st St/W Empire Pl Intersection	41st St/Shirley Ave Intersection	41st St/W Louise Intersection (3)											
						LOS AM/ PM/Sat	LOS AM/ PM/Sat	LOS AM/ PM/Sat	LOS AM/ PM/Sat	LOS AM/ PM/Sat	LOS AM/ PM/Sat											
												#	sq ft			M \$	M \$	M \$	#	#	#	#
A	Raised median with 3/4 access at W Empire Place and 2 thru lanes on Shirley Ave and mall entrance	yes (1)	yes	yes	yes	A/A/A	B/D/D	C/D/E	A/A/A	C/D/D	C/E/E	0	24,720	good	moderate	0.8	6.2	7.0	0	0	0	(5)
B	Raised median with 3/4 access at W Empire Place and one-way outbound at Shirley Ave mall entrance	yes (1)	yes	yes	yes	A/A/B	B/D/D	C/D/E	A/A/B	B/D/D	C/D/E	0	18,895	poor (4)	poor (4)	0.6	5.7	6.3	0	0	0	(5)
C	Center two-way left turn lane with signalized intersections at W Empire Place and Shirley Ave	yes (1)	no	yes	no	A/A/B	A/D/D	C/D/E	A/A/B	B/D/D	C/D/E	0	22,935	good	good	0.7	6.1	6.8	0	0	0	(5)
NB	No-Build	yes	no	no	no	A/B/C	A/B/B	C/D/E	A/B/C	A/B/B	D/E/E	0	0	good	good	NA	NA	NA	0	0	0	0

NA: Not Applicable

(1) LOS criteria at an un-improved 41st/Louise intersection are not met for any scenario; however, 41st St improvements do not result in worse LOS at the 41st/Louise intersection.

(2) LOS for Build Alternatives is with the Diverging Diamond Interchange at I-29; LOS with Single Point Interchange at I-29 is similar.

(3) Improvements at 41st/Louise intersection are not proposed with this project.

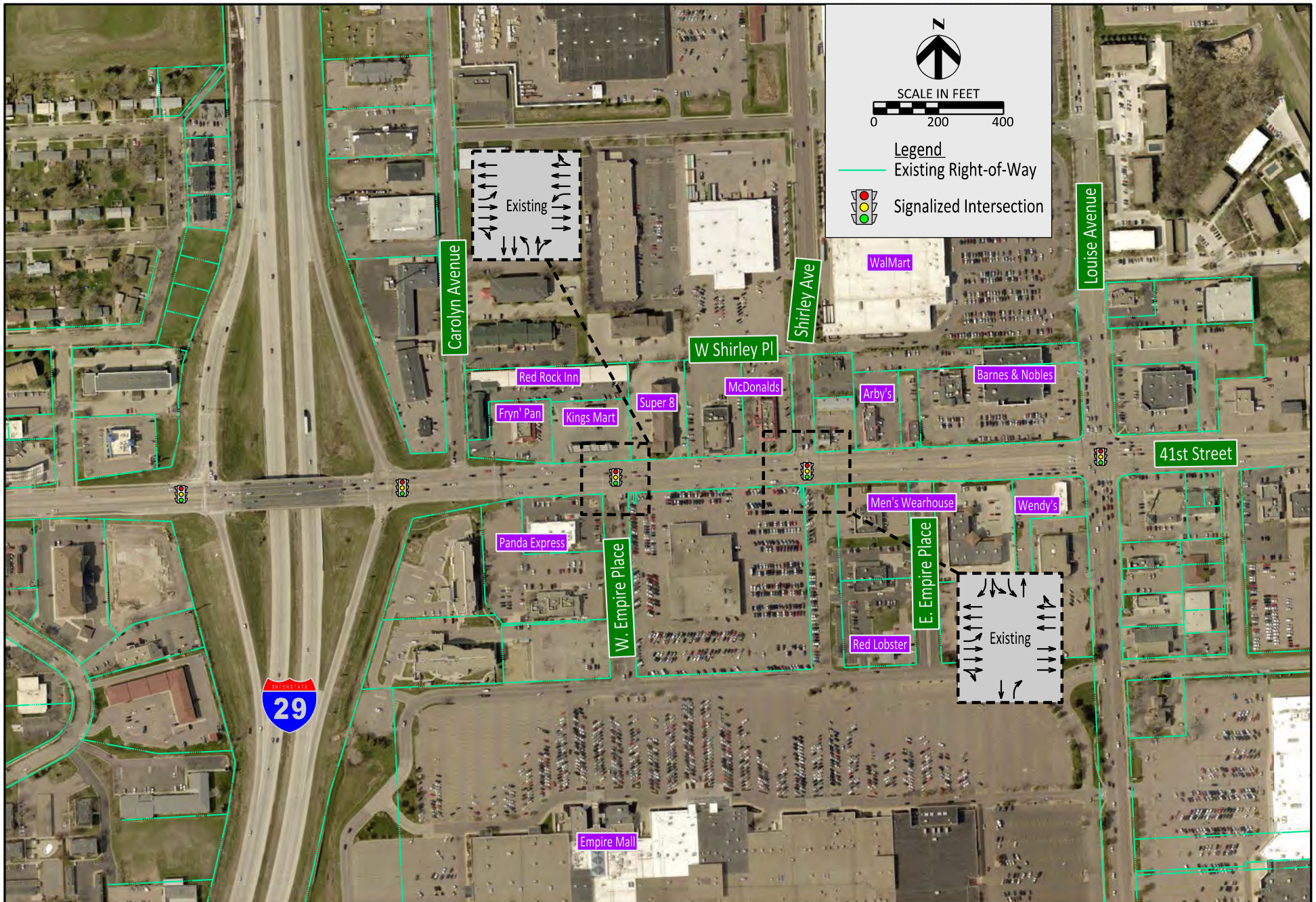
(4) One-way outbound mall access at Shirley Avenue is not desired by the property owner (Empire Mall); the City of Sioux Falls concurs with the property owner.

(5) Panda Express strip mall has been evaluated for Phase I Environmental Site Assessment due to past use as gas station. Underground storage tanks have been removed and previous contaminated materials cases have been closed.

Options recommended for elimination from further evaluation



Attachment A
41st Street Alternatives
Figures East-Exist to East C



Drawn By: B. Miller
Date: 7/22/2016
Chkd By: J. Unruh
Date: 7/22/2016
Revision: 3/10/2017

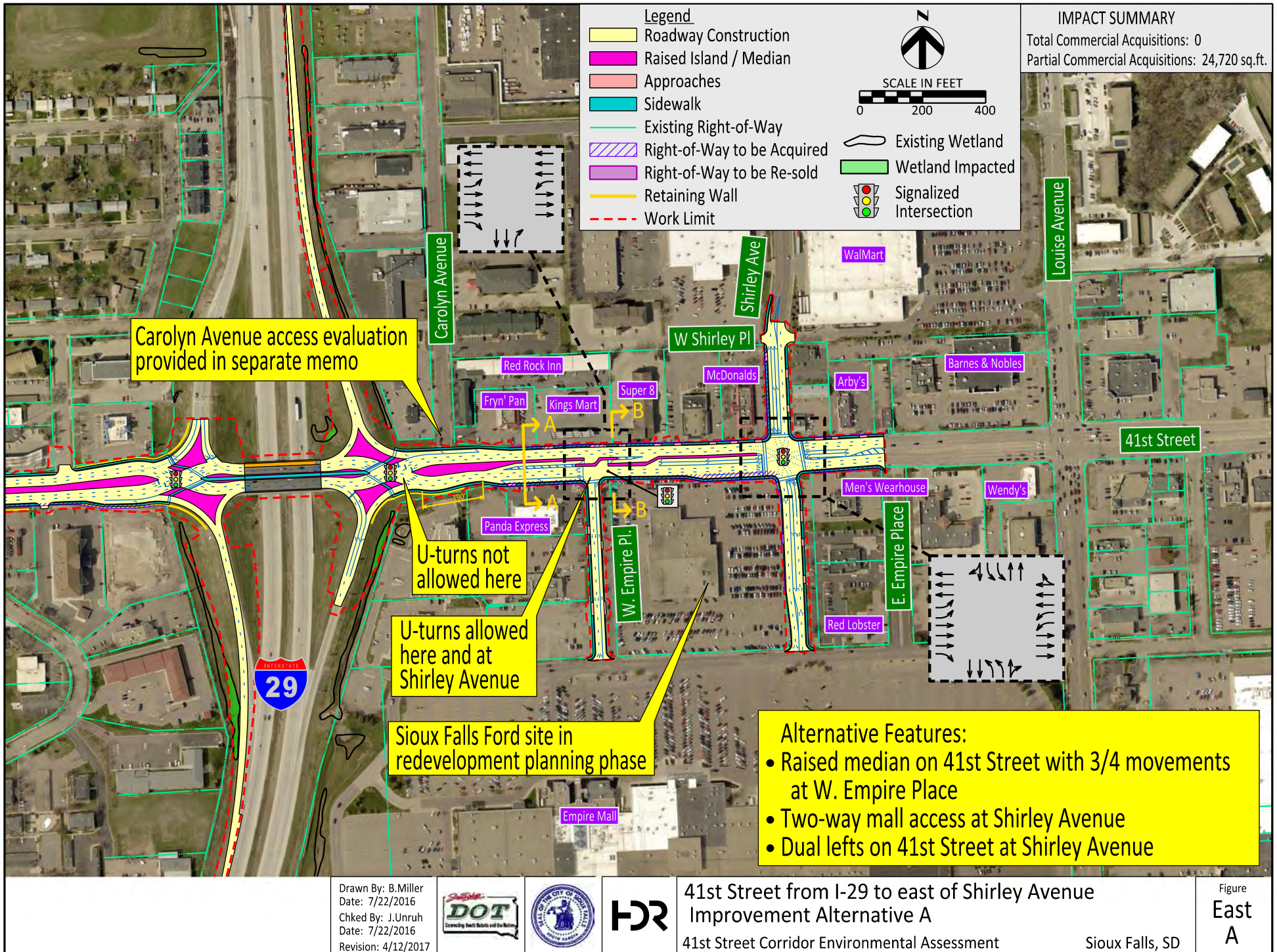


41st Street from I-29 to east of Shirley Avenue
Improvement Alternative A

41st Street Corridor Environmental Assessment

Sioux Falls, SD

Figure
East
Exist.



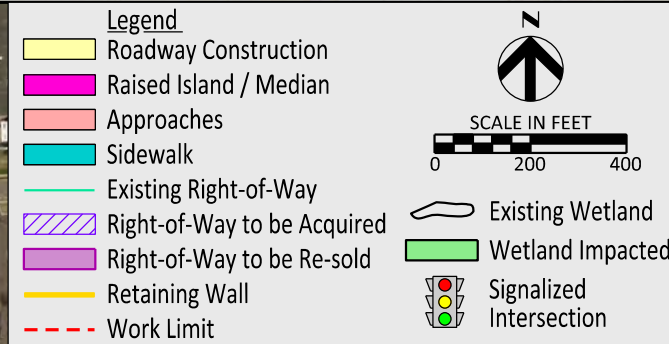
The City of Sioux Falls and Empire Mall have decided to drop this alternative from further consideration because the one-way main access road to the mall is not desirable.

Carolyn Avenue access evaluation provided in separate memo

U-turns not allowed here

U-turns allowed here and at Shirley Avenue

Sioux Falls Ford site in redevelopment planning phase



IMPACT SUMMARY
Total Commercial Acquisitions: 0
Partial Commercial Acquisitions: 18,895 sq.ft.

- Alternative Features:**
- Raised median on 41st Street with 3/4 movements at W. Empire Place
 - Dual lefts on 41st Street at Shirley Avenue
 - One-way Empire Mall exit at Shirley Avenue

Drawn By: B. Miller
Date: 7/22/2016
Chkd By: J. Unruh
Date: 7/22/2016
Revision: 4/12/2017

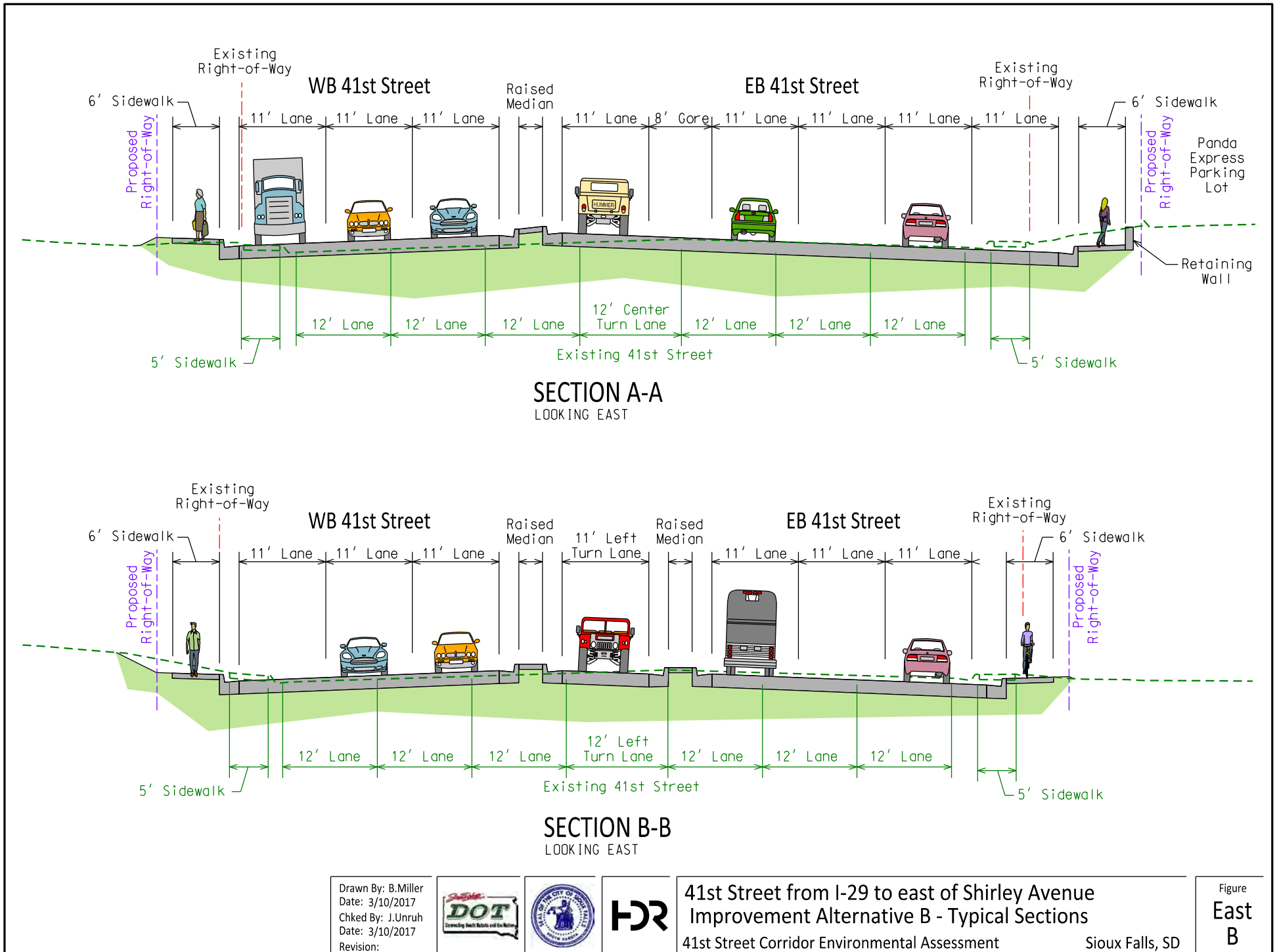


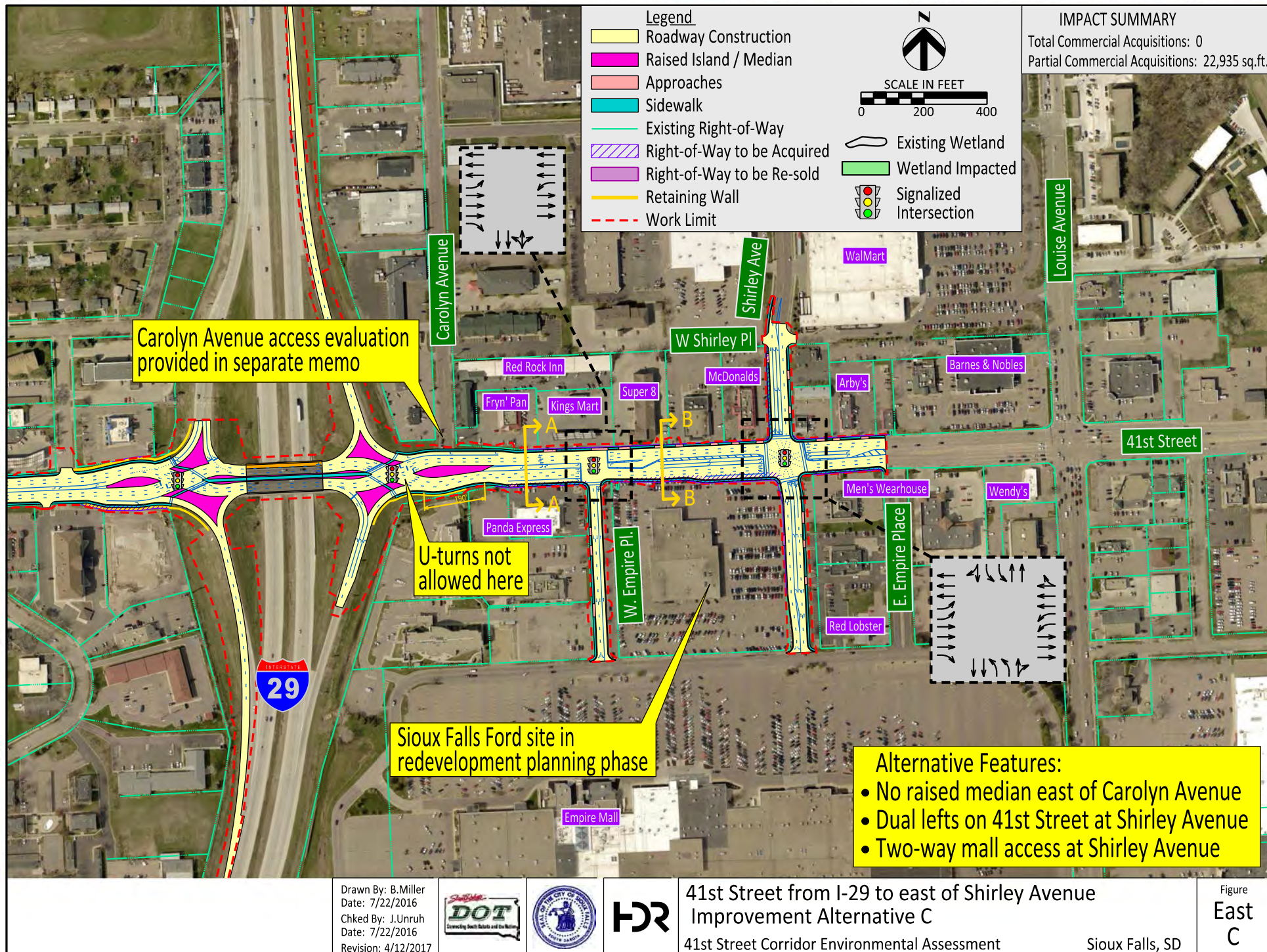
41st Street from I-29 to east of Shirley Avenue
Improvement Alternative B

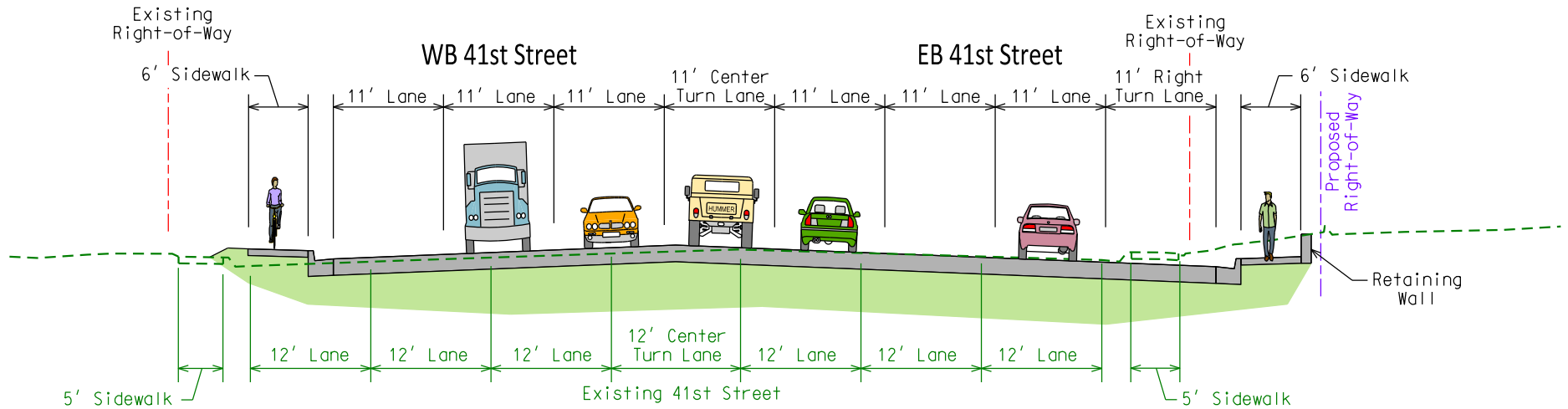
41st Street Corridor Environmental Assessment

Sioux Falls, SD

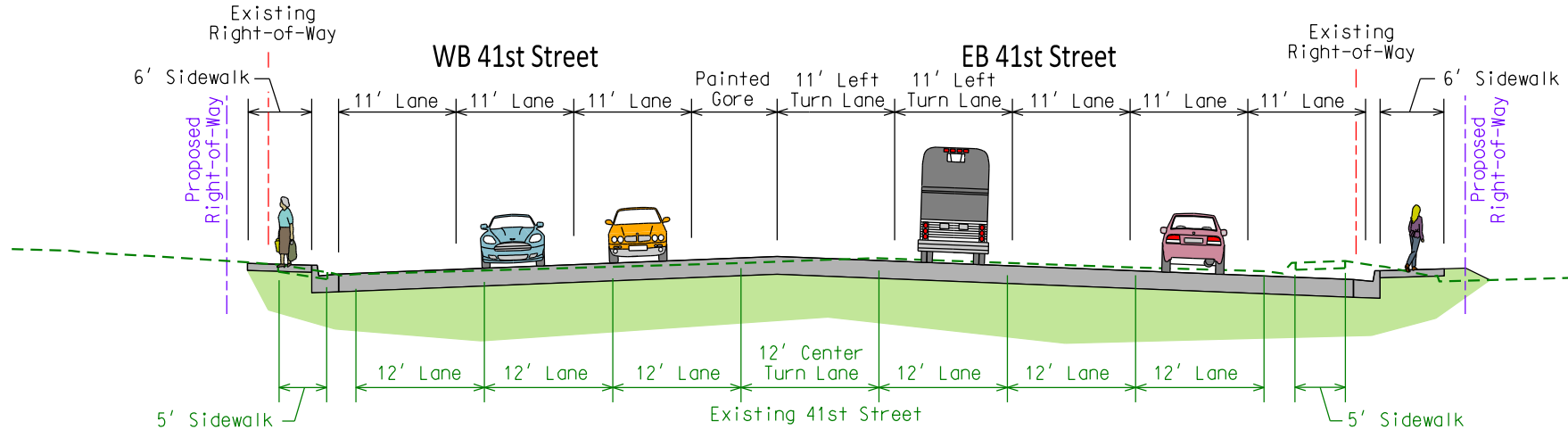
Figure
East
B







SECTION A-A
LOOKING EAST



SECTION B-B
LOOKING EAST

Drawn By: B. Miller
Date: 3/10/2017
Chkd By: J. Unruh
Date: 3/10/2017
Revision:



**41st Street from I-29 to east of Shirley Avenue
Improvement Alternative C - Typical Sections**

41st Street Corridor Environmental Assessment

Sioux Falls, SD

Figure
**East
C**



Attachment B

Response to Business/Landowner Concerns

How does recommended Alternative A meet landowner concerns?

South side of 41 st Street from I-29 to east of Shirley Avenue				
Property	Representative	Meeting	Concern(s)	Response(s)
Sioux Falls Ford	letter from legal representative	follow-up to 3/12/12 public meeting	Preferred the no-build alternative because of catastrophic impacts of all other alternatives on SF Ford property for access and acquisitions.	SF Ford property is in the redevelopment planning phase. Coordination is ongoing with the City of Sioux Falls and the developer of this property. Alternative B has been acceptable to both parties.

North side of 41 st Street from I-29 to east of Shirley Avenue				
Property	Representative	Meeting	Concern(s)	Response(s)
Fryn' Pan Restaurant	Dave Stukel	Public meeting 9/21/11	I am strongly opposed to any type of medians from I-29 to Louise Avenue. My business is "hanging on" in these tough economic times and I feel that medians could be a final straw. I am also strongly opposed to all access to/from Carolyn Avenue being closed off. There would be a huge financial impact to the hotels and my restaurant by closing off Carolyn Avenue.	3/4 access at W Empire Place provides reasonable access to the Fryn' Pan since all access movements are allowed except the left outbound to eastbound 41 st Street. If the Carolyn Avenue cul-de-sac alternative is selected, access from Fryn' Pan to eastbound 41 st Street would be from Carolyn Avenue to 38 th Street to Shirley Avenue. The benefit of the raised median is to improve safety by limiting left-turn movements.
	Bob Fischer	Public meeting 9/21/11	I strongly oppose the installation of medians between I-29 and Louise Avenue. Medians are a major restriction of access to local business. The impact on our restaurant could be as high as a 50% reduction in sales with a minimum impact of 30%. Even the 30% level will put us out of business. Medians would also impact local motels (Comfort Inn, Comfort Suites and Microtel as well as others) from which we get much of our traffic. The closing of the Carolyn Avenue access to 41st Street would impact the above motels and us. It is very doubtful that any of us would survive. I strongly oppose this proposal! Restricting access to/from Carolyn Avenue to all right hand turns would cause lesser but similar damage to us and the motels. I strongly oppose this proposal! Forcing us to consolidate driveways with the BP station next door would be yet another impediment for our customers, arriving and exiting. The increased traffic through the narrow (30 ft) drive. As most, if not all traffic would be going west, cars exiting the BP station would effectively block traffic into and from our restaurant. I strongly oppose this proposal. The project needs to include CLOSE back access to Carolyn Avenue and I-29 affected businesses.	

How does recommended Alternative A meet landowner concerns?

North side of 41 st Street from I-29 to east of Shirley Avenue				
Property	Representative	Meeting	Concern(s)	Response(s)
Super 8 motel at 4100 W 41 st St	Mitchell Millen	Public meeting 9/21/11	<ol style="list-style-type: none"> 1. We would like access to our property at 41st Street and would share with the gas station west of us. 2. The Best Western also gets its access through our parking lot. 	<ol style="list-style-type: none"> 1. With the 3/4 access at W Empire Place, all movements at the Super 8 are being maintained except the left out. Access to eastbound 41st Street will be from W Shirley place to Shirley Avenue to 41st Street. 2. The Best Western connection will remain unchanged.
Arby's at 41 st east of Shirley	Joe James	Public meeting 9/21/11	After the meeting Mike Walz and I attended on the I-29 exit 77 crossroads corridor study we have decided that we would like our first choice to be D and our second choice to be C with the median shorten so our customers could make a left turn into our driveway.	Raised median east of Shirley Avenue is not proposed with Alternative A.
Kings Mart east of Carolyn Avenue	Doc Wang, Hyesuk Wang, Jae Sim	Landowner meeting 4/18/11	<ol style="list-style-type: none"> 1. Business owners estimate that 60% of customers are interstate travelers; therefore, any restriction in access via a raise median would be devastating to their business. Patronage from eastbound 41st street drivers is minimal during the morning rush hour. 2. Owners are wary of access agreements between property owners because of failed attempts on other business sites that they own. 	<ol style="list-style-type: none"> 1. The 3/4 access at W Empire Place provides reasonable access to Kings Mart since all access movements are allowed except the left outbound to eastbound 41st Street. Travelers from I-29 will be able to get back to I-29 without any restrictions. 2. There are multiple mutual access agreements between landowners in this area that have appeared to work well.