FARNAM STREET CORRIDOR STUDY

Dodge Street to 40th Street

OPW 53944

Prepared for:

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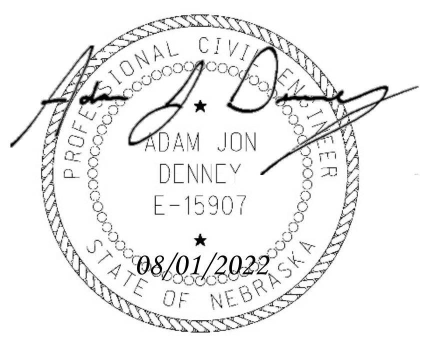

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I. INTRODUCTION

1.1 Project Introduction and Purpose

The City of Omaha has tasked Felsburg Holt & Ullevig (FHU) with completing a corridor study to improve the segment of Farnam Street from Dodge Street to 40th Street. This project coincides with UNMC / Nebraska Medicine's NExT initiative with plans to invest approximately $ 2.6 billion into their campus over an eight-year period.

The purpose of this study is to analyze the feasibility of permanently converting Farnam Street to a continuous, two-way street through the project area. The study evaluates other appropriate improvements that could be implemented to accommodate future growth with a focus on vehicle, bicycle, and pedestrian travel.

The segment of Farnam Street that passes through the Dundee neighborhood is currently a two-lane undivided roadway from 46th Street to Happy Hollow Boulevard. This segment also switches between one-way and two-way operation throughout the day using variable lane assignment via signalization. During morning commuter period (7:00 AM to 9:00 AM), Farnam Street operates as a two-lane one-way roadway in the eastbound direction. During the afternoon commuter period (4:00 PM to 6:00 PM), Farnam Street operates as a two-lane one-way roadway in the westbound direction. This one-way operation only occurs during the commuter peak hours on weekdays; Farnam Street otherwise operates as two-way the rest of the day and all day during the weekends.

From Saddle Creek Road to 40th Street, Farnam Street currently operates as a non-continuous two-way street. Eastbound traffic shifts to Harney Street at the "S" curve near 42nd Street. Two-way traffic resumes on Farnam Street east of 42nd Street. Eastbound vehicles cannot continue on Farnam Street through 42nd Street, but westbound traffic is continuous.

Included in this report is an operations analysis, a cross-section analysis, a crash analysis, a signal warrant analysis, an auxiliary turn lane analysis, and an alternatives analysis. The primary focus is on traffic operations at the following intersections:

- Dodge Street & Happy Hollow Boulevard (signalized)
- Farnam Street & Dodge Street (signalized)
- Farnam Street & Happy Hollow Boulevard (signalized)
- Farnam Street & 52nd Street (signalized)
- Farnam Street & 51st Street (ped signal)
- Farnam Street & 50th Street (signalized)
- Farnam Street & 49th Street (unsignalized)
- Farnam Street & 46th Street (unsignalized)
- Farnam Street & Saddle Creek Road (signalized)
- Farnam Street & 44th Street (signalized)
- Farnam Street & 42nd Street (signalized)
- Farnam Street & 40th Street (signalized)
- Harney Street & 42nd Street (signalized)
- Harney Street & 40th Street (signalized)

The study evaluates the following time periods:

- Existing year (2021) AM and PM weekday peak hours with one-way Farnam Street
- Existing year (2021) AM and PM weekday peak hours with two-way Farnam Street
- Future year (2040) for the AM and PM weekday peak hours with one-way Farnam Street
- Future year (2040) for the AM and PM weekday peak hours with two-way Farnam Street

1.2 Existing Roadway Network

The corridor study evaluates Farnam Street from Dodge Street / Happy Hollow Boulevard to 40th Street. The following section describes in more detail the study area roadway segments. The location of the project in relation to the surrounding roadway network is shown on **Figure 1-1**.

- **Farnam Street**, an east-west roadway, is classified as a minor arterial based on State and Federal guidelines. The speed limit on Farnam Street through the project study area is posted at 30 miles per hour (mph). The segment of Farnam Street that passes through the Dundee neighborhood is a two-lane undivided roadway from 46th Street to Happy Hollow Boulevard. From Saddle Creek Road to 42nd Street, Farnam Street operates as a four-lane divided roadway, and east of 42nd Street, it transitions to a three-lane undivided roadway with two lanes of traffic westbound and one lane of traffic eastbound.
- **Dodge Street**, an east-west street, is classified as an other principal arterial according to Federal and State guidelines and is also US Highway 6. Dodge Street runs just north of Farnam Street, and it has a 5-lane cross section with curb and gutter. The posted speed limit is 35 mph.
- **Harney Street**, an east-west roadway, is classified as a minor arterial with a posted speed limit of 30 mph. Harney Street runs just south of Farnam Street. In the project study area, Harney Street is one-way eastbound roadway with a 3-lane cross section between 42nd Street and 41st Street, and it transitions to a two-lane cross section east of 41st Street.
- **Saddle Creek Road**, a north-south roadway, is classified as an other principal arterial with a posted speed limit of 35 mph through the project study area. Saddle Creek Road runs along the west side of UNMC's campus. In the project study area, Saddle Creek Road is a four-lane divided roadway.
- **Happy Hollow Boulevard** is a major collector street serving the neighborhoods to the north and south of the project study area. It is a north-south roadway running along the west side of the corridor that is classified as a major collector with a posted speed limit of 30 mph. Happy Hollow Boulevard typically has a two-lane cross section with auxiliary lanes at major intersections.
- **52nd Street**, a north-south street, is classified as a major collector with a posted speed limit of 30 mph in the study area. 52nd Street has a two-lane cross section with an auxiliary northbound right-turn lane provided at the intersection with Farnam Street. 52nd Street primarily serves the neighborhoods to the north and south of the project study area.
- **51st Street** is a local street serving the neighborhoods to the north and south of Farnam Street. It has a two-lane cross section with a posted speed limit of 30 mph through the study area. There is a ped signal immediately west of the intersection of 51st Street with Farnam Street.
- **50th Street** is a north-south roadway that is classified as a major collector. It has a two-lane cross section with a posted speed limit of 25 mph through the project study area. Northbound, an auxiliary right-turn lane is provided at the intersection with Farnam Street.
- **49th Street** is a local street serving the neighborhoods along either side of Farnam Street. The speed limit along 49th Street through the study area is posted at 25 mph. 49th Street is a two-lane undivided roadway.
- **48th Street** is a minor collector street serving the neighborhoods along either side of Farnam Street. The speed limit along 48th Street through the study area is posted at 25 mph. 48th Street is a two-lane undivided roadway that provides connectivity between Leavenworth Street and Dodge Street and the Dundee neighborhood.

- **46th Street** is a local street that runs north-south through the study area. It has a posted speed limit of 25 mph. 46th Street has a two-lane cross section in the study area. 46th Street serves as an alternate route for westbound traffic on Farnam Street to get to Dodge Street.
- **44th Street** is local street that runs north-south through the study area. 44th Street has a three-lane cross section with a posted speed limit of 25 mph in the project study area. At the intersection of 44th Street with Farnam Street, auxiliary left-turn lanes are present on both approaches of 44th Street; there is also an auxiliary northbound right-turn lane present at the intersection. South of Farnam Street, 44th Street provides access to UNMC's campus.
- **42nd Street**, a north-south roadway, is classified as a minor arterial according to federal and state guidelines. 42nd Street has a three-lane cross section in the study area with a two-way left-turn lane (TWLTL). The posted speed limit on 42nd Street within the project limits is posted at 30 mph.
- **40th Street**, a north-south roadway, is classified as a major collector within the project study area; north of Dodge Street it is classified as a minor arterial. The segment of 40th Street between Dodge Street and Farnam Street functions features a three-lane cross section with a TWLTL. South of Farnam Street, 40th Street functions as a two-lane undivided roadway. North of Harney Street, the posted speed limit on 40th Street is 30 mph. South of Harney Street, the speed limit is reduced to 25 mph.

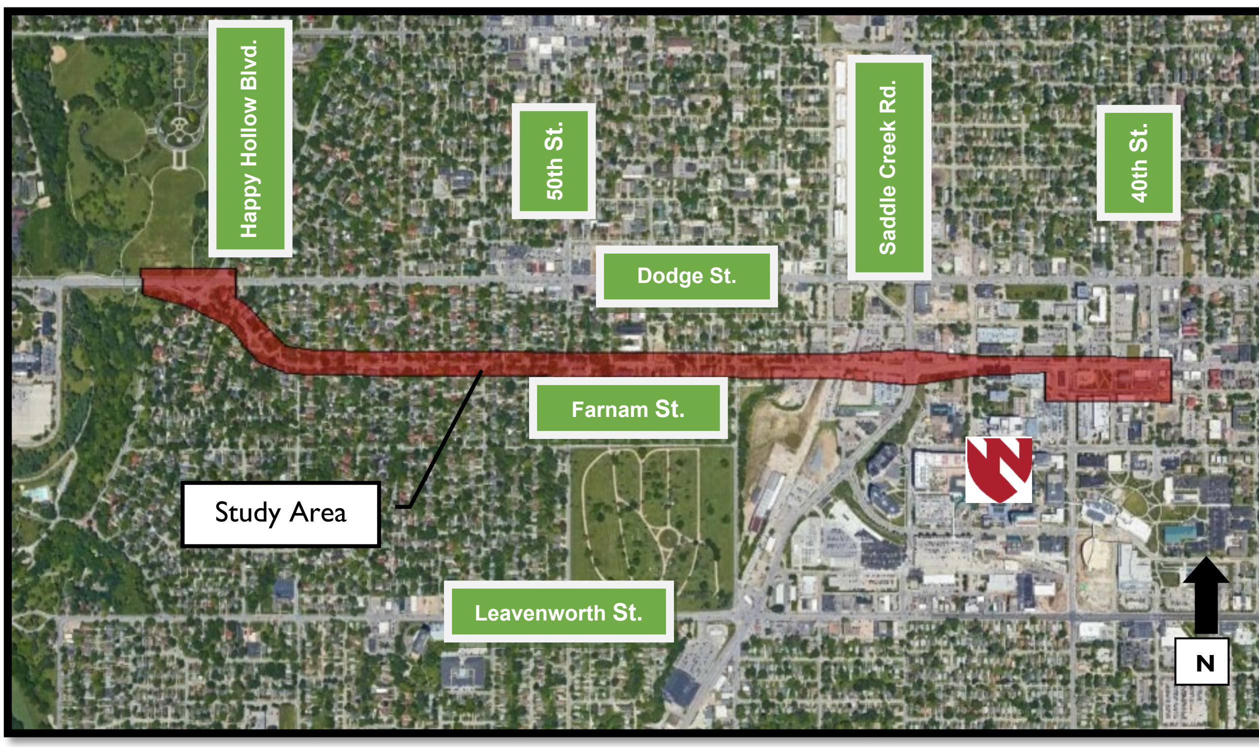


Figure 1-1. Project Study Area

2. BICYCLE, PEDESTRIAN, & TRANSIT FACILITIES

2.1 Existing Transit Facilities

There are several Metro Transit bus routes that run through and around the project study area. The 15 route runs along 42nd Street, then along Farnam Street where it then runs north-south on 40th Street through the study area. The 3 route follows a similar route to that of the 15 bus through the study area; however, it uses Harney Street to go between 40th Street and 42nd Street.

Just north of the study corridor, the 98 route and the Omaha Rapid Bus Transit (ORBT) bus route run along Dodge Street. Metro Transit routes within the study area are shown on **Figure 2-1**.

2.2 Existing Pedestrian/Bicycle Facilities

Numerous pedestrian and bicycle facilities are located along the study corridor. A pedestrian signal is located on the west leg of the intersection of Farnam Street with 51st Street. Pedestrian facilities within the study area are shown on **Figure 2-1**.

There are a number of bicycle facilities surrounding the study area. Multiple facility types are described in the *Omaha Metropolitan Area Bicycle Map, 2017 Edition*, which are addressed below:

Multi-use Trails:

- The Field Club trail runs just south of the project study area, terminating at Leavenworth Street near 40th Street. Various trails are provided throughout the UNMC campus but are not officially designated as multi-use trails.
- Running along the west side of Happy Hollow Boulevard, the Elmwood South Trail runs north and connects into the Happy Hollow Boulevard Trail. This trail follows Happy Hollow Boulevard north.

Bike Omaha System:

- Facilities designated as part of the Bike Omaha System are intended to serve as connections to downtown, major central city destinations, and trail systems throughout Omaha.
- 51st Street, running north-south, is classified as being part of the Bike Omaha System. It provides access to the Boulevard Trail at the intersection of 51st Street with Happy Hollow Boulevard.
- 40th Street, north of Dewey Avenue, is identified as being part of the Bike Omaha System. This route provides bikers access to the Blackstone District and UNMC's campus south of Farnam Street. It also connects into a number of Bike Omaha corridors to the north of the study area. These include Burt Street and Nicholas Street.

Experienced Rider Streets:

- Farnam Street and Harney Street, running east-west, are both designated as experienced rider streets within the project study area. 50th Street as well as 46th Street south of Farnam Street, both running north-south, are also designated as experienced rider streets. According to the City of Omaha's bicycle guide, these streets have moderate traffic volumes and are generally suitable for experienced cyclists comfortable with riding in mixed traffic.

Continuous Low-Volume Streets:

- Howard Street and Dewey Avenue, east-west streets running just south of Farnam Street, are designated as continuous low-volume streets. The Harney Street Bikeway pilot project currently provides a two-way cycle track on Harney Street just east of the study area; Dewey Avenue is designated as the bikeway route west of Turner Boulevard into the UNMC campus.

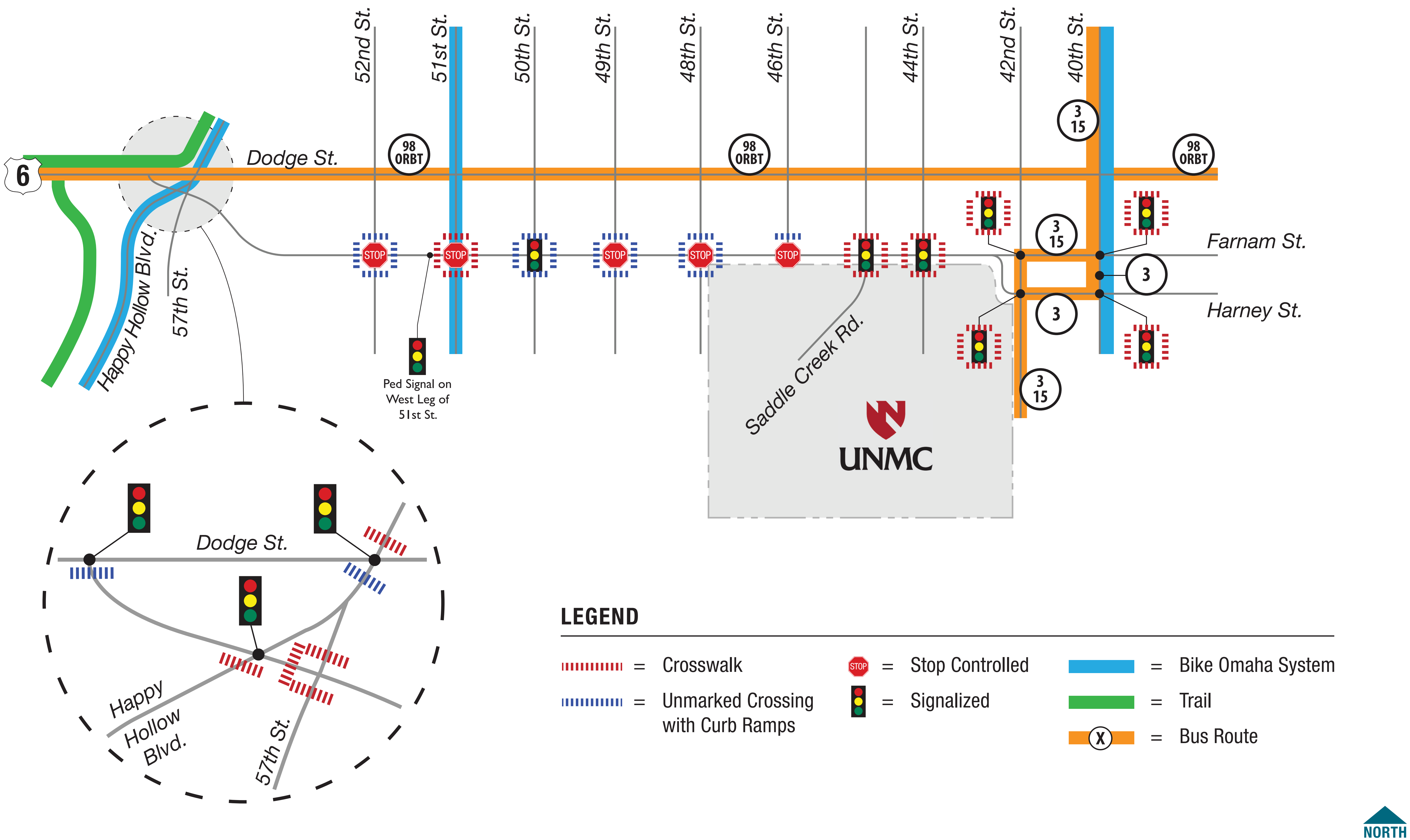
- 51st Street and 56th Street, south of Howard Street, are also classified as continuous low-volume streets.
- 38th Street, 46th Street, 48th Street, and 49th Street run north-south through the project study area, and they are all classified as continuous low-volume streets.

2.3 Education and Recreation Facilities

There are a number of schools in the project study area. The University of Nebraska Omaha (UNO) is located just west of the project study area along Dodge Street between 60th Street and 67th Street. The University of Nebraska Medical Center (UNMC) is located to the south of Farnam Street and east of Saddle Creek Road. Clarkson College is located on the southeast corner of the intersection of Dodge Street with 42nd Street.

Brownell-Talbot School is located north of the study area, situated on the east side of Memorial park, located on the southwest corner of the intersection of Happy Hollow Boulevard with Underwood Avenue. Dundee Elementary School is located on the northwest corner of the intersection of 51st Street with Davenport Street; this is just north of the study corridor.

Parks located in the study area include Memorial Park and Elmwood Park. These are located just west of the study corridor with Memorial Park being located on the north side of Dodge Street, and Elmwood Park being located on the south side of Dodge Street. There is a pool and golf course located within Elmwood Park.



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NOTE: Drawing Not to Scale

FIGURE 2-1

Pedestrian, Bicycle, and Transit Facilities

Farnam Street Corridor Study 120-340-01 11/09/21

3. EXISTING TRAFFIC CONDITIONS

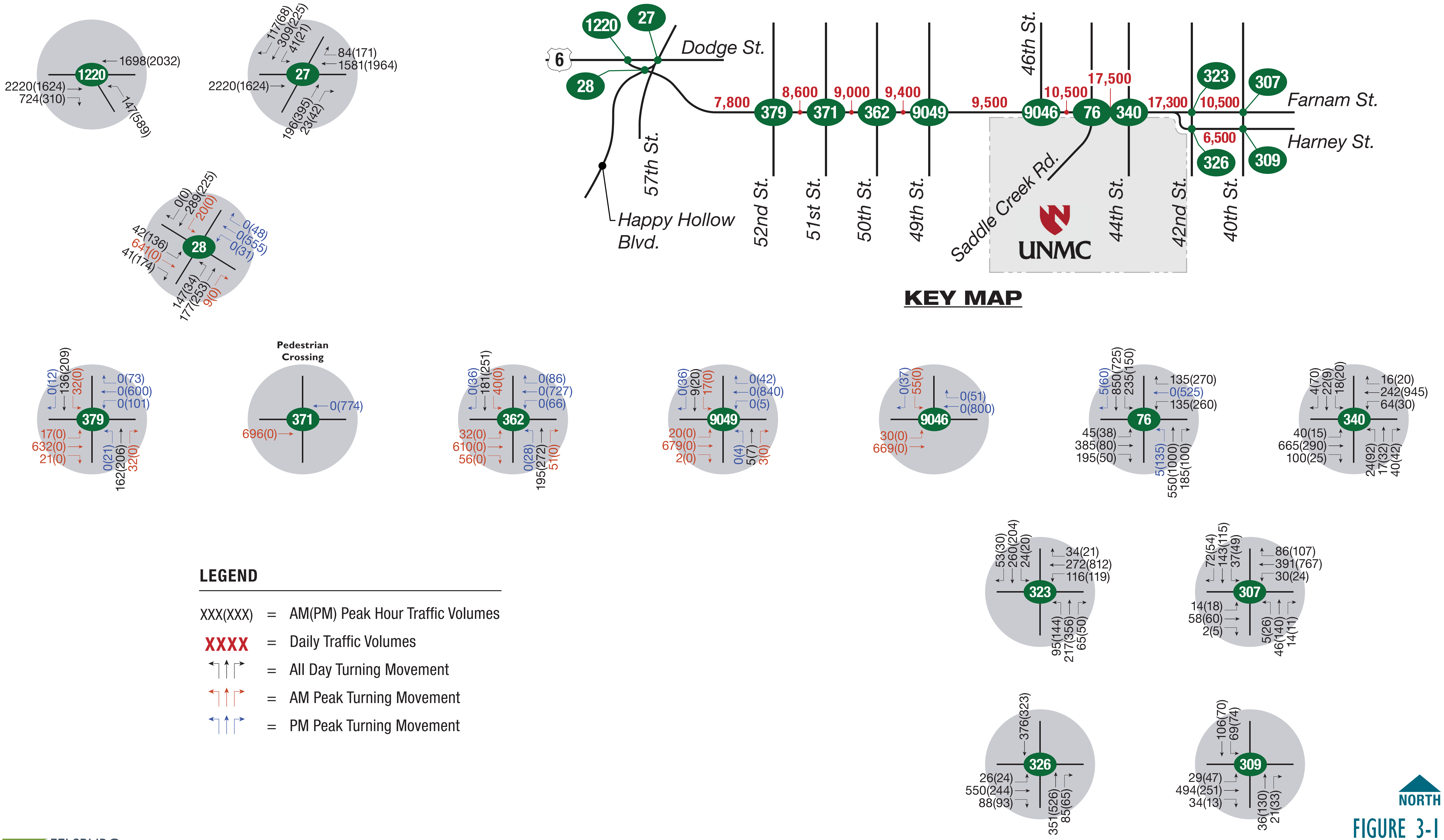
3.1 2021 Existing Traffic Volumes

This study was conducted during the COVID-19 pandemic, which has considerably affected traffic patterns. Therefore, alternative methods of data synthesis were utilized, such as application of growth rates to historic counts, use of ADT data, and application of adjustment factors to estimate traffic volumes. Historic intersection turning movement counts (TMCs) were provided by the City of Omaha at the study intersections. Thirteen of the fourteen study intersections were counted before March 2020 (before COVID-19 travel restrictions which began on March 7, 2020). The count at the intersection of Farnam Street with 49th Street occurred after travel restrictions and was factored and balanced with adjacent intersections to account for the variations in count volumes. **Table 3-1** shows the date, duration, type, and source for each intersection count. **Appendix A** includes detailed turning movement data for each intersection.

Table 3-1. Traffic Counts

Location	Count Date	Bike	Ped	Cars	Trucks	Duration (hours)	Source
Dodge Street & Happy Hollow Boulevard	October 8, 2019		X			8	City
Farnam Street & Dodge Street	October 8, 2019		X			8	City
Farnam Street & Happy Hollow Boulevard	September 18, 2019		X			8	City
Farnam Street & 52nd Street	October 30, 2019		X			8	City
Farnam Street & 51st Street	May 14, 2018	X	X	X	X	24	FHU
Farnam Street & 50th Street	November 4, 2015		X			8	City
Farnam Street & 49th Street	March 2, 2021		X			8	City
Farnam Street & 46th Street	February 23, 2021		X			8	City
Farnam Street & Saddle Creek Road	August 6, 2019		X			8	City
Farnam Street & 44th Street	July 15, 2015		X			8	City
Farnam Street & 42nd Street	October 14, 2015		X			8	City
Farnam Street & 40th Street	June 11, 2018		X			8	City
Harney Street & 42nd Street	July 16, 2015		X			8	City
Harney Street & 40th Street	July 8, 2015		X			8	City

Vehicular traffic volumes for the study area intersections were compared to determine the study area peak hours, as shown in **Appendix A**. The AM peak hour was determined to be 7:30 AM to 8:30 AM, and the PM peak hour was 4:45 PM to 5:45 PM. **Figure 3-1** shows the 2021 Existing peak hour turning movements and average daily traffic (ADT) volumes.



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NOTE: Drawing Not to Scale

FIGURE 3-1

Existing (2021) Traffic Volumes

Farnam Street Corridor Study 120-340-01 11/09/21

3.2 Traffic Operations Analysis

Traffic operations were analyzed for the study intersections using procedures documented in the *Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis (HCM)*, Transportation Research Board, October 2016. From the analyses, a key measure or "level of service" rating of the traffic operational condition was obtained. For intersection operations, LOS provides a qualitative assessment of traffic operational conditions within a traffic stream in terms of the average stopped delay per vehicle at a controlled intersection. Levels of service are described with a letter designation of A, B, C, D, E, or F, with LOS A representing essentially uninterrupted flow, and LOS F representing a breakdown of traffic flow with noticeable congestion and delay. For this study acceptable traffic operations follow the City of Omaha requirements that all signalized intersections to operate at LOS D or better overall and individual movements at stop-controlled or roundabouts to operate a LOS D or better in peak hour conditions

Synchro Version 10 (signalized and stop-controlled intersections) and SIDRA Intersection 8 (roundabouts) traffic analysis software were used to analyze traffic operations at the study intersections. **Table 3-2** summarizes LOS criteria for signalized intersections.

Table 3-2. Intersection Level of Service Criteria

Level of Service	Average Control Delay (sec/veh)	
	Stop Sign/Roundabout Controlled Intersections	Signalized Intersections
A	≤ 10	≤ 10
B	> 10 to 15	> 10 to 20
C	> 15 to 25	> 20 to 35
D	> 25 to 35	> 35 to 55
E	> 35 to 50	> 55 to 80
F	> 50	> 80

Source: HCM 6th Edition, Exhibit 18-4 & 19-8

3.3 Existing Configuration Traffic Operations

Traffic operations were analyzed for the AM and PM peak hours at the fourteen study intersections using the collected traffic volumes with existing intersection configurations. **Figure 3-2** shows the 2021 Existing operations.

All signalized study intersections operate at LOS C or better overall during the AM and PM peak hours under 2021 Existing traffic conditions. Both two-way stop-controlled intersections operate at LOS C or better for stop-controlled and yielding movements during the AM and PM peak hours under 2021 Existing traffic conditions. **Appendix F** provides additional information in the analysis software reports.

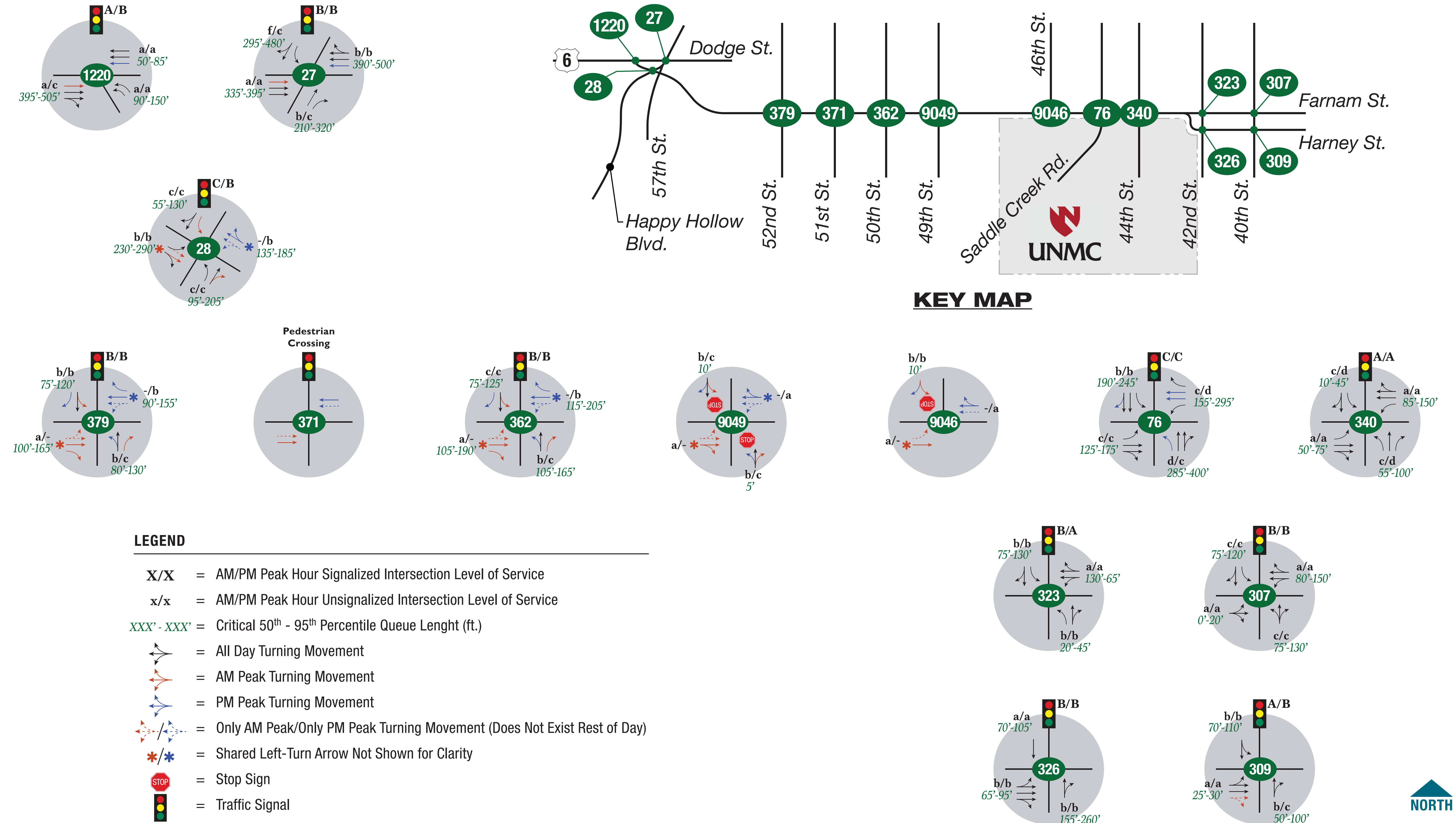

FIGURE 3-2
Existing (2021) Traffic Operations

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NOTE: Drawing Not to Scale

4. CRASH ANALYSIS

4.1 Intersection Crash Summary

The City of Omaha provided crash data for twenty intersections and nineteen segments along the study corridors for the most recent six-year period available, January 2015 through December 2020. 2020 crash data was omitted due to COVID-19 impacting traffic volumes. The crash data was reviewed to identify existing crash types that will be used to develop and compare the safety performance of alternatives.

Findings for intersections are summarized in the following subsections and in **Table 4-1**, **Table 4-2**, and **Table 4-3**. Each of the tables describes different attributes of the crash patterns at the intersections, including the crash year, crash severity, and crash type. A visual overview of crash data is provided on **Figure 4-1**.

Table 4-1 includes the calculations for crash rates at intersections based on million entering vehicles (MEV) and have also been converted into equivalent property damage only (EPDO) to account for higher severity crashes. The EPDO rates use a multiplier of 12.1 for injury and fatal crashes. Crash rates above the City of Omaha average crash rate for the respective intersection type (based on FHWA classification) are highlighted.

Of the intersections with elevated crash rates, seven had a crash rate greater than 150% of the City of Omaha average crash rate. These intersections include:

- 42nd Street & Farnam Street
- Saddle Creek Road & Farnam Street
- 50th Street & Farnam Street
- 52nd Street & Farnam Street
- Happy Hollow Blvd & Farnam Street
- 41st Street & Harney Street

This list of intersections includes all the locations that are later discussed in the alternatives analysis. Additionally, 42nd Street with Harney Street has been added to the in-depth discussion in the next section due to its proximity to and operational relationship with 42nd Street with Farnam Street. **Chart 4-1** to **Chart 4-7** provide an overview of the crash types for the discussed intersections. **Appendix A** includes crash analysis summaries for each intersection.

Intersection crash occurrences and patterns of note not discussed later:

- 40th Street & Farnam Street:
  - 1 pedestrian crash that resulted in a possible injury
  - Occurred between 10:00 AM and 11:00 AM
- 44th Street & Farnam Street:
  - 1 disabling injury crash from an angle type collision
  - Occurred between 2:00 PM and 3:00 PM
  - Southbound vehicle ran the red light

Table 4-1. Intersection Crashes by Year & Crash Rates

Intersections (w/ Farnam Street)	2015	2016	2017	2018	2019	2020	Total	Daily EV	5-Year (MEV)*	Avg. Crash Rate+	Crash Rate / MEV
40th Street	7	4	8	2	0	2	21	15,800	28.85	0.51	**0.73**
41st Street^	1	1	4	0	1	0	7	13,500	24.65	0.23	**0.28**
42nd Street	13	5	9	7	3	4	37	21,600	39.44	0.60	**0.94**
44th Street	1	4	0	2	1	1	8	20,000	36.52	0.23	**0.22**
Saddle Creek Road	16	17	15	12	17	11	77	42,900	78.34	0.58	**0.98**
46th Street**	1	0	1	0	0	0	2	10,800	19.72	0.23	**0.10**
48th Street	4	1	2	3	2	2	12	10,300	18.81	0.55	**0.64**
49th Street**	2	2	2	2	0	3	8	10,200	18.63	0.23	**0.43**
50th Street	6	4	7	10	8	3	35	16,200	29.58	0.51	**1.18**
50th Avenue^	0	1	1	2	4	2	8	8,900	16.25	0.23	**0.49**
51st Street	0	1	1	0	1	0	3	9,100	16.62	0.23	**0.18**
51st Avenue^	0	1	1	0	0	1	2	8,900	16.25	0.23	**0.12**
52nd Street	5	6	4	4	6	5	25	14,100	25.75	0.51	**0.97**
53rd Street^	0	1	0	2	0	0	3	8,500	15.52	0.23	**0.19**
54th Street^	0	0	1	0	0	0	1	7,800	14.24	0.23	**0.07**
55th Street (East)^	2	1	0	0	1	0	4	8,000	14.61	0.23	**0.27**
56th Street^	1	0	0	2	0	0	3	7,800	14.24	0.23	**0.21**
57th Street^	0	0	0	0	1	0	1	7,800	14.24	0.23	**0.07**
Happy Hollow Blvd	10	8	5	4	9	0	36	15,600	28.49	0.51	**1.26**
40th Street & Harney Street	4	1	2	1	1	5	9	10,000	18.26	0.51	**0.49**
41st Street & Harney Street^	0	4	3	6	2	0	15	7,800	14.24	0.23	**1.05**
42nd Street & Harney Street	5	8	5	3	7	4	28	19,300	35.24	0.60	**0.79**
Total / Average	78	70	71	62	64	43	**345**	**13,400**	**24.48**	**-**	**0.53**

2020 Crash Data omitted in crash analysis due to COVID-19 and not included in the total.
*MEV = Million Entering Vehicles
**46th & 49th Street intersection volumes were adjusted to match rest of the corridor
^Counts were not available at this intersection, entering volumes were interpolated based on nearby intersections
+Omaha Citywide Intersection Average Crash Rates (per MEV) based on classification of intersecting roadways (2014-2017)

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Table 4-2. Intersection Crashes by Severity

Intersections (w/ Farnam Street)	Fatal	Disabling	Visible	Possible	PDO	Total Crashes
40th Street	0	0	1	6	14	**21**
41st Street	0	0	1	0	6	**7**
42nd Street	0	0	4	10	23	**37**
44th Street	0	1	1	2	4	**8**
Saddle Creek Road	0	0	4	16	57	**77**
46th Street	0	0	1	0	1	**2**
48th Street	0	0	0	2	10	**12**
49th Street	0	0	0	2	6	**8**
50th Street	0	1	3	9	22	**35**
50th Avenue	0	0	2	2	4	**8**
51st Street	0	0	0	1	2	**3**
51st Avenue	0	0	1	0	1	**2**
52nd Street	2	0	3	5	15	**25**
53rd Street	0	0	0	2	1	**3**
54th Street	0	0	0	0	1	**1**
55th Street (East)	0	0	0	0	4	**4**
56th Street	0	0	0	0	3	**3**
57th Street	0	0	0	0	1	**1**
Happy Hollow Blvd	0	0	2	9	25	**36**
40th Street & Harney Street	0	0	1	3	5	**9**
41st Street & Harney Street	0	1	1	2	11	**15**
42nd Street & Harney Street	0	0	1	4	23	**28**
Total / Average	**2**	**3**	**26**	**75**	**239**	**345**

*If multiple crash severities occurred at the same crash event, the worst crash severity was the one counted.

Table 4-3. Intersection Crashes by Type

Intersections (w/ Farnam Street)	Angle	Sideswipe (Same)	Rear-end	Left-turn Leaving	Ran Off Road	Other^	Total Crashes
40th Street	14	2	3	0	0	2	**21**
41st Street	4	1	0	2	0	0	**7**
42nd Street	28	1	5	0	1	2	**37**
44th Street	3	1	1	3	0	0	**8**
Saddle Creek Road	11	8	28	24	1	5	**77**
46th Street	1	1	0	0	0	0	**2**
48th Street	9	2	0	0	1	0	**12**
49th Street	6	1	1	0	0	0	**8**
50th Street	18	11	3	1	0	2	**35**
50th Avenue	7	1	0	0	0	0	**8**
51st Street	2	1	0	0	0	0	**3**
51st Avenue	0	1	0	0	1	0	**2**
52nd Street	15	7	1	2	0	0	**25**
53rd Street	2	1	0	0	0	0	**3**
54th Street	1	0	0	0	0	0	**1**
55th Street (East)	0	2	0	0	1	1	**4**
56th Street	0	3	0	0	0	0	**3**
57th Street	1	0	0	0	0	0	**1**
Happy Hollow Blvd	22	2	3	7	1	1	**36**
40th Street & Harney Street	4	2	2	0	0	1	**9**
41st Street & Harney Street	14	1	0	0	0	0	**15**
42nd Street & Harney Street	12	6	9	0	0	1	**28**
Total / Average	**174**	**55**	**56**	**39**	**6**	**15**	**345**

^Other is made up of the remaining six crash types. Pedestrian type crashes are among these, consisting of four crashes total.

42nd Street with Farnam Street

Thirty-seven crashes were reported at the intersection of 42nd Street with Farnam Street during the study period. Of these crashes, fifteen of them were Injury crashes; the rest were Property Damage Only. The crash rate for the intersection is 0.94 acc/mev which is above the citywide average crash rate for Minor Arterial/Local streets. Thirty-two of the thirty-seven crashes were angle type crashes with eighteen of these crashes coming because of vehicles running a red light. None of the crashes resulted in fatal or disabling injuries.

One improvement that has proven effective at reducing these types of collisions is the conversion of the intersection to a roundabout. The roundabout would eliminate angle type vehicle crossings and reduce conflict points.

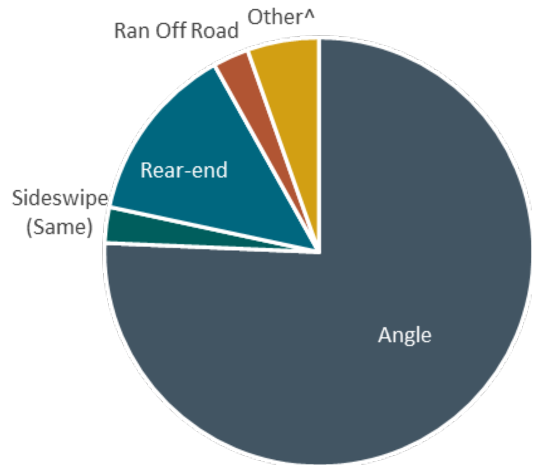


Chart 4-1. 42nd & Farnam Crashes

42nd Street with Harney Street

Twenty-eight crashes were reported (5 Injury, 23 Property Damage Only) at the intersection of 42nd Street with Farnam Street during the study period. The crash rate for the intersection is 0.79 acc/mev which is above the citywide average crash rate for Minor Arterial/Local streets. Twelve of the Twenty-eight crashes were angle type crashes that are attributed to vehicles running a red light. None of the crashes resulted in fatal or disabling injuries. A roundabout or decreasing the number of movements/restricting movements could reduce these types of collisions.

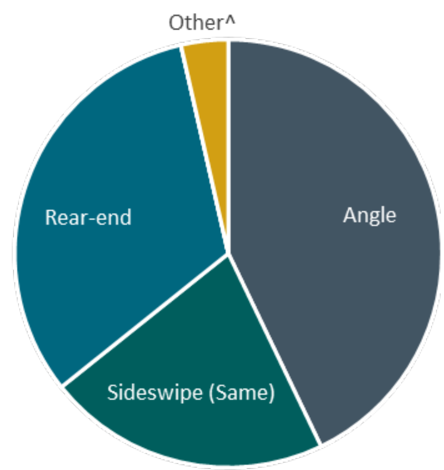


Chart 4-2. 42nd & Harney Crashes

Saddle Creek Road with Farnam Street

Seventy-seven crashes were reported (25 Injury, 52 Property Damage Only) at the intersection of Saddle Creek Road with Farnam Street during the study period. The crash rate for the intersection is 0.98 acc/mev which is above the citywide average crash rate for Minor Arterial/Minor Arterial streets. Thirty-three of the seventy-seven crashes were rear-end type crashes with all but two in the northbound/southbound directions. Another twenty-eight of the seventy-seven crashes were left-turn leaving type crashes.

It should be noted that two pedestrian crashes occurred at the intersection, both were possible injury severity and were due to left-turning vehicle not yielding. None of the crashes at the intersection resulted in fatal or disabling injuries. Adding auxiliary right-turn lanes could help reduce rear-end occurrences. Allowing only protected phasing for left-turning vehicles can lead to reductions in angle, left-turn, and pedestrian related crashes.

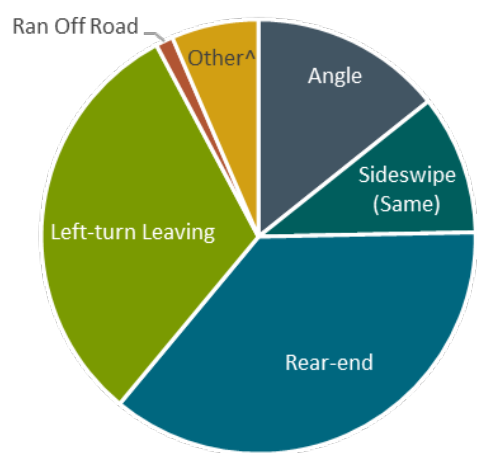


Chart 4-3. Saddle Creek & Farnam Crashes

50th Street with Farnam Street

Thirty-five crashes were reported (13 Injury, 22 Property Damage Only) at the intersection of 50th Street with Farnam Street during the study period. The crash rate for the intersection is 1.18 acc/mev which is well above the citywide average crash rate for Minor Arterial/Local streets. Eighteen of the thirty-five crashes were angle type crashes; another eleven of the thirty-five crashes were sideswipe (same) type crashes.

One of the three disabling crashes on the corridor occurred at 50th Street with Farnam Street. It took place between 5:00 PM and 6:00 PM on a Saturday. Two other injuries occurred at this incident, one visible and one possible. The contributing circumstance to the crash was northbound vehicle running a red light. This crash and other angle type crashes could be mitigated by a roundabout at this intersection.

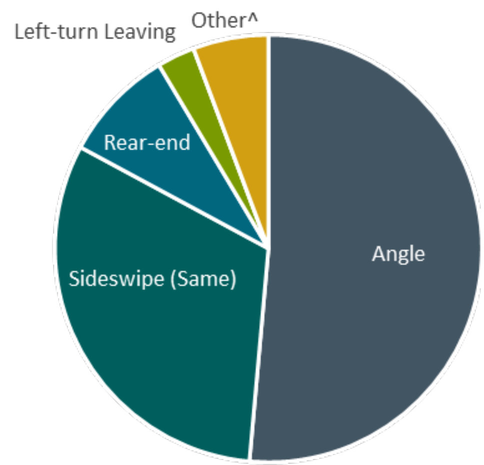


Chart 4-4. 50th & Farnam Crashes

52nd Street with Farnam Street

Twenty-five crashes were reported (10 Injury, 15 Property Damage Only) at the intersection of 52nd Street with Farnam Street during the study period. The crash rate for the intersection is 0.97 acc/mev which is above the citywide average crash rate for Minor Arterial/Local streets. Fifteen of the twenty-five crashes were angle type crashes, and eleven of the angle type crashes were due to vehicles running red lights.

Both fatal crashes of the two within the entire study area occurred at 52nd Street with Farnam Street. Moreover, both crashes included additional injured individuals. Both crashes occurred on weekdays between 5:00 PM and 6:00 PM. Both were northbound vehicles colliding with a westbound vehicle in an angle type crash. One of the occurrences had an unknown fault but the other involved a northbound vehicle passing another northbound vehicle and running the red light. These crashes and the other angle type crashes could be mitigated by a roundabout at this intersection.

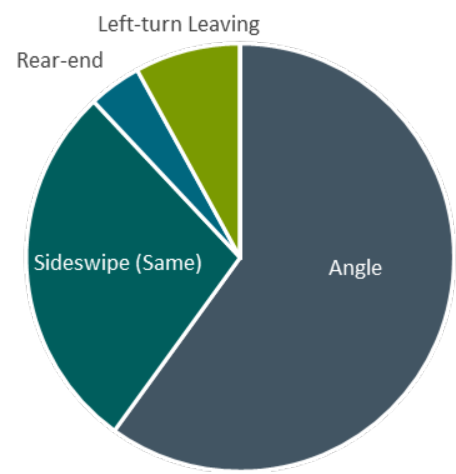


Chart 4-5. 52nd & Farnam Crashes

Happy Hollow Blvd with Farnam Street

Thirty-six crashes were reported (11 Injury, 25 Property Damage Only) at the intersection of Happy Hollow Blvd with Farnam Street during the study period. The crash rate for the intersection is 1.26 acc/mev which is well above the citywide average crash rate for Minor Arterial/Minor Arterial streets. Twenty-two of the thirty-six crashes were angle type crashes that are attributed to vehicles running a red light. There were no other identifiable crash patterns at this intersection. None of the crashes resulted in fatal or disabling injuries.

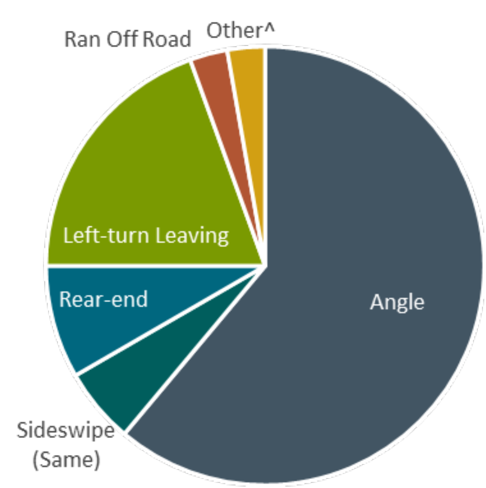


Chart 4-6. Happy Hollow & Farnam Crashes

41st Street with Harney Street

Fifteen crashes were reported (4 Injury, 11 Property Damage Only) at the intersection of Harney Street with 41st Street during the study period. The crash rate for the intersection is 1.05 acc/mev which exceeds the citywide average crash rate for Minor Arterial/Local streets. Fourteen of the Fifteen crashes were angle type crashes. There were no other identifiable crash patterns at this intersection. One of the three disabling crashes on the corridor occurred at 41st Street with Harney Street. It took place between 7:00 AM and 8:00 AM on a Thursday and was an angle type crash.

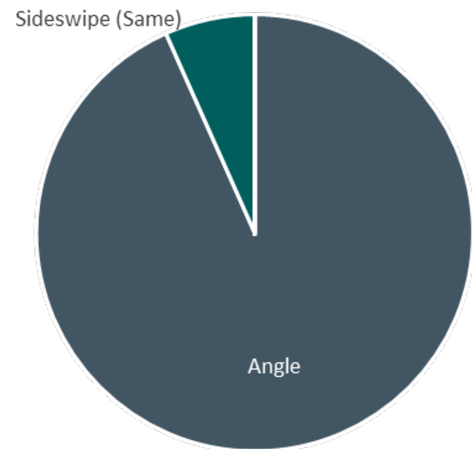


Chart 4-7. 41st & Harney Crashes

4.2 Segment Crash Summary

Calculations for crash rates at segments are based on million vehicle miles traveled (MVMT) and crash density per mile. Crash rates above the City of Omaha average crash rate for minor arterial are highlighted in yellow and crash densities above the City of Omaha citywide average for a minor arterial are also highlighted. Findings for segments are summarized in the following subsections and in **Table 4-4**, **Table 4-5**, and **Table 4-6**. Each of the tables describes different attributes of the crash patterns at the intersections, including the crash year, crash severity, and crash type. A visual overview of crash data is provided on **Figure 4-1**.

Nine of the fourteen segments had elevated crash density and/or rate greater than the City of Omaha average crash density/rate. These segments include:

- Farnam Street: 40th Street to 41st Street
- Farnam Street: 44th Street to Saddle Creek Road
- Farnam Street: Saddle Creek Road to 46th Street
- Farnam Street: 48th Street to 49th Street
- Farnam Street: 49th Street to 50th Street
- Farnam Street: 52nd Street to 57th Street
- Harney Street: 40th Street to 41st Street
- Harney Street: 41st Street to 42nd Street
- Harney Street: 42nd Street to Farnam Street

Chart 4-8 and **Chart 4-9** provide an overview of the crash types along Farnam Street and Harney Street, respectively, within the study area. **Appendix A** includes crash analysis summaries for each segment.

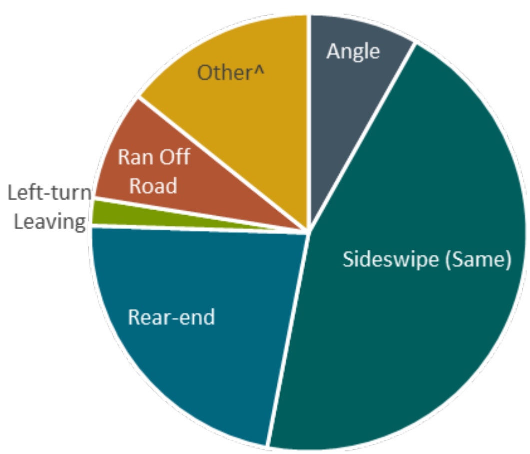


Chart 4-8. Farnam Street Segment Crashes

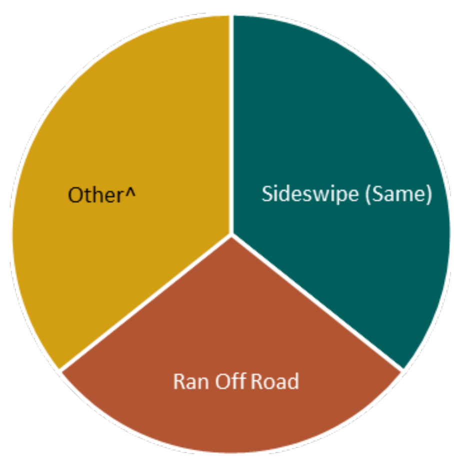


Chart 4-9. Harney Street Segment Crashes

Table 4-4. Segment Crashes by Year & Crash Rates

Segment (on Farnam Street)	2015	2016	2017	2018	2019	2020+	Total	Length (ft)	ADT*	5-Year (MVMT)**	Crash Density / Mile	Crash Rate / MVMT
40th St. - 41st St.	0	1	1	2	1	1	5	330	10,500	1.20	**16.00**	**4.17**
41st St. - 42nd St.	0	1	0	0	0	0	1	330	10,500	1.20	**3.20**	**0.83**
42nd St. - 44th St.	1	1	1	0	1	0	4	790	17,300	4.73	**5.35**	**0.85**
44th St. - Saddle Creek Rd.	0	3	0	0	1	0	4	500	17,500	3.03	**8.45**	**1.32**
Saddle Creek Rd. - 46th St.	0	3	2	2	1	1	8	640	10,500	2.32	**13.20**	**3.44**
46th St. - 48th St.	0	0	1	1	0	1	2	740	9,700	2.48	**2.85**	**0.81**
48th St. - 49th St.	0	1	2	2	2	0	7	660	9,400	2.15	**11.20**	**3.26**
49th St. - 50th St.	0	2	2	3	1	0	8	660	9,400	2.15	**12.80**	**3.73**
50th St. - 51st St.	0	0	0	0	0	1	0	660	9,000	2.05	**0.00**	**0.00**
51st St. - 52nd St.	0	1	1	0	0	0	2	660	8,600	1.96	**3.20**	**1.02**
52nd St. - 57th St.	3	2	0	1	2	2	8	1740	7,800	4.69	**4.86**	**1.70**
Harney St., 40th St. - 41st St.	0	2	1	1	1	0	5	330	6,400	0.73	**16.00**	**6.85**
Harney St., 41st St. - 42nd St.	2	0	1	0	1	0	4	330	6,600	0.75	**12.80**	**5.31**
Harney St., 42nd St. - Farnam St.	0	1	3	1	0	3	5	330	7,400	0.84	**16.00**	**5.92**
Total / Average	**6**	**18**	**15**	**13**	**11**	**9**	**63**	**700**	**10,900**	**2.54**	**7.37**	**1.92**

2020 Crash Data Omitted in Crash Analysis Due to COVID-19 and not included in the total.
*ADT = Average Daily Traffic
**MVMT = Million Vehicle Miles Traveled
+The Omaha Citywide average annual crash density and crash rate for Minor Arterials is 9.77 crashes/mi and 0.98 crashes/MVMT, respectively (2014-2017)

Table 4-5. Segment Crashes by Severity

Segments (on Farnam Street)	Fatal	Disabling	Visible	Possible	PDO	Total
40th St. - 41st St.	0	0	0	1	4	**5**
41st St. - 42nd St.	0	0	0	0	1	**1**
42nd St. - 44th St.	0	0	0	1	3	**4**
44th St. - Saddle Creek Rd.	0	0	0	0	4	**4**
Saddle Creek Rd. - 46th St.	0	0	0	3	5	**8**
46th St. - 48th St.	0	0	0	0	2	**2**
48th St. - 49th St.	0	0	0	0	7	**7**
49th St. - 50th St.	0	0	0	3	5	**8**
50th St. - 51st St.	0	0	0	0	0	**0**
51st St. - 52nd St.	0	0	0	0	2	**2**
52nd St. - 57th St.	0	0	0	0	8	**8**
Harney St., 40th St. - 41st St.	0	0	0	0	5	**5**
Harney St., 41st St. - 42nd St.	0	0	0	1	3	**4**
Harney St., 42nd St. - Farnam St.	0	0	0	0	5	**5**
Total / Average	**0**	**0**	**0**	**9**	**54**	**63**

*If multiple crash severities occurred at the same crash event, the worst crash severity was the one counted.

Table 4-6. Segment Crashes by Type

Segments (on Farnam Street)	Angle	Sideswipe (Same)	Rear-end	Left-turn Leaving	Ran Off Road	Other^	Total
40th St. - 41st St.	0	4	0	0	0	1	**5**
41st St. - 42nd St.	0	1	0	0	0	0	**1**
42nd St. - 44th St.	1	2	1	0	0	0	**4**
44th St. - Saddle Creek Rd.	0	1	2	0	0	1	**4**
Saddle Creek Rd. - 46th St.	0	4	2	0	0	2	**8**
46th St. - 48th St.	0	1	0	0	0	1	**2**
48th St. - 49th St.	1	1	3	1	0	1	**7**
49th St. - 50th St.	1	4	1	0	2	0	**8**
50th St. - 51st St.	0	0	0	0	0	0	**0**
51st St. - 52nd St.	0	2	0	0	0	0	**2**
52nd St. - 57th St.	1	2	2	0	2	1	**8**
Harney St., 40th St. - 41st St.	0	2	0	0	0	3	**5**
Harney St., 41st St. - 42nd St.	0	2	0	0	0	2	**4**
Harney St., 42nd St. - Farnam St.	0	1	0	0	4	0	**5**
Total / Average	**4**	**27**	**11**	**1**	**8**	**12**	**63**

*If multiple crash severities were present at crash event, the worst crash severity was counted.
^Other is made up of the remaining six crash types.

Farnam Street: 40th Street to 41st Street

Five crashes were reported (1 Injury, 4 Property Damage Only) between 40th Street and 41st Street during the study period. The crash rate for this segment of Farnam Street is 4.17 accidents per million vehicle miles traveled (acc/mvmt) which is above the citywide crash rate of 0.98 acc/mvmt for minor arterials. The crash density per mile for this segment was found to be 16.00; this exceeds the citywide crash density of 9.77 for minor arterials. It should be noted that three of four crashes on this segment were Sideswipe (same) crashes.

Farnam Street: 44th Street to Saddle Creek Road

Four crashes were reported (0 Injury, 4 Property Damage Only) between 44th Street and Saddle Creek Road during the study period. The crash rate for this segment of Farnam Street is 1.32 acc/mvmt which is above the citywide crash rate for minor arterials. The crash density per mile for this segment was found to be 8.45; this does not exceed the citywide crash density.

Farnam Street: Saddle Creek Road to 46th Street

Eight crashes were reported (3 Injury, 5 Property Damage Only) between Saddle Creek Road and 46th Street during the study period. The crash rate for this segment of Farnam Street is 3.44 acc/mvmt which is above the citywide crash rate for minor arterials. The crash density per mile for this segment was found to be 13.20; this exceeds the citywide crash density. Four of the eight crashes were Sideswipe (same) type crashes that resulted from westbound traffic lane changes.

Farnam Street: 48th Street to 49th Street

Seven crashes were reported (0 Injury, 7 Property Damage Only) between 48th Street and 49th Street during the study period. The crash rate for this segment of Farnam Street is 3.26 acc/mvmt; this is above the citywide crash rate for minor arterials. The crash density per mile for this segment was found to be 11.20 which exceeds the citywide crash density.

Farnam Street: 49th Street to 50th Street

Eight crashes were reported (3 Injury, 5 Property Damage Only) between 49th Street and 50th Street during the study period. The crash rate for this segment of Farnam Street is 3.73 acc/mvmt which is above the citywide crash rate for minor arterials. The crash density per mile for this segment was found to be 12.80; this is above the citywide crash density. It should be noted that four of the eight crashes were Sideswipe (same) type crashes that resulted from westbound traffic changing lanes.

Farnam Street: 52nd Street to 57th Street

Eight crashes were reported (0 Injury, 8 Property Damage Only) between 52nd Street and 57th Street during the study period. The crash rate for this segment of Farnam Street is 1.70 acc/mvmt which is above the citywide crash rate for minor arterials. The crash density per mile for this segment was found to be 4.86; short of the citywide crash density.

Harney Street: 40th Street to 41st Street

Five crashes were reported (0 Injury, 5 Property Damage Only) between 40th Street and 41st Street during the study period. The crash rate for this segment of Harney Street is 6.85 acc/mvmt which is well above the citywide crash rate for minor arterials. The crash density per mile for this segment was found to be 16.00; this is well above the citywide crash density.

Harney Street: 41st Street to 42nd Street

Four crashes were reported (1 Injury, 3 Property Damage Only) between 41st Street and 42nd Street during the study period. The crash rate for this segment of Harney Street is 5.31 acc/mvmt which is above the citywide crash rate for minor arterials. The crash density per mile for this segment was found to be 12.80; this exceeds the citywide crash density. Two of the crashes were Sideswipe (same) type crashes caused by vehicles changing lanes.

Harney Street: 42nd Street to Farnam Street

Eight crashes were reported (0 Injury, 8 Property Damage Only) between 42nd Street and Farnam Street during the study period. The crash rate for this segment of Harney Street is 5.92 acc/mvmt which is above the citywide crash rate for minor arterials. The crash density per mile for this segment is 16.00 which exceeds the citywide crash density. Seven of the eight crashes were Ran Off Road type crashes with four of these involving DUI's.

4.3 One-way vs. Two-way Crash Summary

As mentioned previously the section of Farnam Street between Happy Hollow Blvd and Saddle Creek Road switches between one-way and two-way operations on Monday to Friday via variable lane assignment. During the morning commuter hour (7:00 AM to 9:00 AM), Farnam Street operates as a one-way roadway in the eastbound direction, and during the evening commuter hour (4:00 PM to 6:00 PM), traffic flows one-way in the westbound direction. The remaining hours and on the weekends Farnam Street two-way, with one lane in each direction carrying traffic.

The four hours of the day that Farnam Street operates as one-way carries approximately 30% of weekday traffic on Farnam Street. Comparatively, 61% of all crashes on Farnam Street (from Happy Hollow Blvd – Saddle Creek Road) occur during One-Way operations. **Table 4-3** and **Table 4-4** display the breakdown by crash type and crash severity. **Chart 4-10** to **Chart 4-11** provide a visual comparison of the types of crashes occurring all-day verses during one-way operations. **Chart 4-12** to **Chart 4-13** compares these two scenarios from a crash severity perspective.

The data includes only Monday-Friday crashes, excludes 2020 data due to Covid-19, and the crashes at the intersection of Happy Hollow Blvd with Farnam Street but not Saddle Creek Road with Farnam Street. The Saddle Creek Road intersection functions essentially as two-way operations throughout the day and serves as a book-end to the one-way operations study area.

Table 4-4. One-Way vs. Two-Way Crash Type Breakdown

Crash Type	All-Day	One-Way Operations*
Angle	68	29
Sideswipe (Same)	47	43
Rear-end	15	7
Left-turn Leaving	7	1
Ran Off Road	3	3
Other^	9	3
Total	**149**	**86**

*One-Way operations are from 7:00-9:00 AM and 4:00-6:00 PM, Monday-Friday
^Other includes the remaining six crash types

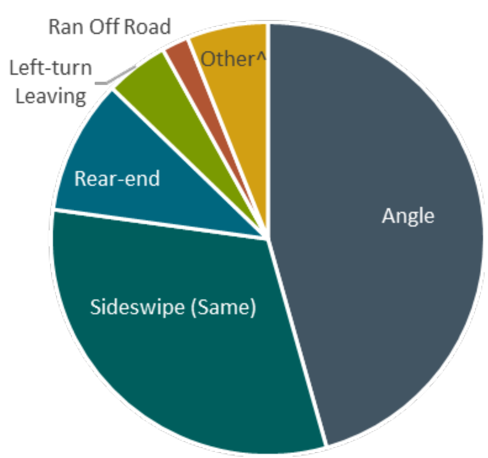


Chart 4-10. All-Day Crashes by Type

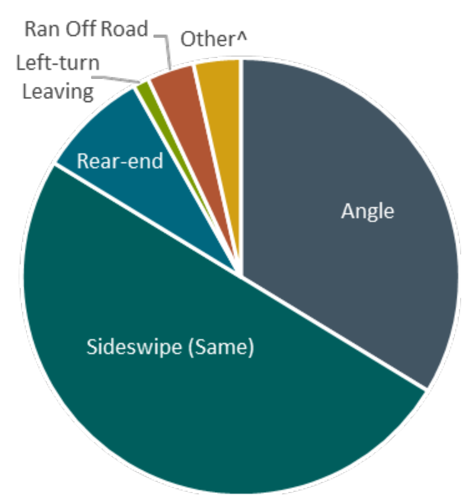


Chart 4-11. One-Way Operations Crashes by Type

Table 4-5. One-Way vs. Two-Way Crash Severity Breakdown

Crash Severity	All-Day	One-Way Operations*
Fatal	2	2
Disabling	1	1
Visible	9	5
Possible	36	15
PDO	101	63
Total	**149**	**86**

*One-Way operations are from 7:00-9:00 AM and 4:00-6:00 PM, Monday-Friday

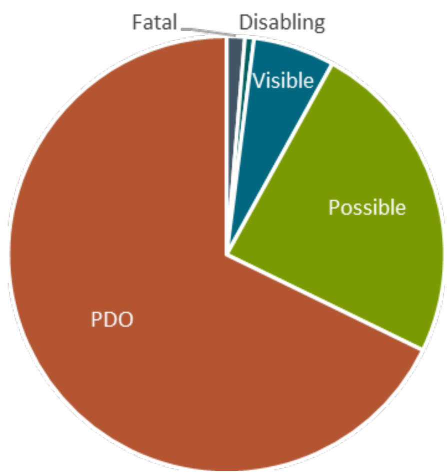


Chart 4-12. All-Day Crashes by Severity

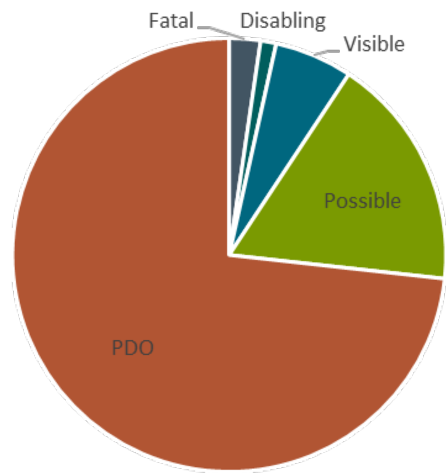


Chart 4-13. One-Way Operations Crashes by Severity

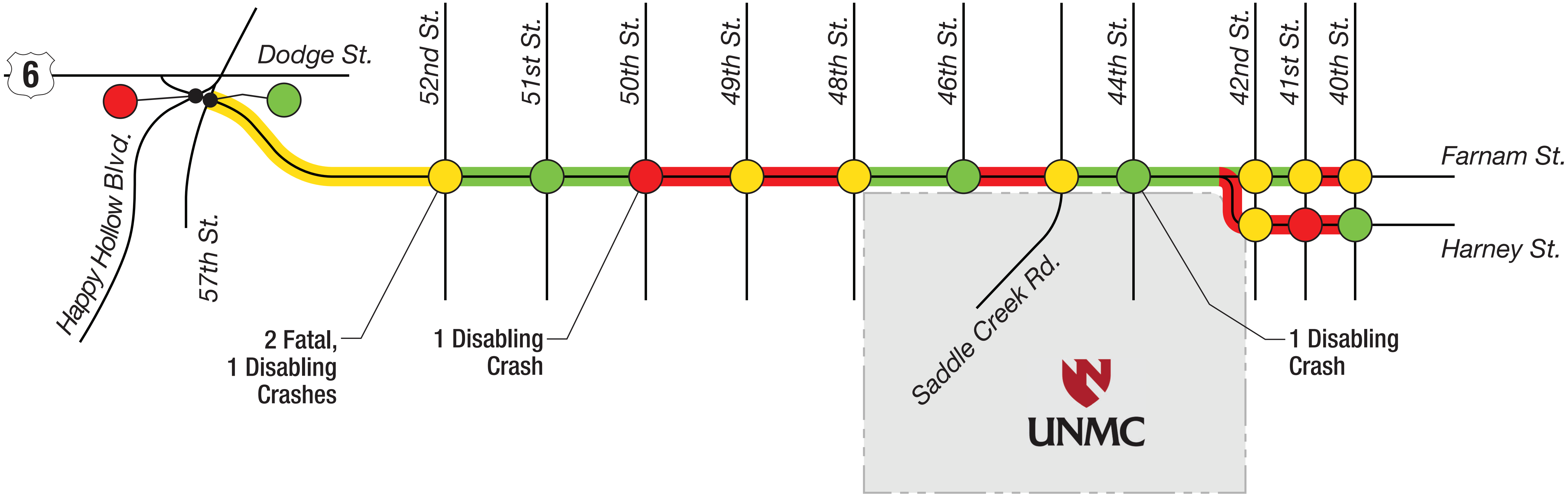
Farnam Street has a transitional period when switching between one-way and two-way operations, closing the lane that will be switched in order to clear out traffic in that direction. The north lane clearance occurs during the AM peak hour and south lane clearance occurs during the PM peak hour. The north lane clearance occurs from 6:50 AM to 7:00 AM and from 8:50 AM to 9:00 AM. The south lane clearance occurs from 3:50 PM to 4:00 PM and from 5:50 PM to 6:00 PM.

Crash rates during the transitional time periods are well below the transitional time's share of the peak periods. Crashes make up only 6% of total crashes, whereas the transitional period is over 15% of the time during the peak period. **Table 4-5** summarized one-way vs. two-way crashes by year as well as the transitional period crashes. A visual overview of crash data is provided on **Figure 4-1**.

Table 4-6. One-Way vs. Two-Way Crash Breakdown by Year

Crashes by Year	All-Day	One-Way Operations*	One-way % of Total	Transitional Period	Transitional Period % of One-way
2015	28	20	71%	1	5%
2016	26	16	62%	1	6%
2017	31	15	48%	2	1%
2018	30	16	53%	0	0%
2019	34	19	56%	1	5%
2020+	14	5	36%	0	0%
Total	**149**	**86**	**56%**	**5**	**6%**

*One-Way operations are from 7:00-9:00 AM and 4:00-6:00 PM, Monday-Friday



LEGEND

- = Less than City-wide Average Crash Rate
- = Between 1x and 2x City-wide Average Crash Rate
- = Greater than 2x City-wide Average Crash Rate

NOTES

- * = City-wide Crash Averages listed in Report and Appendix.
- ** = Crash Data was Collected from a 5-Year Period from 2015-2019. 2020 Crash Data was omitted due to COVID-19 Impacts.

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NOTE: Drawing Not to Scale

NORTH

FIGURE 4-1
Crash Data Overview

5. TWO-WAY TRAFFIC VOLUME DEVELOPMENT

5.1 Two-way Traffic Volume Development

Farnam Street from 46th Street to Happy Hollow Boulevard is currently one-way eastbound during the AM peak period and one-way westbound during the PM peak period. In order to analyze converting this stretch of Farnam Street from one-way to two-way during the AM and PM peak periods, the one-way volumes were converted to two-way volumes. The balanced Existing (2021) traffic volumes were converted to two-way traffic volumes by adding traffic in the counterflow direction, diverting traffic from the primary flow direction due to the lane reduction, and assigning side-street traffic and turning movements based on existing land use and local traffic patterns.

The counterflow traffic was generally assumed to be 60% of the peak direction based on existing counts in the area. This ratio varies throughout the corridor based on traffic generators in the area adding or removing traffic from the corridor. Primary flow direction traffic diverted from the corridor was initially assumed to be zero percent to examine a worst-case scenario. However, to account for the reduction in capacity, and to ensure that volume data matched the UNMC traffic study, a small diversion of 5% during the AM Peak and 10% during the PM Peak was assumed. The diverted traffic was assumed to take Dodge Street and was added to the respective Dodge Street movements included in the study area. Side-street traffic and turning movements were developed based on existing turning movement percentages and adjusted Farnam Street traffic volumes.

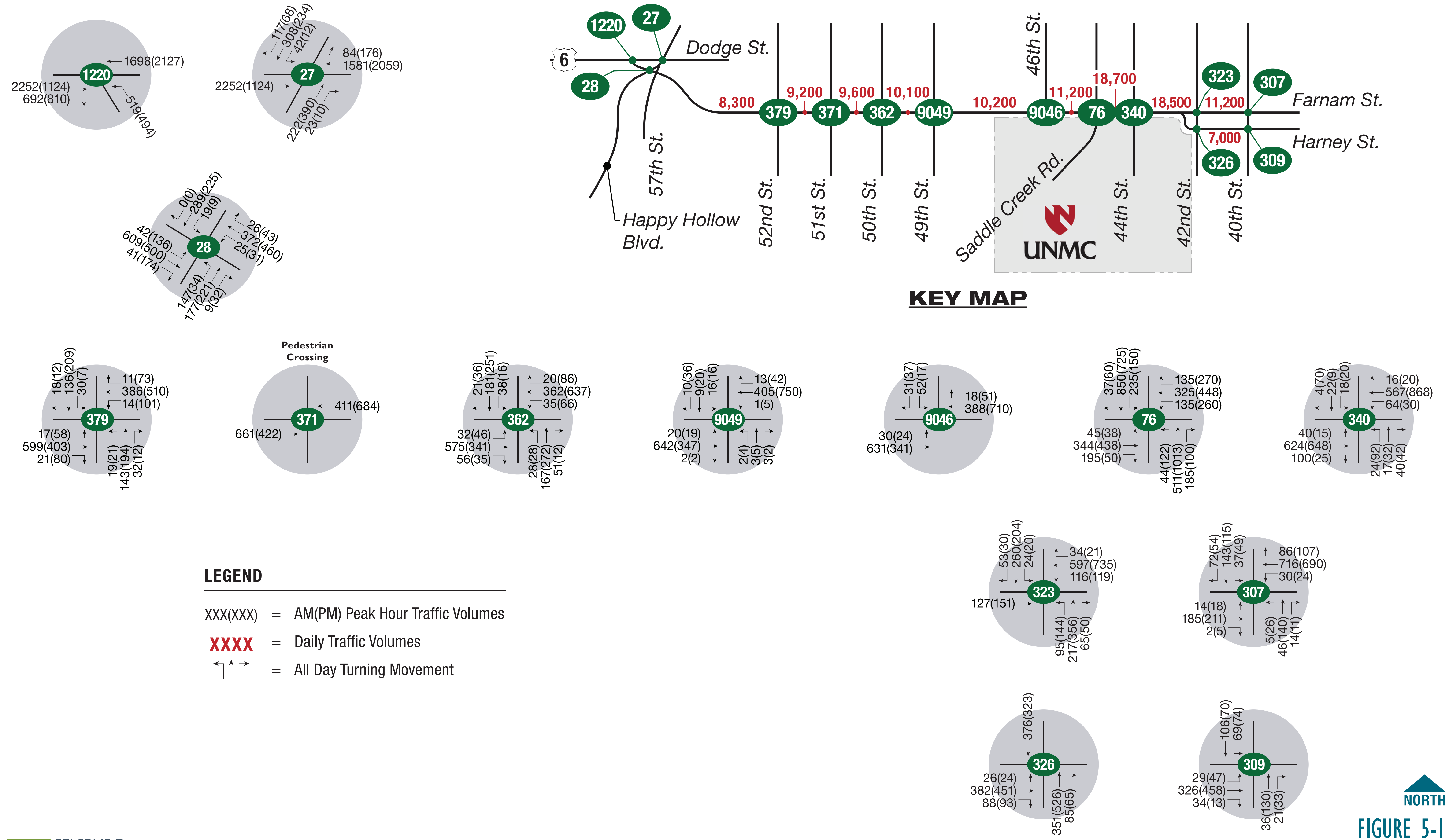
In addition to the two-way conversion, a connection for eastbound Farnam Street traffic to continue eastbound on Farnam Street at 42nd Street is being studied. It was assumed approximately 25% of eastbound traffic will take the connection to the single eastbound lane on Farnam Street while the remaining 75% will proceed on the current alignment to Harney Street. **Figure 5-1** shows the two-way (2021) traffic volumes.

5.2 Two-way (2021) Traffic Operations

Traffic operations were analyzed for the AM and PM peak hours at the fourteen study intersections using the collected traffic volumes with intersection configurations adjusted for two-way traffic flow. **Figure 5-2** shows the two-way (2021) traffic operations.

All signalized study intersections operate at LOS D or better overall during the AM and PM peak hours under 2021 two-way traffic conditions with the exception of the intersection of Farnam Street with 50th Street. This intersection operates at LOS E during the AM peak hour and LOS F during the PM peak hour.

Both two-way stop-controlled intersections operate at LOS D or better for stop-controlled and yielding movements during the AM and PM peak hours under 2021 Existing two-way traffic conditions. **Appendix F** provides additional information on the analysis software reports.



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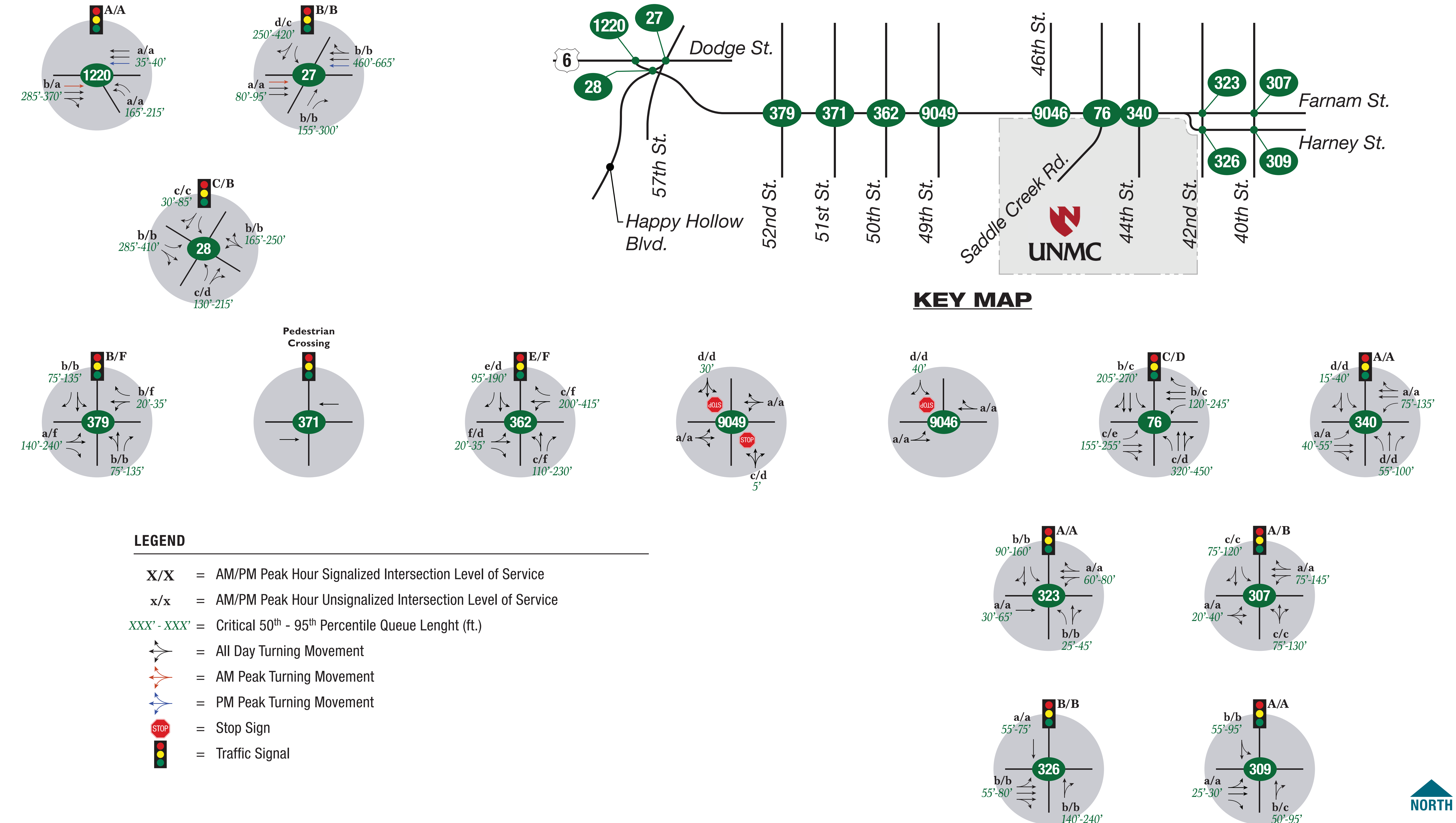
NOTE: Drawing Not to Scale

FIGURE 5-1
Two-Way (2021) Traffic Volumes

Farnam Street Corridor Study 120-340-01 11/09/21



NOTE: Drawing Not to Scale

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FIGURE 5-2
Two-Way (2021) Traffic Operations

Farnam Street Corridor Study 120-340-01 11/09/21

5.3 2040 Forecast Traffic Volumes

The Metropolitan Area Planning Agency (MAPA) provided ADT projections for the study intersections from their 2040 travel demand model. The MAPA model uses TransCad software, and it provides ADT forecasts on network links for the base year (2010) and the future year (2040). These forecasts are provided in **Appendix B**.

The 2010 and 2040 model output from MAPA were used to determine the annual growth rates for each leg of the study intersections. Growth rates and projected ADT values were validated by comparing with available ADT values collected between 2010 and 2021. The growth rates varied from 0.1% to 2.1% across the corridor. The average annual growth rate in the study area from 2010 to 2040 is approximately 0.8%. The growth rates were applied to the estimated 24-hour counts collected as part of the project to develop 2040 forecast ADT volumes. **Figure 5-3** shows the 2040 ADT one-way values and **Figure 5-5** shows the 2040 ADT two-way values for the study area. A detailed analysis of ADT values and growth rates can be found in **Appendix B**.

Estimated peak hour turning movements for 2040 were developed for study area intersections based on guidelines and methodologies documented in *NCHRP Report 255* and *NCHRP Report 765*, evaluating existing traffic counts, MAPA projections for 2040, and adjusting for local travel patterns. **Figure 5-3** shows the 2040 projected turning movement volumes maintaining one-way traffic and **Figure 5-5** shows the anticipated two-way traffic volumes.

5.4 One-way (2040) Traffic Operations

Traffic operations were analyzed for the future year 2040 AM and PM peak hours at the fourteen study intersections using MAPA growth rates to determine future one-way traffic flow. **Figure 5-4** shows the one-way (2040) traffic operations.

All signalized study intersections operate at LOS D or better overall during the AM and PM peak hours under 2040 one-way traffic conditions, except for the intersection of Farnam Street with Saddle Creek Road; during the AM peak hour, the intersection operates at LOS E.

Both two-way stop-controlled intersections operate at LOS D or better for stop-controlled and yielding movements during the AM and PM peak hours under 2040 one-way traffic conditions. **Appendix F** provides additional information on the analysis software reports.

5.5 Two-way (2040) Traffic Operations

Traffic operations were analyzed for the future year 2040 AM and PM peak hours using the developed traffic volumes with intersection configurations adjusted for two-way traffic flow. **Figure 5-6** shows the two-way (2040) traffic operations.

All but three signalized study intersections operate at LOS D or better overall during the AM and PM peak hours under 2040 two-way traffic conditions. At the intersection of Farnam Street with 52nd Street, the PM peak hour operates at LOS F. During both the AM and PM peak hour, the intersection of Farnam Street with 50th Street operates at LOS F as well. The final exception is the intersection of Farnam Street with Saddle Creek Road; during the PM peak hour, the intersection operates at LOS E.

At the two-way stop-controlled intersection of Farnam Street with 49th Street, the northbound and southbound movements operate LOS E and F during the AM and PM peak hours under 2040 two-way traffic conditions. However, it is not uncommon for side street movements at stop-controlled intersection to operate at LOS E or F during the peak periods. **Appendix F** provides additional information on the analysis software reports.

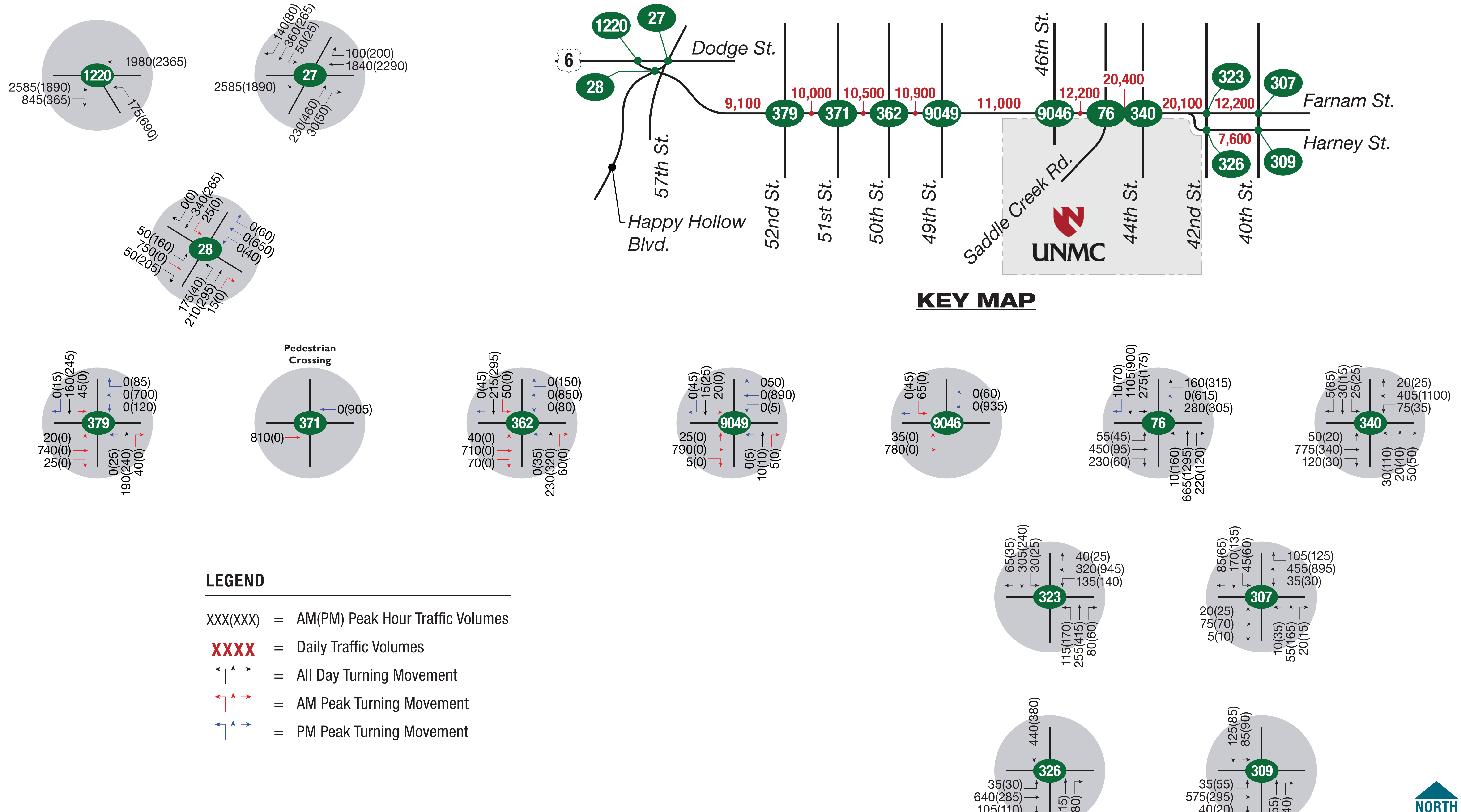


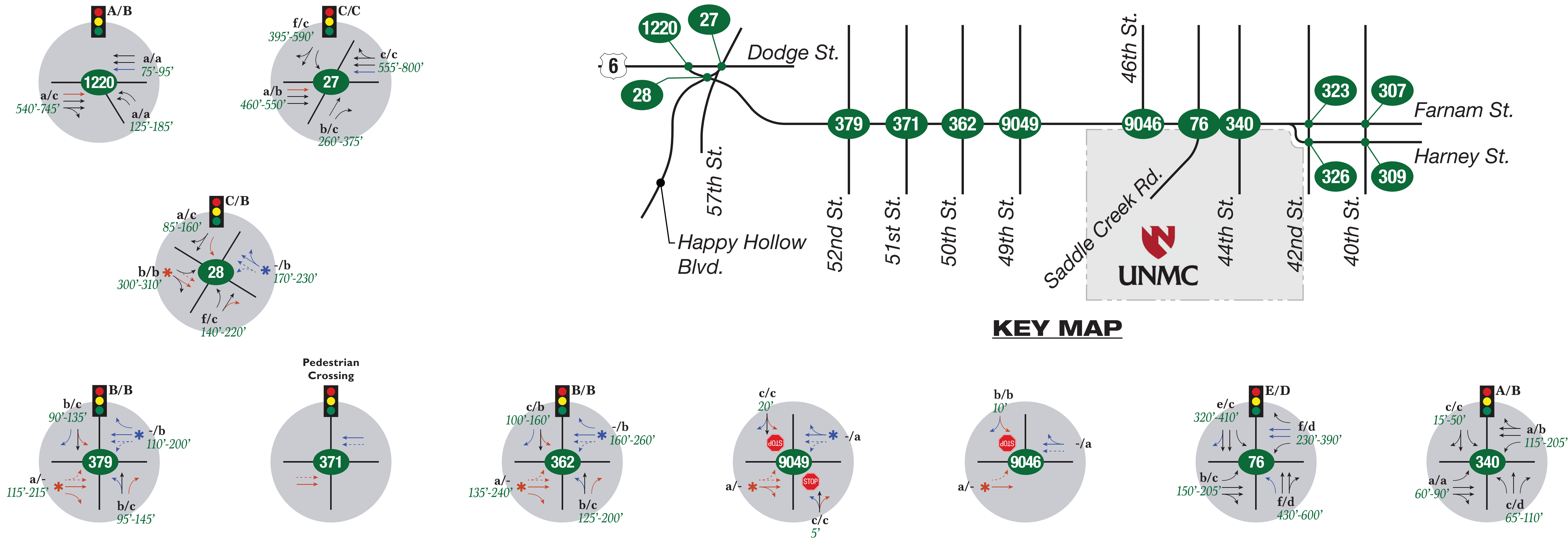
FIGURE 5-3

One-Way (2040) Traffic Volumes

Farnam Street Corridor Study 120-340-01 11/09/21

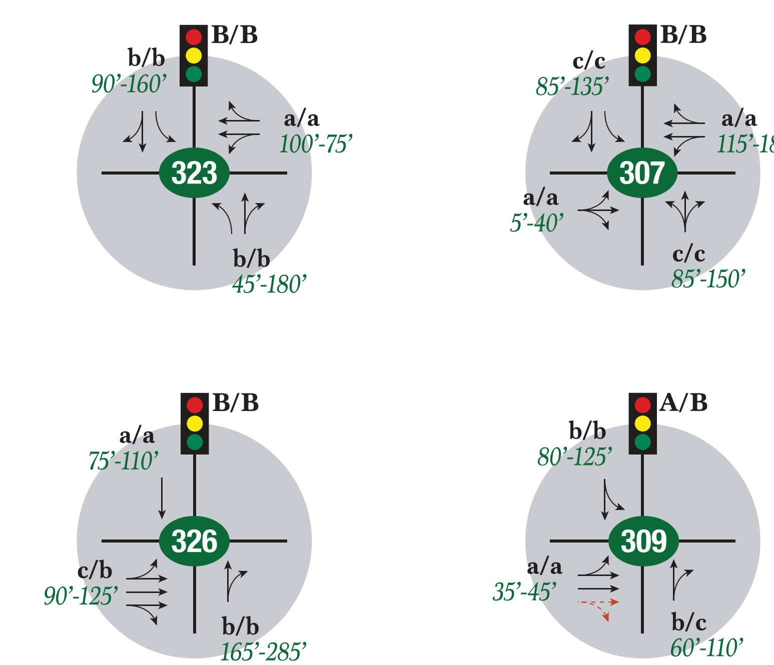
FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale



LEGEND

- **X/X** = AM/PM Peak Hour Signalized Intersection Level of Service
- **x/x** = AM/PM Peak Hour Unsignalized Intersection Level of Service
- *XXX' - XXX'* = Critical 50th - 95th Percentile Queue Lenght (ft.)
- = All Day Turning Movement
- = AM Peak Turning Movement
- = PM Peak Turning Movement
- = Only AM Peak/Only PM Peak Turning Movement (Does Not Exist Rest of Day)
- */* = Shared Left-Turn Arrow Not Shown for Clarity
- STOP = Stop Sign
- = Traffic Signal



FELSBERG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

NORTH

FIGURE 5-4

One-Way (2040) Traffic Operations

Farnam Street Corridor Study 120-340-01 11/09/21

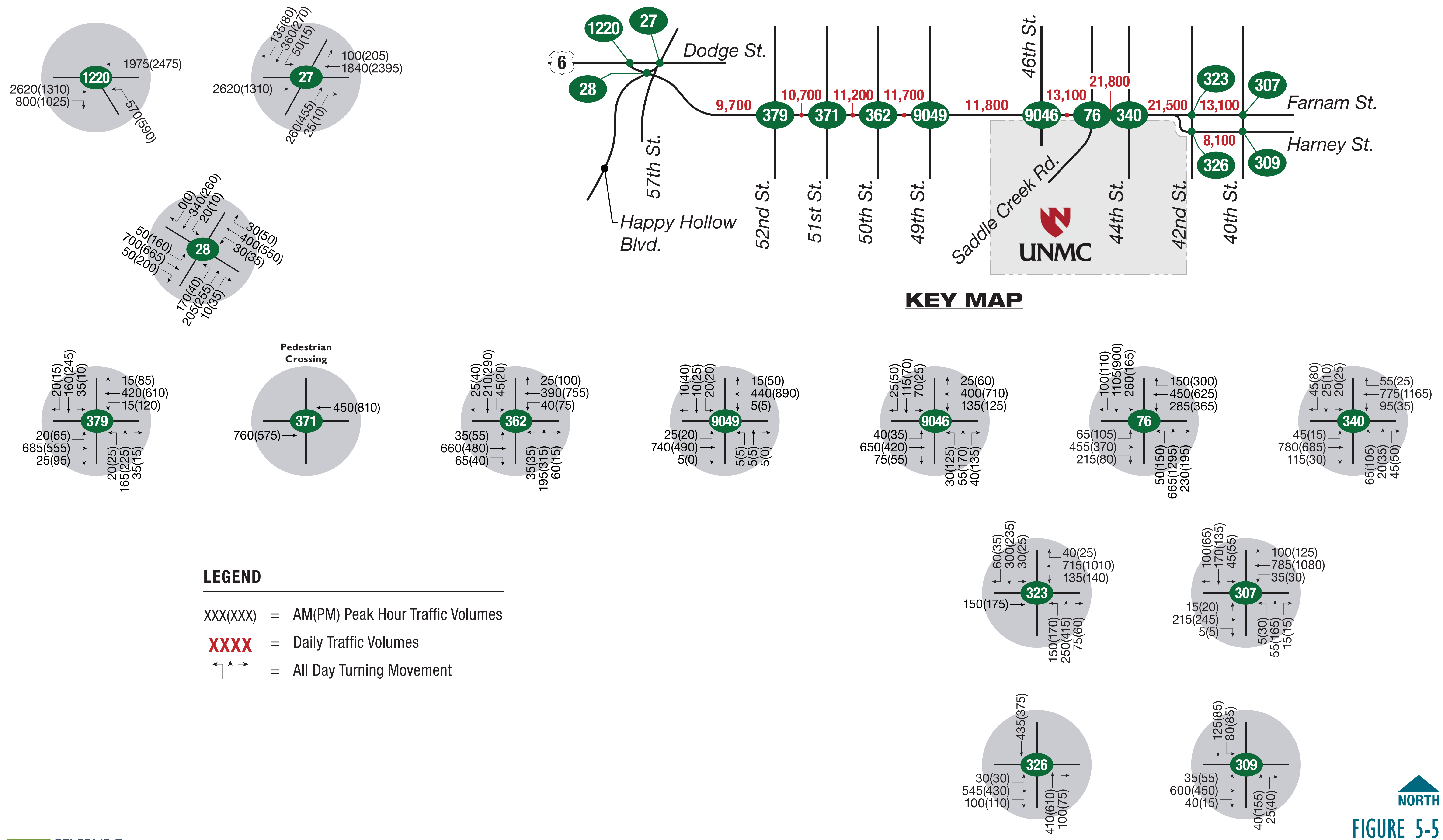
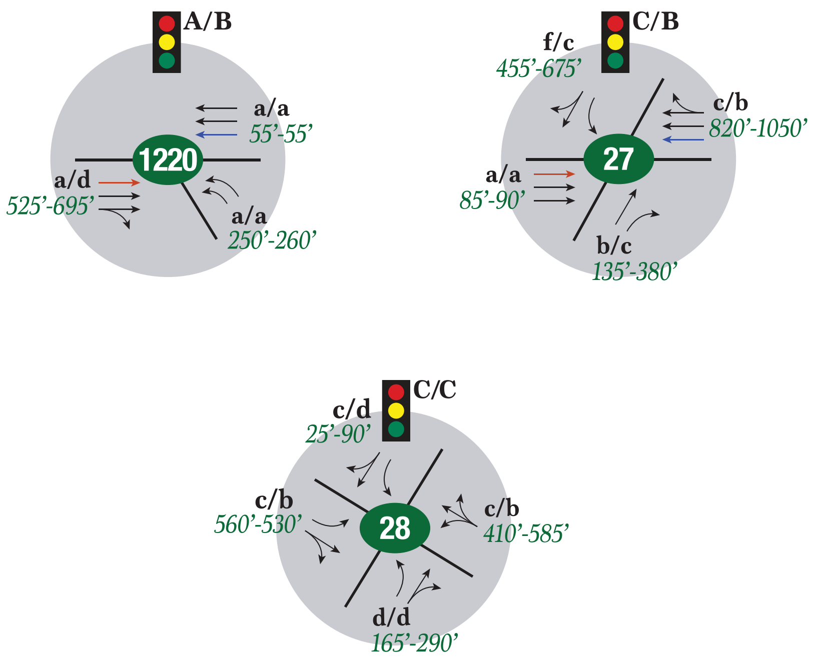


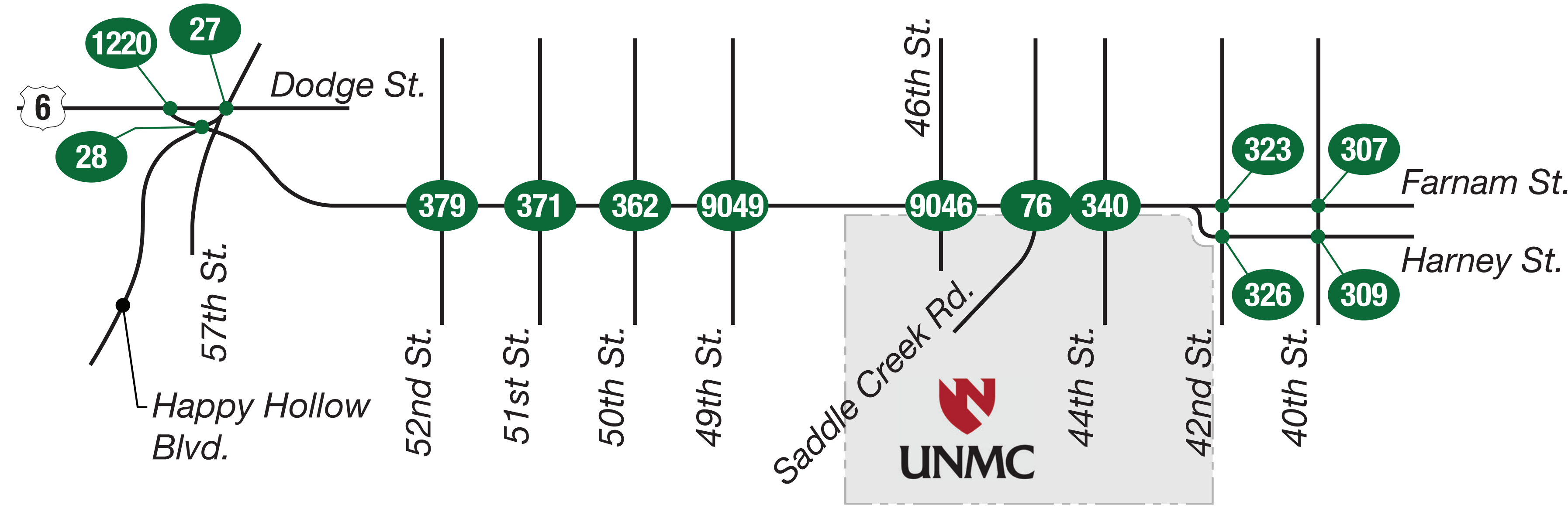
FIGURE 5-5
Two-Way (2040) Traffic Volumes

Farnam Street Corridor Study 120-340-01 11/09/21

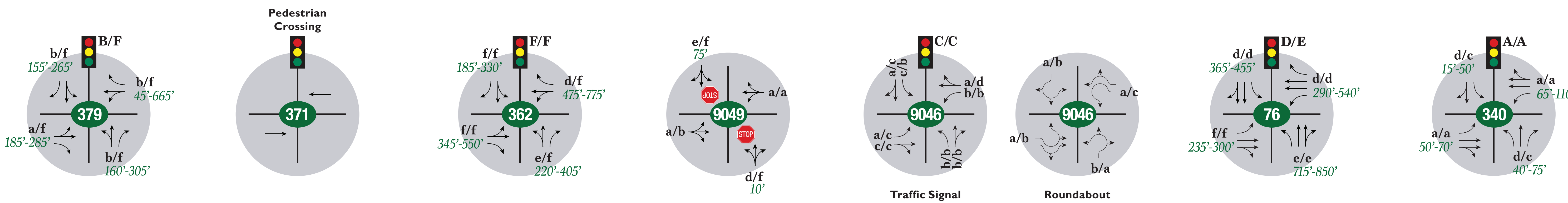
FELSBURG HOLT & ULLEVIG

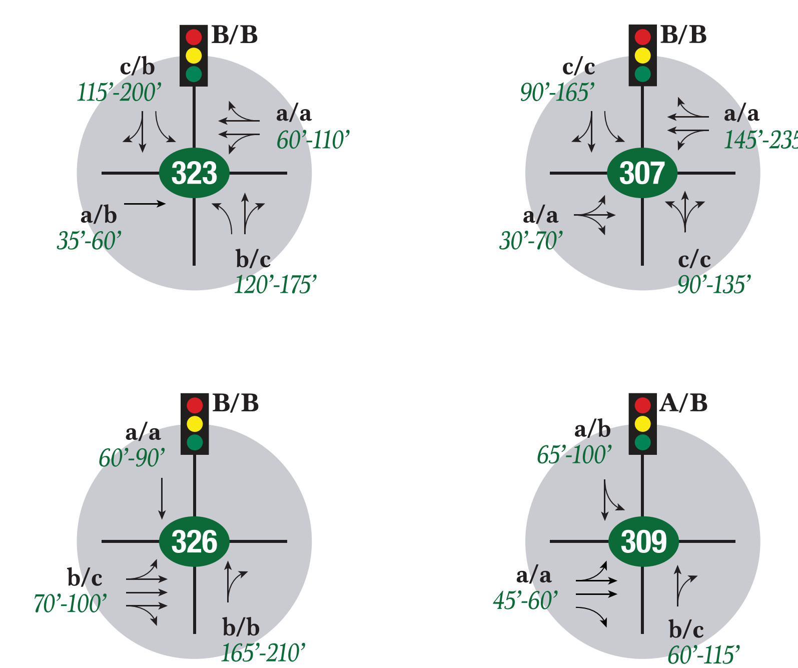
NOTE: Drawing Not to Scale





KEY MAP





LEGEND

X/X = AM/PM Peak Hour Signalized Intersection Level of Service

x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

XXX' - XXX' = Critical 50th - 95th Percentile Queue Lenght (ft.)

= All Day Turning Movement

= AM Peak Turning Movement

= PM Peak Turning Movement

STOP = Stop Sign

= Traffic Signal

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

NORTH

FIGURE 5-6

Two-Way (2040) Traffic Operations

Farnam Street Corridor Study 120-340-01 8/1/22

5.6 MUTCD Signal Warrants Analysis

A review was performed to determine if traffic signals are anticipated to be warranted in the 2040 Future year two-way traffic conditions based on the Manual on Uniform Traffic Control Devices (MUTCD) at each study intersection. Warrant 1 – Eight-Hour Vehicular Volume, Warrant 2 – Four-Hour Vehicular Volume, and Warrant 3 – Peak Hour were considered in the analysis **Table 5-1** summarizes the results of the traffic control device warrant analysis. Detailed results are provided in **Appendix D**. 46th Street with Farnam Street was not included due to the intersection being previously analyzed in the *UNMC Steel Casting Site Traffic Study*.

Table 5-1. MUTCD Signal Warrant Summary

Intersection (w/ Farnam Street)	Existing Traffic Control	Warrant 1			Warrant 2	Warrant 3
		A	B	A&B		
52nd Street	Signal	NO	YES	NO	YES	NO
50th Street	Signal	NO	NO	YES	YES	NO
49th Street	TWSC	NO	NO	NO	NO	NO
44th Street	Signal	NO	NO	NO	YES	NO
42nd Street	Signal	NO	NO	YES	YES	NO
42nd Street & Harney Street	Signal	NO	NO	YES	YES	NO

- = Warrants not analyzed/applicable
TWSC = Two-Way Stop Controlled

All existing signalized intersection met warrants and the intersection of 49th Street with Farnam Street which is currently stop-controlled does not meet MUTCD signal warrants. All locations not included in the table were not reviewed.

5.7 Auxiliary Turn-Lane Analysis

The National Cooperative Highway Research Program (NCHRP) has developed guidance to determine if an auxiliary left or right-turn lane is warranted on the major road or if two lanes should be considered for the minor-street approaches of a two-way stop-controlled intersection. These guidelines are published in *NCHRP Report 457: Evaluating Intersection Improvements*. The methodologies are based on an evaluation of the operating and collision costs associated with the turning maneuver relative to the cost of constructing a turn lane. Additional measures considered for each analysis are detailed below.

Auxiliary Left-turn Lanes

- Major road 85th percentile speed (posted speed can be used if data is unavailable)
- Percent of left-turns in advancing volume
- Major road peak hour advancing and opposing traffic volumes

Auxiliary Right-turn Lanes

- Major road 85th percentile speed (posted speed can be used if data is unavailable)
- Major road peak hour approaching traffic volumes
- Right-turn traffic volumes

Minor-street Approaches

- Major road peak hour traffic volumes (total of both directions)
- Minor road peak hour approaching traffic volumes
- Right-turn traffic volumes
- Percentage of right-turns

NCHRP Report 457 guidelines were used to analyze auxiliary lanes for all the two-way stop-controlled study intersections under 2040 Future year two-way traffic volumes. **Table 5-2** summarizes the results of the auxiliary turn lane and minor approach analyses. Detailed results are provided in **Appendix E**.

Table 5-2. Auxiliary Turn-Lane Analysis Summary

Intersection	Two-lane Minor Approach		Left-Turn Lane		Right-Turn Lane	
	Northbound	Southbound	Eastbound	Westbound	Eastbound	Westbound
49th Street	NO	NO	NO	NO	NO	NO

Based on the NCHRP guidance warrants are not met at the intersection of 49th Street with Farman Street. It should be noted that the intersection of 46th Street with Farnam Street was not included due to the intersection being previously analyzed in the *UNMC Steel Casting Site Traffic Study*.

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6. ALTERNATIVES ANALYSIS

As part of the City of Omaha's Complete Streets policy the selection of preferred alternatives were the result of an iterative alternatives analysis process with the goal of determining the best improvements for all modes of transportation for this project. Farnam Street is classified as General Urban west of 46th Street and Urban Connector to the east of 46th Street based on the Complete Street classification system. This section describes the alternative analysis methodology and procedures. Screening criteria were developed to evaluate the transportation improvement options to identify a preferred alternative. The analysis was based on various factors such as:

- Vehicle Safety
- Pedestrian Safety
- Project Cost
- Minimizing Right-of-Way Impacts
- Traffic Operations
- Access Management

Vehicle safety was based on crash modification factors (CMF) from the CMF Clearinghouse or the change in number of conflict points from geometric and/or traffic control changes. Pedestrian safety weighing was based on whether crossings distances increased/decreased, the presence of pedestrian refuge islands, signal phasing improved pedestrian safety, or if pedestrians had to cross more traffic movements. Project cost and ROW impacts were both based on the roadway design estimates. Traffic operational impacts are based on analysis of both LOS and queueing. Lastly, access management scoring is based on whether the alternatives eliminated accesses, reduced movements, or consolidated access points.

6.1 Description of Alternatives

No alternative roadway cross-sections were evaluated for Farnam Street. It is recommended that the existing cross-section be utilized with modifications to lane arrangements and pavement markings when needed to match intersection alternatives and to accommodate the removal of one-way operation during the peak commuter hours. At intersections, traffic control options such as signalization, roundabouts, and other alternative intersection types were evaluated. Intersection alternatives also include geometric improvements such as auxiliary turn lanes.

6.2 Farnam Street One-way to Two-way Conversion

The feasibility of converting Farnam Street to two-way traffic operations was a main purpose of this study. Since Farnam Street operates as a two-way street most of the time, the majority of the conversion can occur through restriping and the removal of the overhead lane assignment signals. In addition, intersections improvements will also be required at the intersections of Farnam Street with 52nd Street, 50th Street and 46th Street.

Operations

Acceptable (LOS D or better) traffic operations are anticipated under 2040 AM and PM peak hour two-way traffic volumes with the permanent two-way conversion with the exception of the intersections of 52nd Street, 50th Street, and 46th Street with Farnam Street. In order to permanently convert to two-way traffic and provide acceptable traffic operations, improvements to the intersections listed above must be made in addition to the removing the lane assignment signals and signing and striping.

Safety

Based on the crash analysis, specifically the one-way vs. two-way analysis, a disproportionate number of crashes were observed during the transition period and one-way times. Although it is recognized that additional conflict points would be added due to all day two-way traffic and some conflicts may become more prevalent, such as left-turn leaving. On the other hand, some types of crashes may reduce, such as side-swipe (same direction). The previous chapter discusses in-depth the safety of the corridor and the implications of the street conversion.

Concept and Cost Estimate

Figure C-1 through **Figure C-10** in **Appendix C** show the proposed layout of the permanent two-way conversion of Farnam Street.

Conceptual level cost estimates were developed using current unit prices from the City of Omaha's most recent bid tabulations. Based on a planning level cost estimate for removing the lane assignment signals and permanent two-way signing and striping, excluding additional intersection improvements, is estimated at approximately **$71,280**. A detailed cost estimate is shown in **Appendix C.** This cost does not include the needed improvements to the intersections of 52nd Street ($1,500,000), 50th Street ($1,500,000), and 46th Street ($2,800,000) with Farnam Street which are discussed in more detail in the following sections. In total, it is estimated that the permanent two-way conversion of Farnam Street would cost approximately **$5,900,000**. No right-of-way (ROW) acquisition is anticipated as part of the conversion.

6.3 52nd Street with Farnam Street Alternatives

The intersection of 52nd Street with Farnam Street is currently signalized with right-turn lanes provided on all approaches. The current configuration is anticipated to result in a LOS F by Future (2040). To address operations, safety, and pedestrian concerns several intersection improvement alternatives were evaluated and are discussed in detail below. They include:

1. Signalized with Eastbound and Westbound Left-turn Lanes
2. Signalized with Eastbound and Westbound Left & Right-turn Lanes
3. Single-lane Roundabout
4. Single-lane Roundabout with Eastbound and Westbound Right-turn Lanes

6.3.1 Alternative 1 - Signal with EB and WB Left-turn Lanes

Alternative 1 consists of keeping the intersection signalized, adding eastbound and westbound left-turn lanes (permitted phasing), and removing the eastbound and westbound right-turn lanes at the intersection. The northbound and southbound right-turn lanes would remain.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 1, as compared to a No-build scenario where operations is converted to two-way but no improvements are made. The signalized intersection is anticipated to operate at LOS B in the AM peak hour and LOS C in the PM peak hour. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

There were 25 crashes over the 5-year crash analysis period at this intersection. 15 of which were angle type crashes, seven were sideswipes, two were left-turn leaving crashes, and one was a rear-end crash. The addition of left-turn lanes creates an expectation for turning vehicles, addressing the angle-type crashes, and would remove vehicles from the shared through lane stopping to turn, helping to prevent rear-end crashes. Based on CMF Clearinghouse database of the transportation safety research (CMF ID: 270), adding left-turn lanes to both major approaches would lead to a general crash reduction of 19% at the intersection.

6.3.2 Alternative 2 - Signal with EB and WB Left & Right-turn Lanes

Alternative 2 consists of keeping the intersection as signalized, adding eastbound and westbound left-turn lanes (permitted phasing), and keeping eastbound and westbound right-turn lanes at the intersection. The northbound and southbound right-turn lanes would remain.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 2. The signalized intersection is anticipated to operate at LOS B in the AM peak hour and LOS B in the PM peak hour. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As discussed in Alternative 1, the addition of left-turn lanes creates an expectation for turning vehicles, removing vehicles from the shared through lane, addressing the angle-type crashes. Additionally, right-turn lanes would help prevent rear end crashes and create an expectation of turning vehicles for drivers and pedestrians crossing the intersection. Based on CMF Clearinghouse research (CMF ID: 270) adding left-turn lanes to both major approaches would lead to a general crash reduction of 19% at the intersection. Adding extra turn-lanes, increasing pedestrian crossing distance, would increase exposure of high-risk users.

6.3.3 Alternative 3 - Single-lane Roundabout

Alternative 3 consists of reconstructing the intersection as a single-lane regular sized roundabout.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 3. The roundabout is anticipated to operate at LOS B in the AM peak hour and LOS D in the PM peak hour. Individual movements at the roundabout operate at LOS D or better during both peak hours, except for the westbound movement during the PM peak hour, where it operates at LOS E. The 50th and 95th percentile queuing was also examined at the roundabout and included on **Figure 6-1**.

Safety

Many studies have proven that roundabouts are safer than stop-controlled and/or signalized intersections. The Federal Highway Administration has shown that roundabout on average reduce overall crash rates by 37%, injury type crashes by 75%, fatal type crashes by 90%, and pedestrian related crashes by 40%. These benefits are due to lower travel speeds, reduction of the number of conflict points, and the elimination of angle type conflicts totally. Based on CMF Clearinghouse research (CMF ID: 4194) converting a signalized intersection to a roundabout would lead to a general crash reduction of 21% at the intersection. The primary crash pattern at this intersection is angle-type crashes and therefore the crash reduction rate may be higher due to the elimination of angle conflicts. It should also be noted that both fatalities were angle-type crashes. Pedestrian crossings are provided with two-stage crossing and a pedestrian refuge island.

6.3.4 Alternative 4 - Single-lane Roundabout with Right-turn Lanes

Alternative 4 is similar to Alternative 3 and consists of reconstructing the intersection as a single-lane roundabout with the addition eastbound and westbound right-turn lanes. The turn lanes were added to improve operations and queuing issues identified with the single-lane roundabout.

Alternative 4 was not carried forward for future consideration due to City of Omaha input, improbability of buildout, and concerns with ROW impact. Further, and more in-depth, examination of this option can be done as part of another study if a roundabout option is pursued at this location. No concept or cost estimate was developed for this alternative. The alternative was analyzed to determine traffic operations only.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 4. The roundabout is anticipated to operate at LOS B in the AM peak hour and LOS C in the PM peak hour. Individual movements at the roundabout operate at LOS C or better during both peak hours. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As stated for Alternative 3, many studies have proven that roundabouts are safer than stop-controlled and/or signalized intersections. The Federal Highway Administration has shown that roundabout on average reduce overall crash rates by 37%, injury type crashes by 75%, fatal type crashes by 90%, and pedestrian related crashes by 40%. These benefits are due to lower travel speeds, reduction of the number of conflict points, and the elimination of angle type conflicts. Based on CMF Clearinghouse research (CMF ID: 4194) converting a signalized intersection to a roundabout would lead to a general intersection crash reduction of 21%. The primary crash pattern at this intersection is angle-type crashes and therefore the crash reduction rate may be higher due to the elimination of angle conflicts. Both fatalities were angle-type crashes. Pedestrian crossings are provided with two-stage crossing and a pedestrian refuge island; however, the addition of turn lanes at the roundabout require an additional lane to cross and more vehicle exposure.

6.3.5 Alternatives Summary

Concepts and Cost / ROW Impact

Figure C-3 through **Figure C-5** in **Appendix C** show the proposed layouts for the 52nd Street with Farnam Street alternatives. **Table 6-1** shows the estimated costs and right-of-way impacts for each alternative. Detailed cost estimates are shown in **Appendix C** immediately after the proposed layouts**.** A summary of turn lane lengths table is provided in **Appendix E** for all alternatives.

Table 6-1. 52nd Street and Farnam Street Costs & ROW Impact

Intersection	Alternative	Project Cost ($)	ROW Impact (Sq. ft.)
52nd Street & Farnam Street	No-Build	$ -	-
	Alt 1. - Left Turn Lanes	$ 1,341,000	120
	Alt 2. - Left/Right Turn Lanes	$ 1,504,000	2,540
	Alt 3. - Roundabout	$ 781,000	1,765

Alternatives Matrix

Alternatives 1 through 3, and a no-build option, have been visually summarized into a matrix format shown in **Table 6-2.** A quantitative version of the matrix is also provided in **Appendix C.** Alternative 4 was not carried forward for future consideration. Based on the results of the operations and safety analysis it is recommended that Alternative 3 be constructed with the permanent two-way conversion of Farnam Street.

Table 6-2. 52nd Street and Farnam Street Matrix

Intersection	Alternative	Vehicle Safety	Pedestrian Safety	Project Cost	Minimize ROW Impacts	Traffic Operations	Access Management
52nd Street & Farnam Street	No-Build	○	◑	●	●	○	○
	Alt 1. - Left Turn Lanes	◑	◑	○	●	◑	○
	Alt 2. - Left/Right Turn Lanes	◑	○	○	○	●	○
	Alt 3. - Roundabout	●	●	◑	◑	◑	◑

● = Best ◑ = Good ○ = Fair

6.4 50th Street with Farnam Street Alternatives

The intersection of 50th Street with Farnam Street is currently signalized with right-turn lanes provided on all approaches. The current configuration is anticipated to result in a LOS F by Future (2040). To address operations, safety, and pedestrian concerns several intersection alternatives were evaluated and are discussed in detail below. They include:

1. Signalized with Eastbound and Westbound Left-turn Lanes
2. Signalized with Eastbound and Westbound Left & Right-turn Lanes
3. Single-lane Roundabout
4. Single-lane Roundabout with Eastbound and Westbound Right-turn Lanes

6.4.1 Alternative 1 - Signal with EB and WB Left-turn Lanes

Alternative 1 consists of keeping the intersection as signalized, adding eastbound and westbound left-turn lanes, and removing the eastbound and westbound right-turn lanes at the intersection. The northbound and southbound right-turn lanes would remain.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 1. The signalized intersection is anticipated to operate at LOS D in the AM peak hour and LOS E in the PM peak hour. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

There were 35 crashes over the 5-year crash analysis period at this intersection. 18 of which were angle type crashes, 11 were sideswipes (same direction), one was a left-turn leaving crash, three were rear-end crashes, and two were categorized as other. The addition of left-turn lanes creates an expectation for turning vehicles, addressing the angle-type crashes, and would remove vehicles from the shared through lane stopping to turn, helping to prevent rear-end crashes. Based on CMF Clearinghouse research (CMF ID: 270), adding left-turn lanes to both major approaches would lead to a general crash reduction of 19% at the intersection.

6.4.2 Alternative 2 - Signal with EB and WB Left & Right-turn Lanes

Alternative 2 consists of keeping the intersection as signalized, adding eastbound and westbound left-turn lanes, and keeping eastbound and westbound right-turn lanes at the intersection. The northbound and southbound right-turn lanes would remain.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 2. The signalized intersection is anticipated to operate at LOS D in the AM peak hour and LOS D in the PM peak hour. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As discussed in Alternative 1, the addition of left-turn lanes creates an expectation for turning vehicles, removing vehicles from the shared through lane, addressing the angle-type crashes. Additionally, right-turn lanes would help prevent rear end crashes and create an expectation of turning vehicles for drivers and pedestrians crossing the intersection. Based on CMF Clearinghouse research (CMF ID: 270) adding left-turn lanes to both major approaches would lead to a general crash reduction of 19% at the intersection. Adding extra turn-lanes, increasing pedestrian crossing distance, would increase exposure of high-risk users.

6.4.3 Alternative 3 - Single-lane Roundabout

Alternative 3 consists of reconstructing the intersection as a single-lane regular sized roundabout.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 3. The roundabout is anticipated to operate at LOS C in the AM peak hour and LOS E in the PM peak hour. Individual movements at the roundabout operate at LOS D or better during both peak hours, except for the westbound movement during the PM peak hour, where it operates at LOS F. The 50th and 95th percentile queues were examined and included on **Figure 6-1**. It should be noted that the driveway on the southeast corner of the intersection would need to be converted to right-in right-out operations as part of this alternative.

Safety

As stated, and shown previously, it is known that roundabouts are safer than stop-controlled and/or signalized intersection. Based on CMF Clearinghouse research (CMF ID: 4194) converting a signalized intersection to a roundabout would lead to a general intersection crash reduction of 21%. Pedestrian crossings are provided with two-stage crossing and a pedestrian refuge island.

6.4.4 Alternative 4 - Single-lane Roundabout with Right-turn Lanes

Alternative 4 is similar to Alternative 3 and consists of reconstructing the intersection as a single-lane roundabout with the addition of a westbound right-turn lanes. The turn lane was added to improve operations and queuing issues identified with the single-lane roundabout.

No concept or cost estimate was developed for this alternative. The alternative was analyzed to determine traffic operations only. Further, and more in-depth, examination of this option can be done as part of another study if a roundabout option is pursued at this location. Alternative 4 was not carried forward for future consideration due to City of Omaha input, improbability of buildout, and concerns with ROW impact.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 4. The roundabout is anticipated to operate at LOS C in the AM peak hour and LOS D in the PM peak hour. Individual movements at the roundabout operate at LOS D or better during both peak hours, except for the westbound movement during the PM peak hour, where it operates at LOS F. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As stated, and shown previously, it is known that roundabouts are safer than stop-controlled and/or signalized intersection. Based on CMF Clearinghouse research (CMF ID: 4194) converting a signalized intersection to a roundabout would lead to a general intersection crash reduction of 21%. Pedestrian crossings are provided with two-stage crossing and a pedestrian refuge island; however, the addition of turn lanes at the roundabout require an additional lane to cross and more vehicle exposure.

6.4.5 Alternatives Summary

Concepts and Cost / ROW Impact

Figure C-6 through **Figure C-8** in **Appendix C** show the proposed layouts for the 50th Street with Farnam Street alternatives. **Table 6-2** shows the estimated costs and right-of-way impacts for each alternative. Detailed cost estimates are shown in **Appendix C** immediately after the proposed layouts**.** A summary of turn lane lengths table is provided in **Appendix E** for all alternatives.

Table 6-3. 50th Street and Farnam Street Costs & ROW Impact

Intersection	Alternative	Project Cost ($)	ROW Impact (Sq. ft.)
50th Street & Farnam Street	No-Build	$ -	-
	Alt 1. - Left Turn Lanes	$ 1,356,000	175
	Alt 2. - Left/Right Turn Lanes	$ 1,501,000	1,565
	Alt 3. - Roundabout	$ 777,000	1,025

Alternatives Matrix

Alternatives 1 through 3, and a no-build option, have been visually summarized into a matrix format shown in **Table 6-4.** A quantitative version of the matrix is also provided in **Appendix C.** Alternative 4 was not carried forward for future consideration. Based on the results of the operations and safety analysis it is recommended that Alternative 3 be constructed with the permanent two-way conversion of Farnam Street.

Table 6-4. 50th Street and Farnam Street Matrix

Intersection	Alternative	Vehicle Safety	Pedestrian Safety	Project Cost	Minimize ROW Impacts	Traffic Operations	Access Management
50th Street with Farnam Street	No-Build	○	◐	●	●	○	○
	Alt 1. - Left Turn Lanes	◐	◐	○	●	◐	○
	Alt 2. - Left/Right Turn Lanes	◐	○	○	○	●	○
	Alt 3. - Roundabout	●	●	◐	◐	○	◐

● = Best ◐ = Good ○ = Fair

6.5 Saddle Creek Road with Farnam Street Alternatives

The intersection of Saddle Creek Road with Farnam Street is currently signalized with left-turn lanes on each approach and a right-turn lane on the westbound approach. To address operations, safety, and pedestrian concerns several intersection alternatives were evaluated and are discussed in detail below. They include:

1. Signalized with EB & NB Right-turn Lanes and One WB Thru Lane
2. Signalized with Dual EB & WB Left-turn Lanes and NB Right-turn Lane
3. Multi-lane Roundabout
4. Multi-lane Roundabout with Right-turn Lanes on All Approaches

6.5.1 Alternative 1 - Signal w/ EB & NB Right-turn Lanes and One WB Thru Lane

Alternative 1 consists of keeping the intersection signalized, adding eastbound and northbound right-turn lanes, and removing one of the westbound thru lanes at the intersection.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 1. The signalized intersection is anticipated to operate at LOS D in the AM peak hour and LOS E in the PM peak hour. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

There were 77 crashes over the 5-year crash analysis period at this intersection. The crashes ranged widely in type. The addition of right-turn lanes removes vehicles from the shared through lane stopping to turn and helps to reduce rear-end crashes. Based on CMF Clearinghouse research (CMF ID: 286) install a right-turn lane on one approach at a signalized intersection would lead to a general intersection crash reduction of 4%. This crash rate cannot necessarily be doubled, but adding multiple approach turn lanes would net higher crash reduction. Additionally, adding extra turn-lanes and increasing pedestrian crossing distance would increase exposure of high-risk users.

6.5.2 Alternative 2 - Signal w/ Dual EB & WB Left-turn Lanes and NB Right-turn Lane

Alternative 2 consists of keeping the intersection as signalized, adding eastbound and westbound dual left-turn lanes, and adding northbound right-turn lanes at the intersection.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 2. The signalized intersection is anticipated to operate at LOS C in the AM peak hour and LOS D in the PM peak hour. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As discussed in Alternative 1, the addition of right-turn lanes removes vehicles from the shared through lane stopping to turn and helps to reduce rear-end crashes. Based on CMF Clearinghouse research (CMF ID: 286) install a right-turn lane on one approach at a signalized intersection would lead to a general intersection crash reduction of 4%. Adding dual left-turn lanes would require protected-only phasing for the left-turns. Based on CMF clearinghouse research (CMF ID: 334) converting permissive or permissive/protected left-turn phasing to protect only results in a 1% crash reduction overall. Additionally, adding extra turn-lanes and increasing pedestrian crossing distance would increase exposure of high-risk users.

6.5.3 Alternative 3 - Multi-lane Roundabout

Alternative 3 consists of reconstructing the intersection as a multi-lane roundabout.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 3. The roundabout is anticipated to operate at LOS F in the AM and PM peak hours. Individual movements at the roundabout operate at LOS F or worse during most peak hours. Queuing was also examined at the roundabout. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

Many studies have proven that roundabouts are safer than stop-controlled and/or signalized intersection. The Federal Highway Administration has shown that roundabout on average reduce overall crash rates by 37%, injury type crashes by 75%, fatal type crashes by 90%, and pedestrian related crashes by 40%. These benefits are due to lower travel speeds, reduction of the number of conflict points, and the elimination of angle type conflicts totally. Based on CMF Clearinghouse research (CMF ID: 4194) converting a signalized intersection to a roundabout would lead to a general intersection crash reduction of 21%.

6.5.4 Alternative 4 - Multi-lane Roundabout w/ Right-turn Lanes

Alternative 4 is similar to Alternative 3 and consists of reconstructing the intersection as a multi-lane roundabout with the addition of a right-turn lanes on all approaches. The turn lanes were added to provide additional capacity to the roundabout and attempt to alleviate the operations and queuing issues identified with the multi-lane roundabout.

No concept or cost estimate was developed for this alternative. The alternative was analyzed to determine traffic operations only. Alternative 4 was not carried forward for future consideration due to City of Omaha input, improbability of buildout, unacceptable operations and queueing, and concerns with ROW impact.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 4. The roundabout is anticipated to operate at LOS F in the AM and PM peak hours. Individual movements at the roundabout operate at LOS F or worse during most peak hours. Queuing was also examined at the roundabout. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As stated, and shown previously, it is known that roundabouts are safer than stop-controlled and/or signalized intersection. Based on CMF Clearinghouse research (CMF ID: 4194) converting a signalized intersection to a roundabout would lead to a general intersection crash reduction of 21%.

6.5.5 Alternatives Summary

Concepts and Cost / ROW Impact

Figure C-9 through **Figure C-13** in **Appendix C** show the proposed layouts for the Saddle Creek Road with Farnam Street alternatives. **Table 6-5** shows the estimated costs and right-of-way impacts for each alternative. Detailed cost estimates are shown in **Appendix C** immediately after the proposed layouts**.** A summary of turn lane lengths table is provided in **Appendix E** for all alternatives.

Table 6-5. Saddle Creek Road and Farnam Street Costs & ROW Impact

Intersection	Alternative	Project Cost ($)	ROW Impact (Sq. ft.)
Saddle Creek Road & Farnam Street	No-Build	$ -	-
	Alt 1. - Left Turn Lanes	$ 2,661,259	7,365
	Alt 2. - Dual Left Turn Lanes	$ 3,004,000	15,260
	Alt 3. - Roundabout	$ 2,730,000	12,600

Alternatives Matrix

Alternatives 1 through 3, and a no-build option, have been summarized into a matrix format shown in **Table 6-6.** A quantitative version of the matrix is also provided in **Appendix C.** Alternative 4 was not carried forward for future consideration. Based on the results of the analysis, there is a tie between the No-build alternative, Alternative 2, and Alternative 3. Each alternative prioritizes a different aspect of the evaluation matrix. The No-Build option is best when keeping project costs and ROW impacts at a minimum. Alternative 2 prioritizes traffic operations and access management. Alternative 3, a roundabout, is anticipated to lead to the best outcomes for vehicle and pedestrian safety.

Based on the No-build and Alternative 3 options anticipated to experience LOS F operations as well as extensive queueing, it is recommended that Alternative 2 be constructed with the permanent two-way conversion of Farnam Street to effectively move vehicles at this intersection. Farnam Street is a Minor Arterial and Saddle Creek Road is an Other Principal Arterial and the capability to move vehicles effectively through this intersection is a top priority.

Table 6-6. Saddle Creek Road and Farnam Street Matrix

Intersection	Alternative	Vehicle Safety	Pedestrian Safety	Project Cost	Minimize ROW Impacts	Traffic Operations	Access Management
Saddle Creek Road & Farnam Street	No-Build	○	◑	●	●	○	◑
	Alt 1. - Left Turn Lanes	◑	◑	◑	◑	◑	○
	Alt 2. - Dual Left Turn Lanes	◑	○	◑	○	●	●
	Alt 3. - Roundabout	●	●	◑	○	○	◑

● = Best ◑ = Good ○ = Fair

6.6 42nd Street with Farnam/Harney Street Alternatives

The intersections of 42nd Street with Farnam Street and 42nd Street with Harney Street, are currently signalized. To address operations, safety, and pedestrian concerns several intersection alternatives were evaluated and are discussed in detail below. They include:

1. Grid Network and Remove Signal at 42nd Street with Harney Street
    a. Two-way 41st Street & One-way Harney Street
    b. One-way 41st Street & One-way Harney Street
    c. Two-way 41st Street & Two-way Harney Street
2. S-Curve East of 42nd Street and Remove Signal at 42nd Street with Harney Street
3. S-Curve at the Intersection of 42nd Street with Farnam Street
4. Multi-lane Roundabout with 5-Legs
5. Peanut Roundabout with 5-Legs

6.6.1 Alternative 1 - Grid Network and Remove Signal at 42nd Street w/ Harney Street

Alternative 1 consists of eliminating the S-curve west of 42nd Street, reestablishing a grid network, and removing the west leg and signal at 42nd Street with Harney Street. 42nd Street with Farnam Street would have a full-movement eastbound approach. Additionally, this alternative could function with Harney Street and 41st Street being either one-way or two-way, with essentially new signing and pavement striping being the only change to make the switch. All alternatives (1a, b, and c) are shown in **Appendix C**.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 1. The signalized intersection of 42nd Street with Farnam Street is anticipated to operate at LOS B in the AM and PM peak hours. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

There were 65 crashes over the 5-year crash analysis period at the two intersections, 37 crashes at 42nd Street with Farnam Street and 28 crashes at 42nd Street with Harney Street. The crashes were mostly angel type crashes, with sideswipe (same direction) and rear-end crashes also common. Consolidating movements from two intersection to one intersection has the potential to decrease crashes. Additionally, re-establishing a grid pattern within the street network will simplify movements and create consistency for driver expectations.

CMFs were not used to quantify the safety benefits of this alternative due to the alternative being non-conventional. Unlike changes in traffic control or lane arrangements, which are one-for-one replacement and/or addition, these are unique improvement not easily quantifiable by CMFs. Looking at the reduction or increase in conflict points at each intersection, 42nd Street with Farnam Street would increase from 19 conflict points to 32, a 68% increase. 42nd Street with Harney Street would decrease its conflict points from 9 to 1, an 89% decrease. Applying the percent factors to the total crashes at each intersection, there would not be a change in the total crashes between Alternative 1 and the no-build option. There would also be a net increase of 5 angle type crash conflict points at 42nd Street with Farnam Street and Harney Street.

6.6.2 Alternative 2 - East S-Curve and Remove Signal at 42nd Street w/ Harney Street

Alternative 2 consists of eliminating the S-curve west of 42nd Street, creating a new S-curve east of 42nd Street, closing 41st Street between Farnam Street and Harney Street, and removing the west leg and signal at 42nd Street with Harney Street. 42nd Street with Farnam Street would have a full-movement eastbound approach.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 2. The signalized intersection of 42nd Street with Farnam Street is anticipated to operate at LOS B in the AM and PM peak hours. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As discussed in Alternative 1, consolidating movements from two intersections to one intersection reduces the overall conflict points where crashes can occur. Additionally, the new S-curve would be only one lane instead of two. This would eliminate the possibility of sideswipe (same direction) crashes occurring during the S-curve maneuver. The S-curve would create an additional crossing for pedestrians and bicyclists, increasing their exposure to vehicle traffic. Additionally, slip lanes are not conducive to pedestrian crossings.

CMFs were not used to quantify the safety benefits of this alternative due to the alternative being non-conventional. Unlike changes in traffic control or lane arrangements, which are one-for-one replacement and/or addition, these are unique improvement not easily quantifiable by CMFs. Looking at the reduction or increase in conflict points at each intersection, 42nd Street with Farnam Street would increase from 19 conflict points to 32, a 68% increase. 42nd Street with Harney Street would decrease its conflict points from 9 to 1, an 89% decrease. Additional conflict points, merge and diverge, would occur at the S-curve. There would also be a net increase of 5 angle type crash conflict points at 42nd Street with Farnam Street and Harney Street.

6.6.3 Alternative 3 - 42nd Street w/ Farnam Street West S-Curve

Alternative 3 consists of reconstructing the intersection of 42nd Street with Farnam Street as a 5-leg intersection, the 5th leg being an S-curve that connects with Harney Street. This alternative would include the removal existing S-curve west of 42nd Street, closing the west leg of 42nd Street with Harney Street, and establishing a full-movement eastbound approach at 42nd Street with Farnam Street.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 1. The signalized intersection of 42nd Street with Farnam Street is anticipated to operate at LOS B in the AM and PM peak hours and the intersection of 42nd Street with Harney Street is anticipated to operate at LOS A in the AM peak hour and LOS B in the PM peak hour. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As discussed in Alternative 1, consolidating movements from two intersections to one intersection reduces the overall conflict points where crashes can occur. The addition though of fifth leg to 42nd Street with Farnam Street would increase the No-build scenario's 28 conflict points to 44 conflict points, a 57% increase, in the Alternative 3 scenario. Most of the increases in conflict points would be crossing type conflicts.

6.6.4 Alternative 4 - Multi-lane Roundabout w/ 5-Legs

Alternative 4 consists of reconstructing both intersections of 42nd Street with Farnam Street and Harney Street as one 5-legged multi-lane roundabout. This alternative has many benefits, such as operations and safety, but the grades to the east and west of 42nd Street would make construction difficult. Additionally, two options of this alternative are proposed. Alternative 4a as a traditional roundabout and Alternative 4b as "Peanut" shaped roundabout.

Operations

Figure 6-1 shows the anticipated traffic operations under 2040 two-way traffic conditions for Alternative 4. The roundabout is anticipated to operate at LOS C in the AM and PM peak hours. Individual movements at the roundabout operate at LOS D or better during most peak hours, except for the southbound movement which operates at LOS E for both AM and PM peak hours. The 50th and 95th percentile queues were examined and included on **Figure 6-1**.

Safety

As shown previously, it is known that roundabouts are safer than stop-controlled and signalized intersections. Based on CMF Clearinghouse research (CMF ID: 4194) converting a signalized intersection to a roundabout would lead to a general intersection crash reduction of 21%. Additionally, conflict points would reduce from 28 total between the two intersections in a No-Build scenario to just 10 conflict points at a 5-leg roundabout.

6.6.5 Alternatives Summary

Concepts and Cost / ROW Impact

Figure C-14 through **Figure C-20** in **Appendix C** show the proposed layouts for the 42nd Street with Farnam/Harney Streets alternatives. **Table 6-7** shows the estimated costs and right-of-way impacts for each alternative. Detailed cost estimates are shown in **Appendix C** immediately after the proposed layouts**.** A summary of turn lane lengths table is provided in **Appendix E** for all alternatives.

Table 6-7. 42nd Street & Farnam/Harney Streets Costs & ROW Impact

Intersection	Alternative	Project Cost ($)	ROW Impact (Sq. ft.)
42nd Street & Farnam/Harney Streets	No-Build	$ -	-
	Alt 1. a, b, c - Grid Network	$ 3,530,000	10,925
	Alt 2. - East "S" Curve	$ 3,477,000	21,695
	Alt 3. - West "S" Curve	$ 3,614,000	26,750
	Alt 4. a, b - Roundabout / Peanut	$ 3,548,000	28,725

**If multiple options listed, highest Cost/ROW is listed. Detailed output included in Appendix.*

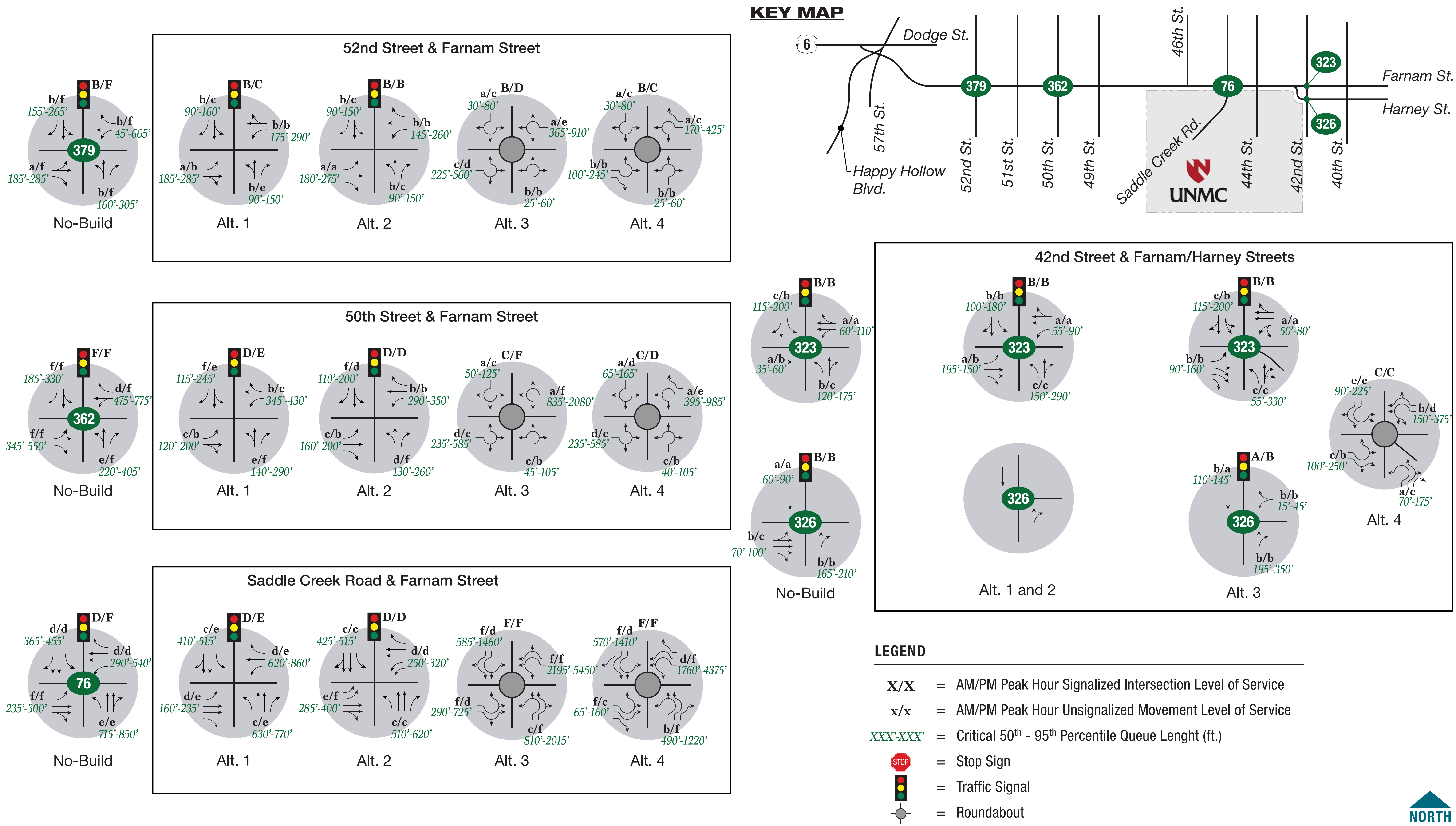
Alternatives Matrix

Each alternative, and a no-build option, have been summarized into a matrix format shown in **Table 6-8.** A quantitative version of the matrix is also provided in **Appendix C.** Based on the results of the analysis, there is a tie between the No-build and Alternative 1. The No-build option would keep project costs and ROW impacts at a minimum. Whereas, Alternative 1 would address operational, access management, and pedestrian safety concerns. Although, the No-build option does not address the desired to convert Farnam Street from one-way to two-way. Therefore, Alternative 1 is recommended to be constructed, in one of its variations. It is recommended that the City work with UNMC when the NExT development begins to take shape to determine the future configuration of this area.

Table 6-8. 42nd Street & Farnam/Harney Streets Matrix

Intersection	Alternative	Vehicle Safety	Pedestrian Safety	Project Cost	Minimize ROW Impacts	Traffic Operations	Access Management
42nd Street & Farnam/Harney Streets	No-Build	◑	◑	●	●	◑	○
	Alt 1. a, b, c - Grid Network	◑	●	○	◑	●	◑
	Alt 2. - East "S" Curve	○	○	○	○	◑	◑
	Alt 3. - West "S" Curve	○	○	○	○	◑	◑
	Alt 4. a, b - Roundabout / Peanut	●	◑	○	○	○	●

● = Best ◑ = Good ○ = Fair



FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

FIGURE 6-1

Proposed Alternatives (2040) Traffic Operations

7. ACCESS MANAGEMENT

Access management principles should be followed where feasible along the Farnam Street corridor and at adjacent intersections throughout the study area. The *2012 City of Omaha Guidelines and Regulations for Driveway Location, Design and Construction Manual* and the Land Use Element of the *City of Omaha Master Plan* provide guidelines for commercial access requirements onto public streets and should be referenced when new commercial access is requested.

Along the Farnam Street corridor, there are several locations where existing driveways and side streets are in close proximity to signalized intersections. This type of access spacing degrades progression on arterial streets and introduces conflict points, thereby increasing the potential for crashes.

With the residential nature of Farnam Street from Dodge Street to 46th Street, access management will be difficult due to residential driveways onto Farnam Street that provide the only access to the resident and garage.

On Farnam Street between 46th Street and 44th Street, there are several direct business accesses and parking lots accesses. Along the north side of Farnam Street, opportunities for consolidated accesses and restricted access to RIRO should be evaluated with the design of the 46th Street and Saddle Creek Road improvements. Access to Farnam Street will be limited with the proposed UNMC Steel Casting Site redevelopment on the south side with only a full access at 46th Street.

East of 44th Street, there are several parking lots with access onto Farnam Street. On the north side, alternative access is provided via a back alleyway, and the two access onto Fanam Street could be eliminated. On the south side, as the NExT project begins to take shape, access locations should be evaluated and consolidated if possible.

8. PUBLIC INVOLVEMENT

A stakeholder meeting was held for the Farman Street Two-way Conversion: 50th and 52nd Street intersection Improvements (OPW 53944) on April 25, 2022, at the Barbara Weitz Community Engagement Center on the campus of the University of Nebraska at Omaha. The meeting was held in room 220 and ran from 3:00 PM to 4:30 PM. The stakeholders include property owners on the four corners of the 50th and 52nd Street intersections as well as representatives from the neighborhood association.

A public open house meeting was held for the Farman Street Two-way Conversion: 50th and 52nd Street intersection Improvements (OPW 53944) on April 25, 2022, at the Barbara Weitz Community Engagement Center on the campus of the University of Nebraska at Omaha following the stakeholders meeting. The meeting was held in rooms 201/205/209 and ran from 5:00 PM to 7:00 PM. The presentation is included in **Appendix G.**

The open house began with a 20-minute presentation presenting the results of the study. There was no question-and-answer session following the presentation. This was followed by an open house format with several stations spread throughout the room, staffed by City officials and FHU staff to answer public questions and take comments.

The meeting had 53 attendees listed on the sign-in sheet. There were several who declined to sign-in and several additional representatives from the City of Omaha, FHU, and local media outlets were present. In summary, there were an estimated 75 people in attendance.

8.1 Comments

Several opportunities and methods to solicit comments were provided to the citizens. Comment forms were provided at the public open house and online via the Keep Omaha Moving website (http://www.keepomahamoving.com/projects/farnam-street-two-way-conversion-50th-and-52nd-street-intersection-improvements-opw-53844). Additional comments were also provided to the City of Omaha via email and phone conversations. The comments received are included in **Appendix G.**

A total of 92 comments were received for the project, and the breakdown by media type is below:

- Online – 63 comments
- Comment Forms – 6 comments
- Email or Phone – 23 comments

8.2 Summary

All comments were cataloged and separated into the following categories: Safety, Access, Traffic Flow, Traffic Operations, Pedestrians, Drainage, Pavement, Suggestion, and Other. Please note that some comments were split into multiple categories. The table below summarizes the number of comments by category.

Table 8-1. Public Comments Summary by Category

Topic	Safety	Access	Traffic Flow (mobility)	Traffic Operations	Pedestrian	Drainage	Pavement	Suggestions	Other	Total
Total Commented per Topic Category	25	2	7	11	11	0	0	29	12	**97**

Most comments were in favor of converting Farman Street to two-way traffic all-day, every-day, and acknowledged that addressing safety (crashes and speeds) for vehicles and pedestrians was important. However, there was a divide on what additional improvements are required.

Several comments noted wanting the conversion but without any additional improvements to the intersections of 50th Street and 52nd Street. The City indicated that completing the conversion without additional improvements is not an alternative due to the current safety issues.

The second theme favored of the conversion with safety as the top priority for pedestrians and vehicles. Many of these comments noted the roundabout as the safest option; however, there were a few that indicated roundabouts were not safe for pedestrians. Studies have shown that a single-lane roundabout provides a safer pedestrian crossing than a traffic signal.

8.3 Recommendation from Public Meeting

Based on the consensus of the comments received, it is recommended that Farnam Street be converted to two-way traffic, and Alternative 3 – Roundabouts is the recommended lane configuration for the intersections of 50th Street and 52nd Street.

9. SUMMARY AND RECOMMENDATIONS

Key findings and recommendations of this study are summarized as follows:

- For the study area intersections, the AM peak hour was determined to be 7:30 AM to 8:30 AM and the PM peak hour is 4:45 PM to 5:45 PM.

- A crash analysis was completed for the study area intersections and roadway segments. Of the twenty study area intersections all but four had a crash rate above the statewide intersection crash rate for similar facilities. Seven of the nineteen roadway segments had crash densities above the citywide average for similar facilities.

- One-way operations during the AM and PM peak periods, from Dodge Street to Saddle Creek Road, carry 30% of the daily traffic on Farnam Street whereas the same 4-hour period accounts for 58% of all crashes throughout the day. The most common crash type during this period was sideswipe (same direction) and the most common severity were property damage only.

- MUTCD signal warrants were examined at the study intersections. All existing signals were warranted along the corridor.

- NCHRP 457 auxiliary turn lane warrants were examined at the unsignalized intersections along the study corridor. No recommendations were made as part of this analysis.

- Queuing analysis was completed for all study area intersections and is shown on **Figure 5-2**, **Figure 5-4**, **Figure 5-6**, and **Figure 6-1**. For the alternatives that recommend additional turn lanes, recommended storage lane lengths and tapers are described in **Appendix E**. In addition to queues, other context sensitive design considerations such as not tapering through intersections, ROW constraints, and utility avoidance were used to determine acceptable turn lane lengths.
- The alternatives analysis included the examination of increasing volumes, operations, safety, and costs for a total of 12 intersection options and 1.5 miles of street segment. Based on this analysis it is feasible to convert Farnam Street, between Dodge Street and 40th Street, to two-way operations all day. If converted the following conclusions can be made:
  - Traffic operations along most of the corridor would function at acceptable levels. An alternative's analysis was completed at intersections that would need addition improvements to provide acceptable levels of service with permanent two-way traffic.
  - Intersection improvements are recommended to the intersections of 52nd Street, 50th Street, 46th Street (not analyzed as part of this study), Saddle Creek Road, and between 42nd Street and 40th Street.
  - Based on the safety analysis along the corridor, conversion of Farnam Street from one-way to two-way operations all day is anticipated to result in a safer roadway due to consistent traffic flow expectancy along the corridor for both drivers and pedestrians. Although it is recognized that additional conflict points would be added due to all day two-way traffic and some conflicts may become more prevalent, such as left-turn leaving.
- Based on the alternatives analysis, input from the stakeholders, and comments from the open house meeting, a recommendation matrix was created to summarize the recommended alternatives at each intersection. **Table 9-1** displays the results of the alternatives analysis. Exact geometrics of the recommended alternatives may change once moved to design.

Table 9-1. Alternatives Analysis Summary

Intersection	Alternative 1	Alternative 2	Alternative 3	Alternative 4
52nd Street & Farnam Street	Left-turn Lanes	Left/Right-turn Lanes	Roundabout	Roundabout w/ Right-turn Lanes
50th Street & Farnam Street	Left-turn Lanes	Left/Right-turn Lanes	Roundabout	Roundabout w/ Right-turn Lanes
Saddle Creek Road & Farnam Street	Left-turn Lanes	Dual Left-turn Lanes	Roundabout	Roundabout w/ Right-turn Lanes
42nd Street & Farnam/Harney Streets	Grid Network	East S-Curve	West S-Curve	Roundabout

- The no-build/do nothing alternative is not a feasible alternative to consider with the conversion of Farnam Street to two-way traffic all-day due to the following reasons:
    - With two-way traffic during the peak hours, under the existing lane configurations, LOS F operations are anticipated during the PM peak hours at the signalized intersections of 50th Street and 52nd Street. This is anticipated with both existing and future two-way traffic volumes.
    - The existing safety concerns, angle type collisions and red light running at the signalized intersections of 50th Street and 52nd Street, are not addressed if they remain in their existing configuration. It is anticipated that these types of collisions would continue to occur if no change is made. Additionally, rear-end type crashes could potentially increase since traffic is restricted to one-lane and no left-turn lanes are provided at the intersections.
- Pedestrian, bicycle, and transit facilities were reviewed along the corridor. If two-way conversion of Farnam Street is pursued, rearrangement of bus stops, pedestrian crossings, bicycle facilities may need to be altered. Additionally, efforts need to be made to educate the public of the new traffic patterns, this can be done with public meetings, marketing, and roadway signage.

- The total cost of the project to convert Farnam Street to permanent two-way operations, with the recommended intersection improvements identified in this study, would be **$7,995,657**. With the addition of the 46th Street with Farnam Steet intersection (estimated at $2,762,848), the total cost becomes **$10,758,505**. The total project costs are summarized in **Table 9-2** below.

Table 9-2. Cost Breakdown Summary

Location	Recommended Alternative	Cost
Farnam Street One-way to Two-way conversion	Lane Assignment Signals Removals & Signing and Striping	$79,794
52nd Street & Farnam Street	Roundabout	$781,312
50th Street & Farnam Street	Roundabout	$777,017
46th Street & Farnam Street*	Roundabout or Traffic Signal	$2,762,848
Saddle Creek Road & Farnam Street	Dual Left-turn Lanes	$3,003,711
42nd Street & Farnam/Harney Streets	Grid Network	$3,353,823
Total:	**-**	**$10,758,505**

*The intersection of 46th Street with Farnam Street was analyzed as part of the *UNMC Steel Casting Site Traffic Study*.

- With several ongoing redevelopment projects and roadway improvements required to accommodate this development and the conversion of Farnam Street to permanent two-way traffic, the following outlines a recommended implementation plan to turn this vision from a study into reality:
  - Phase 1 – Complete the design and construction of the recommended improvements to the intersections of Farnam Street with 46th Street and Saddle Creek Road. These improvements will be completed concurrently with the redevelopment of the UNMC Steel Casting Site. These improvements are anticipated for construction from 2023-2024.
  - Phase 2 – Converted Farnam Street to permanent two-way traffic. This could be completed with the removal of the overhead lane assignment signs and signing and striping. This would be an interim condition until safety and operational improvements to 52nd Street and 50th Street are completed. This provides a temporary two-way Farnam Street from Dodge Street to the S-curve until permanent improvements are made. This will need to occur concurrently with the construction/opening of the 46th Street with Farnam Street intersection.
  - Phase 3 – Complete the design and construction of the recommended improvements to the intersections of Farnam Street with 52nd Street and 50th Street. Once these improvements are constructed, Farnam Street will become a permanent two-way street from Dodge Street to the S-curve. Construction for these improvements is anticipated in 2023-2024. If possible, construction of Phases 1, 2 & 3 should occur concurrently. This would require project schedules from UNMC and the City to align as well as extensive contractor coordination.
  - Phase 4 – The final piece of the full conversion to two-way traffic is the segment of Farnam Street between the S-curve and 42nd Street. The timing of the NExT redevelopment will heavily influence when this piece of the conversion occurs. With this final piece, the transformation of Farnam Street to permanent two-way traffic will be complete.

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