

Technical Memorandum 1- Existing Conditions

Highway 10 through Dilworth Corridor Study

Fargo Moorhead Metro COG, MnDOT, and the City of Dilworth

July, 2022



Dilworth

US 10 | Corridor Study

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1.0 Introduction

The Fargo-Moorhead Metropolitan Council of Governments (Metro COG), Minnesota Department of Transportation (MnDOT) and the City of Dilworth, Minnesota (City) have initiated a corridor study of United States Highway 10 through Dilworth from the western city limits at 34th Street N to the eastern city limits at 60th Street N. The purpose of the study is to evaluate the current and future needs along the corridor and identify a recommended set of potential improvement projects for consideration in future construction programs. Improvement projects are currently programmed for this corridor in the next 5-10 years. This memo is intended to document the existing physical elements and traffic conditions along the corridor.

Study Location

Highway 10 serves as the main roadway to and through the City of Dilworth, with connections to I-94 via 34th Street on the west side of Dilworth and MN State Highway 336 on the east side. Highway 10 is a 4-lane divided/undivided Principal Arterial roadway that runs east-west with the speed limit transitioning from west to east through the corridor from 45 mph at 34th Street N, to 30 mph at 5th Street NW, to 65 mph near 7th Street NE. The study area has one zone of on-street parking and intermittent sidewalks. Different land uses exist along the corridor that include commercial, industrial, residential, and public park zoning.

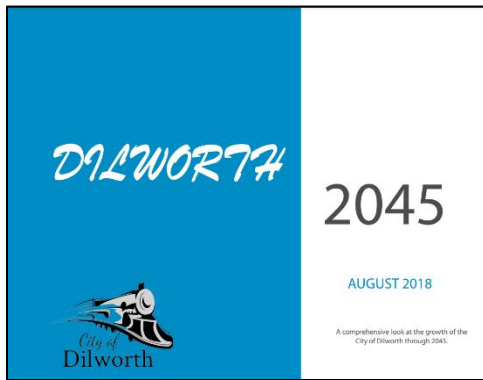
Figure 1 Study Location



Dilworth is on the eastern edge of the Fargo-Moorhead metropolitan area. It is the second largest community in Clay County. According to the 2020 census the City of Dilworth had a population of 4,612 with a median age of 34.3 years and a male to female ratio of 50%-50%. The average household size was 3.11. With Highway 10 running through downtown Dilworth, it creates an opportunity to connect the adjacent community, as well as travelers on Highway 10 to the amenities offered by multiple gas stations, shops, bars, and restaurants.

2.0 Related Studies

There are several relative studies and planning documents that have been completed which have helped shape the existing characteristics of the Highway 10 corridor and provide guidance for the future. The following studies are the most relevant to this Highway 10 corridor study.



Dilworth Comprehensive Plan

“Dilworth 2045” is the City’s comprehensive plan completed in 2018 by the City Administration, City Council, City Planning Commission, and Metro COG. The plan serves as a guiding document for development in the city. It contains information on current development and resources and anticipates future demand for certain land uses, municipal services, and other community needs. The plan establishes the vision for the community as “Dilworth is a welcoming, friendly community with small town character and an array of excellent schools, parks, civic amenities, and commercial conveniences. By continuing to invest in its neighborhoods, community services, and recreational facilities, the city will ensure its legacy as a thriving, independent community while contributing to the success and progress of the metropolitan area.” The Comprehensive Plan identifies a future land use plan and transportation needs within the community. Key recommendations of the plan relating to transportation along Highway 10 include:

- Provide an efficient, safe, and connective transportation system that is coordinated with existing needs and will effectively serve projected travel needs.
- Enhance walking and bicycling as alternative transportation options which increase mobility and improve public health.
- Promote a strong and unique sense of community through downtown development that adds to Dilworth’s charm and integrity as a small town.

2045 Fargo-Moorhead Metropolitan Transportation Plan

Metro Grow 2045 is the metropolitan area’s long range transportation plan. It was created in 2019 by Metro COG and its member jurisdictions. It provides performance assessments of the multimodal transportation system, gathers a multifaceted cross-section of input from across the community, and provides improvement alternatives that are constrained by the anticipated amount of transportation funding that will be available until 2045.

The plan identified Highway 10 in Dilworth as one of the region’s corridors with a high level of motorist delay and low level of travel time reliability. Recommendations for future projects that would impact the corridor include railroad grade separation projects at either Main Street or 14th Street E south of Highway 10.



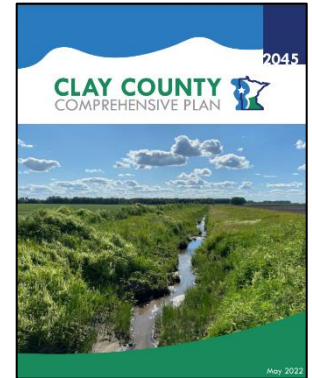


US 10/75 Corridor Study

In May 2020, the city of Moorhead, MN, MnDOT, and Metro COG completed a study of Highway 10 and Highway 75 through Moorhead. The study developed context sensitive solutions for each corridor, balancing the needs of the jurisdictions, stakeholders, and users. This study on Highway 10 ended at 34th Street, which is the border between Moorhead and Dilworth. The recommendations of this study will also have an influence on the future of Highway 10 in Dilworth as well. The study recommended reshaping Highway 10 west of 34th Street from a 4-lane divided highway to an urbanized corridor. This would impact the commercial vehicle inspection site 0.75 miles west of 34th Street. The study suggests a potential location for the inspection site would be between 12th and 60th streets in Dilworth.

2045 Clay County Comprehensive & Transportation Plan

The 2045 Clay County Comprehensive Plan describes the analysis, future projections, goals, and objectives that the county has developed for how decisions will be made over the next 25 years. The plan sets broad approaches to direct the future growth and development in the areas of land use, transportation, natural resources, housing, and economic competitiveness. For each topic, the plan sets goals, establishes objectives to achieve those goals, and identifies strategies and actions needed for implementation. The plan identified County Road 9 north of Highway 10 in Dilworth as a route for future urbanization.



Fargo-Moorhead Bicycle and Pedestrian Plan

Metro COG maintains the Bicycle and Pedestrian Plan with updates every 5 years, with the most recent update adopted in 2016. The plan looks at all types of bicycle and pedestrian facilities that have a transportation element. The purpose of the plan is to “identify current issues and needs as they relate to bicycling and pedestrian movements in the area; develop goals, objectives, and recommendations to enhance bicycle and pedestrian accommodations and safety for all types of users regardless of age, gender, race, social status, or mobility needs.” The plan includes a long-range project to construct a shared use path along Highway 10 from County Rd 9 to 12th Street NE.

3.0 Construction History

US Highway 10 was originally graded in 1923 as a rural 2-lane roadway. In 1954 and 1965 the corridor was expanded to a 4-lane facility. The general history of construction on the Highway 10 corridor is shown in **Table 1**. There have also been numerous minor projects such as resurfacing and modifying turn lanes. The complete history of construction of the corridor can be found on MnDOT's eDocs website.

Table 1 Construction History


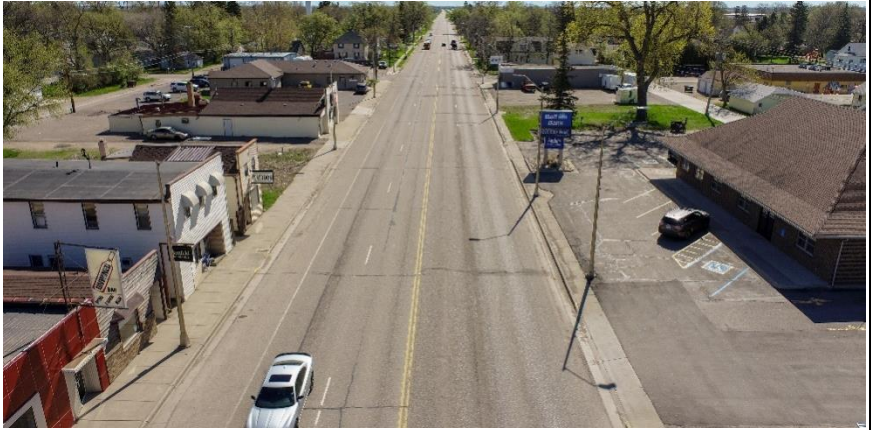
Year	Location	Type of Work	Surfacing Width	Thickness
1923	34th Street to 60th Street	Grading & Surfacing	24'	4" Gravel
1927	34th Street to 60th Street	Surfacing	18'	8" Concrete
1941	34th Street to 4th Street W	Widening & Shoulders	40'	6" Gravel (Shoulders)
	4th Street W to 7th Street E	Widening, Bituminous Surfacing, Curb & Gutter, Storm Sewer	51'	6" Gravel (Shoulders) 2" Bituminous (Shoulders)
1950-51	7th Street E to 60th Street	Widening, Bituminous Surfacing	44'	8" Gravel (Shoulders) 3" Bituminous (Mainline)
1954	34th Street to County Rd 9	Grading EB Lanes, Concrete & Bituminous Surfacing, Median, Frontage Roads	32' (WB) - 4' (Med) - 32' (EB)	3" Bituminous (EB Shoulder) 7" Concrete (EB Mainline) 3" Bituminous (WB)
	County Rd 9 to 4th Street W	Grading EB Lanes, Concrete Base, Bituminous Surfacing,	Varies 58' to 74'	7" Concrete Base (EB Mainline) 3" Bituminous (EB & WB)
	4th Street W to 7th Street E	Grading EB Lanes, Concrete Base, Bituminous Surfacing, Storm Sewer	58' 10"	7" Concrete Base 3" Bituminous
1956	Main Street	Traffic Signals		
1965	7th Street E to 60th Street	Grading EB Lanes Concrete Surfacing	37'	5.25" Gravel Base (Mainline) 8" Concrete (Mainline)
1968	4th Street W to 7th Street E	Overlay	58' 10"	5/8" Bituminous
	7th Street E to 60th Street	Overlay (WB) Turn Lanes	37'	1 5/8" Bituminous
1974	34th Street to 4th Street W	Widen WB, Add Turn Lanes, Widen Median	32' (WB) - 16' (Med)	Var.
1977	7th Street E to 60th Street	Turn Lanes	12'	3" Bituminous
1979	4th Street W to 7th Street E	Overlay	58' 10"	3/4" Bituminous
1986	7th Street E to 60th Street	Remove Existing Pavement, Overlay, Shoulders (WB)	38'	2.5" Bituminous (Shoulders) 4.5" Bituminous (Mainline)
1989	34th Street to 4th Street W	Widening, Overlay	36' (WB) - 16' (Med) - 36' (EB)	5" Bituminous
1992	4th Street W to 7th Street E	Overlay	58' 10"	2"-3" Bituminous
2009	7th Street E to 60th Street	2" Milling (Mainline), Reconstruct Shoulders, Overlay	38' (WB)	4" Bituminous
2010	34th Street to 7th Street E	Grading, Milling, Overlay	Var.	Var.

4.0 Geometry and Typical Section

The horizontal alignment is straight on Highway 10 since it is a section line road. Township and range included in the corridor are T139N-R48W and sections 2, 11, 1, and 12. The vertical alignment is flat throughout the corridor.

There are three distinct sections through the corridor study area. Each section has unique roadway configuration, speed limits, pedestrian and bicycle facilities, access control, and adjacent land use. The existing typical sections found on the Highway 10 corridor are shown in **Table 2**.

Table 2 Typical Sections

Segment	Notes	
34 th Street to 4 th Street W	<ul style="list-style-type: none"> Divided 4-lane roadway with raised concrete median 12' driving lanes with 8' outside and 4' inside shoulders, 16' median (88' pavement total) Turn lanes 45 mph speed limit Frontage roads 8' wide sidewalk on south side 155' Right of Way <p>Segment Pavement Breakdown:</p> <ul style="list-style-type: none"> Pavement – 5" bituminous pavement Base – 8" concrete Base 	
4 th Street W to 7 th Street E	<ul style="list-style-type: none"> Undivided 4-lane roadway 12'-14' driving lanes, 8' 10" parking lane on north side of road from Main Street to 3rd Street W (58' 10" pavement total) No turn lanes 35 mph speed limit Sidewalks located on north and south side various widths 76' Right of Way <p>Segment Pavement Breakdown:</p> <ul style="list-style-type: none"> Pavement – 4"-5" bituminous pavement Base – 7"-8" concrete/gravel base 	

<p>7th Street E to 60th Street</p>	<ul style="list-style-type: none"> • Divided 4-lane roadway with a 46' grass median • Two 12' driving lanes. 10' and 4' shoulders (38' pavement total each roadway) • Turn lanes • 65 mph speed limit • No sidewalks • 256' Right of Way <p>EB Segment Pavement Breakdown:</p> <ul style="list-style-type: none"> • Pavement – 2" - 3" bituminous pavement • Base – 8" concrete base <p>WB Segment Pavement Breakdown:</p> <ul style="list-style-type: none"> • Pavement – 6" bituminous pavement • Base – 8" concrete base 	
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5.0 Pavement Condition

The following sections summarize the existing pavement condition within the Highway 10 study corridor. The information is based on visual observation and construction history data.

34th Street to 4^h Street W – The existing pavement in this segment is showing signs of transverse cracking, longitudinal cracking, longitudinal joint distress, rutting and weathering. Curb and gutter located in the median is in average to below average condition. Weeds and grass are growing in the concrete median joints.

4th Street W to 7th Street E – The existing pavement in this segment is showing signs of transverse cracking, longitudinal cracking, longitudinal joint distress, and weathering. Curb and gutter in the corridor shows signs of pitting and distress. Sidewalk in this segment is not ADA compliant. Non-compliance includes ramps, cross slope, and PAR width. Driveway cuts in this corridor do not facilitate a way for a wheelchair to transverse safely.

7th Street E to 60th Street - The existing pavement in this segment is showing signs of transverse cracking, longitudinal cracking, longitudinal joint distress, and weathering. Curb and gutter in this section shows signs of pitting and distress. Weeds and grass are growing in the concrete median joints.

6.0 Access and Parking

There is no parking along the south side of Highway 10 throughout the corridor. Parking is only allowed on the north side between Main Street and 3rd Street E between the hours of 6 a.m. and 2 a.m. This area has businesses and homes that do not have driveways or access to parking directly off Highway 10. **Figure 2** shows the areas where parking is allowed and not allowed, and the restrictions (if any) that are in place.

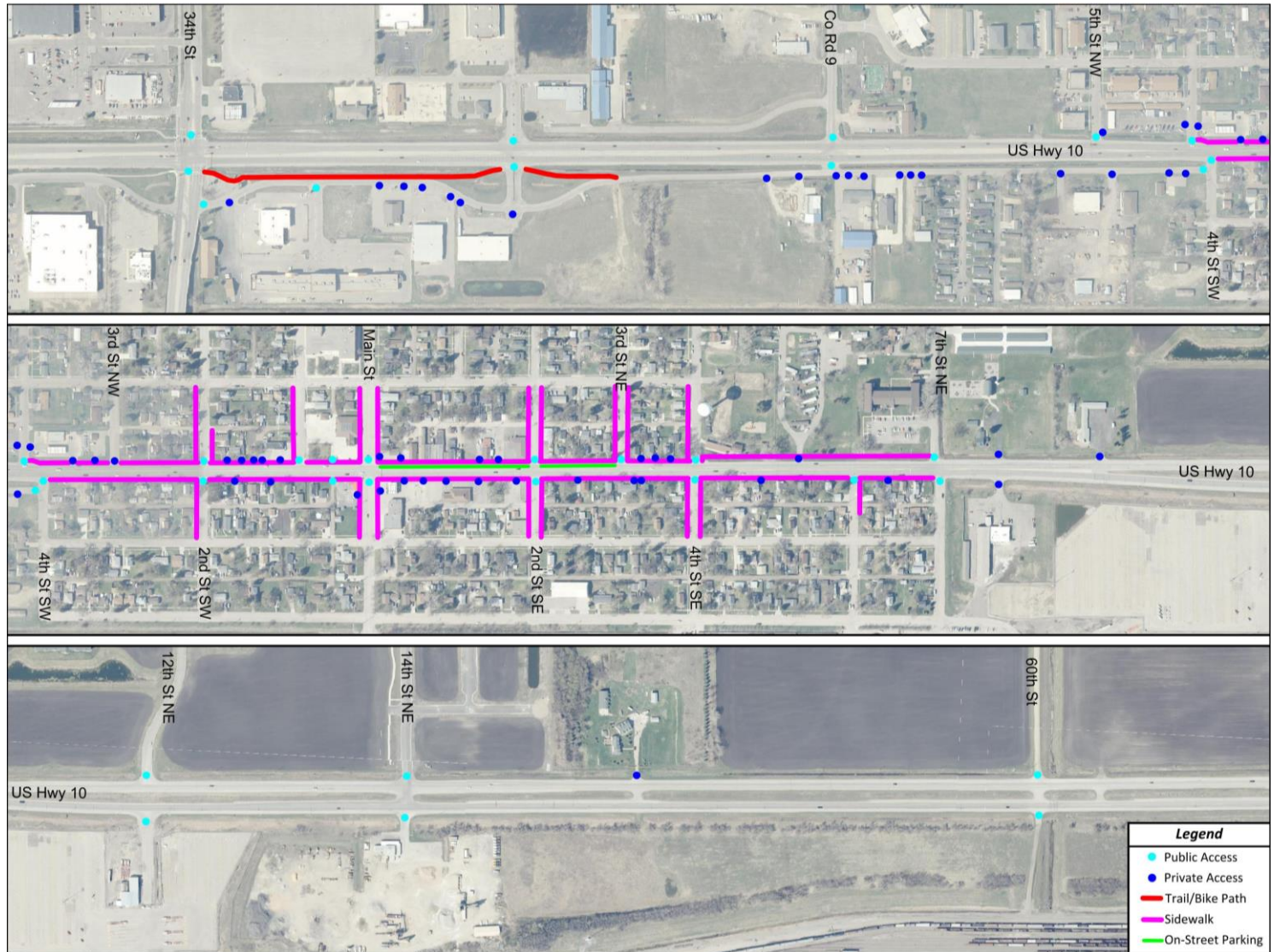
The location and type of access points along the corridor are shown on **Figure 2**. There are 61 total direct access points on the 2.5 mile corridor, equating to an average of 24 accesses per mile. 31 of the access points are to private property, 30 are public roads (considering the north and south sides of a full intersection as separate accesses). The highest concentration is between 4th Street W and 4th Street E where there are 38 access points within a half mile.

MnDOT provides guidance for spacing of street and driveway access points. Primary street intersections should be spaced at ½ mile apart and secondary streets should be no less than 1/4 mile apart through urban areas. In the urban core areas, a spacing of 300-600 feet is recommended, depending on block spacing. Driveway spacing guidance is not provided for an urban core area, as there are many factors contributing to the necessary location of the driveways.

7.0 Pedestrian and Bicycle Facilities

Pedestrian and bicycle facilities were analyzed throughout the corridor. The existing sidewalks are either concrete or bituminous pavement, in generally poor condition, and vary in width between 4 to 8 feet. There are multiple gaps in the sidewalk network.

Figure 2 Access, Parking, and Sidewalks



The lack of sidewalk facilities in certain areas hinders and discourages pedestrian and bicycle movements through the corridor. There is no connectivity between the central downtown area of Dilworth and the east and west areas, limiting connections between residential and business districts. There are no bicycle-specific facilities within the corridor. Dilworth's city ordinance allows people on bicycles to ride on the sidewalk, except when riding in a business district.

The sidewalk facilities through the corridor are as follows:

- 34th Street to County Rd 9 – intermittent 8 foot sidewalk on the south side of Highway 10, no sidewalk on the north side.
- County Rd 9 to 4th Street W – No sidewalks present.
- 4th Street W to Main Street – 4 foot sidewalk on both the north and south sides.
- Main Street to 2nd Street E – 8 foot sidewalk on the north side and 4 foot sidewalk on the south side.
- 2nd Street E to 7th Street E – 4 foot sidewalk on both the north and south sides.
- 7th Street E to 60th Street – No sidewalks present.

Pedestrian Comfort Level Assessment

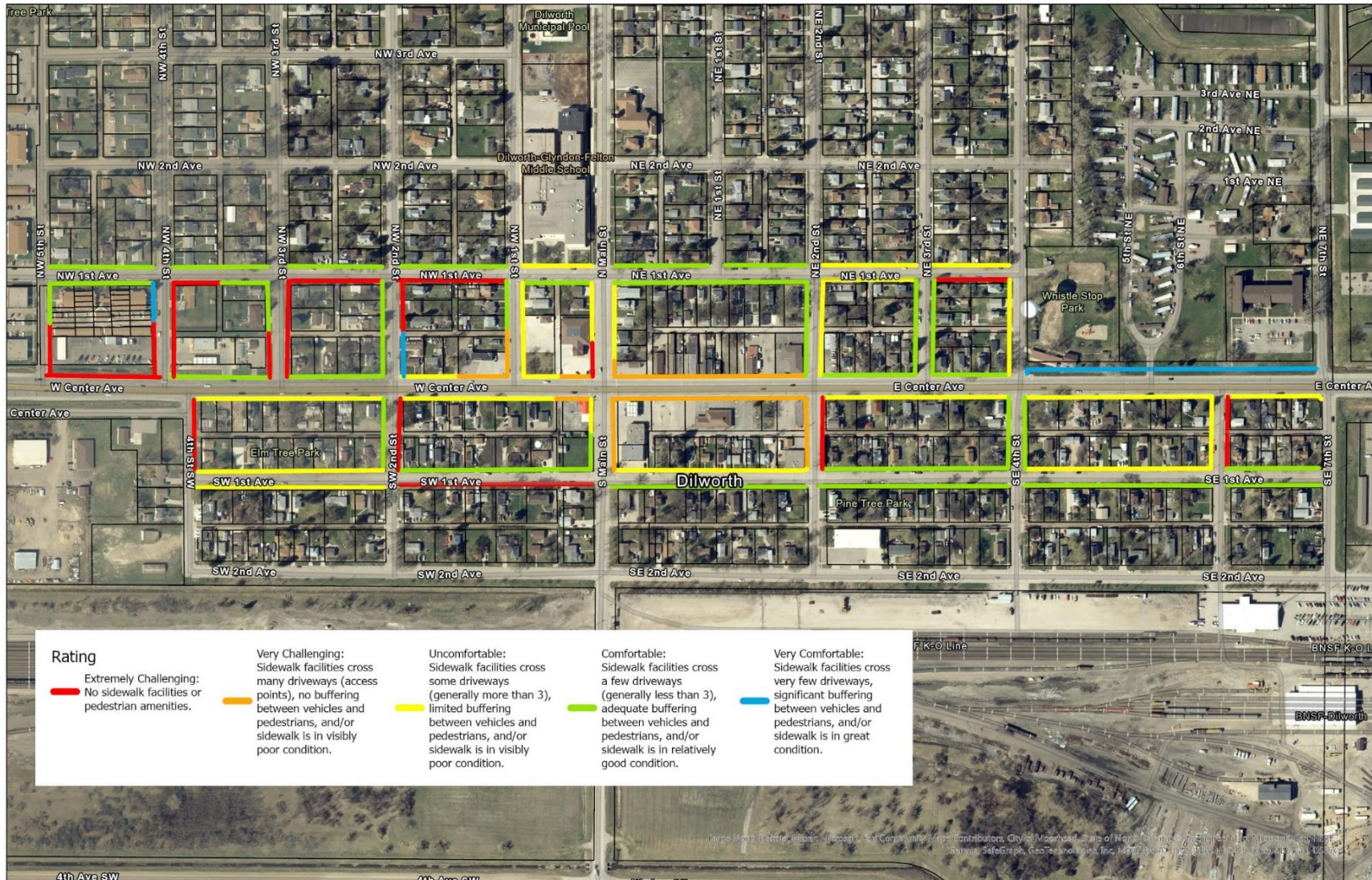
A visual assessment of the pedestrian facilities along and around Highway 10 in the City of Dilworth was conducted. This assessment primarily considered pedestrian perceptions of safety and level of comfort on the sidewalks. The assessment takes into consideration the presence of intersections and driveways (access points), the presence and quality of buffering between the pedestrian and vehicle infrastructure (including roadways and parking areas), and the overall condition of the path and the surrounding environment.

The assessment used a simple rating system between one (1) and four (4). Zero (0) was used to denote locations where no sidewalks are present, but there may still be pedestrian activity. These rankings were further translated to one's comfort level when using the corridor for walking (see **Figure 3**).

Pedestrian Facilities Rating Standards:

- **Extremely Challenging** (Rating = 0): No sidewalk facilities or pedestrian amenities.
- **Very Challenging** (Rating = 1): Sidewalk facilities cross many driveways (access points), no buffering between vehicles and pedestrians, and/or sidewalk is in visibly poor condition.
- **Uncomfortable** (Rating = 2): Sidewalk facilities cross some driveways (generally more than 3), limited buffering between vehicles and pedestrians, and/or sidewalk is in visibly poor condition.
- **Comfortable** (Rating = 3): Sidewalk facilities cross a few driveways (generally less than 3), adequate buffering between vehicles and pedestrians, and/or sidewalk is in relatively good condition.
- **Very Comfortable** (Rating = 4): Sidewalk facilities cross very few driveways, significant buffering between vehicles and pedestrians, and/or sidewalk is in great condition.

Figure 3 Pedestrian Level of Stress Rating



General Findings

Generally, Highway 10 may be perceived as an uncomfortable environment for pedestrians based on the number of driveway crossings, parking lots, and limited buffering between vehicles. Nearly half of the blocks are considered “challenging” or “uncomfortable.” Sidewalks that are considered “comfortable” are generally located outside of the US 10 corridor along side-streets or parallel routes.

There are either signed or marked crosswalks at 34th Street, Main Street, and 4th Street E. The distance from 34th Street to Main Street is one mile and there are gaps in the pedestrian facilities between the crosswalks, increasing the likelihood of pedestrians crossing at unmarked locations.

The pedestrian crossing at 4th Street E was enhanced with a Rectangular Rapid Flashing Beacon (RRFB) system in 2020 as shown in **Figure 4**. While the RRFB provides additional conspicuity to the crosswalk, there is a possibility of a motorist not seeing a pedestrian because their view is blocked by a same-direction vehicle in the adjacent lane. Crosswalks for multi-lane roads may benefit from additional RRFB's and signs mounted overhead or in or a median refuge.

Figure 4 Rectangular Rapid Flashing Beacon at 4th Street E

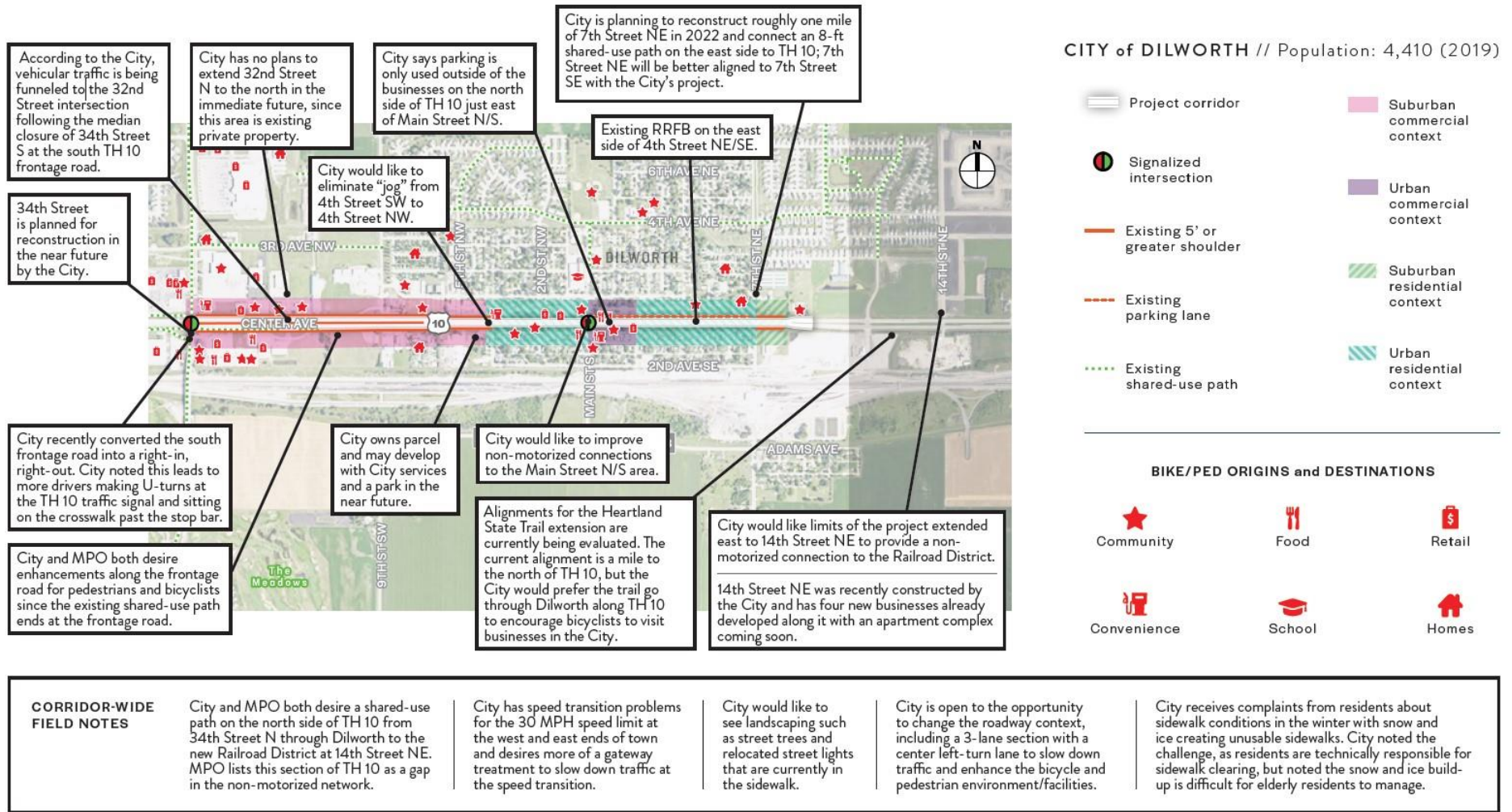


Another issue concerning the existing sidewalks is snow storage, particularly along the south side of Highway 10 between 4th Street W and 7th Street E. There is no boulevard space for snow storage and the existing sidewalks become blocked during the winter months.

MnDOT completed A Pedestrian and Bicycle Scoping Report through Dilworth in 2021 with observations made by MnDOT's Bicycle & Pedestrian Safety Engineer and staff, District Staff, and City representation during a virtual field walk. **Figure 5** shows the existing conditions that were noted in the report. The report provided the following background/context:

- The review identified a Suitability of Pedestrian and Cycling Environment (SPACE) score is 42 for the entire project. Higher scores indicate a higher likelihood that there is a need for non-motorized facilities and may indicate a higher likelihood of a safety concern, especially for scores above 51.
- From the Statewide Pedestrian System Plan, the Priority Areas for Walking score (PAWS) is within a Tier 1 priority area.
- The corridor is not part of the District 4 Bicycle Plan.
- The Fargo-Moorhead Metropolitan Bicycle and Pedestrian Plan (2016) proposed the long-range goal of constructing a shared-use path along US 10 between west of 40th Street and 12th Street E.
- Dilworth Safe Routes to School Survey Results (2010) identifies a lack of connected, well-kept sidewalks, high traffic speeds, and lack of help crossing TH 10 (such as a crossing guard or traffic signal) as barriers that hinder children from walking or bicycling to school.

Figure 5 Pedestrian and Bicycle Scoping Recommendation Report



8.0 Lighting and ITS

There is existing lighting from 34th Street to 14th Street E. The lights from 34th Street to 4th Street are not LED style lights. The lights from 4th Street W to 7th Street E were recently updated with new poles and LED fixtures. The lights on the south side in this segment are located the middle of the sidewalk, approximately 2 feet from the curb, blocking the pedestrian access route. There is no existing street lighting from 14th Street E to 60th Street.

There is one Dynamic Message Sign (DMS) for eastbound traffic located on the south side of Highway 10 just east of 7th Street E. MnDOT uses these signs to display information to travelers such as road conditions, closures, and safety messages.

9.0 Utilities

There are existing city-owned utilities throughout the corridor along with storm sewer infrastructure and some privately owned utilities.

Sanitary Sewer

- 34th Street to 5th Street W – 8” sanitary sewer lines run along the south side.
- 5th Street W to 2nd Street W – There are two 10” sanitary sewer crossings 150 feet west and east of Main Street intersection.
- 2nd Street W to 7th Street E – The north side has an 8” sanitary sewer line that ends at 4th Street E. The south side has an 8” sanitary sewer throughout.
- 7th Street E to 60th Street – There is an 8” sanitary sewer line running on the north side of the road between 12th Street E and 14th Street E.

Watermain

- 34th Street to 5th Street W – 8” ACP watermain runs on the south side.
- 4th Street W to 2nd Street E – The 8” ACP watermain jogs north and tees into a 12” PVC line that runs on the north side until it tees and runs north and south at 2nd Street E.
- 2nd Street E to 7th Street E – 8” ACP watermain crosses 4th Street E and runs north and south through the intersection.
- 7th Street E to 60th Street – 16” CIP watermain starts at 7th Street E on the north side of the roadway to 60th Street E.

Storm Sewer

- 34th Street to 4th Street W – Runoff is collected in the north and south ditches. No underground storm sewer in this segment.
- 4th Street W to Main Street – 18” RCP storm sewer and curb inlets.
- Main Street to 2nd Street E – 15” RCP storm sewer and curb inlets. Main line storm sewer ends 300 feet east of Main Street.
- 2nd Street E to 4th Street E – 15” RCP storm sewer and curb inlets start near 3rd Street W.
- 4th Street E to 7th Street E – 18” RCP storm sewer and curb inlets. Main line storm sewer ends at 7th Street E and empties into the north ditch.
- 7th Street E to 60th Street – Runoff is collected in the north and south ditches. No underground storm sewer in this segment of the corridor.

Other Public and Private Utilities

Several overhead and underground public and private utilities are present within the corridor, as summarized below. The information provided is based on visual observation and available data.

- Overhead facilities – Overhead power lines run mostly parallel and perpendicular to the corridor. There are several power lines that cross directly over the corridor. These occur west and east of the Main Street intersection, west of 2nd Street E intersection, west of 5th Street E and east of 7th Street E.

- Underground facilities – Xcel gas line, Xcel underground power, RR Valley Co-op power and multiple cable/internet/telephone companies have underground facilities in the study area.

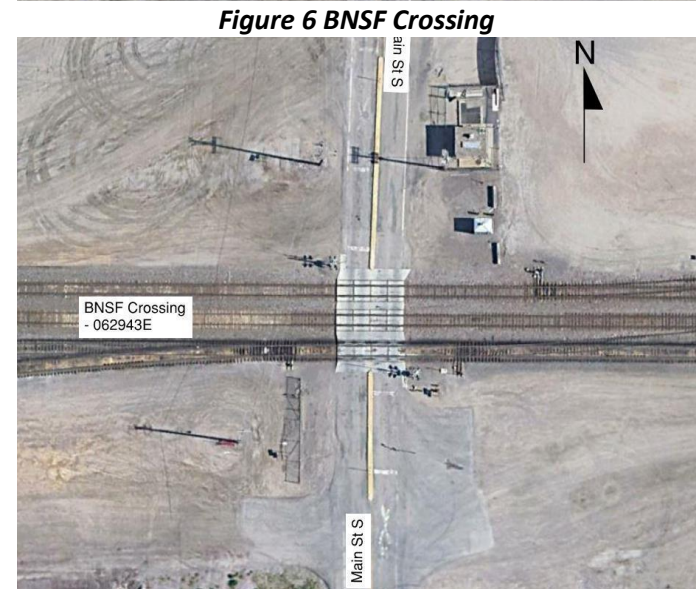
10.0 Railroad Crossings

BNSF Railway

There is one at-grade railroad crossing near the Highway 10 corridor. It is located 850 feet south of the corridor on Main Street S. The current crossing has the following characteristics:

- 3-track crossing located just south of TH 10 and Main Street intersection.
- USDOT Crossing No. 062943E
- Existing warning device: Crossing Gates
- Trains per day: 68
- Timetable Speed: 79 MPH
- AADT: 300
- Posted Speed Limit: 30 MPH

There are no pedestrian facilities at this crossing. There have been no accidents at this crossing since 1990, according to the data provided on the Federal Railroad Administration's database.



11.0 Transit

MATBUS operates one route in Dilworth that travels across the Highway 10 corridor. Route 6 crosses Highway 10 at the 7th Street E and 34th Street Intersections. Between 4th Street E and 34th Street, the route utilizes the frontage road along the south side of Highway 10. It has been noted by MATBUS that the stops along this segment are not ideal and provide poor connectivity to the north side of Highway 10. Ridership data is provided below:

Route 6 Ridership Data

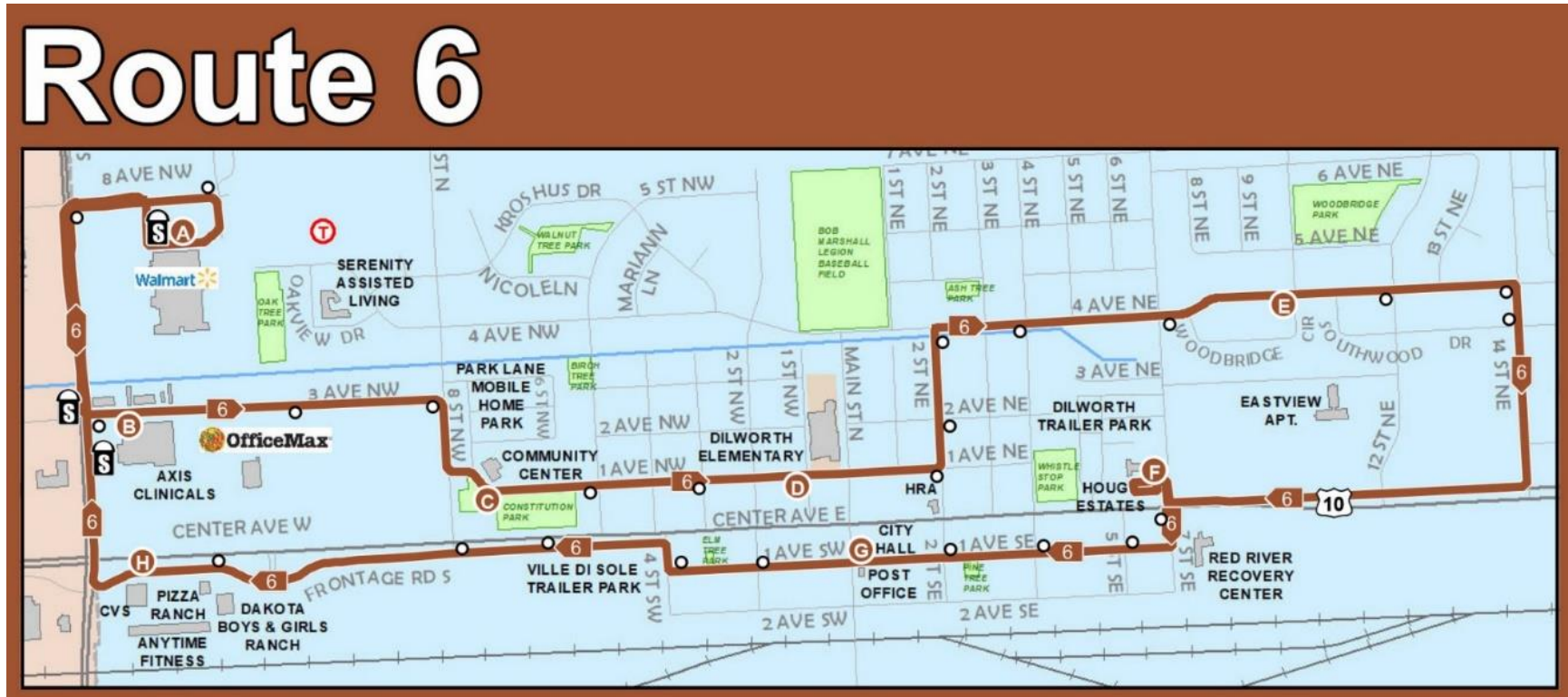
- 2019: 16,710
- 2020: 15,244
- 2021: 10,315

Typical Monthly Ridership Data

- November 2019: 1,521
- November 2020: 1,268
- November 2021: 767

In addition to the 2020 MATBUS rides in 2020, Dilworth MAT Paratransit provided an additional 918 rides and Dilworth Metro Senior Ride provided an additional 639 rides in 2020. These services provide a door-to-door service for seniors and others with mobility concerns. **Figure 7** shows the MATBUS route through Dilworth.

Figure 7 MATBUS Route 6



12.0 Land Use

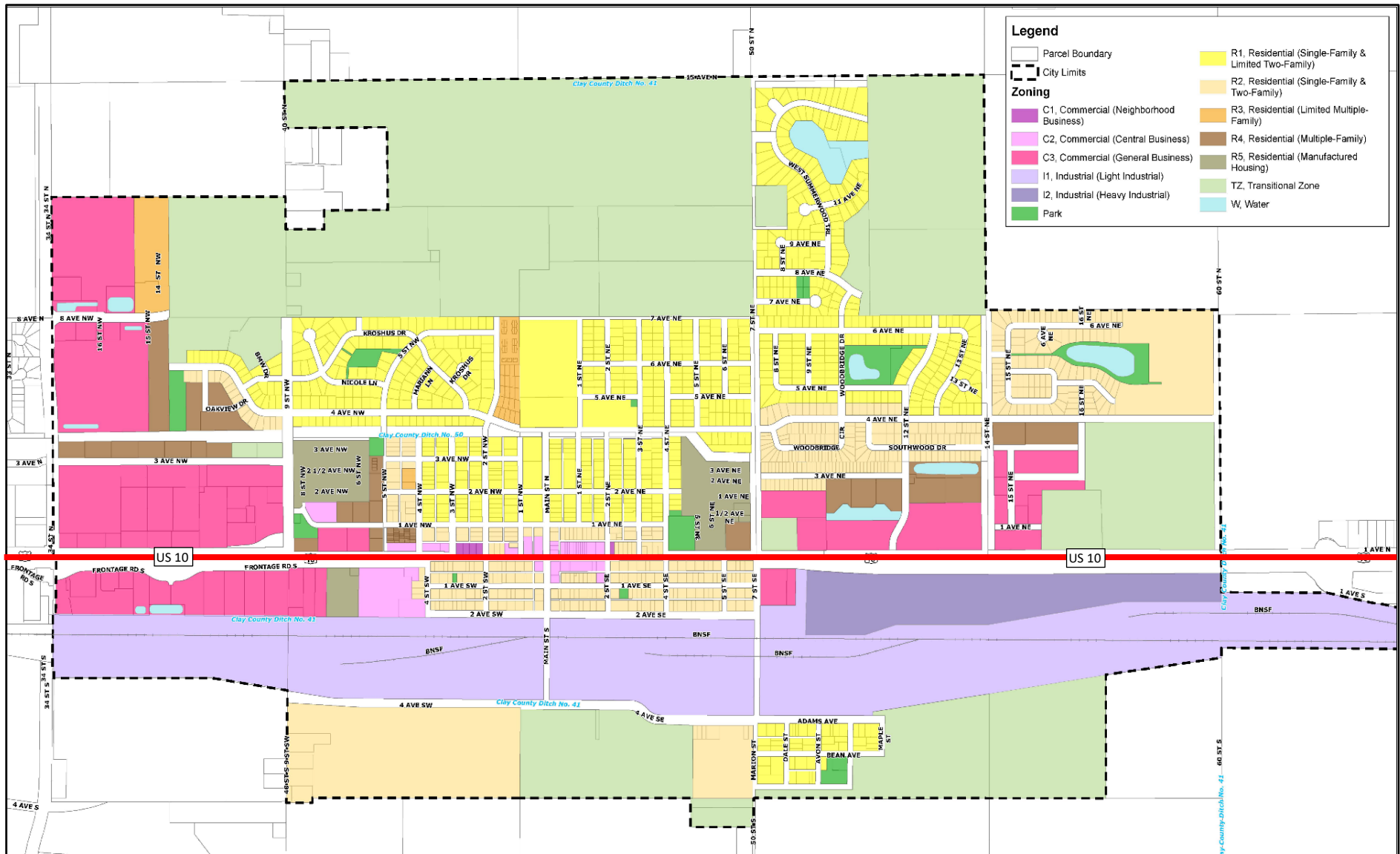
The existing land use areas adjacent to the Highway 10 corridor through Dilworth vary from suburban commercial to urban residential according to the MnDOT Land Use Context Tech Memo. Land use for Highway 10 can be broken in 3 segments. **Figure 8** shows the City's current zoning map.

34th Street to 4th Street W – The existing land use in this segment could be described as “Suburban Commercial”. The adjacent land in this segment is mostly zoned for commercial use. There are a few parcels of residential zoning.

4th Street W to 7th Street E – The existing land use in this segment could be described as “Urban Residential”. The adjacent land is a primarily residential, with a few commercial land use zones, along with city parks.

7th Street E to 60th Street – The existing land use in this segment could be described as “Suburban Commercial”. The north side of the roadway is a mix of commercial and transitional land use zones. The south side of the roadway is entirely industrial with one parcel of commercial zoning.

Figure 8 Current Land Zoning



13.0 Trees and Landscaping

The tree and landscaping review is intended to document the existing streetscape features for consideration while planning for improvements during the Highway 10 corridor study and help determine potential impacts. There are no existing trees or significant landscaping features within the Highway 10 Right of Way through the study corridor. There are, however, numerous private trees, especially through the core residential areas along Highway 10. There are a few small landscaping features outside of a few businesses and homes on private property just outside of the ROW.

Impacts on existing trees should be carefully evaluated while considering improvements to the corridor. The city and community should be an integral part of those discussions. Community “ownership” of existing trees is common and often a sensitive issue to adjacent property owners and the neighborhood.

34th Street to 4th Street W – There are a few sporadically placed trees on the south side between the EB lanes and frontage road. There are also a few trees on the north side. These trees are not in the Highway 10 ROW but appear to be within the frontage road ROW.

4th Street W to 7th Street E – There are a few hedges and bushes within this section of road that may be on the fringes of the existing ROW. There are no trees that are evident within the ROW as it is limited behind or in front of the existing sidewalk.

7th Street E to 60th Street E – There are no trees or shrubs within the ROW of this segment of roadway.

14.0 Traffic Operations – Existing Conditions

Existing traffic conditions were reviewed within the study area to quantify current operations and identify any existing issues. The evaluation of existing conditions included collecting traffic volumes, observing roadway characteristics, and analyzing crash history and intersection capacity, which are described in the following sections.

Traffic Volumes

The following intersections and/or driveways along Highway 10 were included as part of the capacity analysis and study process.

- 34th Street *
- Frontage Road / Shopping Center Access *
- County Road 9 / 40th Street W *
- 5th Street W
- 4th Street W
- 2nd Street W
- Main Street *
- 2nd Street E
- 4th Street E
- 7th Street E *
- 12th Street E
- 14th Street E *
- 60th Street N

** Denotes a study intersection where new counts were collected.*

Intersection turning movement and pedestrian/bicyclist counts were collected as noted on either Tuesday, March 29th or Thursday, March 31st, 2022. Data was collected for a 13-hour period (i.e., from 6 a.m. to 7 p.m.) at each location to understand how traffic patterns vary throughout the day, as well as to assist with traffic control warrants as part of this study. Historical Annual Average Daily Traffic (AADT) volumes were provided by MnDOT.

Based on the traffic data collected, total traffic volume profiles and traffic volume profiles by direction were developed at select locations as shown in **Figure 9** and **Figure 10**, respectively. These profiles help illustrate how vehicular activity varies throughout the day along segments of the corridor. In general, the corridor follows a typical pattern with a defined morning peak occurring between 7:15 and 8:15 a.m. and an evening peak between 4:30 and 5:30 p.m. There is also a defined commuter travel pattern, with a higher westbound traffic pattern during the a.m. peak period and a higher eastbound travel pattern during the p.m. peak period. Traffic volumes generally decrease as you travel from west to east along the corridor.

Figure 9 Hourly Traffic Volume Profiles

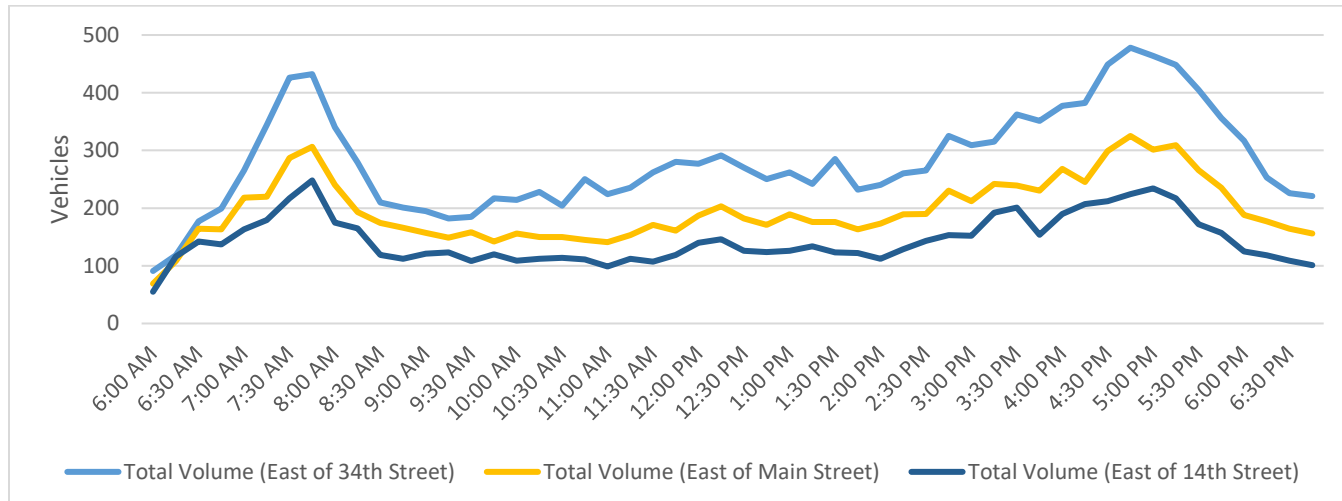
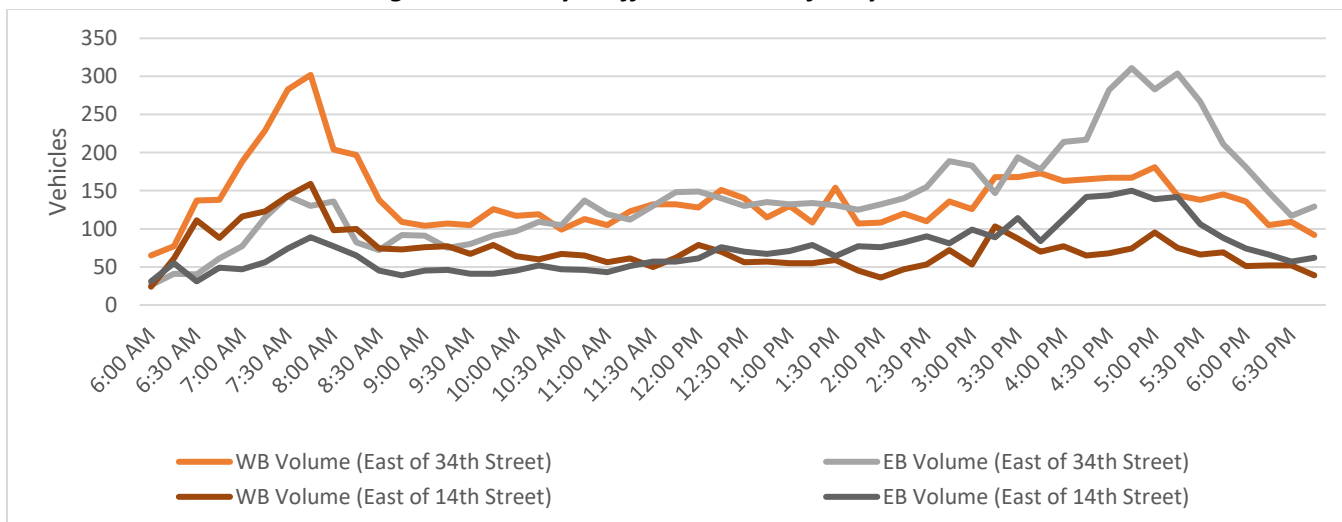


Figure 10 Hourly Traffic Volume Profile by Direction



Daily Traffic Volumes

Historical annual average daily traffic (AADT) volumes within the study area dating back to 1996 were reviewed to understand area growth trends. Based on the data shown in **Figure 11**, AADT volumes along Highway 10 have been relatively stable over the last 20-years. Although there has been a fair amount of development, this can partially be attributed to area transportation improvements, including the MN Highway 336 interchange construction which occurred during 2003 and 2004, as well as new I-94 Access at 34th Street, which has had an impact on regional travel patterns. Traffic volumes collected in 2021 and 2022 are generally consistent with pre-COVID conditions.

AADT volumes currently range from approximately 9,000 to 18,000 vehicles per day (vpd) along the Highway 10 corridor. Daily traffic volumes are highest near 34th Street and steadily decrease to the east side of the study corridor, near MN Highway 336. Cross-street ADT volumes range from a couple hundred vehicles per day, up to approximately 2,500 vpd.

Since the study corridor is known to be used as a commuter route, freight route, and recreational route, average daily traffic volumes along the corridor were reviewed by day of the week and time of the year as well. This data is based on traffic data from the adjacent Weigh in Motion (WIM) Station #43, which is located east of MN Highway 336, just outside of the study area.

Figure 12 illustrates AADT volume patterns by day of the week and direction along the study corridor. In general, the AADT volumes are relatively steady and balanced between eastbound and westbound between Monday and Thursday. However, there is a noticeable increase on Fridays in the eastbound direction, and a similar increase on Sundays in the westbound direction. This data is consistent with the recreational travel patterns associated with Fargo-Moorhead area residents traveling to/from “lake country” for the weekend.

Figure 11 Historical Highway 10 Annual Average Daily Traffic Volumes

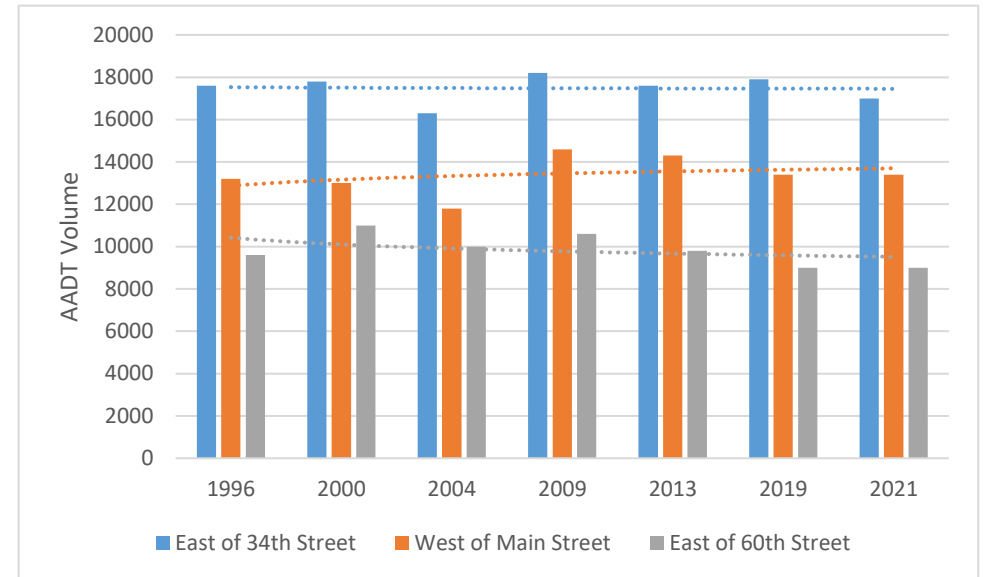


Figure 12 Highway 10 AADT Volumes by Day of Week / Direction

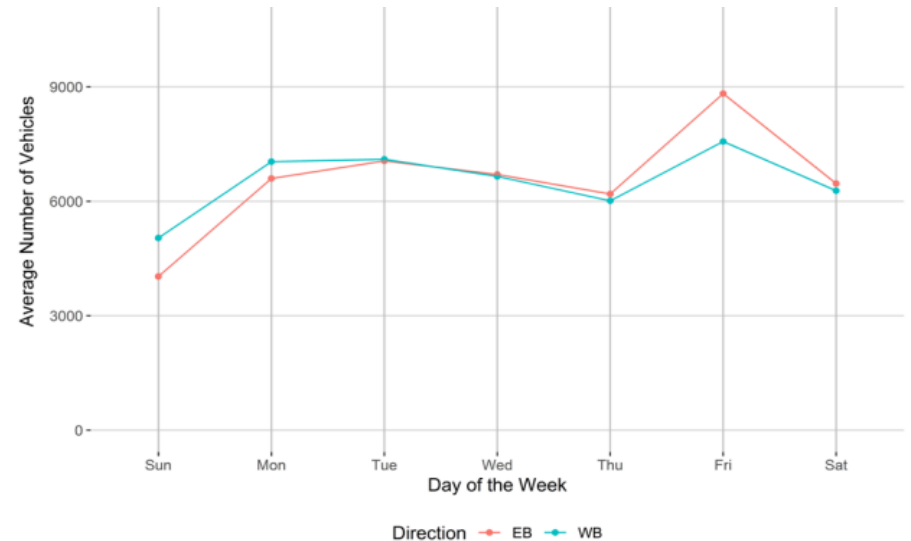


Figure 13 Highway 10 Heavy Vehicle AADT Volumes by Day of Week / Direction

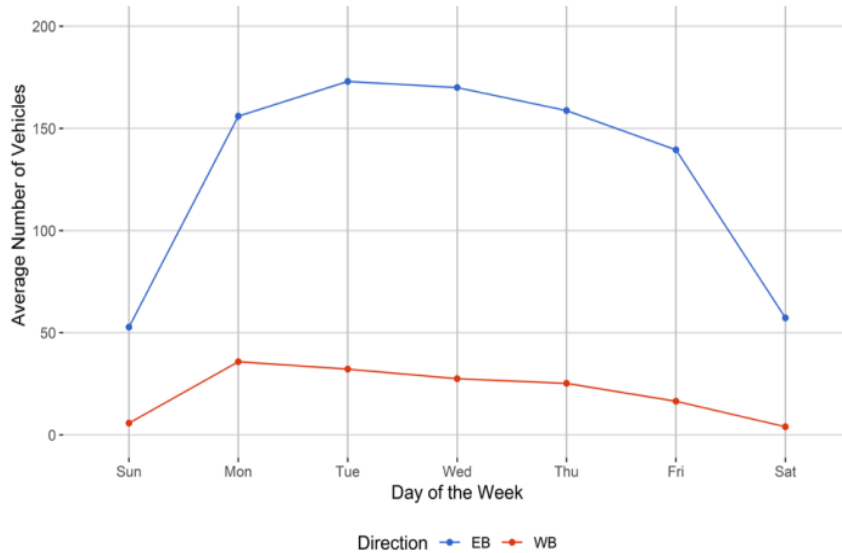
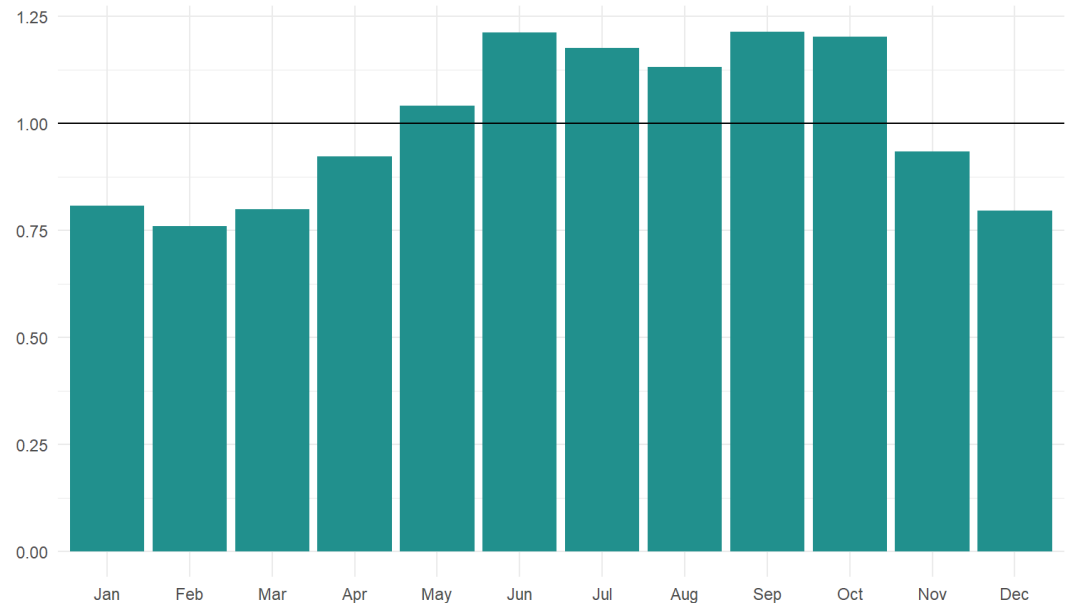


Figure 13 illustrates heavy commercial vehicle activity by day of the week. This data illustrates that truck activity is generally steady between Monday and Thursday, with less activity on Friday, Saturday, and Sunday. The WIM data also identified a higher proportion of truck activity in the eastbound direction, as opposed to the westbound direction along Highway 10. The newly collected data is consistent with these findings, with approximately 10 percent of eastbound vehicles being classified as heavy commercial vehicles and approximately five (5) percent of westbound vehicles being classified as heavy commercial vehicles.

Figure 14 illustrates heavy vehicle activity by month, with 1.00 being an average month. This data illustrates an increase of approximately 20% in heavy vehicle activity between May and October in the area, which coincides with peak agricultural activity. American Crystal Sugar has a large processing plant located in Moorhead to the northwest of the study corridor and there is a grain elevator to the east of the study area on Highway 10 near MN 336. These businesses generate additional ag-related freight activity during the summer and fall.

Figure 14 Highway 10 Heavy Vehicle Activity by Month



Travel Patterns

To understand who's using the corridor, a combination of StreetLight data, existing turning movement counts, and land use information was leveraged. This information was organized and summarized into key travel patterns of Highway 10 motorists. The key travel patterns indicate that approximately 55 percent of motorists along Highway 10 (east of 34th Street) originate or are destined to the Dilworth area, while the remaining motorists are traveling to/from MN Highway 336 or Highway 10 (east of MN Highway 336). This is illustrated in orange in **Figure 15**.

West of the study corridor, motorists travel patterns are relatively balanced between continuing along Highway 10 towards Fargo as well as areas to both the north and south of Highway 10. 34th Street, south of Highway 10, is a popular travel pattern for motorists within the study segment, with approximately 35 percent of users that originate or are destined for 34th Street. Approximately 10 percent of users travel to/from the MN Highway 75 and 15th Avenue area. This is illustrated in purple in **Figure 15**.

Existing a.m. and p.m. peak hour traffic volumes are illustrated in **Figure 16** and **Figure 17**, respectively.

Pedestrian and bicyclist activity was identified at the time traffic data was collected. Most of the pedestrian and bicycle movements were made at the signalized intersections. At 34th Street most movements were east-west across the intersection, while there were over 50 north-south pedestrian and bicycle crossings at Main Street.

Figure 15 Travel Patterns

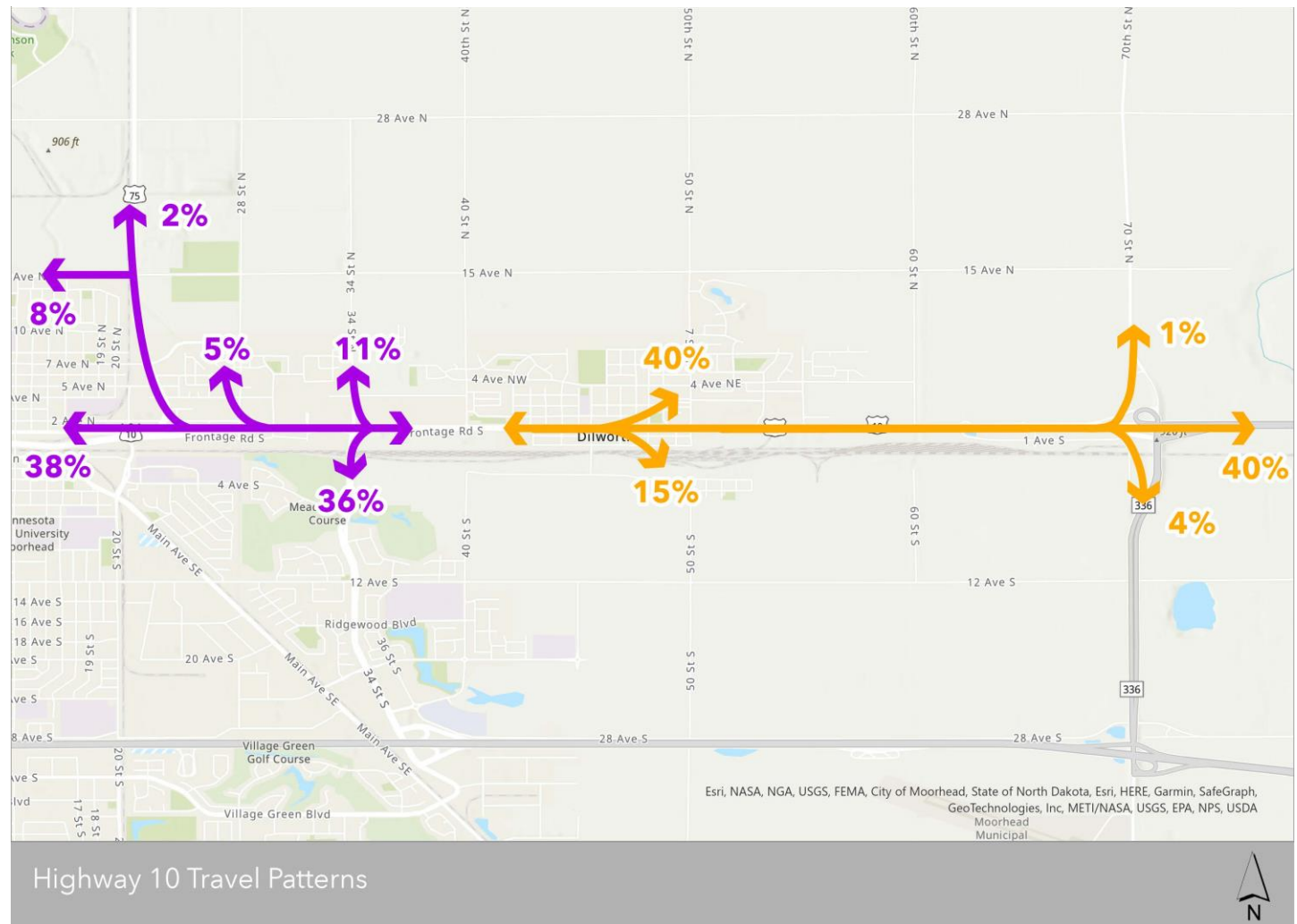


Figure 16 Existing AM Peak Hour Volumes



Figure 17 Existing PM Peak Hour Volumes



Corridor and Intersection Operations

ADT volumes along Highway 10 range from approximately 9,000 to 18,000 vehicles per day. The corridor also varies from a four-lane undivided facility to a four-lane divided arterial with turn lanes to a four-lane expressway. Typical planning level capacity thresholds by facility type are shown in **Table 3**.

Table 3 Planning Level Capacity Thresholds

Facility Type	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Primary/Principal Arterial (5-lane)	< 11,400	< 18,200	< 29,100	< 32,600	< 36,300	< 36,300
Primary/Principal Arterial (4-lane)	< 7,600	< 12,100	< 19,400	< 23,300	< 27,600	< 27,600
Primary/Principal Arterial (3-lane)	< 4,900	< 7,900	< 12,700	< 17,000	< 21,100	< 21,100
Primary/Principal Arterial (2-lane)	< 3,100	< 5,000	< 8,000	< 12,000	< 15,900	< 15,900

SOURCE: Mn/DOT and WSB & Associates

Based on this planning-level capacity approach, the US Highway 10 corridor operates between the Level of Service (LOS) A or LOS C range, depending on the segment. A summary of the planning-level capacity analysis by segment is shown in **Table 4**.

Table 4 Planning Level Capacity Analysis

Highway 10 Segment	Existing Facility Type	Existing AADT Volume	Planning-Level LOS
34 th Street to 5 th Street W	5-lane	17,900	LOS B
5 th Street W to 7 th Street E	4-lane	13,400	LOS C
7 th Street E to MN Highway 336	5-lane	9,000	LOS A

Although the planning-level capacity can provide a good barometer of corridor operations, intersection performance often provides a clearer indication of how the corridor operates. Therefore, a detailed capacity analysis was completed at the study intersections along Highway 10 to understand various performance metrics, including LOS, queuing, and travel time.

The intersection capacity analysis was completed using Synchro/SimTraffic Software (version 11), which incorporates methods outlined in the Highway Capacity Manual, 6th Edition. The software was used to develop calibrated models that simulate observed traffic operations and identify key metrics such as intersection Level of Service and queues. These models incorporate collected traffic, pedestrian, and bicyclist volumes, traffic controls, and driver behavior factors. Existing signal timing provided by the cities of Moorhead and Dilworth were incorporated as well.

Level of Service quantifies how an intersection is operating. Intersections are graded from LOS A through LOS F, which corresponds to the average delay per vehicle values shown in **Table 5**. An overall intersection LOS A through LOS D is generally considered acceptable in the Fargo-Moorhead Metropolitan Area. LOS A indicates the best traffic operation, while LOS F indicates an intersection where demand exceeds capacity.

For side-street stop-controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service, which takes into account the total number of vehicles entering the intersection and the capability of the intersection to support the volumes.

Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, most delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high-levels of delay (i.e., poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

The existing intersection capacity analysis shown in **Table 6** indicates that all study intersections currently operate at an overall LOS C or better during the a.m. and p.m. peak hours. However, it is difficult to make left-turn or crossing maneuvers from the side-street approaches along the corridor, particularly at the Frontage Road and County Road 9 during the peak hours. This is illustrated by the LOS E and LOS F operations for these side-street approaches during the peak hours. In the table, the first letter represents the overall intersection level of service, while the second letter represents the worst side-street approach if it is an unsignalized intersection. The seconds of delay shown for signalized intersections is for the overall intersection, while for unsignalized intersections, the delay shown is for the worst side-street approach.

Table 5 Intersection Level of Service Thresholds

Level of Service	Average Delay / Vehicle	
	Stop, Yield, and Roundabout Intersections	Signalized Intersections
A	< 10 seconds	< 10 seconds
B	10 to 15 seconds	10 to 20 seconds
C	15 to 25 seconds	20 to 35 seconds
D	25 to 35 seconds	35 to 55 seconds
E	35 to 50 seconds	55 to 80 seconds
F	> 50 seconds	> 80 seconds

Table 6 Existing Intersection Capacity Analysis

Highway 10 Intersection	Traffic Control	AM Peak Hour	PM Peak Hour
34th Street	SIGNAL	B (24 sec)	C (31 sec)
Frontage Road	SSS	A / E (47 sec)	B / F (155 sec)
CR 9 / 40th Street W	SSS	A / E (37 sec)	A / F (98 sec)
5th Street W	SSS	A / C (24 sec)	A / B (14 sec)
4th Street W	SSS	A / C (24 sec)	A / C (24 sec)
2nd Street W	SSS	A / C (22 sec)	A / C (23 sec)
Main Street	SIGNAL	A (7 sec)	A (6 sec)
2nd Street E	SSS	A / C (19 sec)	A / C (21 sec)
4th Street E	SSS	A / C (18 sec)	A / C (21 sec)
7th Street E	SSS	A / C (19 sec)	A / C (23 sec)
12th Street E	SSS	A / B (11 sec)	A / B (11 sec)
14th Street E	SSS	A / C (17 sec)	A / B (13 sec)
60th Street E	SSS	A / B (14 sec)	A / B (13 sec)

The busiest intersection along the corridor is at 34th Street, where there are several movements where queues extend through the full length of the available turn lane storage. During the a.m. peak hour, these queues occur in the westbound and northbound left-turn lanes. During the p.m. peak hour, queues are generally within the available turn lane storage, but the eastbound and southbound through movement queues extend beyond the adjacent turn lanes, impacting access to the turn lanes. This occurs approximately five percent of the peak hour. Northbound and southbound queues also regularly extend beyond the adjacent Frontage Road access points along 34th Street, which are located approximately 150 feet and 100 feet to the north and south of Highway 10, respectively.

Corridor travel times and average arterial speed data was obtained from the calibrated SimTraffic modeling results. As shown in **Table 7**, average travel times through the 2.5 mile study corridor are approximately five (5) minutes, plus or minus about 15 seconds. The average travel speeds equate to approximately 32- to 38-mph.

Table 7 Corridor Travel Time and Average Speed

Highway 10 Direction	AM Peak Hour		PM Peak Hour	
	Travel Time	Arterial Speed	Travel Time	Arterial Speed
Westbound	4 min. 56 sec.	38 mph	4 min. 54 sec.	38 mph
Eastbound	5 min. 00 sec.	33 mph	5 min. 13 sec.	32 mph

15.0 Crash History

A review of historical crash data was completed along the corridor to identify any trends, hotspots or contributing factors. Five years of crash history were reviewed within the study area, which included data from January 2017 through December 2021. The crash data was obtained using MnDOT's MnCMAT2 crash mapping tool.

During the analysis period, there were a total of 149 reported crashes within the study area, which equates to an average of 30-crashes per year. **Figure 18** illustrates the reported crashes by year. There was a noticeable dip in 2020, which was likely tied to the decrease in vehicle activity associated with the COVID-19 Pandemic.

The majority of the crashes occurred between 6 a.m. and 8 p.m., with peak crash activity occurring between 12 p.m. and 6 p.m. There is a noticeable increase in reported crashes on Fridays, which coincides with the increase in recreational activity along the corridor. Summaries of the reported crashes by time of day and day of the week are illustrated in **Figure 19** and **Figure 20**, respectively.

Figure 18 Reported Crashes by Year

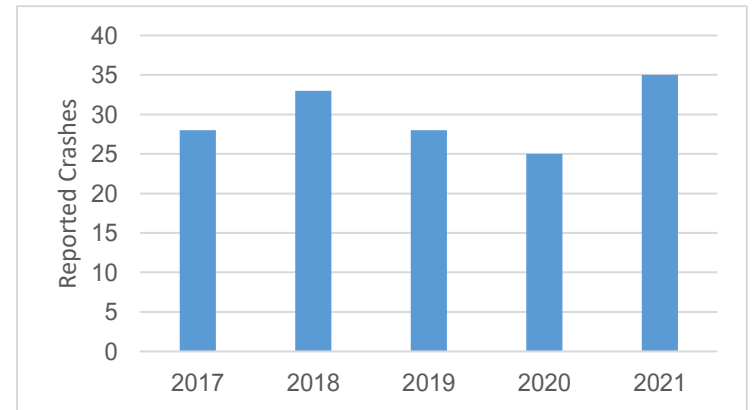


Figure 19 Crashes by Time of Day

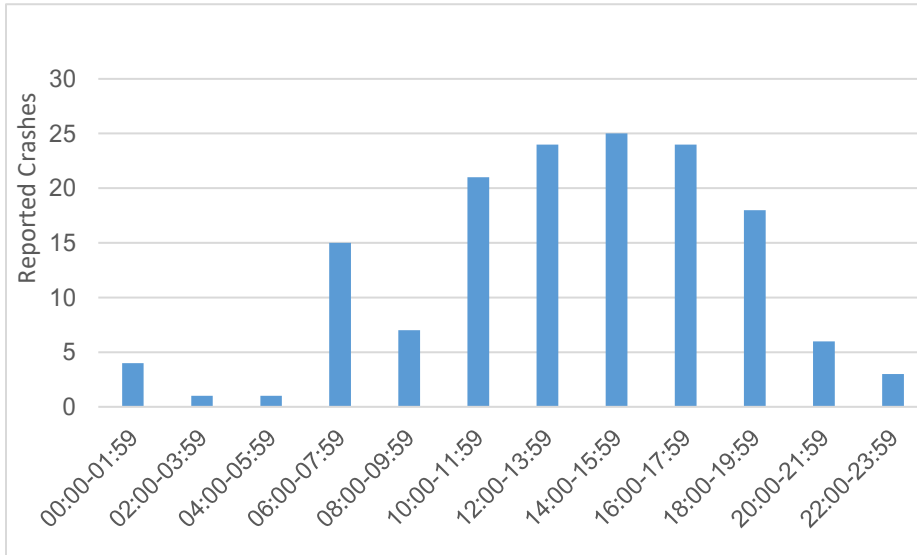
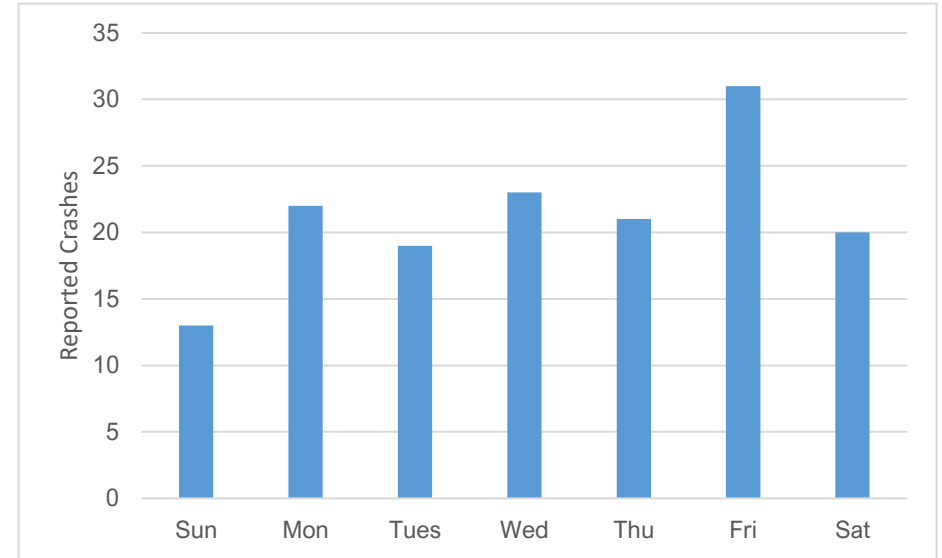
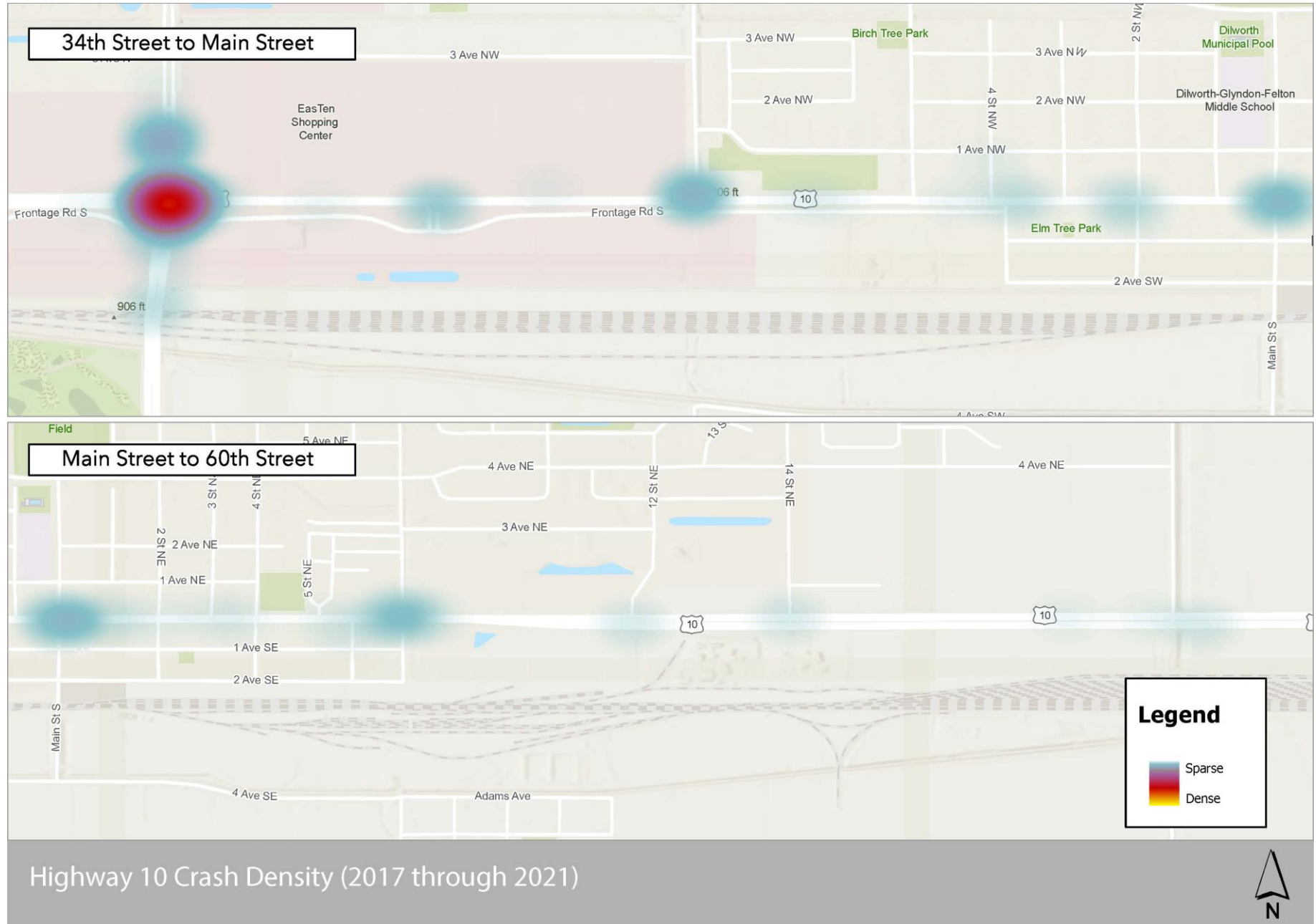


Figure 20 Crashes by Day of the Week



A crash density heat map, shown in **Figure 21**, was developed to illustrate where crashes are occurring along the corridor. Most of the reported crashes occurred at the Highway 10 and 34th Street intersection. The majority of other reported crashes occurred were intersection related, but there was not a specific location that was significantly higher than any other intersection.

Figure 21 Crash Density



Crash types and crash severity were also reviewed as part of the crash history. A summary of the reported crash types and crash severity by location are illustrated in **Figure 22** and **Figure 23**, respectively, while the specific locations are shown in **Figure 24** and **Figure 25**, respectively. This data indicates that most reported crashes were either rear-end or angle-type crashes, which are the most common types associated with corridors with similar characteristics. There was only one (1) pedestrian related crash within the study area, at 34th Street.

From a crash severity perspective, most crashes were property-damage only. There were two (2) fatal accidents and five (5) serious injury crashes. One of the fatal accidents occurred at 34th Street in January 2018 due to a rear-end accident approaching the intersection, while the other occurred at 2nd Street E in September 2021. The crash at 2nd Street E involved a motorcyclist hitting a westbound vehicle on Highway 10. There were no engineering/geometric related issues identified that contributed to the crashes.

Figure 22 Reported Crashes by Crash Type

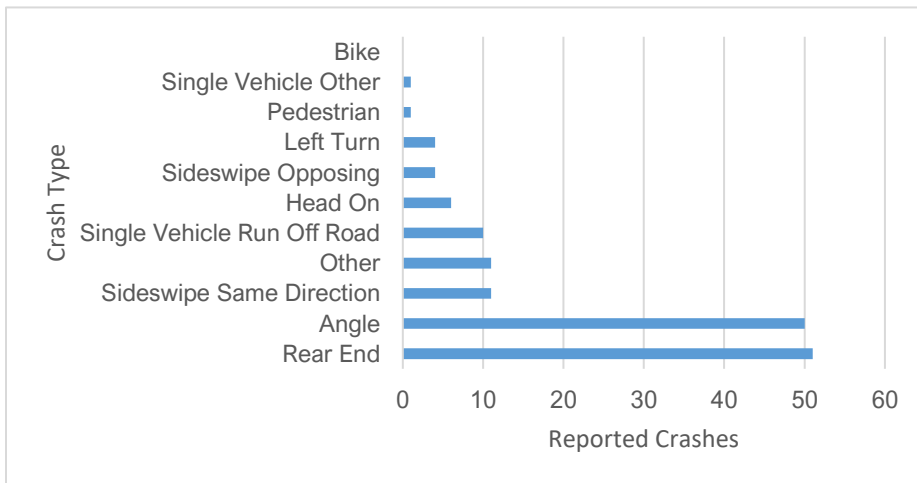


Figure 22 Reported Crashes by Crash Severity

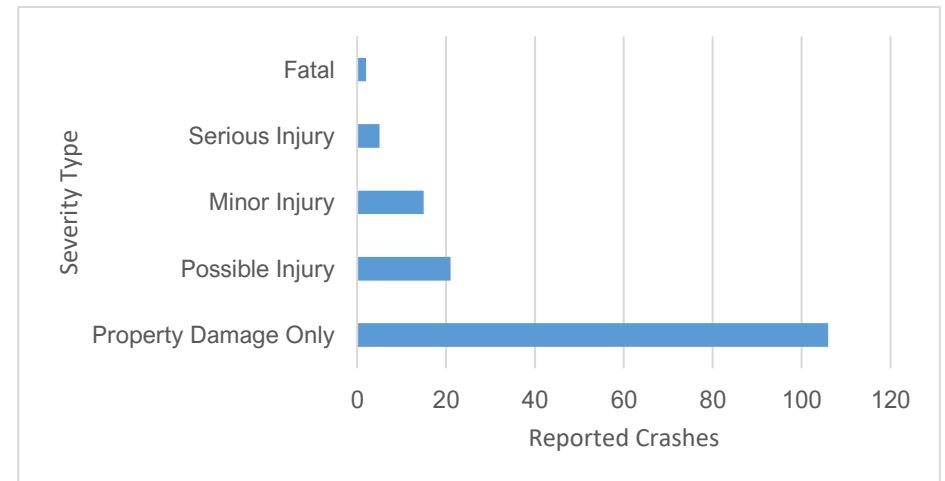


Figure 23 Crash Severity

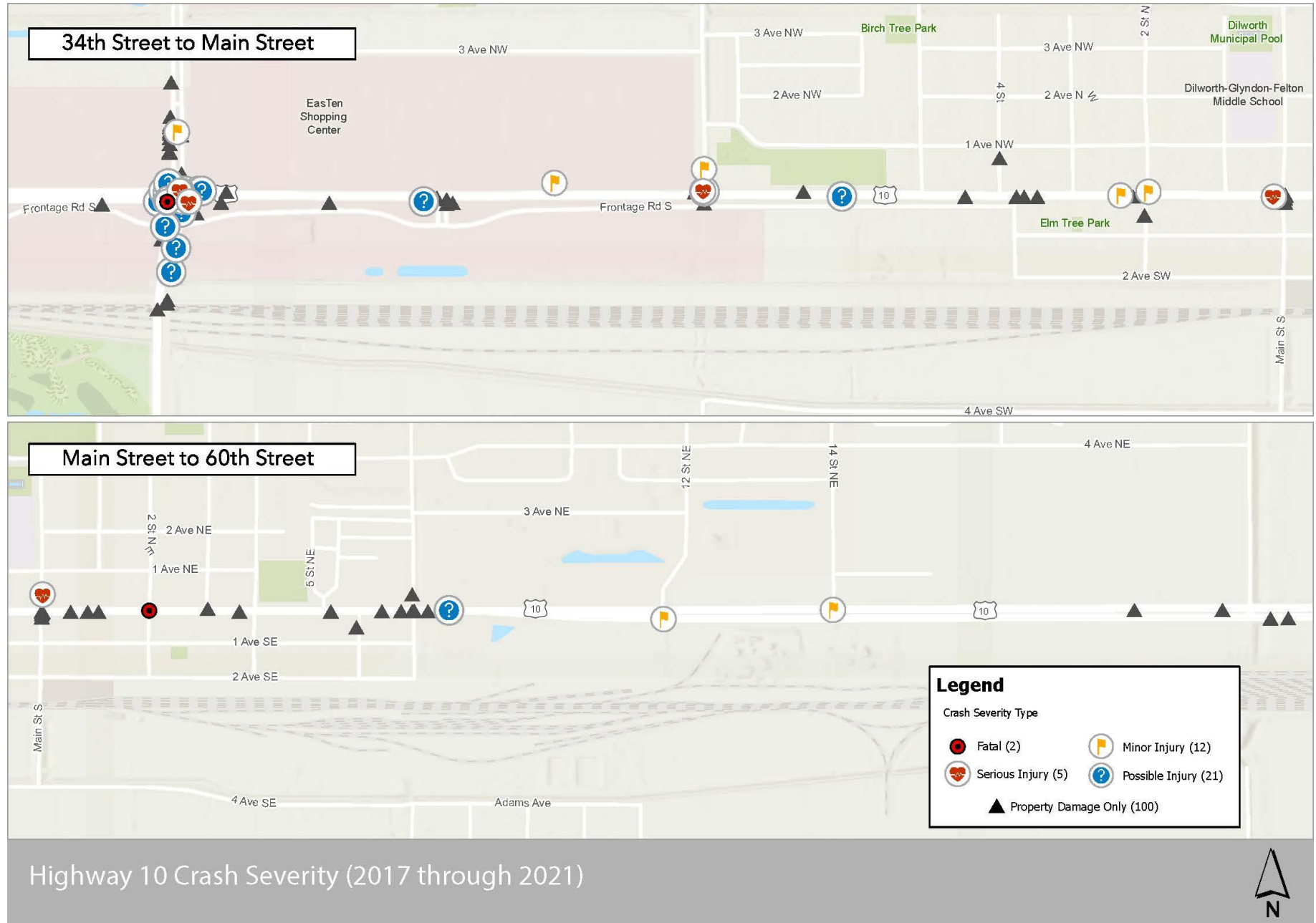
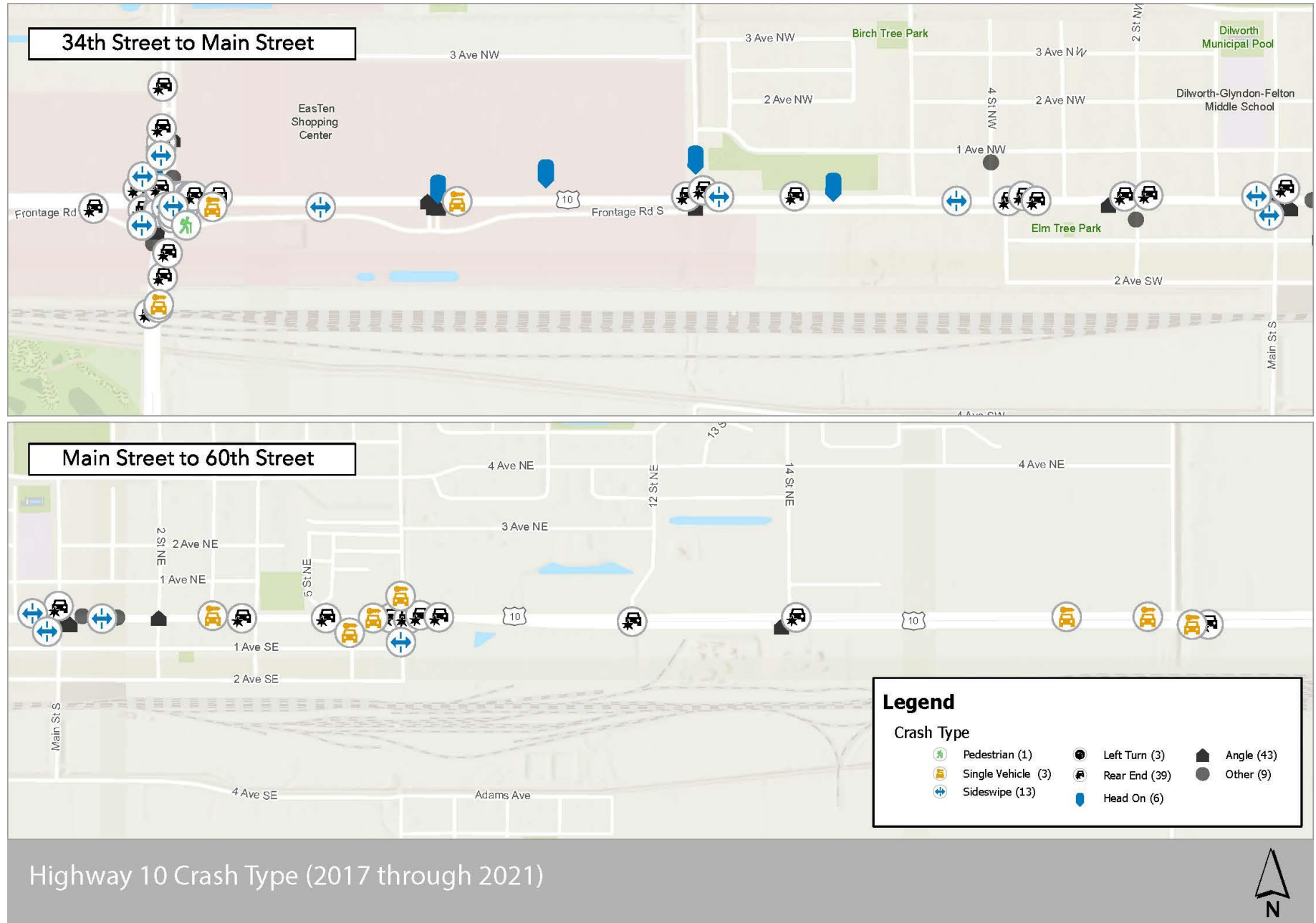


Figure 24 Crash Type



Corridor Safety Screening

From a crash rate and severity rates perspective, a basic segment crash performance calculation was completed. Based on this calculation, the study corridor has a segment crash rate of 2.1 crashes per million vehicle-miles and an observed fatal and serious injury crash rate (FAR) of approximately 9.9. This data compares to statewide averages of approximately 2.0 and 2.7, respectively, for corridors with similar characteristics. Thus, from a crash frequency perspective, the study corridor is about average, however there are significantly more fatal and serious injury crashes than comparable corridors.

Intersection Safety Screening

As noted earlier, most crashes within the study corridor occurred at the 34th Street intersection. There were 58 reported crashes at the 34th Street intersection during the last 5-years. The crash and severity rates of this intersection are well above the statewide average and critical rates for intersections with similar characteristics. One of the contributing factors in this location is the adjacent access along 34th Street immediately to the north and south of Highway 10, which is within the functional area of the intersection.

The County Road 9 / 40th Street intersection has crash and severity rates above the critical rates for intersections with similar characteristics, while the 7th Street E intersection has a crash rate above the critical rate and the 2nd Street E intersection has a severity rate above the critical rate. At 7th Street E, this intersection has a slight offset in the north-south direction and is also near the speed limit transition on the east end of the corridor. These issues can impact a motorist's perception of gaps and create additional conflicts and complexity while traveling. At 2nd Street E, the severity rate is skewed by the fatal accident noted earlier, which was not engineering related and therefore this location does not have an immediate issue to address.

The other study intersections do not have crash or severity rates that are significantly higher from a statistical metric above statewide intersections with similar characteristics. All other study intersections had less than 10 crashes per location over the last five (5) years, which equates to less than 2 crashes per year on average.

Segment Safety Screening

Segment: US Highway 10 Dilworth (34th Street to 60th Street)

Statewide Averages based on 2016-2020 crashes

Crashes by Crash Severity	
Fatal (K)	2
Incapacitating Injury (A)	5
Minor Injury (B)	15
Possible Injury (C)	21
Property Damage (PDO)	106
Total Crashes	149

Analysis Description	
Length	2.900 miles
VMT	70,997,220
Non-junction AND Junction Crashes	

Annual crash cost per mile = \$943,310

Statewide comparison = Urban 4-Lane Divided

Total Crash Rate (CR)		Fatal & Serious Injury Crash Rate (FAR)	
Observed	2.099	Observed	9.860
Statewide Average	1.993	Statewide Average	2.732
Critical Rate	2.430	Critical Rate	5.950
Critical Index	0.86	Critical Index	1.66

The observed crash rate is the number of crashes per million vehicle miles traveled (MVMT). The critical rate is a statistical comparison based on similar trunk highways statewide. An observed crash rate greater than the critical rate indicates that the section operates outside the expected, normal range. The critical index reports the magnitude of this difference (i.e. observed crash rate ÷ critical crash rate).

The observed total crash rate for this period is 2.10 per MVMT; this is 14% below the critical rate. Based on similar statewide segments, an additional 24 crashes over the five years would indicate this section operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 9.86 per 100 MVMT; this is 1.7 times the critical rate. This section may be a sustained severe crash location.

A summary of the crash and severity rates by intersection is provided in **Table 8**.

Table 8 Intersection Crash and Severity Rate Summary

Highway 10 Intersection	Reported Crashes 2017 thru 2021	Observed Crash Rate	Average Crash Rate	Critical Crash Rate	Observed Severity Rate	Average Severity Rate	Critical Severity Rate
34th Street	58	1.03	0.51	0.76	7.11	0.69	3.00
Frontage Road	5	0.15	0.13	0.30	0.00	0.31	3.03
CR 9 / 40th Street W	9	0.33	0.13	0.32	3.62	0.31	3.48
5th Street W	0						
4th Street W	3	0.12	0.13	0.33	0.00	0.31	3.76
3rd Street W	0						
2nd Street W	2	0.08	0.13	0.33	0.00	0.31	3.78
1st Street W	0						
Main Street	7	0.27	0.51	0.89	3.82	0.69	4.68
2nd Street E	1	0.04	0.13	0.33	4.05	0.31	3.78
3rd Street E	1	0.04	0.13	0.33	0.00	0.31	3.78
4th Street E	1	0.04	0.13	0.33	0.00	0.31	3.78
6th Street E	1	0.07	0.13	0.40	0.00	0.31	5.59
7th Street E	7	0.41	0.13	0.38	0.00	0.31	4.93
12th Street E	0						
14th Street E	2	0.13	0.13	0.39	0.00	0.31	5.37
60th Street E	0						

Values in red indicate a rate above the critical crash or severity rate

16.0 Existing Conditions Summary

Highway 10 through Dilworth is a vital east-west corridor for the community and the region and is scheduled for improvement projects in the next 5-10 years. The roadway links Dilworth to the metropolitan area to the west and to the rural “lakes country” to the east. Within Dilworth, Highway 10 has changing lane configurations, different adjacent land uses, varying traffic characteristics. The existing conditions along the corridor can be summarized as follows:

- There have been previous studies and plans that have identified issues provided guidance relating to Highway 10. Plans such as the Dilworth Comprehensive Plan provides general guidance for creating a transportation system that is safe, connected, enhances alternative transportation options, coordinates with adjacent land needs, and promotes the development of the community. These plans have also identified projects affecting Highway 10 such as a new grade separated railroad crossing south of Highway 10 near 14th Street E, pedestrian and bicycle route improvements, and urbanization of County Rd 9 north of Highway 10.

- Highway 10 has been constructed to three different typical cross sections. These changing sections create an inconsistent corridor:
 - 34th Street to 4th Street E is a 5-lane divided road with turn lanes and a raised median, restricted access, and limited sidewalks
 - 4th Street E to 7th Street W is a 4-lane undivided urban street with no turn lanes, numerous access points, an on-street parking zone, and sidewalks on both sides
 - 7th Street W to 60th Street is a 5-lane divided road with turn lanes, restricted access, and no sidewalks
- The pedestrian/bicycle facilities are disconnected between the destinations along Highway 10 through Dilworth and potential origins. There are either no or limited sidewalks in the western and eastern areas. Where there are sidewalks in the central downtown area, they do not provide a comfortable user experience due to narrow width, poor condition, driveway crossings, obstructions, distance between crosswalks, and do not conform to ADA standards. MnDOT's 2021 Pedestrian and Bicycle Scoping Report documented the existing issues and provides recommendations for non-motorized facilities.
- Existing land use context varies along the corridor from Suburban Commercial to Urban Residential. There are areas of undeveloped land between 34th Street and County Rd 9, and between 7th Street W and 60th Street. These are currently high-speed areas where Highway 10 is a divided rural highway. This roadway configuration may not be appropriate for the types of business that would fill in the undeveloped areas.
- Traffic volumes have remained relatively stable over the last 20 years due to improvements in the area network. Traffic reduces from 17,000 vehicles per day near 34th Street, to 8,000 vehicles per day near 60th Street. The existing lane configurations provide adequate capacity for these volumes. Over half of the vehicles traveling on Highway 10 have origins or destinations in Dilworth. The intersections are all operating at an acceptable Level of Service. However, the side street approaches at the Frontage Road intersection and County Road 9 experience a peak hour delay of E or worse.
- There are an average of 30 crashes per year along the corridor, equating to a crash rate of 2.1 crashes per million vehicle miles which is near the statewide average of 2.0. Most crashes are property-damage only, although there were two fatal crashes and five crashes with serious injuries, resulting in a Fatal & Serious Injury (FAR) crash rate of 9.9 which is significantly more than the statewide average of 2.7. Most of the crashes occur at the 34th Street intersection. The crash rates at 34th Street, County Rd 9, and 7th Street E are above the critical crash rate. The crash severity rates at 34th Street, County Rd 9, and 2nd Street E are above the critical severity rate.