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17TH ST N CORRIDOR STUDY MOORHEAD, MN

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I. Introduction

The Fargo-Moorhead Metropolitan Council of Governments (Metro COG) and the City of Moorhead worked with the community to identify multimodal transportation improvements on 17th Street N between 1st Avenue N and 15th Avenue N (Figure 1). 17th Street N is a collector roadway that extends from the downtown Moorhead business area at 1st Avenue N to the recently improved intersection at 15th Avenue N within the primarily residential area.

A unique characteristic of the 17th Street N corridor is its 140 feet of platted right-of-way and approximately 60 feet of curb-to-curb pavement. The first known plat for this corridor, originally named Park Avenue, was recorded in December of 1881 as part of Elder's First Addition. The name remained Park Avenue through subsequent plats until 1936 when outlots completing the 140-foot right-of-way platting were recorded with the modern name of 17th Street N.

It has numerous private driveways and several local access points. The 17th Street N corridor is an important north-south connection facilitating travel between local residential streets to 1st Avenue N and 15th Avenue N and ultimately providing connections to US Highway 75 and US Highway 10. The corridor serves multiple transportation users including automobiles, freight, transit, pedestrians, and bicyclists.



Originally platted in 1881 with the name Park Avenue, a unique characteristic of 17th Street N is its 140' of right-of-way









Figure 1 – Corridor Study Area

For ease in describing key study area needs in more depth, the corridor is split into a north segment and a south segment based on their different settings and needs.

Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, is generally characterized by a low speed (30 mile per hour), three-lane urban section with a center left turn lane and on-street parking on both sides of the roadway. Pedestrian facilities are incomplete and limited. The

Park Christian School zone along the corridor generates high peak hour volumes of bus, student driver, and parent drop off and pick up traffic. D-S Beverages generates heavy commercial truck traffic between the beverage distribution location just north of 2nd Avenue and US Highway 10. Traffic generation is further increased by direct access to 1st Avenue N and close proximity access to US Highway 10.



Transition from three-lane to two-lane section near 4th Ave N

Segment 2 – 4th Avenue N to

15th Avenue N, the residential segment with primarily single-family homes, is a low-speed (30 mile per







hour), two-lane urban section with on-street parking on both sides of the roadway. The pedestrian network includes a continuous and connected sidewalk throughout; however several pedestrian ramps are missing or not Americans with Disabilities Act-compliant. The far northern part of this segment, from approximately 10th Avenue N to 15th Avenue N, falls within a 500-year floodplain. Drainage is an issue in this area as sections of curb and gutter have settled, there are limited number of inlets along the corridor, and the boulevard slopes are very flat. The segment is a local traffic trip generator as it serves connections to several single-family, multiple vehicle households. North of 15th Avenue N, the zoned Industrial area would be most conveniently served by US Highway 75 and 15th Avenue N (County Road 83) and should result in little to no heavy truck traffic on 17th Street N.

The remainder of the study report is organized into sections to provide context on the study background and purpose, agencies involved, existing and future conditions, improvement options, and recommendations. Some of these areas have standalone summary documents which are referenced in this report.

II. Agency & Public Involvement

Agency coordination and public involvement were key components to the successful development of the 17th Street N Corridor Study recommendations. This required early and continuous involvement of all affected interests identified during the initial stages of the project. To document these different agencies, groups, and interests and to define their roles and goals in the project, a Public Engagement Plan was developed. The Public Engagement Plan is included in **Appendix A**.

The study was led by a Project Management Team (PMT) and a Study Review Committee (SRC). The PMT was comprised of Metro COG and City of Moorhead staff and guided the study schedule, process, and deliverables. It included:

- Luke Champa, Project Manager, Metro COG
- Dan Farnsworth, Transportation Planner, Metro COG
- Jonathan Atkins, Traffic Engineer, City of Moorhead
- Robin Huston, City Planner, City of Moorhead
- Cody Christianson, Project Manager, Bolton & Menk, Inc.
- Jim Mertz, Project Planner, Bolton & Menk, Inc.
- Connor Cox, Project Planner, Toole Design

The SRC was comprised of planning and engineering staff from the City of Moorhead, Metro COG, NDDOT, FHWA, MATBUS, Moorhead Public Service, and Park Christian School. It included:

- Luke Champa, Project Manager, Metro COG
- Dan Farnsworth, Transportation Planner, Metro COG







- Jonathan Atkins, Traffic Engineer, City of Moorhead
- Robin Huston, City Planner, City of Moorhead
- Steve Moore, Public Works Director, City of Moorhead
- Lori Van Beek, Transit Manager, City of Moorhead
- Travis Schmidt, General Manager, Moorhead Public Service
- Michael Levang, Junior/Senior High Principal, Park Christian School
- Wayne Zacher, Local Government Division, NDDOT
- Kristen Sperry, Planning and Environmental Program Manager, FHWA
- Cody Christianson, Project Manager, Bolton & Menk, Inc.
- Jim Mertz, Project Planner, Bolton & Menk, Inc.
- Connor Cox, Project Planner, Toole Design
- Andrew Krog, Design Engineer, Bolton & Menk, Inc.

The SRC met 3 times over the course of the 12-month process to review the technical analysis and public involvement and provided recommendations to the Metro COG Policy Board and the Moorhead City Council.

Public and agency input was also important to the study and is described in more detail in Section VII and copies of meeting summaries are in **Appendix I**.







III. Existing Conditions

At the onset of the project a comprehensive analysis of past, present, and future conditions along the corridor was completed. Existing and no-build (2045) conditions were documented and assembled into a detailed Existing and No-Build Conditions Memorandum, **Appendix B**. The study team's existing condition analysis examined the following areas:

- Corridor History
- Previous studies overview
- Demographics and trends
- Transportation system characteristics
- Study area characteristics
- Land use and major traffic generators
- Existing and no-build traffic conditions
- Crash history
- Access
- Pedestrian and bicycle
- Transit
- Social, environmental, and economic (SEE) resources
- Summary of issues

Previous Studies Overview

To ensure that the 17th Street N recommendations complied with goals and objectives of prior planning efforts, the study team conducted a thorough review of corresponding local and regional plans. A summary of each prior study's goals was developed as they apply to 17th Street N. Plans reviewed as part of the existing conditions analysis included:

- City of Moorhead Comprehensive Plan Addendum (November 2009)
- Fargo-Moorhead Metropolitan Bicycle and Pedestrian Plan (February 2017)
- Moorhead Downtown Master Plan (December 2020)
- 1st Avenue North: A Review of the Corridor from the Red River to 21st Street (November 2008)
- 2045 Fargo-Moorhead Metropolitan Transportation Plan (November 2019)
- Fargo-Moorhead Metropolitan Area 2016-2020 Transit Development Plan (December 2016)







- City of Moorhead Arts and Culture Framework Development Plan (February 2019)
- City of Moorhead ADA Transition Plan for Public Right-of-Way (July 2018)
- Fargo/West Fargo Parking and Access Study (December 2018)

Previous and Planned Projects

To identify capital improvement projects completed, planned, or programmed within and around the study area the study team reviewed the Metro COG 2020-2023 Transportation Improvement Program and the Moorhead 2020-2025 Capital Improvement Plan. **Figure 2** identifies future projects in the study area as depicted in the Capital Improvement Plan. The projects include:

- 17th Street N Rehabilitation from 1st Avenue N to 15th Avenue N, Planned 2022
- 15th Avenue N Rehabilitation, Completed 2019
- 4th Avenue N Rehabilitation from 14th Street N to 17th Street N, Planned 2022

Demographics and Trends

This section provides an overview of past and projected demographics in the area, to demonstrate how growth has and will impact demand for facilities.

Population and Households

The City of Moorhead has experienced significant and steady growth since 2000. Between 2000 and 2018, the population of the City increased by 31.6%. Based on forecasts developed by the Metro COG in the 2016 Fargo-Moorhead Demographic Forecasts, the population is expected to continue rising and increase 39% by 2045. This growth rate is higher than that of Minnesota. **Table 1** shows the population, number of households, and persons per household for the City of Moorhead.

Growth rates equivalent to those seen in Moorhead have important implications on local transportation systems, including residential roadways such as 17th Street N. Rapid growth can increase rates of travel to Park Christian School and local businesses in the area. The 17th Street corridor is an important commuter route as it provides a direct north-south connection for many residents living in the area. As population increases, it is possible that demand for the roadway, public transportation, and improved bicycle/pedestrian facilities will increase.







Future Projects

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Table 1: City of Moorhead – Population and Households								
Category 2000 2010 2018 2045 ⁴ % Change 2000-20								
Population	32,177 ¹	38,065 ²	42,359 ³	58,870	31.6%			
Households	12,180 ²	15,274 ²	15 <i>,</i> 999 ³	22 <i>,</i> 560	31.4%			
Persons per Household	2.43 ²	2.41 ²	2.42 ³	2.47	~0%			

¹Source: City of Moorhead Comprehensive Plan Update (2009)

²Source: U.S. Census Bureau

³Source: American Community Survey (5-year estimates 2014-2018) ⁴Source: 2016 Fargo-Moorhead Demographic Forecasts

Age

Like population, age distribution (**Table 2**) has the capacity to affect transportation usage and demand. In 2018, the median age in Moorhead was approximately 30 years old. This is younger than both Clay County and Minnesota. In 2018, the largest population cohort in Moorhead was between 20-24 years old. This is likely partially due to the colleges and universities in the Fargo-Moorhead Metropolitan Area. The large number of college-aged students in the City contributes to this younger median age. According to the Fargo-Moorhead Long Range Transportation Plan, this age cohort is the most likely to commute via public transportation. This leads to greater demand for public transportation and other alternate forms of transportation in Moorhead than in the rest of Clay County.

About 23% of Moorhead's population was under 18 in 2018. While this percentage is smaller than the percentage of Clay County residents that were under 18, it is still indicative of the importance of pedestrian/bicycle safety and programs such as Safe Routes to School. About 12% of City residents are over 65 years old. This cohort of residents typically shows greater demand for public transit and services such as dial-a-ride transit.

Table 2 – Age Distribution, 2018						
Age	Moorhead	Clay County				
Under 5	2,964	4,513				
5-9	2,732	4,288				
10-14	2,439	3,956				
15-19	4,070	5,446				
20-24	5,713	6,527				
25-29	3,378	4,430				
30-34	3,168	4,487				
35-39	2,603	3,979				
40-44	2,076	3,440				
45-49	1,974	3,409				







% Over 6E	11 00/	12 00/
% Under 18	22.6%	24.1%
Median Age	29.9	32.5
85 and Over	1,070	1,455
80-85	670	1,065
75-79	764	1,388
70-74	1,089	1,663
65-69	1,461	2,506
60-64	1,869	3,172
55-59	2,408	3,663
50-54	1,947	3,414

Source: US Census Bureau – ACS 5-year Estimates (2014-2018)

Employment

The Minnesota Department of Employment and Economic Development (DEED) estimates approximately 14,329 jobs exist in the City of Moorhead as of 2019. The average weekly earnings are \$796 per week. The largest industries are education and health services; trade, transportation, and utilities; and retail trade. 43.7% of workers are employed in the education and health services industry. 20% of workers are employed in the trade, transportation, and utilities industry which could indicate increased demand for efficient roadways. Job growth is expected in the City as population increases. This may put strain on commuter routes, such as 17^{th} Street N, if the City does not work to increase roadway efficiency and multimodal transportation options.

In 2018, the majority of Moorhead employees either drove alone or carpooled to work (**Table 3**). This high reliance on driving single-occupancy vehicles could mean greater numbers of automobile trips as population in the City increases, placing greater demand on the existing transportation infrastructure. Currently, only 5.5% of employees rely on public transportation, bike, or walk to work. This share could increase as Moorhead executes various plans to improve multimodal transportation in the City.

Table 3 – Means of Transportation to Work,2018							
Means City of Moorhead Clay County							
Drove Alone	79.5%	79.6%					
Carpooled	7.7%	8.3%					
Transit	1.4%	1.0%					







Walked	3.4%	3.1%
Bicycle	0.7%	0.6%
Other Means	0.9%	0.8%
Worked at Home	6.3%	6.6%
Mean Travel Time to	17.3	19.6
Work (Minutes)		

Source: US Census Bureau – ACS 5-year Estimates (2014-2018)

Transportation System Characteristics

In the context of the overall transportation system, 17th Street N serves as a collector roadway providing a key connection from 1st Avenue N to 15th Avenue N and ultimately providing connections to US Highway 75 and US Highway 10. The connection to 1st Avenue N and associated land uses such as D-S Beverages, Burger Time, Stenerson Bros. Lumber, and Park Christian School influence traffic and use of the 17th Street N corridor.

Land Use and Major Traffic Generators

Existing and future land uses, as well as major traffic generators, within in the study area are shown on **Figures 3 and 4** and described below.

Existing Land Use Patterns

Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, is primarily zoned Community Commercial and Public/Institutional. These zoning districts are associated with adjacent local businesses and Park Christian School. The southern extent of the study area touches the Mixed-Use development area along the south side of 1st Avenue N.

Segment 2 – 4th Avenue N to 15th Avenue N, the residential segment is primarily Low Density Residential and mostly made up of single-family homes. A few multi-family housing units and two local parks exist within 2-3 blocks adjacent on either side of the 17th Street N study corridor. At the north end, on the northeast quadrant of 17th Street N and 13th Avenue N is a zone of High Density Residential that is home to Moorhead Manor, an assisted living facility that provides an intermediate level of care for residents who cannot safely live independently including senior care. The north end of the study corridor touches an area currently zoned as Agricultural on the north side of the north end of 15th Avenue N (County Road 83).









Future Land Use

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Future Land Use Patterns

Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, will only see a proposed land use change at the southwest quadrant of 17th Street N and 4th Avenue N, which is currently zoned Commercial and is proposed to be zoned Medium Density Mixed Residential. The 2009 Comprehensive Plan Addendum defines Medium Density Residential as a density of 4 to 10 units per acre. The remainder of this study area segment will remain primarily a mix of Community Commercial and Public/Institutional with the southern extent also remaining Mixed Use development along the south side of 1st Avenue N.

Segment 2 – 4th Avenue N to 15th Avenue N, the residential segment, will see zoning changes throughout the segment from Low Density Residential to Medium Density Mixed Residential, as proposed in the 2009 Comprehensive Plan Addendum. This zoning update will provide for growth in residential density to support the developing Community Commercial and Mixed-Use areas along 1st Avenue N and the nearby downtown. The northeast quadrant of 17th Street N and 13th Avenue N, that is home to the Moorhead Manor, is proposed to be changed from High Density Residential to Medium Density Residential. At the north end of the study corridor, north of 15th Avenue N, the existing Agricultural zone is proposed to be changed to Industrial.

Major Traffic Generators

Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, results in a dense concentration of uses that drive major local and regional traffic. Traffic generation is further increased by direct access to 1st Avenue N and close proximity access to US Highway 10.

The Park Christian School zone generates high peak hour volumes of bus, student driver, and parent drop off and pick up traffic along the corridor. D-S Beverages generates heavy commercial truck traffic between the location just north of 2nd Avenue and US Highway 10.

Segment 2 – 4th Avenue N to 15th Avenue N, the residential segment is a major local traffic trip generator as it serves connections to several single-family, multiple vehicle households. North of 15th Avenue N, the zoned Industrial area would be most conveniently served by US Highway 75 and 15th Avenue N (County Road 83) and should result in little to no heavy truck traffic on 17th Street N.

Existing Traffic Operations

Turning movement count data was collected along 17th Street N at the intersections of 15th Avenue, 8th Avenue, and 1st Avenue in September 2020. Park Christian School was in session when the count was taken. The traffic counts were compared to previous count data available to determine if modifications were to be made to the data or if the count was reflective of







normal traffic. Traffic volumes at 15th Avenue were found to be normal, but the traffic volumes at 8th Avenue and 1st Avenue were found to be lower than previous count data indicated so these counts were increased accordingly.

An analysis of existing AM and PM peak hour intersection operations was completed in Synchro/SimTraffic. All intersections in the study area are stop controlled. 15th Avenue at the north extent and 1st Avenue at the south extent of the study area have stop controls that stop traffic on 17th Street N and give right of way to the east-west Minor Arterial roadways. 8th Avenue at 17th Street N is all way stop controlled. All other intersections are side street stop controlled giving right of way to 17th Street N traffic.

The average intersection delay is a volume-weighted average of delay experienced by all motorists entering the intersection on all intersection approaches. Intersections and each intersection approach are given a ranking from Level of Service (LOS) A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS A through D are generally perceived to be acceptable to drivers. LOS E indicates that an intersection is operating at, or very near, its capacity and that travelers experience considerable delays. LOS F indicates an intersection where demand exceeds capacity resulting in substantial delays. **Table 4** shows the intersection delay as well as the maximum delay of all movements at each intersection.

Table 4 – Existing Traffic Operations Analysis								
Intersection	Peak	Intersection	Maximum Movement					
intersection	Hour	(Delay [*] - LOS)	Mvmt	Delay* - LOS				
1st Ave & 17th St Two-Way Stop Controlled	AM	3 - A	SBL	26 - D				
	PM	2 - A	SBL	22 - C				
17th St & 8th Ave All-Way Stop Controlled	AM	6 - A	WBT	8 - A				
	PM	6 - A	NBT	7 - A				
17th St & 15th Ave	AM	2 - A	NBL	9 - A				
Two-Way Stop Controlled	PM	2 - A	NBL	11 - B				

*Delay is in seconds per vehicle

Based on the existing conditions operational analysis, all intersections operate with LOS A overall. The southbound left at 1st Avenue and 17th Street N operates with LOS D during the AM peak hour and LOS C during the PM peak hour. All other movements operate with LOS A or B. The maximum eastbound left turn queue at the intersection of 1st Avenue and 17th Street N extends beyond the channelized turn lane during the AM peak hour. The maximum eastbound left turn queue extends 150 ft where the storage length is 120 ft. The average queue extends 50 ft. Additionally, due to the close proximity of driveways along the southbound approach of







the 1st Avenue and 17th Street N intersection, the maximum southbound left turn queue and average southbound right turn queue block driveways. All other queues are acceptable.

Future No-Build Traffic Conditions

Traffic forecasts were developed analyzing historical growth, household/population/ employment projections anticipated for the area, and future land use projections using the traffic forecasting methodology detailed in this Study's Traffic Forecasting Memorandum. Forecasted 2045 AM and PM peak hour intersection operations were also completed in Synchro/SimTraffic. The results are show in **Table 5**.

Table 5 – 2045 No Build Traffic Operations Analysis								
Intersection	Peak	Intersection	Maximum Movement					
intersection	Hour	(Delay [*] - LOS)	Mvmt	Delay* - LOS				
1st Ave & 17th St	AM	6 - A	SBL	113 - F				
Two-Way Stop Controlled	PM	4 - A	SBL	56 - F				
17th St & 8th Ave	AM	5 - A	WBT/SBT	6 - A				
All-Way Stop Controlled	PM	5 - A	NBL	6 - A				
17th St & 15th Ave	AM	3 - A	NBL	12 - B				
Two-Way Stop Controlled	PM	2 - A	NBL	14 - B				

*Delay is in seconds per vehicle

The results of the 2045 No Build operational analysis indicate that the intersection delay overall remains acceptable with LOS A during both peak hours at all three intersections analyzed. The southbound left movement at 1st Avenue and 17th Street N is anticipated to operate with LOS F during both peak hours with an average delay of nearly two minutes per vehicle during the AM peak hour and nearly one minute per vehicle during the PM peak hour. All other movements operate with LOS C or better. The maximum eastbound left turn queue at the intersection of 1st Avenue and 17th Street N extends beyond the channelized turn lane during the AM peak hour. The maximum eastbound left turn queue extends 200 ft where the storage length is 120 ft. The average queue extends 75 ft. Additionally, the average southbound queues at the 1st Avenue and 17th Street N intersection block driveways along 17th St N at. All other queues are acceptable.







Crash History

A crash analysis was completed for the study area to understand the existing safety concerns. A segment crash analysis was completed for the 17th Street N corridor from 1st Ave N to 15th Ave N in addition to intersection crashes. Crash data from the most recent five years (2015-2019) was evaluated. The crash history is summarized in **Figure 5**.

The key results of the crash analysis for the timeframe between 2015-2019 include:

- 13 intersection crashes
- 9 of the 13 crashes were right angle crashes
- There were no reported fatal crashes
- There was one reported non-fatal severe crash
- There were no reported pedestrian or bicycle crashes
- The intersection of 1st Ave N and 17th Street N operates outside the normal range compared to similar intersection statewide for total crash rate as well as fatal and serious crash rate with one serious injury crash.
- All other intersections operate within the normal range compared to similar intersections statewide.
- The overall corridor operates within the normal range compared to other two lane roadways with similar AADT.

A ten-year (2010-2019) crash analysis was completed for fatal crashes in addition to crashes involving a pedestrian and/or bicycle. There was a possible injury bicycle crash at the intersection of 1st Ave N and 17th Street N in 2011. The bicyclist was crossing 17th Street N and was hit by a vehicle along southbound 17th Street N attempting to turn right onto 1st Ave N. There is a sidewalk along the north side of 1st Ave N where the bicyclist was crossing, but the crosswalk is not marked. There were no reported fatal crashes or pedestrian crashes in the last ten years.

Tables 6 and **7** below summarize the total crash rate findings for the intersections and segment overall.

Table 6 – Intersection Crash Summary (2015-2019)								
Intersection	Total Crashes	Severe Crashes (K + A)	Actual Crash Rate*	Statewide Average	Critical Rate**	Critical Index***		
1st Ave N & 17th St N	7	1	0.29	0.09	0.27	1.09		
2nd Ave N & 17th St N	1	0	0.16	0.09	0.47	0.33		
4th Ave N & 17th St N	1	0	0.19	0.09	0.52	0.36		
6th Ave N & 17th St N	1	0	0.23	0.09	0.57	0.40		







7th Ave N & 17th St N	1	0	0.17	0.09	0.50	0.35
8th Ave N & 17th St N	1	0	0.23	0.24	0.96	0.24
11th Ave N & 17th St N	1	0	0.50	0.09	0.88	0.57

Table 7 – Segment Crash Summary (2015-2019)

Segment	Total Crashes	Severe Crashes (K + A)	Actual Crash Rate*	Statewide Average	Critical Rate**	Critical Index***
17th St N from 1st Ave N to 15th Ave N	13	1	2.09	1.32	2.59	0.81

*Crash Rate – The number of crashes per million entering vehicles.

****Critical Rate** – A statistical comparison based on similar intersections statewide.

*****Critical Index** – Reports the magnitude of the difference between the crash rate and the critical rate. If the critical index is greater than 1 this indicates that the intersection is operating outside the expected range when compared to similar intersection statewide.







Crash History

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Corridor Access

The "Fargo/West Fargo Parking and Access Study" outlines recommended access spacing for various roadway types. While 17th Street N is located within the City of Moorhead, the access study provides guidance that is applicable to the project corridor. The primary, secondary, and private accesses are identified in **Figure 6**. The "Fargo/West Fargo Parking and Access Study" provides recommended spacing between signals, unsignalized full accesses, right-in/right-outs, and driveways based on roadway type.

The access study identifies seven roadway types: regional arterial, commercial arterial, mixed use arterial, mixed use collector, residential collector, mixed use neighborhood, and residential neighborhood. The functional classification of 17th Street N is a collector, but the land use changes at 4th Ave N with the south portion of the corridor serving commercial and public/ institutional uses and the northern portion serving residential homes. Based on the land uses, segment 1, 17th Street N from 1st Ave N to 4th Ave N, was analyzed as a mixed-use collector roadway and segment 2, 17th Street N from 4th Ave N to 15th Ave N, was analyzed as a residential collector. The recommended spacing between unsignalized full access intersections is 300-400 feet for both roadway types. **Table 8** shows the spacing between intersections along 17th Street N.

Table 8 – Full Access Intersection Spacing			
Full Access Intersections	Actual Spacing (ft)	Recommended Spacing (ft)	Meets Spacing Recommendation
1st Ave N to 2nd Ave N	330	300 - 400	Yes
2nd Ave N to 3rd Ave N	365	300 - 400	Yes
3rd Ave N to 4th Ave N	340	300 - 400	Yes
4th Ave N to 5th Ave N	340	300 - 400	Yes
5th Ave N to 6th Ave N	340	300 - 400	Yes
6th Ave N to 7th Ave N	340	300 - 400	Yes
7th Ave N to 8th Ave N	350	300 - 400	Yes
8th Ave N to 10th Ave N	660	300 - 400	Yes
10th Ave N to 11th Ave N	170	300 - 400	No
11th Ave N to 13th Ave N	1080	300 - 400	Yes
13th Ave N to 15th Ave N	380	300 - 400	Yes







Table 8 shows that the recommended spacing is met between all full access intersection except between 10th Ave N and 11th Ave N. It should be noted that the intersections of 10th Ave N and 13th Ave N are offset. The 10th Ave N intersection approaches are offset by approximately 100 ft. The 13th Ave N intersection approaches are offset by approximately 40 ft.

The spacing between driveways was also analyzed along 17th Street N. The recommended driveway spacing differs between the two roadway types. For a mixed-use collector roadway, driveways are recommended to be spaced 200 ft apart. For a residential collector roadway, driveways are recommended to be spaced 50-100 ft apart. **Table 9** shows the spacing between driveways along 17th Street N. Since there were multiple driveways between each intersection a range in spacing reflecting the shortest to longest distance was listed.

Table 9 – Driveway Spacing			
Intersections	Actual Driveway Spacing (ft)	Recommended Driveway Spacing (ft)	Meets Spacing Recommendation
1st Ave N to 2nd Ave N	30-115	200	No
2nd Ave N to 3rd Ave N	20-110	200	No
3rd Ave N to 4th Ave N	20-200	200	No
4th Ave N to 5th Ave N	30-110	50-100	No
5th Ave N to 6th Ave N	40-105	50-100	No
6th Ave N to 7th Ave N	30-110	50-100	No
7th Ave N to 8th Ave N	30-70	50-100	No
8th Ave N to 10th Ave N	30-85	50-100	No
10th Ave N to 11th Ave N	15-90	50-100	No
11th Ave N to 13th Ave N	5-105	50-100	No
13th Ave N to 15th Ave N	55-190	50-100	Yes

Table 9 indicates than the only segment along 17th Street N with all driveways spaced such that they meet the recommendation for the designated roadway type is between 13th Ave N and 15th Ave N.

The MnDOT Access Management Manual was also utilized to evaluate the corridor spacing. MnDOT provides guidance based on facility type and environment. For an urban collector the recommended spacing between two primary full access intersections is 660 ft. For a collector in an urban core environment the recommended spacing is 300-660 ft. For collector roadways there is not a specific driveway spacing recommended.







	15 AVEN	
	A construction of the second s	
S S S Hansmann Park 12 AVE N 11 AVE N	15 ST N 15 ST N 15 ST N 16 ST N 18 TIP ST N	HWYY 76 N
Robert Asp Elementary		75
Legend Study Area	S S S S S S S S S S S S S S S S S S S	
Access Inventory Primary Intersection Secondary Intersection		
 Private Shared Private Access 		
Minor Arterial - Other Minor Arterial	3/AVEN	
Minor Collector		
0 600 Feet Source: Metro COG, Clay County, Moorhead, Nearman	CEN CEN	TERAVE

Map



Pedestrian and Bicycle Connections

Existing and planned pedestrian and bicycle connections along the 17th Street N corridor are shown in **Figure 7**. A planned bicycle facility on 17th Street N would connect to two local bicycle facilities at 2nd Ave N and 15th Ave N. These two facilities connect the corridor to the Red River, commercial and employment opportunities in downtown Moorhead, Fargo, Dilworth, and North Dakota State University.

Additionally, the planned facility on 17th Street N would improve connections for bicycle commuters and recreational bicyclists between 2nd Avenue N and 15th Avenue N, another critical north-south link in North Moorhead. There is also a planned bicycle facility along 7th Ave N which would cross 17th Street N and further improve bicycle connections in the area.

17th Street N includes pedestrian sidewalks from 4th Ave N to 15th Ave N, running along the residential section of the corridor. Pedestrian facilities do not exist along the corridor from 1st Ave N to 4th Ave N except for recent improvements near Park Christian School. There are several instances of ADA pedestrian ramps in poor condition or absent at intersections along 17th St. These are listed below:

- Northwest corner of 17th Street N and 4th Ave, crossing 17th Street N
- Northwest and Southwest corners of 17th St and 5th Ave, crossing 17th Street N and 5th Ave N
- Northeast corner of 17th Street N and 7th Ave, crossing 17th Street N
- Northwest corner of 17th Street N and 8th Ave, crossing 17th Street N
- Southeast corner of 17th Street and 11th Ave, crossing 17th Street N







Information

ADA Ramp Condition from 2018 Moorhead ADA Transition Plan



November 2020 Real People. Real Solutions.

15 AVEN 00 00 Moorhead Manor, **13AVEN Buland Park** N GL ANNY MAVER 10 AVEN 10 AVEN [75] **SAVEN** Northeast Park 7 AVE N





Transit Service

MATBUS, Fargo-Moorhead Metropolitan Area's public transportation service, offers 23 fixed routes, in addition to door-to-door services for people with disabilities and senior citizens. **Figure 8** shows the transit routes and bus stops offered along and near the 17th Street N corridor. Route 4, which runs along 17th Street from 7th Ave N to 13th Ave N, operates Monday through Friday from 6:15 AM to 11:15 PM and Saturdays from 7:15 AM to 11:15 PM. Service along the route is scheduled for every 30 minutes. The route runs Northbound along 17th St, turning onto the corridor at 7th Ave and stopping five times before turning off the corridor at 13th Ave. Route 4 connects the corridor to both downtown Moorhead and downtown Fargo. From here, transit riders can reach many important destinations in the cities, including Minnesota State University – Moorhead, North Dakota State University, and the West Acres Shopping Center.

In May 2020, an extra bus was temporarily added to Route 4 during peak ridership hours – 10:00 AM to 7:00 PM – to assist riders in socially distancing while on the bus. Having trips available every 20 minutes, instead of every 30 minutes, allows riders to have more options for travel times and prevents crowding on buses.

Maintenance

The existing pavement typical section on the 17th Street N corridor is approximately 60 feet curb-to-curb from 1st Ave N to 15th Ave N. This width provides unique challenges compared to similar two and three-lane roadways in the city. Existing bituminous surface maintenance requires more materials, time, and cost. Likewise, winter roadway maintenance requires additional sand/salt material and snowplow trips compared to similar roadways.

Signal Warrant Analysis

A signal warrant analysis was completed at the intersections of 1st Avenue N and 15th Avenue N with 17th Street N. Both existing and 2045 forecasted volumes were analyzed. The signal warrant analysis indicated that signals are not justified at either location with existing or 2045 traffic volumes.

At the intersection of 17th Street N and 15th Avenue N both the mainline and minor street volumes are too low to justify a traffic signal. At the intersection of 17th Street N and 1st Avenue N, the mainline volumes are high enough with nine hours meeting the mainline volume threshold for warrant 1A, however, the minor street volumes are too low to justify a traffic signal. The results of the signal warrant analysis are shown in **Appendix B**.







17th St N Corridor Study - Figure 8

Fargo-Moorhead Metropolitan Council of Governments

Transit November 2020

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IV. Purpose & Need Framework

Purpose

Metro COG and the City of Moorhead desire to define a comprehensive vision for 17th Street in preparation for the 2022 street rehabilitation project. The purpose of the 17th Street N Corridor Study is to:

- Identify context-sensitive transportation improvements that will safely accommodate all users
- Provide efficient mobility and access for all modes of travel
- Preserve community connections
- Encourage economic vitality
- Future improvements should also include financially responsible infrastructure that is compatible with the natural and built environment

To achieve these goals the study's primary structure included defining the issues and potential opportunities along the corridor, establishing the corridor vision and goals, and developing and evaluating potential multimodal infrastructure improvement alternatives.

Need

Study partners aimed to address the following needs for 17th Street N in the City of Moorhead:

Modal Interrelationships

WALKABILITY/BIKEABILITY

Within and connecting to the study area, there are many destinations for pedestrians and bicyclists to travel to/from. The study area is served by an incomplete and mostly non-ADA compliant pedestrian sidewalk system and two east-west local bicycle facility connections that intersect 17th Street N at 15th and 2nd Avenue N. These bicycle facility connections provide both pedestrian and bicycle connections to and from 17th Street N. Complete descriptions of existing facilities and maps illustrating the existing and planned network of sidewalks and trails can be found in the 17th Street N Corridor Study Existing Conditions Report – **Appendix B.**









TRANSIT SERVICE

MATBUS, Fargo-Moorhead Metropolitan Area's public transportation service, offers Route 4, which runs along 17th Street from 7th Ave N to 13th Ave N. Route 4 connects the corridor to both downtown Moorhead and downtown Fargo. Current stops along 17th Street are unimproved and do not contain any amenities such as shelters, benches, lighting, or bus bulbs. The lack of ADA accommodations near bus stop locations limits the accessibility to the transit service.

HEAVY COMMERCIAL VEHICLE MOVEMENTS

A few heavy commercial vehicle generating businesses/developments have been identified in the south end of study corridor (Segment 1). According to 2019 traffic data, heavy commercial vehicles account for approximately 9 to 12 percent of all trips on 17th Street N.



Vehicle Mobility

The 17th Street N corridor is an important north-south connection facilitating travel between local residential streets to 1st Avenue N (a Minor Arterial roadway) and 15th Avenue N (a Major Collector roadway). Future improvements must ensure the efficient mobility of vehicles through the corridor.

Vehicle Safety

Developed alternatives need to ensure the safe operation of vehicles along the corridor. The corridor study examined all segments of 17th Street N and its intersections for existing and future safety concerns. Alternatives developed need to provide safe vehicle transportation.

Infrastructure Conditions

PAVEMENT/MAINTENANCE REDUCTION

The existing pavement typical section on the 17th Street N corridor is approximately 60 feet curb-tocurb from 1st Ave N to 15th Ave N. The entire platted right-of-way is approximately 140 feet. This excessive width is nearly double the widths of similar adjacent roadways and provides unique challenges compared to similar two and three-lane roadways in the city. Existing bituminous surface maintenance requires more materials, time, and cost. Likewise, winter roadway maintenance requires additional sand/salt material and snowplow trips compared to similar roadways.







DRAINAGE CONCERNS

Drainage is an issue in this area as sections of curb and gutter have settled, there are a limited number and inconsistent inlets along the corridor, and the boulevard slopes are very flat. Areas of ponding occur during spring melt and storm events.

See **Appendix C** for additional considerations, potential SEE (social, economic, and environmental) factors, and the full Purpose & Need Statement.

V. Study Goals and Objectives

Table 2 outlines the goals and objectives for the 17th Street N Corridor Study. The goals and objectives are intended to align with regional and local transportation plans as much as possible. They build off the existing conditions, issues and needs outlined in the Purpose and Need Framework, and define desired results or outcomes. Multiple objectives for each goal exist to provide additional details on how the goal can be achieved. The goals and objectives were used as the framework to guide the identification and evaluation of improvement options within the study area.

Goal	Objective	
Safely accommodate all users (motor vehicles, freight, transit, pedestrians, bicyclists)	Eliminate serious injury crashes	
	Reduce all crashes in both frequency and severity	
	Provide safe pedestrian and bicycle facilities along 17 th Street N and at all crossings	
Provide efficient mobility and access for all modes of travel	Provide acceptable system reliability serving existing and planned growth	
	Manage access consistent with roadway functional class and access spacing guidelines when applicable	
	Provide a connected transportation system that accommodates trips consistent with roadway functional class	
	Accommodate business delivery and freight needs	
	Accommodate future transit plans and needs	

Table 2 – Goals and Objectives







	Provide convenient access for pedestrians and bicyclists to serve demand
	Provide convenient access for vulnerable populations including youth and elderly
Develop a financially responsible infrastructure implementation plan	Develop projects and phasing that meet schedule and funding constraints
	Minimize right-of-way costs
	Minimize maintenance and lifecycle costs
	Maximize benefit-cost of improvements
	Maximize potential to secure competitive funding

Preserve community connections and economic vitality	Provide reasonable access and connectivity for businesses and neighborhoods Maintain sustainable access for local trips into/out of Downtown Moorhead and to/from Highway 10 Support existing and future land use plans Serve the neighborhood livability for all populations including elderly and youth
	Seek consistency with regional and local plans
Provide infrastructure	Avoid, minimize, and mitigate impacts to the built environment Avoid, minimize, and mitigate impacts to sensitive
with the natural and built environment	environmental resources.
	Avoid, minimize, and mitigate impacts for flood risks and stormwater issues.







VI. Identification and Evaluation of Alternatives

Before developing alternatives for the 17th Street North corridor, the project team evaluated existing conditions (Section III), identified key transportation issues, and engaged community members and the general public to understand the needs and priorities for the corridor (Section VII). Following the technical analysis and public involvement, the project team identified a series of preliminary concepts for each segment of the corridor. A meeting was held with the consultant team, Metro COG, and City of Moorhead staff to review and vet the preliminary concepts. Several of the preliminary concepts were eliminated from further consideration due to a number of factors, including:

- Did not achieve project goals
- Did not achieve goals and priorities of community members
- Did not achieve broader City goals
- Cost and/or construction feasibility

After vetting the preliminary concepts, the project team narrowed down the viable alternatives and developed typical sections and conceptual plan layouts for each alternative. Two alternatives were developed for Segment 1, and five alternatives were developed for Segment 2. Typical sections of each alternative are shown and described on the following pages. Plan layouts of each alternative are shown in **Appendix E**.

Each alternative's probable costs are based on MnDOT 2019 statewide average bid prices. To develop planning-level opinions of probable costs, it was necessary to make some assumptions about construction. The opinions of probable costs include typical construction materials and costs such as excavation, grading, base, pavement, pavement markings, and signing and markings. They also include the construction of new curb extensions as well as new ADA-compliant curb ramps at each intersection.

Each alternative includes a range for the opinions of probable costs. The high end of the range includes an allowance for design and engineering. Each opinion of probable cost also includes a 25% contingency that may account for unexpected costs or unknown project-specific cost items at this planning-level phase. These opinions of probable costs also include lump sum allowances for construction cost incidentals such as landscaping/ turf establishment, drainage/utilities, and erosion and sediment control. Individual project costs may vary; these opinions of probable costs are only intended to be used at a planning level and should be refined throughout project development.

Segment 1

Two alternatives were developed for Segment 1, and the basic characteristics of each alternative are described below. All of the alternatives feature curb extensions at some intersections which are not shown in the typical sections below. Some intersection corners in Segment 1 do not have curb extensions because of the need to accommodate large truck turning movements which made curb







extensions unviable. Curb extensions are shown in the plan view layouts for each alternative, which can be found in **Appendix E**.



Alternative 1A – Path and Sidewalk



ALTERNATIVE 1A OVERVIEW:

- 10' shared use path on the east, connects with the path in front of Park Christian School
- 6' sidewalk on the west
- Curb extensions along 17th Street, but not on cross streets
- Existing travel lanes and parking lanes remain unchanged
- Marked crosswalks at each intersection

ALTERNATIVE 1A OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement Alternative 1A are \$850,000-\$980,000. The opinions of probable costs include the cost of resurfacing the roadway, adding curb extensions, rebuilding all driveway aprons on the east side, constructing a shared use path and a sidewalk, new ADA-compliant curb ramps, striping, signing and marking, and a 25% contingency for unexpected costs. The higher end of the range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.









Alternative 1B – Path, Sidewalk, and Buffered Bike Lanes

Figure 10 – Alternative 1B Typical Section

ALTERNATIVE 1B OVERVIEW:

- On-street buffered bike lanes
- 10' shared use path on the east, connects with the path in front of Park Christian School
- 6' sidewalk on the west
- Curb extensions along 17th Street, but not on cross streets
- Travel lanes and parking lanes narrowed
- Marked crosswalks at each intersection

ALTERNATIVE 1B OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement Alternative 1B are \$910,000-\$1,040,000. The estimate includes the cost of resurfacing the roadway, adding curb extensions, rebuilding all driveway aprons on the east side, constructing a shared use path and a sidewalk, new ADA-compliant curb ramps, striping, signing and marking, and a 25% contingency for unexpected costs. The higher end of the opinions of probable costs range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.






Segment 1 – No Build



Figure 11 – Segment 1 No Build Typical Section

SEGMENT 1 - NO BUILD OVERVIEW:

- No changes to existing conditions
- Parking on both sides of street
- 14' center turn lane
- No sidewalk or on either side of street
- No bike facility
- No curb extensions

SEGMENT 1 - NO BUILD OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement the no build option are \$560,000-\$650,000. The estimate includes the cost of resurfacing the roadway, restriping the roadway to match existing conditions, replacing existing sidewalk curb ramps with new, ADA-compliant curb ramps, and a 25% contingency for unexpected costs. The higher end of the opinions of probable costs range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.

Segment 2

Five alternatives were developed for Segment 2, and the basic characteristics of each alternative are described below. All of the alternatives feature curb extensions at all intersections which are not shown in the typical sections below. Curb extensions are shown in the plan view layouts for each alternative, which can be found in **Appendix E**.









Alternative 2A – Buffered Bike Lanes

Figure 12 – Alternative 2A Typical Section

ALTERNATIVE 2A OVERVIEW:

- On-street buffered bike lanes
- Curb extensions at each intersection
- Marked crosswalks at each intersection
- On-street parking retained on both sides of the street
- Existing travel lanes narrowed

ALTERNATIVE 2A OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement Alternative 2A are \$2,420,000-\$2,780,000. The estimate includes the cost of resurfacing the roadway, adding curb extensions, new ADA-compliant curb ramps, striping, signing and marking, and a 25% contingency for unexpected costs. The higher end of the opinions of probable costs range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.









Alternative 2B – Center Median and Path



ALTERNATIVE 2B OVERVIEW:

- 20' landscaped median in the center of the street
- 10' shared use path replaces sidewalk on the east
- Curb extensions at each intersection
- Marked crosswalks at each intersection
- On-street parking retained on both sides of the street
- Shared use path may impact some existing trees; path alignment could meander to minimize impacts to high-quality mature trees

ALTERNATIVE 2B OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement Alternative 2B are \$3,190,000-\$3,660,000. The estimate includes the cost of resurfacing the roadway, adding curb extensions, constructing a center median, constructing a shared use path, rebuilding driveway aprons on the east side, new ADA-compliant curb ramps, striping, signing, and marking, and a 25% contingency for unexpected costs. The higher end of the opinions of probable costs range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.









Alternative 2C – Center Median and Shared Lanes

Figure 14 – Alternative 2C Typical Section

ALTERNATIVE 2C OVERVIEW:

- 20' landscaped median in the center of the street
- Shared lane markings (shared travel lane for bicyclists and motorists)
- Curb extensions at each intersection
- Marked crosswalks
- On-street parking retained on both sides of the street

ALTERNATIVE 2C OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement Alternative 2C are \$2,870,000-\$3,300,000. The estimate includes the cost of resurfacing the roadway, constructing a center median, adding curb extensions, new ADA-compliant curb ramps, striping, signing and marking, and a 25% contingency for unexpected costs. The higher end of the opinions of probable costs range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.









Alternative 2D – Path and Center Turn Lane



ALTERNATIVE 2D OVERVIEW:

- 10' shared use path replaces sidewalk on the east
- Curb extensions at each intersection
- Existing travel lanes narrowed
- Existing parking lanes retained
- Marked crosswalks at each intersection
- Shared use path may impact some existing trees; path alignment could meander to minimize impacts to high-quality mature trees

ALTERNATIVE 2D OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement Alternative 2D are \$2,730,000-\$3,140,000. The estimate includes the cost of resurfacing the roadway, adding curb extensions, constructing a shared use path, rebuilding driveway aprons on the east side, new ADA-compliant curb ramps, striping, signing and marking, and a 25% contingency for unexpected costs. The higher end of the opinions of probable costs range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.









Alternative 2E – Path and Buffered Bike Lanes



ALTERNATIVE 2E OVERVIEW:

- 10' shared use path replaces sidewalk on the east
- On-street buffered bike lanes
- Curb extensions at each intersection
- Marked crosswalks at each intersection
- On-street parking retained on both sides of the street
- Existing travel lanes narrowed
- Shared use path may impact some existing trees; path alignment could meander to minimize impacts to high-quality mature trees

ALTERNATIVE 2E OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement Alternative 2E are \$2,760,000-\$3,180,000. The estimate includes the cost of resurfacing the roadway, adding curb extensions, constructing a shared use path, rebuilding driveway aprons on the east side, new ADA-compliant curb ramps, striping, signing, and marking, and a 25% contingency for unexpected costs. The higher end of the opinions of probable costs range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.







Segment 2 – No Build



Figure 17 – Segment 2 No Build Typical Section

SEGMENT 2 - NO BUILD OVERVIEW:

- No changes to existing conditions
- Parking on both sides of the street
- Very wide, 21' travel lanes
- Sidewalks on both sides of the street
- No bike facility
- No curb extensions

SEGMENT 2 - NO BUILD OPINIONS OF PROBABLE COSTS

The planning-level opinions of probable costs to implement the no build option are \$1,960,000-\$2,250,000. The estimate includes the cost of resurfacing the roadway, restriping the roadway to match existing conditions, replacing existing sidewalk curb ramps with new, ADA-compliant curb ramps, and a 25% contingency for unexpected costs. The higher end of the opinions of probable costs range includes the costs for roadway design and engineering. More information on the opinions of probable costs is provided in **Appendix F**.







Segment 2 Sidewalk Alignment Options

Throughout the 17th Street North corridor, the sidewalks are set back approximately 33' from the curb, creating a very wide boulevard space. This extra-wide boulevard space translates to sidewalk infrastructure set back farther from the street compared to most intersecting streets.

At intersections, the stop signs on cross streets are located in front of the crosswalks due to the distance between the curb and the sidewalks. This configuration creates potential pedestrian safety issues because vehicles on cross streets drive over the pedestrian crossing location before stopping. The project team developed a potential alternative treatment (Option 2) that could mitigate the pedestrian safety challenges associated with the existing sidewalk crossing location.



Figure 18 – Existing sidewalks Setback Approx. 33' from the curb, as shown by the red arrow









Option 1: Existing Sidewalk Crossing Location

Figure 19 – Sidewalk Crossing Option 1

OPTION 1 OVERVIEW:

- Sidewalk crossing location is located farther away from 17th St (same alignment as existing sidewalks)
- Pedestrians in crosswalks are less visible to people driving on 17th St because they are located farther from the intersections
- Stop signs located in front of the crosswalks; cars drive through the crosswalks before stopping

OPTION 1 OPINIONS OF PROBABLE COSTS

Since the sidewalk alignment in Option 1 is the same as existing conditions, it does not require any additional costs to implement. The cost for Option 1 is included in the opinions of probable costs for each alternative.









Option 2: Sidewalk Bend-In Alternative

Figure 20 – Sidewalk Crossing Option 2

OPTION 2 OVERVIEW:

- Sidewalk bends in closer to 17th St at intersections (existing sidewalks would be removed near intersections and new sidewalks would be constructed)
- Pedestrians in crosswalks would be more visible to people driving on 17th St because they are located closer to the intersection
- Stop signs are located behind the crosswalks; cars required to stop before driving through the crosswalk

OPTION 2 OPINIONS OF PROBABLE COSTS

The opinion of probable costs for implementing the sidewalk bend-in alternative is approximately \$50,000 per intersection. The opinion of probable costs assumes the construction of curb extensions, so the cost to implement Option 2 in tandem with an alternative with curb extensions would cost less. More information on the opinions of probable costs is provided in **Appendix F**.







Technical Evaluation of Alternatives

The project team evaluated each of the alternatives in Segment 1 and Segment 2 based on a set of technical evaluation criteria. The evaluation criteria were developed based on the overall project goals, which included five main categories:

- Safety
- Mobility
- Cost
- Sustainability
- Environmental Impacts

Criteria		Segment 1			
		No Build	Shared Use Path	Buffered Bike Lanes	
Evaluation Matrix Goals	Safety	0	+		
	Mobility	0	+	+	
	Cost	0	+	+	
	Sustainability	0	+	+	
	Environmental Impacts	-	+	+	

Criteria		Segment 2					
		No Build	Buffered Bike Lanes	Median w/ Shared Use Path	Median w/ Shared Roadway	Buffered Bike Lanes w/ Shared Use Path	3-Lane Roadway w/ Shared Use Path
	Safety	0	++	+			
Evaluation Matrix Goals	Mobility	0	++	+	+	++	+
	Cost	0	+	0	+	+	+
	Sustainability	0	+	0	0	+	+
	Environmental Impacts	-	+	++	++	+	+

A summary of the technical evaluation matrix is shown above. A more detailed technical evaluation matrix is shown in **Appendix H**, which includes individual objectives and goals for each evaluation category.







VII. Public and Agency Input

Public and agency input was collected throughout the study and described in the sections below.

Public Engagement Plan

At the onset of the study the project team completed a Public Engagement Plan to guide public input activities. With uncertainty due to the COVID-19 pandemic, this plan was designed to provide flexibility of engagement tactics.

Communication Strategies

Multiple communication strategies were used to inform the public of their engagement opportunity.

- Study announcement postcards were sent to addresses adjacent to the project corridor to inform them of the project.
- An expanded mailing to all assumed regular corridor users were sent to around 325 for the first and second open house.
- Facebook posts were boosted and shared by multiple organizations including Metro COG, City of Moorhead, and Downtown Moorhead, inc.
- Text to subscribe and email blasts were used. Throughout the project 88 total subscribers received email updates and information.

Study Review Committee Input

The Study Review Committee (SRC) met 3 times throughout the study but was consulted frequently to review the technical analysis and public involvement and provide study guidance. Two SRC surveys were conducted in connection with the first two public input opportunities.

Public Input

Three public input opportunities were collected in the fall and winter of 2020 and the spring of 2021 to gather input on existing conditions, study goals, and the full range of concepts identified, screened, and evaluated. Due to COVID-19 measures, all input opportunities were held online in which attendees could watch an informational video, join a live virtual meeting, or view a recording of a virtual meeting and provide feedback via online comment cards, mailed surveys, or directly contacting project staff. Each public input opportunity included a two-to-three-week public comment period and numerous participation options.







Appendix I provides copies of the information shared at the meetings and complete reports of public input received.

Project Website

The project team configured a project website that provided a public-facing platform to disseminate project information, provide alternative descriptions, view recorded virtual open houses, and complete online surveys. The website was updated frequently to reflect the project stages.

August 7 – 31, 2020 Public Input Opportunity

Members of the community were able to watch an informational video, provide comments, and



take a survey on what they saw as the biggest opportunities/challenges along the corridor. There were 183 surveys completed. Also presented was a toolbox of potential solutions that could be implemented along the corridor. Educational materials about these solutions were presented in the informational video along with detailed advantages and disadvantages of the concepts.

Roadway Options					
Ped/Bike Improvement Options	What is it?	Benefits	Challenges		
School Zone Speed Limit SCHOOL SPEED LIMIT 25 WHEN CHILDREN ARE PRESENT	This is a lower speed limit within a school zone, determined based on an engineering or traffic investigation. The slower speed limit is only in effect during opening or closing school hours. Any speeding in the area is subject to a double fine.	 Reduces speed during school start/end time Establishes clear route for biking/walking to and from school Increases driver awareness of school zone 	 Signage alone does not result in lower speeds and increased driver attention Slowing down and speeding up when entering and exiting the school zone can degrade traffic safety 		
High-Visibility Crosswalk Markings	High-visibility crosswalk markings use ladder markings to increase the visibility of a crossing location for drivers. They can include stop bars to indicate where vehicles should stop near intersections.	 Increases visibility of pedestrian crossing paths Potential to decrease vehicle speed 	 Not shown to reduce crashes Speeds increase over time as marking wear down 		

The First Public Input Opportunity provided a toolbox of potential solutions for members of the public to evaluate







Moorhead seeks input to update widest residential street

Moorhead city leaders and historians explore what led to the strange street's size.

Written By: Barry Amundson | 8:00 am, Aug. 29, 2020



This shows the 60-foot-wide, mostly residential 17th Street North in Moorhead, which is being studied for improvements. David Samson / The Forum

MOORHEAD — Many people have wondered why a one-mile stretch of 17th Street North in Moorhead is so wide.

A Fargo Forum Newspaper article from August 29, 2021 highlighted the project and requested input from the public







Feedback collected from

ж

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NHEN August 7 - August 31, 2020 103 Responses to Goals + Objectives Survey 73 Responses to Design Options Survey

PURPOSE OF THE ONLINE PUBLIC INPUT OPPORTUNITY

SPONSE

SURVEY

The purpose of the Online Public Input Opportunity was to gather community feedback on:

- the project goals top priorities for the corridor »
- existing conditions a tool box of improvement ideas

FEEDBACK ABOUT EXISTING CONDITIONS

- Most respondents drive the corridor and feel safe driving 30
- About 1/3 of the respondents walk and/or bike the corridor, and generally feel safe 30 walking and biking
- Top concerns for walking include the lack of lighting, car/truck speeds, and lack of 39 sidewalks south of 4th Ave
- Some people bicycling feel unsafe due to high vehicle speeds 35

FEEDBACK ABOUT FUTURE DESIGN OPTIONS



Figure 21 – Public Input Summary from August 2020



TOP PRIORITIES

Connect the sidewalk network

Develop safer pedestrian crossings

Add landscaping and street trees

Maintain on-street parking for residents

ADDITIONAL COMMENTS

- Desire for intersection 30 improvements and dedicated turn lanes at 1st Ave N
- Create safer/shorter street 30 crossings; Add marked crosswalks and improve the curb ramps
- Slow down motor vehicle traffic 30
- Interest in adding street trees and 30 landscaped boulevards
- Improve drainage / repair curb and 30 gutter
 - Widen the sidewalks







November 30 – December 21, 2020 Public Input Opportunity

Members of the community were able to learn about the proposed 17th St N corridor alternatives, take a survey on which alternatives or portions thereof that they prefer, and provide additional feedback. There were 135 surveys completed. Metro COG also hosted a virtual open house via Zoom Video Communications on Wednesday, December 16th from 4:00 p.m. to 5:00 p.m. Members of the 17th St N Corridor Study project team presented project background, corridor alternatives, and the project's next steps. There was a live question and answer session with the opportunity to provide direct feedback to the corridor study team on the corridor alternatives. In total the second online survey received responses from 137 members of the public.



The comment-mapping tool, INPUTiD, was used to display alternative layouts and receive public comments.

February 4 – 18, 2021 Public Input Opportunity

The results of prior engagement efforts for Segment 2 (residential segment) determined that members of the public would like to maintain the corridor's existing curb-to-curb width, on-street parking, and driveway access. Respondents also wanted to add traffic calming (reduce vehicle speed), improve pedestrian crossings, and add bicycle trail connections. Metro COG and the study team developed two additional concepts for Segment 2 based upon feedback received that meets these requirements. These additional concepts are Alternatives 2D and 2E. The public was asked to provide feedback on each alternative by completing a survey or contacting the project team directly. In total the third online survey received responses from 84 members of the public.







VIII. Recommended Alternative

The recommendations for each segment are described in the following sections. The recommendations were based on the technical evaluation completed by the project team, community and stakeholder feedback, and agency support from the City of Moorhead and Metro COG.

Recommended Alternative: Segment 1 (1st Ave to 4th Ave)

The recommended alternative in Segment 1 is Alternative 1B. Alternative 1B retains on-street parking on both sides of the street, retains the center turn lane, adds a sidewalk connection on the west side of the street, adds a shared use path on the east side of the street that connects to the existing shared use path outside of Park Christian School, and adds on-street buffered bike lanes in each direction.



Figure 22 – The recommended alternative for Segment 1 is Alternative 1B

Alternative 1B is recommended in Segment 1 for the following reasons:

- Achieves a majority of the study goals
- Increases pedestrian connectivity by adding a sidewalk and path between 1st Avenue and 4th Avenue
- Provides better access to Park Christian School with the addition of a path
- Increases pedestrian safety by adding curb extensions, which shortens pedestrian crossing distances, increases the visibility of pedestrians, and reduces motor vehicle speeds
- Achieves broader City goals (2008 Comprehensive Plan) of adding on-street bike lanes in Moorhead
- Scores the highest in the technical evaluation matrix







Community member and stakeholder feedback is supported in the recommended alternative:

- Retains parking on both sides of the street
- Removes curb extensions where they would interfere with truck turning movements to access businesses, such as at 2nd Avenue
- Slows motor vehicle speeds (through curb extensions and narrower travel lanes)
- Accommodates large trucks for businesses

Recommended Alternative: Segment 2 (4th Ave to 15th Ave)

The recommended alternative in Segment 2 is Alternative 2E. Alternative 2E retains on-street parking on both sides of the street, adds a shared use path on the east side of the street that connects to the proposed shared use path in Segment 1, and adds on-street buffered bike lanes in each direction which also connect to the proposed buffered bike lanes in Segment 1.



Figure 23 – The recommended alternative for Segment 2 is Alternative 2E

Alternative 2E is recommended in Segment 2 for the following reasons:

- Achieves a majority of the study goals
- Increases pedestrian safety by adding curb extensions, which shortens pedestrian crossing distances, increases the visibility of pedestrians, and reduces motor vehicle speeds
- Achieves broader City goals (2008 Comprehensive Plan) of adding on-street bike lanes in Moorhead
- Provides a path connection to the existing path along 15th Avenue
- Scores the highest in the technical evaluation matrix







Community member and stakeholder feedback is supported in the recommended alternative:

- Retains parking on both sides of the street
- Adds a shared use path on the east side of the street
- Removes a center median, which would restrict driveway access
- Slows motor vehicle speeds (through curb extensions and narrower driving lanes)

Segment 2 Sidewalk Alignment Recommendation

The sidewalk bend-in alternative (Option 2) is recommended at select intersections along Segment 2 due to its safety benefits for people walking along 17th Street and crossing the intersecting streets. It is recommended to be implemented at intersections with higher pedestrian activity, and thus a greater need for pedestrian safety improvements. The specific intersections that this option is recommended for requires further study and may be determined during the project's design process.

Option 2 had more support from community members, with 51% of survey participants voting to "Support" or "Strongly Support" this option, while 17% were "Neutral" and 29% either "Opposed" or "Strongly Opposed" the option. Option 2 was also supported by City of Moorhead staff and Metro COG staff.

Other Corridor Considerations

Through the public comment received, the following improvements should also be considered for the 17th Street corridor:

- Additional roadway lighting
- Improved drainage
- Additional street trees and landscaping
- Continue to monitor traffic and safety conditions at the intersection of 1st Avenue N and 17th Street to determine if a traffic signal may be warranted in the future.







IX. Next Steps

The purpose of the 17th Street N Corridor Study is to develop a plan for improvements to 17th Street N which will guide what may be included in the 2022 rehabilitation project along 17th Street. The concepts developed as part of this study are high-level and will need additional refinement through preliminary and final design. Environmental review and permitting will also be required with exact requirements based on the scope of the project and the funding source. As future projects may turn from plan to reality, they will move forward as part of the City's CIP process, which involves additional public engagement specific to the project area and timing. The following issues will need further vetting during preliminary design:

- Transition of bikeway facilities at project termini,
- Roadway and pedestrian lighting, depending on project budget,
- Routing of shared use path to avoid mature trees, and
- Prioritizing intersections for recommended sidewalk treatments, if required by budget.

The improvement options identified and alternatives recommended in this study will help the City of Moorhead continue to maintain a better functioning, greater mobility, and safer collector roadway.

The City of Moorhead should also anticipate the annual maintenance needs of the painted buffered bicycle lanes and ensure that is incorporated into the appropriate budgets. Maintaining the high visibility of the bicycle lanes will ensure a safe, reliable on-street bicycle facility.

Study partners must continue to work together to further plan, obtain funding, design, and implement the recommended improvement projects. All partners have an active role in implementing these improvements. All competitive funding sources should be considered. Agencies should also update their comprehensive and transportation plans to include these findings to better leverage funding sources. Funding sources that may be applicable to future projects along 17th Street include:

- Transportation Alternatives (TA) funding program is specifically for the small-scale active transportation projects like pedestrian and bicycle facilities. The TA funding program uses a competitive application process, but the shared use path recommended on the corridor would be an excellent candidate for this fund option.
- MnDOT Safe Routes to School grants and funding program is specifically for Safe Routes to School projects. These funds are subject to change as funding allocations to MnDOT change. These grant programs are also competitive. The rapid flashing beacons recommended near Park Christian School and the enhanced crosswalks would be an excellent candidate for this fund option.
- Local Road Improvement Program (LRIP) provides funding for capital construction costs only. The amount allocated to the fund and available to projects is done in every other year through the Minnesota bonding process. This funding program uses a competitive application process for each of its three project categories with a maximum award of \$1.25 M (as of the last solicitation). The next application process will likely not occur until 2022.





Appendix A: Public Engagement Plan



17th Street N Corridor Study

Public Engagement Plan

April 7, 2020



Real People. Real Solutions.

BMI No. T49.120979

A. Purpose and Background

This Public Engagement Plan will guide outreach efforts by identifying specific stakeholder groups to engage, strategies to employ, tools to utilize, and ongoing communication forums. These efforts will focus on leading the community through a transparent study process concluding in a publicly supported recommendation.

Public engagement will be a key component in the successful completion of the 17th St N Corridor Study. Engagement opportunities provide a platform for the public and local agencies to lend their voice and input to the study development and alternative evaluation. Providing productive comment forums allows the project team and public to work together to develop a solution that has broad community support, lending credibility to key decisions made during the project. Making timely, accurate, and useful information available to both key decision-makers and the general public will assist in gaining necessary public and agency support to ultimately approve and implement the study recommendations.

This Public Engagement Plan is a fluid document and may be updated throughout the course of the study.

B. Goals, Objectives and Expected Outcomes

The overall goals and objectives of the public involvement process are to:

- Properly identify and engage stakeholders and vested individuals and groups
- Outline opportunities for public outreach
- Describe how and when public engagement opportunities will occur
- Integrate public involvement tasks with the project design team process

The intended outcome of the engagement efforts outlined in this plan is that the public has actively participated in the study process and to ultimately gain public and stakeholder support for the recommended solutions.

C. Study Review Committee (SRC)

<u>Metro COG</u> Dan Farnsworth *Transportation Planner* <u>farnsworth@fmmetrocog.org</u> 701-532-5106

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<u>City of Moorhead</u> Jonathan Atkins *Traffic Engineer* Jonathan.atkins@cityofmoorhead.com 218-299-5388

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Park Christian School Michael Levang Junior/Senior High Principal mlevang@parkchristianschool.org 218-236-0500 NDDOT Wayne Zacher Local Government Division wzacher@nd.gov 701-328-2118

<u>FHWA – ND</u> Kristen Sperry Planning and Environmental Program Manager kristen.sperry@dot.gov 701-221-9464

BOLTON & MENK, INC. (BMI) Cody Christianson Project Manager cody.christianson@bolton-menk.com 952-890-0509x3496

Jim Mertz GIS Specialist/Public Engagement james.mertz@bolton-menk.com 701-739-8095

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D. Develop List of Stakeholders

One of the ongoing tasks during the study phase of the project will be to identify and engage with stakeholders. The consulting team will work with Metro COG and city staff to identify stakeholders which shall include, but are not limited to:

	Study Review Committee (SRC)	Public		
	FM Metro COG	Adjacent Residents	Area commuters and nearby off-corridor	
	City of Moorhead – Engineering	Burger Time	property owners	
	City of Moorhead – Planning	Bridgepointe Community Church of the Nazarene	General Public	
	City of Moorhead – Public Works	Stenerson Bros Lumber	Applicable Jurisdictions and Elected Officials	
17th St N	City of Moorhead – Transit	Lloyd's Auto Body	Applicable Organizations	
Corridor	Park Christian School	D-S Beverages	and Groups (such as bike/	
Study	NDDOT	Park Christian School	groups, neighborhood associations)	
	FHWA – ND	All Stor Powl	Transit Usors	
	Bolton & Menk, Inc.			
	Toole Design		Commission	
		Moornead Manor	Historical & Cultural Society of Clay County	

E. Study Review Committee (SRC)

SRC Meetings (qty. 3) with Agency and Consultant staff will be held throughout the project. These meetings provide opportunity for ongoing study coordination and direction at critical decision-making steps or major milestones. Study status and deliverables will be discussed as well as any issues or solutions as they arise. These meetings will be integral to managing schedule and budget.

F. Public Engagement

At the time of creation of this Public Engagement Plan the United States and local governments in the Fargo-Moorhead Metropolitan area are practicing cautionary social distancing measures to combat the spread of the novel coronavirus, COVID-19. For this reason, the Public Engagement Plan will utilize a variety of in-person and virtual engagement activities with the ability to be flexible and adapt these practices in timing and format as the public health situation evolves.

Project communications and engagement activities with the general public will take multiple forms to better reach a wider audience. The communication outlets found below will inform the public about the study's progress, share plans, graphics, and schedules, and identify opportunities to get involved.

1. Face-to-Face Communications

a) A Focus Group Workshop will be organized to inform area non-profits and business owners about study details and to receive feedback on the issues and opportunities along the corridor.

b) Open House Meetings

BMI will host two open houses to engage residents, students, property/business owners, and organizations along the corridor. The first will provide an opportunity to share the project purpose and need and gather input on goals, issues, needs, and opportunities. The second will gather input on proposed solutions.

Bolton & Menk will coordinate with the SRC to determine the specific timing and content of each meeting, with the goal of engaging key residents and stakeholders to achieve informed consent for the project. Topics will focus on multimodal improvements/bicycle facilities, traffic calming, safety improvements, access management, potential impacts to adjacent properties and residents, and project schedule. Attendees will have an opportunity to provide feedback on alternatives and will have a greater understanding of the issues and recommended solutions that will be moved forward into final design.

2. Communication Toolbox

a) Webpage Content

The project webpage will be hosted by Metro COG. Bolton & Menk will provide project information including notifications, project updates, public meeting summaries, and links to the digital campaign tools for inclusion on the project webpage. All communication will refer the audience to check the webpage for up-to-date information. Update notifications and meeting information will be sent to subscribers.

b) Digital Communications Platform

A digital communication platform will be maintained by Bolton & Menk throughout the entirety of this study. This platform will allow for stakeholders to sign up for email or text updates. The project team will be able to use this platform to distribute project information and upcoming meeting details as well as to track user engagement.

c) $INPUTiD^{TM}$

Bolton & Menk's INPUTiD[™], a custom web-based application that allows the public to provide comments specific to a location, will be created for this study. Users can react and respond to previous comments enabling the project team to track trends and gauge the level of support within the community. Our communications lead will regularly monitor input and provide timely responses. This will be a valuable tool to maintain communication with the public and stakeholders.

Initially, this application will be made available to gather concerns about existing conditions and needs to be considered in development of alternatives. Once developed, design alternatives will be uploaded to the application to collect input specific to proposed elements to gather feedback on impacts.

d) Project Mailings

Up to three mailings will be prepared and sent by Bolton & Menk. The first will be a study announcement that informs local stakeholders about the project and directs individuals to the study website and text-to-subscribe features. The latter mailings will be created and distributed in coordination with the Open House meetings and will include project updates, opportunities for input, and details for upcoming meetings. Metro COG will be responsible for reviewing content prior to distribution.

e) Social Media Content

Bolton & Menk will assist Metro COG in producing graphics, images and related content for posting study updates on Metro COG and City of Moorhead social media accounts.

f) Online Surveys

Bolton & Menk will create two online surveys that will coordinate in timing with the Open House meetings. They will be structured in a manner that closely relates to the questions asked at the Open House to replicate the Open House experience.

g) Newspaper/Press Release

Bolton & Menk will work with Metro COG to create text for inclusion in press releases or newspaper box advertisements prior to Open House meetings.

17 th St N Corridor Study Public and Agency Engagement Plan Checklist						
	Initiative	Quantity	Date Complete	Timeframe Notes		
Study Review Committee (SRC)	SRC Meetings	3				
Public	Focus Group Workshop	1		Prior to public input meeting #1		
	E-blast and Text Updates	Up to 3		Prior to public input meetings, at release of recommendations		
	Materials for Metro COG Webpage	Up to 3		Project milestones		
	INPUTID	1		After project initiation		
	Web Survey	2		Coordinated with open houses		
	Public Meeting	2		Coordinated with SRC Meeting #2		
	Social Media Content	Up to 3		Project milestones		
	Newspaper/Press Release	2		Prior to public meetings		
	Direct Mailings	3		Study announcement, prior to public meetings		

Appendix B: Existing Conditions



17th Street N Corridor

Study

FINAL Existing + No-Build Conditions Memorandum



Date:	November 9, 2020			
То:	Luke Champa, Assistant Planner, FM Metro COG			
	Dan Farnsworth, Transportation Planner, FM Metro COG			
From:	Cody Christianson, PE, Project Manager, Bolton & Menk, Inc.			
	Jim Mertz, GISP, Project Planner, Bolton & Menk, Inc.			
Subject:	Existing and No-Build Conditions			
	17 th Street N Corridor Study			
	Fargo-Moorhead Metropolitan Council of Governments (Metro COG)			



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I. Introduction

The Fargo-Moorhead Metropolitan Council of Governments (Metro COG), in collaboration with the City of Moorhead, is working to identify transportation improvements on 17th Street N, as shown on **Figure 1** (Appendix A). The study will:

- Define issues and potential opportunities both today and into the future
- Develop and evaluate potential infrastructure improvement alternatives to address existing and projected issues and to guide future growth and development
- Establish improvement recommendations
- Develop an implementation plan that can be phased in over time

The purpose of this memorandum is to document existing and no-build conditions and to identify and confirm issues along and near 17th Street N. This memo is organized by the following sections:

- Corridor History
- Previous studies overview
- Demographics and trends
- Transportation system characteristics
- Study area characteristics
- Land use and major traffic generators
- Existing and no-build traffic conditions
- Crash history
- Access
- Pedestrian and bicycle
- Transit
- Social, environmental, and economic (SEE) resources
- Summary of issues

This information will guide the development of plan goals and objectives and ultimately the identification of improvement alternatives for 17th Street N.







Appendix A of this memo contains figures of each of the study area characteristics listed above and SEE resources, including:

- Figure 1 Study Area
- Figure 2 Future Projects
- Figure 3 Access Inventory and Functional Class
- Figure 4 Existing Land Use
- Figure 5 Future Land Use
- Figure 6 Traffic Volumes and Crash History
- Figure 7 Pedestrian and Bicycle Connections
- Figure 8 Current AM Peak Hour Operations
- Figure 9 Current PM Peak Hour Operations
- Figure 10 Transit
- Figure 11 Natural Features
- Figure 12 Social and Cultural Features

Corridor History

A unique characteristic of the 17th Street N corridor is its 140 feet of platted right-of-way and approximately 60 feet of curb-to-curb pavement. The first known plat for this corridor, Elder's First Addition, was recorded in December 1881 by Moorhead Attorney Ferdinand Elder. The plat named the street Park Avenue and depicts 140 feet of right-of-way compared to the standard 80 feet at the time. The name Park Avenue continued in 1882 for the next plat north, Hole's Second Addition. Park Avenue was likely the official street name until July 1902 when Moorhead's current addressing system was implemented. By 1936, Auditor's out lots completed the 140-foot right-of-way platting along the existing corridor, and these are the first documents recorded with the modern name of 17th Street N.

Previous Studies Overview

Several studies have been completed which provide direction for future transportation needs within and around the 17th Street N corridor. The key points in each study relevant to the corridor area are summarized below by plan title.







City of Moorhead Comprehensive Plan Addendum (November 2009)

The Moorhead Comprehensive Plan was developed by the City Council, the Planning Commission, the Comprehensive Plan Steering Committee, the Active in Moorhead Partnership, and the North Dakota State Data Center in November 2009 as a guiding document for planning over the next 25 years. The City's Comprehensive Plan provides the legal framework for planning and zoning in Moorhead. The plan includes background and community context, a vision for the community, the land use plan, detailed description of activity centers, and strategic initiatives/implementation methods for the future.

The land use plan recommends an update in the land use designation along 17th Street N from 1st Ave N to 15th Ave N from mostly low-density residential to a mix of medium density mixed residential, medium density residential, public/institutional, and community commercial. It is recommended that the majority of the corridor, from 4th Ave N to 13th Ave N be designated at medium density mixed residential.

Other recommendations presented in the document include reinvestment throughout the city in the form of maintenance, new community gathering spaces, and increased retail and recreational opportunities. A pedestrian crossing is recommended on the east side of the intersection of 1st Ave N and 17th Street N.

The plan also presents various strategic initiatives to assist with achieving community goals. The strategic initiatives presented are:

- 1) Use the growth area plan to guide development decisions
- 2) Implementation of downtown/infill redevelopment area framework plans
- 3) Flood risk reduction
- 4) Support the Active in Moorhead partnership
- 5) Adopt a "Complete Streets" design philosophy
- 6) Planning in a time of economic distress
- 7) Growth management

Fargo-Moorhead Metropolitan Bicycle and Pedestrian Plan (February 2017)

The Fargo-Moorhead Metropolitan Council of Governments (Metro COG) released the Fargo-Moorhead Metropolitan Bicycle and Pedestrian Plan in February 2017 as a sub-element of Metro COG's Long Range Transportation Plan. The plan, updated every 5 years, identifies current issues and needs as they relate to bicycling and pedestrian movements in the area and







develops recommendations to enhance bicycle and pedestrian accommodations and safety of all users. Recommendations presented in this plan include:

- 1) Bicycle and Motorist Education: bicycle safety education, distribution of bikeway maps, update of Bikefm.org website, and NDDOT coordination
- 2) Safety: intersection safety improvements, law enforcement of school zone speed limits and crosswalk compliance, and state DOT coordination
- Bicycle and Pedestrian Network Improvements: construction of protected bike lanes, bike lanes, sharrows, or signed roadway along 17th Street N from 2nd Ave N to 15th Ave N
- 4) Bicycle and Pedestrian Network Improvements: addition of bike lanes, sharrows or signed roadway on 7th Ave N from 11th St to US 75 intersecting 17th Street N
- 5) Improved Maintenance: maintenance of path surface conditions, increased street sweeping, and continued snow removal
- 6) Encouragement: urban design/planning that encourages density and more bicycle and pedestrian use, apply as a Bicycle Friendly Community, provide public with FM bikeway maps, and provide public notifications through online and print media

Moorhead Downtown Master Plan (not yet published)

In July 2019, the City of Moorhead together with Downtown Moorhead, Inc. began a comprehensive examination of Moorhead's downtown area. Recommendations aim to improve transportation, encourage vibrancy, and stimulate development. The plan is expected to be released in July 2020.

The project area includes the southern portions of the 17th Street N corridor. This southern block is part of a sub-area defined as the Creative Pioneer District to reflect goals of creative industry development. *As recommendations are made available, they will be included here.*

1st Avenue North: A Review of the Corridor from the Red River to 21st Street (November 2008)

In November 2008, the Moorhead Engineering and Community Service Departments released a review of 1st Avenue North from the Red River to 21st Street. This study includes a preliminary design plan for 1st Avenue N roadway reconstruction and rehabilitation, including roadway, traffic control, access management, streetscape improvements, and pedestrian/bicycle facilities. It also includes recommendations for properties adjoining 1st Avenue N and recommendations for corridor improvements including infrastructure and right-of-way. Recommendations relevant to the 17th Street N corridor include:

1) A two-inch mill overlay along 1st Avenue N between 8th Street and 17th Street







- 2) A traffic signal at the intersection of 1st Avenue N and 17th Street N to alleviate significant side street delays
- A 4.5-ft sidewalk along the north side of 1st Avenue N between 8th Street and 17th Street and an 8-ft wide sidewalk starting at 17th Street N
- A marked pedestrian crossing and raised median curb along the east leg of the 1st Avenue N and 17th Street N intersection
- 5) Streetscape improvements along 1st Avenue N including at the 17th Street intersection

2045 Fargo-Moorhead Metropolitan Transportation Plan (November 2019)

The 2045 Fargo-Moorhead Metropolitan Transportation Plan, released in November 2019, is a collaborative effort of the Fargo-Moorhead Metropolitan Council of Governments and its member jurisdictions. This plan, also called Metro Grow, establishes a vision for transportation across the Fargo-Moorhead metropolitan area through the year 2045. It identifies an action plan for how the region can address long-term mobility, safety, and access needs through investments in the existing transportation system. The plan is developed to meet community goals, needs, and priorities by taking a multi-modal approach to the transportation system and considering potential future investments in the roadway, transit, bicycle, pedestrian, and freight systems for the region. An update is required every five years.

The plan includes recommendations based on established goals. The goals include

- 1) Safety system & security: provide a transportation system that is safer for all users and resilient to incidents,
- 2) Travel efficiency & reliability: improve regional mobility,
- 3) Walking & biking: increase walking and biking as a mode of transportation,
- 4) Transit access: support enhanced access to the existing and future MATBUS system,
- 5) Maintain transportation infrastructure: provide a financial plan that supports maintaining transportation infrastructure in a state of good repair,
- 6) Environmental sustainability: provide a transportation system that provides access equitability and limits impacts to the natural and built environment,
- 7) Economic development & transportation decisions: promote transportation projects that support regional economic goals, support freight movement, and promote projects that can be financially sustained for the long-term, and
- 8) Emerging transportation trends: incorporate transportation trends and new technologies in regional transportation plans.






The plan includes specific strategies to achieve these goals. Strategies relevant to the 17th Street N corridor include:

- 1) Facilitate local implementation of short-term system management projects and consider additional mid-to longer term solutions to manage congestion on local roadways,
- 2) Prioritize projects that reduce the number of bicycle and pedestrian crashes and improve safety for all users, and
- 3) Consider recommendations presented in the Fargo-Moorhead Metropolitan Area 2016-2020 Transit Development Plan to improve existing transit services.

Fargo-Moorhead Metropolitan Area 2016-2020 Transit Development Plan (December 2016)

In December 2016, the Fargo-Moorhead Metropolitan Council of Governments published the Fargo-Moorhead Metropolitan Area 2016-2020 Transit Development Plan to complete a rigorous assessment of the current transit system and provide recommendations for future transit development in the Metro Area Transit (MATBUS) service area. MATBUS is a transit agency collectively operated by the Cities of Fargo and Moorhead to provide 15 fixed-routes and demand-response transit service in the Fargo-Moorhead Metropolitan Area – specifically Fargo, West Fargo, Moorhead, and Dilworth.

The plan recommends a two-track strategy to improve the fixed route and paratransit services provided in the metro area. The tracks are:

- Improve the effectiveness of the system within the current budget of revenue hours of service. The focus of this portion of the recommended plan was to critically assess the strong and weak portions of the current system with the purpose of improving both. This approach will result in not only advances associated with pulling up the poor performing routes/segments (Reworking Route 18 and Route 23), but pushing forward highly productive elements (Route 15), and
- 2) Identify changes to and/or expansion of the system that require increasing the annual operating funding and additional capital investment and assign the increased dollars to concepts that fills gaps, is supported by residents, and looks to future regional growth.

Specific to fixed bus route 4, which runs along the majority of the 17th Street N corridor from 4th Ave N to 13th Ave N, the plan recommends:

1) Addressing Route 4 resident complaints by realigning from 20th St N to 17th Street N and from 5th Ave N to 13th Ave N to provide more frequent service,







- 2) Improving Moorhead night route on-time and service by extending routes 1, 3, 4, and 5 end times to 11:00 PM and adding a second bus to Route 4 to provide 30 minute service on weekday and Saturday nights, and
- 3) Addressing requests for Sunday service in Moorhead by operating Sundays from approximately 9:00 AM to 7:00 PM on Routes 1, 2, 3, 4, 5, and paratransit.

City of Moorhead Arts and Culture Framework Development Plan (February 2019)

The City of Moorhead Arts and Culture Framework Development Plan, or the Creativity & Culture Roadmap, was developed to help the Moorhead community find common ground in accelerating the role of arts and culture in creating well-being and prosperity for Moorhead. It is a tool inviting multiple approaches for involvement and implementation in the spirit of innovation and creativity that it celebrates. The plan recommends investing in the following areas to accomplish measurable, long-term goals and objectives:

- 1) Placemaking: create places where people want to gather,
- 2) Working together: build and support public and private capacity and collaboration to grow the creative sector,
- 3) Story and identity: brand and market Moorhead's unique artistic, cultural, and creative attributes, and
- 4) Implementation: coordinate and champion people, processes, and practices to propel this framework forward.

The plan includes specific goals and objectives for each recommended area of investment. Some goals that relate directly to the 17th Street N corridor include:

- 1) Work with neighborhoods, each with its unique cultural identity gathering locations, to develop a strong sense of neighborhood, ensuring that arts and culture are integrated as a key vehicle for defining neighborhood identity,
- Enhance Moorhead's visual appeal through streetscapes, murals, greenspace development, and arts and culture to modernize the look, feel, and accessibility of the city, and
- 3) Encourage collaboration within government planning bodies or elsewhere in the community, ensuring that arts and culture add value and are an integral part of the planning process.







City of Moorhead ADA Transition Plan for Public Right-of-Way (July 2018)

The City of Moorhead Americans with Disabilities Act Transition Plan for Public Right of Way was published in July of 2018 as part of requirements laid out in the Americans with Disabilities Act (ADA). The plan is a summary of their three-phase approach to evaluating accessibility of the community's infrastructure and achieving compliance with the ADA. It includes documentation of the City's accessibility-related policies and procedures, a project field review guide, an inventory of public right-of-way facilities and their condition, a summary of public outreach efforts, and required elements of an ADA Transition Plan.

During the inventory of pedestrian facilities, the City found most public right-of-way facilities to be non-compliant with ADA standards. 82% of curb ramps, 100% of sidewalk ramps, 48% of accessible pedestrian signals, 88% of on-street transit facilities, 100% of public parking lots, and 85% of at-grade pedestrian railroad crossings were found to be non-compliant with ADA standards. This includes many curb ramps and uncontrolled crossing locations along the 17th Street N corridor that are in poor condition or not available.

Fargo/West Fargo Parking and Access Study (December 2018)

In December 2018, the City of West Fargo, the City of Fargo, and the Fargo-Moorhead Metropolitan Council of Governments published a Parking and Access Study in response to high levels of growth in the area. The purpose of the study was to analyze how parking plays a role in site development, how street networks can be best laid out to create efficiency in the transportation network, and how modifications to both access and parking regulations can achieve the goals of Metro COG, Fargo, and West Fargo. The key goals of this study were to:

- 1) Develop guidelines that encourage safe traffic flow, as well as a comfortable walking and biking experience
- 2) Develop access and roadway guidelines that complement land use form, as opposed to just functional classifications
- 3) Reduce the need to build excess off-street parking
- 4) Enable sustainable development patterns

The study analyzed the development patterns, roadway functional classifications, the existing zoning code, and parking utilization rates to development a list of issues and opportunities related to parking and access in the metro area.

1) Issue: Many of the streets in Fargo and West Fargo are designed to maximize traffic flow, with several lanes and high speeds. It negatively impacts walkability and creates safety issues for all users.







Opportunity: Not all streets are used the same way, and their amenities need to reflect that. Different streets should accommodate different users based on the distinct characteristics and land use patterns.

2) Issue: Developers are attuned to the distinct parking characteristic for different land uses, but are more likely to follow existing regulations than challenge parking minimum requirements as it would slow down the approval process.

Opportunity: Giving developers the flexibility to provide less parking is a key aspect of satisfying market demand and increasing affordability.

3) Issue: Fargo and West Fargo's non-vehicular networks are limited and disconnected from one another, preventing people who are walking, biking, or accessing transit from reaching their destination.

Opportunity: Future development needs to be more compact and connected to give people more options when traveling in and around Fargo. Managing street intervals and driveways is a key factor in shaping development pattern.

4) Issue: The amount of parking supplied vastly exceeds demand. All three of the land use types surveyed did not require the amount of parking that was supplied. Creating too much parking diminishes a neighborhood's vitality and walkability, creating sprawled development patterns, and leading to vehicle-dominated neighborhoods.

Opportunity: When planned holistically, parking can accommodate residents, employees, and businesses, without detracting from the vitality of the public realm. Creating policies and regulations that accurately reflect the parking demand, costs, and economic characteristics of a particular location is essential in achieving a balanced parking supply overall.

Recommendations from this study are included in the *Corridor Access* section of this report.

Previous and Planned Projects

Various projects are completed, planned, or programmed within and around the study area. The Metro COG 2020-2023 Transportation Improvement Program and the Moorhead 2020-2025 Capital Improvement Plan identify projects in the community. **Figure 2** (Appendix A) identifies future projects in the study area as depicted in the Capital Improvement Plan. The projects include:

- 17th Street N Rehabilitation from 1st Avenue N to 15th Avenue N, Planned 2022
- 15th Avenue N Rehabilitation, Completed 2019
- 4th Avenue N Rehabilitation from 14th Street N to 17th Street N, Planned 2022







Demographics and Trends

This section provides an overview of past and projected demographics in the area, to demonstrate how growth has and will impact demand for facilities.

Population and Households

The City of Moorhead has experienced significant and steady growth since 2000. Between 2000 and 2018, the population of the City increased by 31.6%. Based on forecasts developed by the Metro COG in the 2016 Fargo-Moorhead Demographic Forecasts, the population is expected to continue rising and increase 39% by 2045. This growth rate is higher than that of Minnesota. **Table 1** shows the population, number of households, and persons per household for the City of Moorhead.

TABLE T

Growth rates equivalent to those seen in Moorhead have important implications on local transportation systems, including residential roadways such as 17th Street N. Rapid growth can increase rates of travel to Park Christian School and local businesses in the area. The 17th Street corridor is an important commuter route as it provides a direct north-south connection for many residents living in the area. As population increases, it is possible that demand for the roadway, public transportation, and improved bicycle/pedestrian facilities will increase.

Table 1: City of Moorhead – Population and Households					
Category	2000	2010	2018	2045 ⁴	% Change 2000-2018
Population	32,177 ¹	38,065 ²	42,359 ³	58 <i>,</i> 870	31.6%
Households	12,180 ²	15,274 ²	15,999 ³	22,560	31.4%
Persons per Household	2.43 ²	2.41 ²	2.42 ³	2.47	~0%

¹Source: City of Moorhead Comprehensive Plan Update (2009)

²Source: U.S. Census Bureau

³Source: American Community Survey (5-year estimates 2014-2018) ⁴Source: 2016 Fargo-Moorhead Demographic Forecasts

Age

Like population, age distribution (Table 2) has the capacity to affect transportation usage and demand. In 2018, the median age in Moorhead was approximately 30 years old. This is younger than both Clay County and Minnesota. In 2018, the largest population cohort in Moorhead was between 20-24 years old. This is likely partially due to the colleges and universities in the Fargo-Moorhead Metropolitan Area. The large number of college-aged students in the City contributes to this younger median age. According to the Fargo-Moorhead Long Range Transportation Plan, this age cohort is the most likely to commute via public transportation. This leads to greater demand for public transportation and other alternate forms of transportation in Moorhead than in the rest of Clay County.







About 23% of Moorhead's population was under 18 in 2018. While this percentage is smaller than the percentage of Clay County residents that were under 18, it is still indicative of the importance of pedestrian/bicycle safety and programs such as Safe Routes to School. About 12% of City residents are over 65 years old. This cohort of residents typically shows greater demand for public transit and services such as dial-a-ride transit.

Table 2 – Age Distribution, 2018					
Age	Moorhead	Clay County			
Under 5	2,964	4,513			
5-9	2,732	4,288			
10-14	2,439	3,956			
15-19	4,070	5,446			
20-24	5,713	6,527			
25-29	3,378	4,430			
30-34	3,168	4,487			
35-39	2,603	3,979			
40-44	2,076	3,440			
45-49	1,974	3,409			
50-54	1,947	3,414			
55-59	2,408	3,663			
60-64	1,869	3,172			
65-69	1,461	2,506			
70-74	1,089	1,663			
75-79	764	1,388			
80-85	670	1,065			
85 and Over	1,070	1,455			
Median Age	29.9	32.5			
% Under 18	22.6%	24.1%			
% Over 65	11.9%	12.9%			

Source: US Census Bureau – ACS 5-year Estimates (2014-2018)

Employment

The Minnesota Department of Employment and Economic Development (DEED) estimates approximately 14,329 jobs exist in the City of Moorhead as of 2019. The average weekly earnings are \$796 per week. The largest industries are education and health services; trade, transportation, and utilities; and retail trade. 43.7% of workers are employed in the education and health services industry. 20% of workers are employed in the trade, transportation, and utilities industry which could indicate increased demand for efficient roadways. Job growth is expected in the City as population increases. This may put strain on commuter routes, such as







17th Street N, if the City does not work to increase roadway efficiency and multimodal transportation options.

In 2018, the majority of Moorhead employees either drove alone or carpooled to work (Table 3). This high reliance on driving single-occupancy vehicles could mean greater numbers of automobile trips as population in the City increases, placing greater demand on the existing transportation infrastructure. Currently, only 5.5% of employees rely on public transportation, bike, or walk to work. This share could increase as Moorhead executes various plans to improve multimodal transportation in the City.

Table 3 – Means of Transportation to Work, 2018				
Means	City of Moorhead	Clay County		
Drove Alone	79.5%	79.6%		
Carpooled	7.7%	8.3%		
Transit	1.4%	1.0%		
Walked	3.4%	3.1%		
Bicycle	0.7%	0.6%		
Other Means	0.9%	0.8%		
Worked at Home	6.3%	6.6%		
Mean Travel Time to	17.3	19.6		
Work (Minutes)				

Source: US Census Bureau – ACS 5-year Estimates (2014-2018)

II. Transportation System Characteristics

This section describes elements of the existing transportation network, information related to land use, traffic operations, safety, access, and non-motorized connections. Typical sources of data are called out where applicable.

Functional Classification

The functional classification system is used to create a roadway network that efficiently collects and distributes traffic from neighborhoods to the state highway system. A successful system coordinates and manages mobility, roadway design, and route alignment as well as seeks to match current and future access and land use with the adjacent roadway's purpose, speeds, and spacing. The functional classification system is comprised of principal arterials, minor arterials, major and minor collectors, and local roadways.







Within the study extents, north of US Highway 10, the 17th Street N corridor serves as a Collector roadway between 1st Avenue North and 15th Avenue North. The existing ADT (vehicles per day) ranges from 1,100 at the north end to 3,500 at the southern end of the corridor, according to MnDOT's 2015 and 2017 traffic counts. South of US Highway 10, and outside the study extents, 17th Street South serves as a Minor Arterial roadway between Main Avenue and 12th Avenue. The 17th Street N corridor is an important north-south connection facilitating travel between local residential streets to minor arterial commercial corridors and ultimately to US Highway 10, a vital east-west Principal Arterial. **Figure 3 (Appendix A)** shows the functional class network in the study area.

Since 17th Street N is a collector roadway through a developed residential and commercial business area it has several private driveway and local street access points. The east-west local streets that intersect the 17th Street N study area includes 13th Avenue, 11th Avenue, 10th Avenue, 8th Avenue, 7th Avenue, 6th Avenue, 5th Avenue, 3rd Avenue, and 2nd Avenue. 4th Avenue is an east-west Collector roadway that intersects 17th Street N in the study area. 15th Avenue at the north extent and 1st Avenue at the south extent of the study area are both Minor Arterial roadways.

Study Area Overview

Figure 1 shows the 17th Street N project corridor which extends from the downtown Moorhead business area at 1st Avenue N to the recently improved intersection at 15th Avenue N within the primary residential area. Throughout the 17th Avenue N study area a wide pavement section of 60 feet of curb-to-curb requires a more costly asphalt maintenance program than typical residential roadways. The entire platted right-of-way is approximately 140 feet.

For ease in describing key corridor characteristics in more depth, the corridor is split into two segments based on their different settings and needs.









Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, is generally characterized by a low speed, three-lane urban section with a center left turn lane and on-street parking on both sides of the roadway. Pedestrian facilities are incomplete and limited. These three blocks south of 4th Avenue include daily traffic to local businesses and Park Christian School.



Segment 2 – 4th Avenue N to 15th Avenue N, the residential segment with primarily single-family homes, is a low-speed, two-lane urban section with on-street parking on both sides of the roadway. The pedestrian network includes a continuous and connected sidewalk throughout however several ADA ramps are missing or inadequate. The far north part of this segment, from approximately 10th Avenue N to 15th Avenue N, falls within a 500-year floodplain. Drainage is an issue in this area as sections of curb and gutter have settled, there are limited number of inlets along the corridor, and the boulevard slopes are very flat.









Land Use and Major Traffic Generators

Existing and future land uses, as well as major traffic generators, within in the study area are shown on **Figures 4 and 5** and described below.

Existing Land Use Patterns

Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, is primarily zoned Community Commercial and Public/Institutional. These land uses are associated with adjacent local businesses and Park Christian School. The southern extent of the study area touches the Mixed-Use development area along the south side of 1st Avenue N.

Segment 2 – 4th Avenue N to 15th Avenue N, the residential segment is primarily Low Density Residential and mostly made up of single-family homes. A few multi-family housing units and two local parks exist within 2-3 blocks adjacent on either side of the 17th Street N study corridor. At the north end, on the northeast quadrant of 17th Street N and 13th Avenue N is a zone of High Density Residential that is home to Moorhead Manor, an assisted living facility that provides an intermediate level of care for residents who cannot safely live independently including senior care. The north end of the study corridor touches an area currently zoned as Agricultural on the north side of the north end of 15th Avenue N (County Road 83).

Future Land Use Patterns

Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, will only see a proposed land use change at the southwest quadrant of 17th Street N and 4th Avenue N, which is currently zoned Commercial and is proposed to be zoned Medium Density Mixed Residential. The 2009 Comprehensive Plan Addendum defines Medium Density Residential as a density of 4 to 10 units per acre. The remainder of this study area segment will remain primarily a mix of Community Commercial and Public/Institutional with the southern extent also remaining Mixed Use development along the south side of 1st Avenue N.







Segment 2 – 4th Avenue N to 15th Avenue N, the residential segment will see a change throughout that changes the primary zone from Low Density Residential to Medium Density Mixed Residential. This zoning update will provide for growth in residential density to support the developing Community Commercial and Mixed-Use areas along 1st Avenue N and the nearby downtown. The northeast quadrant of 17th Street N and 13th Avenue N, that is home to the Moorhead Manor, is proposed to be changed from High Density Residential to Medium Density Residential. At the north end of the study corridor, north of 15th Avenue N, the existing Agricultural zone is proposed to be changed to Industrial.

Major Traffic Generators

Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, results in a dense concentration of uses that drive major local and regional traffic. Traffic generation is further increased by direct access to 1st Avenue N and close proximity access to US Highway 10.

The large Park Christian School zone generates high peak hour volumes of bus, student driver, and parent drop off and pick up traffic. D-S Beverages generates heavy commercial truck traffic between their location just north of 2nd Avenue and US Highway 10.

Segment 2 – 4th Avenue N to 15th Avenue N, the residential segment is a major local traffic trip generator as it serves connections to several single-family, multiple vehicle households. Future increased residential density will increase local traffic trips through the study area. North of 15th Avenue N, the proposed Industrial area is most conveniently served by US Highway 75 and 15th Avenue N (County Road 83) and should result in little to no heavy truck traffic on 17th Street N.

Existing Traffic Operations

Turning movement count data was collected along 17th Street N at the intersections of 15th Avenue, 8th Avenue, and 1st Avenue in September 2020. Park Christian School was in session when the count was taken. The traffic counts were compared to previous count data available to determine if modifications were to be made to the data or if the count was reflective of normal traffic. Traffic volumes at 15th Avenue were found to be normal, but the traffic volumes at 8th Avenue and 1st Avenue were found to be lower than previous count data indicated so these counts were increased accordingly.

An analysis of existing AM and PM peak hour intersection operations was completed in Synchro/SimTraffic. All intersections in the study area are stop controlled. 15th Avenue at the north extent and 1st Avenue at the south extent of the study area have stop controls that stop traffic on 17th Street N and give right of way to the east-west Minor Arterial roadways. 8th Avenue at 17th Street N is all way stop controlled. All other intersections are side street stop controlled giving right of way to 17th Street N traffic.







The average intersection delay is a volume-weighted average of delay experienced by all motorists entering the intersection on all intersection approaches. Intersections and each intersection approach are given a ranking from Level of Service (LOS) A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS A through D are generally perceived to be acceptable to drivers. LOS E indicates that an intersection is operating at, or very near, its capacity and that travelers experience considerable delays. LOS F indicates an intersection where demand exceeds capacity resulting in substantial delays. **Table 4** shows the intersection delay as well as the maximum delay of all movements at each intersection.

Table 4 – Existing Traffic Operations Analysis					
Intercection	Peak	Intersection	Maximum Movement		
Intersection	Hour	(Delay [*] - LOS)	Mvmt	Delay* - LOS	
1st Ave & 17th St Two-Way Stop Controlled	AM	3 - A	SBL	26 - D	
	PM	2 - A	SBL	22 - C	
17th St & 8th Ave All-Way Stop Controlled	AM	6 - A	WBT	8 - A	
	PM	6 - A	NBT	7 - A	
17th St & 15th Ave Two-Way Stop Controlled	AM	2 - A	NBL	9 - A	
	PM	2 - A	NBL	11 - B	

*Delay is in seconds per vehicle

Based on the existing conditions operational analysis, all intersections operate with LOS A overall. The southbound left at 1st Avenue and 17th Street N operates with LOS D during the AM peak hour and LOS C during the PM peak hour. All other movements operate with LOS A or B.

Future No-Build Traffic Conditions

Traffic forecasts were developed analyzing historical growth, household/population/ employment projections anticipated for the area, and future land use projections. Forecasted 2045 AM and PM peak hour intersection operations were also completed in Synchro/SimTraffic. The results are show in **Table 5**.

Table 5 – 2045 No Build Traffic Operations Analysis						
Intersection	Peak	Intersection	Maximum Movement			
Intersection	Hour	(Delay* - LOS)	Mvmt	Delay* - LOS		
1st Ave & 17th St	AM	6 - A	SBL	113 - F		
Two-Way Stop Controlled	PM	4 - A	SBL	56 - F		
17th St & 8th Ave	AM	5 - A	WBT/SBT	6 - A		
All-Way Stop Controlled	PM	5 - A	NBL	6 - A		







17th St & 15th Ave	AM	3 - A	NBL	12 - B
Two-Way Stop Controlled	PM	2 - A	NBL	14 - B

*Delay is in seconds per vehicle

The results of the 2045 No Build operational analysis indicate that the intersection delay overall remains acceptable with LOS A during both peak hours at all three intersections analyzed. The southbound left movement at 1st Avenue and 17th Street N is anticipated to operate with LOS F during both peak hours with an average delay of nearly two minutes per vehicle during the AM peak hour and nearly one minute per vehicle during the PM peak hour. All other movements operate with LOS C or better.

Crash History

A crash analysis was completed for the study area to understand the existing safety concerns. A segment crash analysis was completed for the 17th Street N corridor from 1st Ave N to 15th Ave N in addition to intersection crashes. Crash data from the most recent five years (2015-2019) was evaluated. The crash history is summarized in **Figure 6**.

The key results of the crash analysis for the timeframe between 2015-2019 include:

- 13 intersection crashes
- 9 of the 13 crashes were right angle crashes
- There were no reported fatal crashes
- There was one reported non-fatal severe crash
- There were no reported pedestrian or bicycle crashes
- The intersection of 1st Ave N and 17th Street N operates outside the normal range compared to similar intersection statewide for total crash rate as well as fatal and serious crash rate with one serious injury crash.
- All other intersections operate within the normal range compared to similar intersections statewide.
- The overall corridor operates within the normal range compared to other two lane roadways with similar ADT.

A ten-year (2010-2019) crash analysis was completed for fatal crashes in addition to crashes involving a pedestrian and/or bicycle. There was a possible injury bicycle crash at the intersection of 1st Ave N and 17th Street N in 2011. The bicyclist was crossing 17th Street N and was hit by a vehicle along southbound 17th Street N attempting to turn right onto 1st Ave N. There is a sidewalk along the north side of 1st Ave N where the bicyclist was crossing, but the crosswalk is not marked. There were no reported fatal crashes or pedestrian crashes in the last ten years.







Tables 6 and **7** below summarize the total crash rate findings for the intersections and segment overall.

Table 6 – Intersection Crash Summary (2015-2019)							
Intersection	Total Crashes	Severe Crashes (K + A)	Actual Crash Rate*	Statewide Average	Critical Rate**	Critical Index***	
1st Ave N & 17th St N	7	1	0.29	0.09	0.27	1.09	
2nd Ave N & 17th St N	1	0	0.16	0.09	0.47	0.33	
4th Ave N & 17th St N	1	0	0.19	0.09	0.52	0.36	
6th Ave N & 17th St N	1	0	0.23	0.09	0.57	0.40	
7th Ave N & 17th St N	1	0	0.17	0.09	0.50	0.35	
8th Ave N & 17th St N	1	0	0.23	0.24	0.96	0.24	
11th Ave N & 17th St N	1	0	0.50	0.09	0.88	0.57	

Table 7 – Segment Crash Summary (2015-2019)						
Segment	Total Crashes	Severe Crashes (K + A)	Actual Crash Rate*	Statewide Average	Critical Rate**	Critical Index***
17th St N from 1st Ave N to 15th Ave N	13	1	2.09	1.32	2.59	0.81

*Crash Rate – The number of crashes per million entering vehicles.

****Critical Rate** – A statistical comparison based on similar intersections statewide.

*****Critical Index** – Reports the magnitude of the difference between the crash rate and the critical rate. If the critical index is greater than 1 this indicates that the intersection is operating outside the expected range when compared to similar intersection statewide.

Corridor Access

The "Fargo/West Fargo Parking and Access Study" outlines recommended access spacing for various roadway types. While 17th Street N is located within the City of Moorhead, the access study provides guidance that is applicable to the project corridor. The primary, secondary, and private accesses are identified in **Figure 3**. The "Fargo/West Fargo Parking and Access Study"







provides recommended spacing between signals, unsignalized full accesses, right-in/right-outs, and driveways based on roadway type.

The access study identifies seven roadway types: regional arterial, commercial arterial, mixed use arterial, mixed use collector, residential collector, mixed use neighborhood, and residential neighborhood. The functional classification of 17th Street N is a collector, but the land use changes at 4th Ave N with the south portion of the corridor serving commercial and public/ institutional uses and the northern portion serving residential homes. Based on the land uses, 17th Street N from 1st Ave N to 4th Ave N was analyzed as a mixed-use collector roadway and 17th Street N from 4th Ave N to 15th Ave N was analyzed a residential collector. The recommended spacing between unsignalized full access intersections is 300-400 feet for both roadway types. **Table 8** shows the spacing between intersections along 17th Street N.

Table 8 – Full Access Intersection Spacing					
Full Access Intersections	Actual Spacing (ft)	Recommended Spacing (ft)	Meets Spacing Recommendation		
1st Ave N to 2nd Ave N	330	300 - 400	Yes		
2nd Ave N to 3rd Ave N	365	300 - 400	Yes		
3rd Ave N to 4th Ave N	340	300 - 400	Yes		
4th Ave N to 5th Ave N	340	300 - 400	Yes		
5th Ave N to 6th Ave N	340	300 - 400	Yes		
6th Ave N to 7th Ave N	340	300 - 400	Yes		
7th Ave N to 8th Ave N	350	300 - 400	Yes		
8th Ave N to 10th Ave N	660	300 - 400	Yes		
10th Ave N to 11th Ave N	170	300 - 400	No		
11th Ave N to 13th Ave N	1080	300 - 400	Yes		
13th Ave N to 15th Ave N	380	300 - 400	Yes		

Table 8 shows that the recommended spacing is met between all full access intersection except between 10th Ave N and 11th Ave N. It should be noted that the intersections of 10th Ave N and







13th Ave N are offset. The 10th Ave N intersection approaches are offset by approximately 100 ft. The 13th Ave N intersection approaches are offset by approximately 40 ft.

The spacing between driveways was also analyzed along 17th Street N. The recommended driveway spacing differs between the two roadway types. For a mixed-use collector roadway, driveways are recommended to be spaced 200 ft apart. For a residential collector roadway, driveways are recommended to be spaced 50-100 ft apart. **Table 9** shows the spacing between driveways along 17th Street N. Since there were multiple driveways between each intersection a range in spacing was listed.







Table 9 – Driveway Spacing					
Intersections	Actual Driveway Spacing (ft)	Recommended Driveway Spacing (ft)	Meets Spacing Recommendation		
1st Ave N to 2nd Ave N	30-115	200	No		
2nd Ave N to 3rd Ave N	20-110	200	No		
3rd Ave N to 4th Ave N	20-200	200	No		
4th Ave N to 5th Ave N	30-110	50-100	No		
5th Ave N to 6th Ave N	40-105	50-100	No		
6th Ave N to 7th Ave N	30-110	50-100	No		
7th Ave N to 8th Ave N	30-70	50-100	No		
8th Ave N to 10th Ave N	30-85	50-100	No		
10th Ave N to 11th Ave N	15-90	50-100	No		
11th Ave N to 13th Ave N	5-105	50-100	No		
13th Ave N to 15th Ave N	55-190	50-100	Yes		

Table 9 indicates than the only segment along 17th Street N with all driveways spaced such that they meet the recommendation for the designated roadway type is between 13th Ave N and 15th Ave N.

The MnDOT Access Management Manual was also utilized to evaluate the corridor spacing. MnDOT provides guidance based on facility type and environment. For an urban collector the recommended spacing between two primary full access intersections is 660 ft. For a collector in an urban core environment the recommended spacing is 300-660 ft. For collector roadways there is not a specific driveway spacing recommended.

Pedestrian and Bicycle Connections

Existing and planned pedestrian and bicycle connections along the 17th Street N corridor are shown in **Figure 7**. A planned bicycle facility on 17th Street N would connect to two local bicycle facilities at 2nd Ave N and 15th Ave N. These two facilities connect the corridor to the Red River, commercial and employment opportunities in downtown Moorhead, Fargo, Dilworth, and North Dakota State University.

Additionally, the planned facility on 17th Street N would improve connections for bicycle commuters and recreational bicyclists between Highway 10 and North Moorhead. There is also a planned bicycle facility along 7th Ave N which would cross 17th Street N and further improve bicycle connections in the area.

17th Street N includes pedestrian sidewalks from 4th Ave N to 15th Ave N, running along the residential section of the corridor. Pedestrian facilities do not exist along the corridor from 1st







Ave N to 4th Ave N except for recent improvements near Park Christian School. There are several instances of ADA pedestrian ramps in poor condition or absent at intersections along 17th St. These are listed below:

- Northwest corner of 17th St and 4th Ave, crossing 17th St
- Northwest and Southwest corners of 17th St and 5th Ave, crossing 17th St and 5th Ave
- Northeast corner of 17th Street N and 7th Ave, crossing 17th Street N
- Northwest corner of 17th Street N and 8th Ave, crossing 17th Street
- Southeast corner of 17th Street and 11th Ave, crossing 17th Street

Transit Service

MATBUS, Fargo-Moorhead Metropolitan Area's public transportation service, offers 23 fixed routes, in addition to door-to-door services for people with disabilities and senior citizens. **Figure 8** shows the transit routes and bus stops offered along and near the 17th Street N corridor. Route 4, which runs along 17th Street from 7th Ave N to 13th Ave N, operates Monday through Friday from 6:15 AM to 11:15 PM and Saturdays from 7:15 AM to 11:15 PM. Service along the route is scheduled for every 30 minutes. The route runs Northbound along 17th St, turning onto the corridor at 7th Ave and stopping five times before turning off the corridor at 13th Ave. Route 4 connects the corridor to both downtown Moorhead and downtown Fargo. From here, transit riders can reach many important destinations in the cities, including Minnesota State University – Moorhead, North Dakota State University, and the West Acres Shopping Center.

In May 2020, an extra bus was temporarily added to Route 4 during peak ridership hours – 10:00 AM to 7:00 PM – to assist riders in socially distancing while on the bus. Having trips available every 20 minutes, instead of every 30 minutes, allows riders to have more options for travel times and prevents crowding on buses.

Maintenance

The existing pavement cross section on the 17th Street N corridor is approximately 60 feet curbto-curb from 1st Ave N to 15th Ave N. This width provides unique challenges compared to similar two and three-lane roadways in the city. Existing bituminous surface maintenance requires more materials, time, and cost. Likewise, winter roadway maintenance requires additional sand/salt material and snowplow trips compared to similar roadways.







III. Social, Economic, and Environmental (SEE) Considerations

An environmental screening was completed for the 17th Street N corridor. The following section documents findings related to potential environmental impacts within the footprint of the corridor to be used as a primer for required National Environmental Policy Act (NEPA) and state environmental reviews later in the project and to inform and evaluate corridor alternatives. The following key findings in **Table 10** are summarized from the environmental screening attached in **Appendix B**.

Та	Table 10 – Environmental Screening Summary				
Торіс	Existing and Planned Conditions	Considerations			
Minority Populations	Block groups directly North and South of 17 th St and the block group West of the corridor beginning at 13 th St are minority population block groups and considered environmental justice populations.	Staff will work with the Study Review Committee to identify how to best reach out to these populations near the corridor.			
Low-Income Populations	The block group East of the corridor beginning at 13 th St is a low-income population block group and considered an environmental justice population.	Staff will work with the Study Review Committee to identify how to best reach out to these populations near the corridor.			
Language	5 percent of the population speaks a language other than English or speaks English less than "very well."	Staff will offer translation services to those with limited English proficiency.			
Age	24 percent of the population is under 18 years old and 16 percent of the population is over 65 years old.	Staff will ensure outreach includes local schools and retirement homes, specifically Moorhead Manor, located on the corridor.			
Housing	16 percent of housing is renter occupied and 44 percent of renters are cost burdened.	Staff will send all future project mailers to each unit in multiple family residences.			







Та	Table 10 – Environmental Screening Summary				
Торіс	Existing and Planned Conditions	Considerations			
Cover Types	The project area is entirely developed land, ranging from low- to high-density. Construction activities may impact boulevard tree cover.	Impacts to native plant communities, landscape vegetation, functional vegetation, high value vegetation, hazard trees.			
Land Use	South portion of the corridor is zoned for community commercial and public/institutional uses. North portion of the corridor is mostly medium density mixed residential.	Land use changes are allowing for increased residential and mixed- use density.			
Geology, Soils, and Topography	97 percent of soil along the corridor is urban land or urban land – aquerts complex with a 0 to 2 percent slope.	Compatibility with construction/drainage design			
Water Resources	Red River runs one mile from the corridor and County Ditch No. 41 is present near the project area to control flooding. The northern part of the corridor is within a 500-year floodplain.	Impacts need to be avoided/limited per regulatory requirements			
Contamination/ Hazardous Materials/Wastes	There are 13 potentially contaminated sites in the project area, most being hazardous waste sites or construction stormwater sites.	Potential construction delays/costs and potential cleanup liability			
Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources	The study area does not include NWI Wetlands, impaired lakes or streams, rare natural features, or MnDNR native plant communities.	Federal and state designations, coordination and review requirements, potential mitigation Native plant communities, landscape vegetation, functional vegetation, high value vegetation, and hazard trees.			
Transportation	There are several potential noise receptors adjacent to the corridor consisting of single and multi-family residential. Potential noise receptors were identified using criteria outlined in the Analysis and Abatement Guidance for Highway Traffic Noise Regulation provided	Identify noise receptors and comply with federal and state requirements.			







Table 10 – Environmental Screening Summary		
Торіс	Existing and Planned Conditions	Considerations
	by the Federal Highway Administration (FHWA). The need for a noise analysis will be highly unlikely due to the low volume and speed local street environment but final determination will be once individual improvement projects are identified.	
Utilities	Sanitary sewer pipe is present throughout the study area primarily running through the center of the roadway. Storm pipes are present throughout the study area primarily running along the east side of the roadway. Watermains are present throughout the corridor area primarily running along the east side of the roadway. Electrical distribution systems are present in the corridor both overhead and underground. Overhead and street lights are primarily on the west side of the corridor with numerous electrical crossings in the study area.	Conflicts with utilities may increase schedule and cost requirements.
Drainage	Due to relatively flat topography present in the area, storm runoff along the roadway profile in street gutters is inconsistent. Areas of ponding occur during spring melt and storm events. Anecdotal evidence of ponding on adjacent properties has also been received, but not observed.	Existing drainage systems, sensitive waters and regulatory requirements
Visual	The corridor appears as a low-density commercial corridor in the southern portion and as a single-family residential street in the northern portion.	Impacts to and including scenic intrusion, grading, trails, bridges, walls, lighting, fencing, railings, vegetation modifications
Air, Noise, and Cumulative Potential Effects	Air, noise, and cumulative potential effects will be considered in a future NEPA analysis once a project is funded.	Comply with federal noise and impacts to air quality







IV. Summary of Issues

Below are a summary of issues and topics discussed throughout this Existing Conditions Report.

- Capacity Needs: The existing operational analysis indicates that there are no capacity
 issues along the 17th Street N corridor with current volumes. The 2045 No Build analysis
 indicates that the southbound left turn at 17th Street N and 1st Avenue is anticipated to
 operate with excessive delay during both peak hours. All other movements are
 anticipated to operate with acceptable delay.
- Safety: The intersection of 1st Ave N and 17th Street N operates outside the normal range compared to similar intersections statewide for both total number of crashes and for fatal and serious crashes with one serious injury crash. There were 13 crashes in the project area over the last five years (2015-2019). Right angle crashes were the most common accounting for 9 of the 13 crashes. No fatal or pedestrian and bicycle crashes were reported (2015-2019) however there was one possible injury bicycle crash reported in (2010-2019).
- System Linkages: Within the study extents, north of US Highway 10, the 17th Street N corridor serves as a Collector roadway between 1st Avenue North and 15th Avenue North. The 17th Street N corridor is an important north-south connection facilitating travel between local residential streets to 1st Avenue N, a minor arterial commercial corridor, and ultimately to US Highway 10, a vital east-west Principal Arterial. Nine Local Streets, two Minor Arterials, and one Collector Street intersects the 17th Street N study corridor. The 1st Avenue N corridor and Downtown Moorhead has experienced infill and redevelopment growth and serves as a regional hub for health care, education, retail, agriculture, and industry.
- Local Connectivity & Accessibility: The 17th Street N corridor serves connectivity to commercial businesses and regional institutional uses (Park Christian School). Connectivity and accessibility are important for both vehicle and pedestrian traffic to allow these uses, and future uses, to thrive in addition to providing the neighborhood livability the current and future demographics desire. Current vulnerable populations include elderly and youth populations.
- **Consistency with Regional and Local Plans:** Many previous plans and studies have been completed for the study's system corridors, in which many needs and opportunities were identified. Previous planning efforts have identified recommendations of land use changes for increased density, wholistic enhanced bicycle and pedestrian accommodations, access to and service level of transit, emerging transportation trends, life-cycle maintenance needs and considerations, environmental sustainability, new







community gathering spaces, community arts and cultural identity, and increased retail and recreational opportunities.

- Modal Interrelationships: The study area is served by an incomplete and mostly non-ADA compliant pedestrian sidewalk system and two east-west local bicycle facility connections that intersection 17th Street N at 15th and 1st Avenue. These bicycle facility connections provide both pedestrian and bicycle connections to and from 17th Street N. A planned bicycle facility along the 17th Street N study area would improve connections for bicycle commuters and recreational bicyclists between US Highway 10 and North Moorhead. A complete and accessible pedestrian sidewalk system will be necessary to provide neighborhood connectivity and access to an existing MATBUS transit route, on 17th Street, to Downtown Moorhead and Downtown Fargo.
- Environmental Considerations: There are some social, economic, and environmental (SEE) resources in proximity to the planning area that need to be considered that include environmental justice populations, potentially contaminated sites, and existing boulevard trees. Any wildlife displaced by any projects or construction resulting from the completion of this study will likely relocate to suitable nearby areas.
- Access Spacing. Since 17th Street N is a collector roadway through a developed residential and commercial business area it has several private driveway and local street access points. The access spacing analysis indicated that all full access intersections meet the recommended spacing except between 10th Ave N and 11th Ave N. The spacing of driveways along the corridor, however, does not meet the recommended spacing lengths except between 13th Ave N and 15th Ave N.







Appendix A: Figures







17th St N Corridor Study - Figure 1

Fargo-Moorhead Metropolitan Council of Governments

Project Location

November 2020







Future Projects



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Future Land Use

November 2020







Crash History

November 2020 & MENK Real People. Real Solutions.

BOLTON





November 2020







17th St N Corridor Study - Figure 8

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Transit November 2020





Natural Features







17th St N Corridor Study - Figure 10

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November 2020





Appendix B: Environmental Screening



17th Street N Corridor Study FINAL Environmental Screening

Date:	November 9, 2020	
То:	Luke Champa, Assistant Planner, FM Metro COG	
	Dan Farnsworth, Transportation Planner, FM Metro COG	
From:	Cody Christianson, PE, Project Manager, Bolton & Menk, Inc.	
	Jim Mertz, GISP, Project Planner, Bolton & Menk, Inc.	
Subject:	Environmental Screening Summary	
	17 th Street N Corridor Study	
	Fargo-Moorhead Metropolitan Council of Governments (Metro COG)	






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I. Introduction

This is a preliminary screening of the potential environmental impacts within the footprint of the 17th Street N corridor project. The purpose of this document is to identify potentially sensitive areas by considering all National Environmental Policy Act (NEPA) protected social, economic, and environmental categories. This screening will be used as a primer for required NEPA and state environmental reviews later in the project and will be used to inform and evaluate corridor alternatives. This document does not accommodate the necessary NEPA process or state environmental review process, which would occur once a project becomes funded.

Project Area

Figure 1 shows the 17th Street N project corridor which extends from the downtown Moorhead business area at 1st Avenue N to the recently improved intersection at 15th Avenue N within the primary residential area. The 17th Street corridor transitions from a residential two-lane road to a three-lane section at 4th Avenue N. The three blocks south of 4th Avenue include daily traffic to local businesses and Park Christian School. Continuing north from 4th Avenue, the 17th Street corridor transitions to a residential setting, where adjacent land uses are primarily single-family homes. As a major collector roadway, the 17th Street corridor is important for area residents and the businesses it serves. An important commuter route, it provides a direct north-south connection. The corridor includes 140 feet of platted right-of-way and approximately 60 feet of curb-to-curb pavement.

The north part of the corridor, from approximately 10th Avenue to 15th Avenue, fall within a 500-year floodplain. This part of the corridor falls within the residential segment of the study area.

II. Environmental Justice Analysis

Background

Executive Order 12898 (1994), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, must be addressed if impacts result in an adverse and disproportionately high impact on minority or low-income communities. Minority and lowincome populations are "readily identifiable groups...who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons...who will be similarly affected by a proposed DOT program, policy or activity" (U.S. DOT, 2012).

Environmental justice populations are minority and/or low-income populations that are meaningfully greater than those of the general population. "Meaningfully greater" for







environmental justice populations is generally defined as one where the minority or lowincome population is either 10 percent higher than the county average, or greater than 50 percent of the total geographic unit, or determined based on input from local officials or stakeholders (FHWA Office of Human Environment, 2012).

In addition to minority and low-income populations, the EPA also uses education, language, and age demographic indicators to determine a community's potential susceptibility to environmental impacts associated with construction activities. In addition to these indicators, this analysis also looks at housing indicators to determine susceptibility to environmental impacts.

Demographics Overview

The 17th Street Corridor is located in the City of Moorhead, Minnesota. In 2018, the City had a population of 42,359. The entire corridor falls in MN Census Tract 201, which had a population of 5,184 in 2017. For the purpose of the environmental justice analysis, the study area was increased to the entire MN Census Tract 201. Because 17th Street N is a North-South commuter corridor for residents in the area, environmental justice populations throughout the census tract have the potential to experience disproportional impacts during construction activities along the corridor. Permanent impacts of projects along the corridor are intended to improve the transportation corridor for all users. There are 5 block groups in the MN Census Tract 201 which have a population of 5,075 people according to the 2017 American Community Survey 5-year Estimates (2017) (Table 1).







Table	e 1: Environmental Justice	MN Censu	s Tract 201	Clay County, MN		
Ρορι	Ilations in 17 th Street N Project Area	Count	Percent	Count	Percent	
	Population	5,075		62,801		
city	White	4,325	85.2%	55,131	87.8%	
thni	Hispanic or Latino	299	5.9%	2,796	4.5%	
Щ	Black or African American	107	2.1%	1,905	3.0%	
e ar	Asian or Pacific Islander	90	1.8%	640	1.0%	
Rac	Native American	10	0.2%	898	1.4%	
	Two or more races or some other race	244	4.9%	1,431	2.6%	
ome	Population for whom poverty status is determined	5,046		58,990		
lnc	Population below poverty level	365	7.2%	6,828	11.6%	
tion	25 years and older	3,634		38,071		
ucat	Less than high school education	170	4.7%	1,950	5.1%	
Е	High school graduate, no college degree	1,829	50.3%	17,949	47.1%	
e	5 years and older	4,758		58,288		
Juage	Speak English less than "very well"	207	4.4%	1,064	1.8%	
-ang	Speak Spanish	250	5.3%	998	1.7%	
	Speak another language	143	3.0%	2,324	4.0%	
-	Under 5 years	317	6.2%	4,513	7.2%	
Age	Under 18 years	1,193	23.5%	15,154	24.1%	
	65 years and older	813	16.0%	8,077	12.9%	
	Occupied Households	2,029		23,782		
ng	Owner occupied households	1,703	83.9%	16,282	68.5%	
ousi	Cost burdened owner-occupied households	351	20.6%	2,635	16.2%	
Ĩ	Renter occupied households	326	16.1%	7,500	31.5%	
	Cost burdened renter-occupied households	119	44.2%	3,845	55.7%	
ability	Population for whom disability status is determined	5,075		62,287		
Dis	Population with a disability	659	13.0%	6,157	9.9%	
es	Households	2,029		23,782		
ehicl	No vehicle available	95	4.7%	1,614	6.8%	
٨e	One vehicle available	552	27.2%	6,695	28.2%	

Source: US Census Bureau – ACS 5-year Estimates (2014 – 2018)







Minority Populations

Minority populations includes individuals who identify as Hispanic or Latino, Black or African American, Asian American or Pacific Islander, Native American, some other race, or two or more races, as defined by the U.S. Census Bureau. A minority population is considered an environmental justice population for this analysis if a block group in the study area contains a 10 percent higher concentration of minorities that the county average. Since 13 percent of Clay County's populations are considered minorities, we are interested in block groups in the MN Census Tract 201 that have 23 percent or greater minority populations. There are seven block groups above 23 percent minority populations (**Figure 2**) within MN Census Tract 201 that can be considered environmental justice populations. There are several more block groups near the study area and both the block groups directly North and South of the 17th Street N corridor and the block group West of the corridor beginning at 13th Street N are minority population block groups and considered environmental justice populations. Staff will work with the Study Review Committee to identify how to best reach out to minority populations near the corridor.

Low-Income Populations

Low-income is approximated by census reporting of individuals with income below 200 percent of the poverty level. A low-income population is defined as one where the block group contains a 10 percent higher concentration of low-income individuals than the county average. Since the Clay County average for low-income individuals is 12 percent, we are interested in block groups in the MN Census Tract 201 that have 22 percent or greater minority populations. Using this metric, the census block group on the East side of census tract 201 (**Figure 2**) and can be considered an environmental justice population. Staff will work with the Study Review Committee to identify how to best reach out to low-income populations near the corridor.

Language

Nearly 6 percent of the population in MN Census tract 201 speaks a language other than English or and over 4 percent that speaks English less than "very well." This is in comparison to the Clay County average of just over 4 percent of the population that speaks a language other than English or less than 2 percent that speaks English less than "very well." It will be important for the project team to work with residents to identify which languages, other than English, are spoken most in the community. Staff should offer translation services to those with limited English proficiency.







Age

23.5 percent of the population in census tract 201 is under 18 years old. To reach this population and their families, the project team can partner with schools in the area to host informational booths or open house events targeted at families of students.

16 percent of the population in this census tract is over 65 years old. The staff should spend time completing outreach at Moorhead Manor, a retirement home along the corridor. Elderly populations can be disproportionately affected by transportation projects. Residents of Moorhead Manor are more likely to be heavily affected due to the location of the retirement home along the corridor.

Housing

Although not an Environmental Justice population, staff should be aware of where renters in the study area live. About 16 percent of housing in census tract 201 is renter occupied. Of this 18 percent, about 44 percent are cost burdened. To be cost burdened, a person or family must be spending more than 30 percent of their income on rent or mortgage each month.

The project team should engage specifically with renters by sending all future project mailers to each unit in multiple family residences.

Disability

Although not an Environmental Justice population, staff should be aware of residents in the project area living with a disability. 13 percent of the population in census tract 201 for whom disability status is determined has a disability. Special attention should be paid to engaging this population during the design phase of any projects along the corridor.

III. Social, Economic and Environmental Impacts (SEE)

The information below will serve as a primer for required NEPA and state environmental reviews for any future project along the 17th Street N corridor and will be used to inform and evaluate corridor alternatives. The following sections document the environmental conditions along and approximately one block East and West of 17th St N from 1st Ave N to 15th Ave N.

Cover Types

The project area is entirely developed land. It ranges from low- to high-density along the corridor. Existing boulevard trees may be impacted by potential solutions and associated construction activities.







Land Use

Existing land uses along the corridor are shown in Figure 3 below. At the time of this report, the City of Moorhead was in the process of updating their future land use plans. When the process is complete, the updated future land use plan will be reflected here and in other relevant 17th Street N Study documentation.

The southern section of 17th Street, from 1st Avenue to 4th Avenue, is majority community commercial or public/institutional. This section of the corridor is the location of Park Christian School, Bridgepointe Community Church, and multiple businesses including Burger Time, Stenerson Bros Lumber, D-S Beverages, Lloyd's Auto Body Inc, All Star Bowl, and Northside Truck Repair.

The northern section of 17th Street, from 4th Avenue to 15th Avenue, has been designated as mostly medium density mixed residential and medium density residential at the location of Moorhead Manor between 13th Avenue and 15th Avenue. This section of the corridor is comprised on mostly single-family houses.

Geology, Soils, and Topography

Soil data were obtained from the NRCS Web Soil Survey for Clay County. Table 2 lists the three different soils present along the project corridor. This information will be used to assess various soil limitation such as hydric characteristics and the limitations for road improvements. There is no change in elevation along the corridor.

Table 2 – Soil Survey								
Soil Type	Slopes	Acres						
Urban Land – Aquerts complex	0 to 2 percent	75.7						
Urban Land	0 to 2 percent	21.7						
Bearden Silty Clay Loam	0 to 2 percent	3.1						

Water Resources

There are no water resources in along the 17th Street N corridor, but Red River runs approximately one mile from corridor. County Ditch Number Forty-One is also present near project area to control flooding. The northern part of corridor, from approximately 10th Avenue to 15th Avenue is within a 500-year floodplain.

Contamination/Hazardous Materials/Wastes

Potentially contaminated site data was obtained from the MPCA's What's in My Neighborhood dataset. There are 13 potentially contaminated sites in the project area.







Table 3 – Contamination/Hazardous Materials/Wastes							
Type of Contaminated Site	Number of Sites along Corridor						
Hazardous Waste	7						
Construction Stormwater	3						
Beard Petroleum Remediation, Leak Site	1						
Brownfields, Voluntary Investigation and Cleanup	1						
Underground Tanks	1						

Wetlands, Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources

The U.S. Fish and Wildlife Service does not report any NWI Wetlands, impaired lakes or streams, rare natural features, or MnDNR native plant communities within the 17th Street N study area.

Transportation

This section describes elements of the existing transportation network, information related to land use, traffic operations, safety, access, and non-motorized connections. This section concludes with a review of known social, economic, and environmental (SEE) resources considerations within the study area.

Functional Classification

The functional classification system is used to create a roadway network that efficiently collects and distributes traffic from neighborhoods to the state highway system. A successful system coordinates and manages mobility, roadway design, and route alignment as well as seeks to match current and future access and land use with the adjacent roadway's purpose, speeds, and spacing. The functional classification system is comprised of principal arterials, minor arterials, major and minor collectors, and local roadways.

Within the study extents, north of US Highway 10, the 17th Street N corridor serves as a Collector roadway between 1st Avenue North and 15th Avenue North. The existing ADT (vehicles per day) ranges from 1,100 at the north end to 3,500 at the southern end of the corridor, according to MnDOT's 2015 and 2017 traffic counts. South of US Highway 10, and outside the study extents, 17th Street South serves as a Minor Arterial roadway between Main Avenue and 12th Avenue. The 17th Street N corridor is an important north-south connection facilitating travel between local residential streets to minor arterial commercial corridors and ultimately to US Highway 10, a vital east-west Principal Arterial. **Figure 3 (Appendix A)** shows the functional class network in the study area.

Since 17th Street N is a collector roadway through a developed residential and commercial business area it has several private driveway and local street access points. The east-west local streets that intersect the 17th Street N study area includes 13th Avenue, 11th Avenue, 10th







Avenue, 8th Avenue, 7th Avenue, 6th Avenue, 5th Avenue, 3rd Avenue, 2nd Avenue. 4th Avenue is an east-west Collector roadway that intersects the 17th Street N in the study area. 15th Avenue at the north extent and 1st Avenue at the south extent of the study area are both Minor Arterial roadways.

Figure 3 in the existing conditions report shows the roadway jurisdiction in the study area.

Utilities

<u>Sanitary</u>

According to the City of Moorhead GIS, sanitary sewer systems in the corridor area were all constructed between 1944-1958. The material of the main lines in this area is vitrified clay pipe. In the southern portion of the corridor from 1st Ave N to 4th Ave N sanitary sewer main lines cross the corridor perpendicularly at the intersections. Moving north from 4th Ave N to 15th Ave N sanitary sewer mains are located near the centerline of the roadway. There is a sanitary high point mid-block between 11th Ave N and 13th Ave N. At this location main lines travel north or south respectively.

<u>Storm</u>

According to the City of Moorhead GIS, storm sewer systems in the project area are all reinforced concrete pipe. Storm main lines primarily run on the east side of 17th Street N except for block gaps between 1st Ave N and 2nd Ave N and 6th Ave N and 7th Ave N where intersection catch basins are served by east-west storm mains. Storm mains from 2nd Ave N to 6th Ave N primarily carry water to an east-flowing storm main at 4th Ave N. Storm mains from 7th Ave N primarily carry water to an east-flowing storm main at 10th Ave N.

<u>Drainage</u>

Due to relatively flat topography present in the area, storm runoff along the roadway profile in street gutters is inconsistent. Areas of ponding occur during spring melt and storm events. Anecdotal evidence of ponding on adjacent properties has also been received, but not observed.

<u>Water</u>

Water distribution systems in the area, according to Moorhead Public Service GIS, run along the west side of the roadway throughout the entirety of the corridor. Watermains are primarily constructed from cast iron from 1st Ave N to 8th Ave N and the primary material from 8th Ave N to 15th Ave N is Polyvinyl Chloride (PVC) pipe. Ages of the pipe vary throughout the corridor with installation dates ranging from 1960-2019. Segments of watermain that cross the intersection at 4th Ave N were installed in 1941.







Electrical

According to data provided by Moorhead Public Service, electrical distribution systems throughout the study area vary. The southern portion of the corridor from 1st Ave N to 4th Ave N is primarily served by underground primary and secondary electrical distribution lines. Further north underground crossings of primary electrical lines are present between 10th Ave N and 13th Ave N with a crossing at the intersection of 13th Ave N and 17th Street N. Overhead secondary lines run along the west side of the corridor between 6th Ave N and 13th Ave N with overhead crossings at 2nd Ave N, 4th Ave N, 6th Ave N, and 10th Ave N. Primary lines for the residential area between 4th Ave N and 15th Ave N are generally located in the alley a half-block from the 17th Street Corridor in either direction. Street lights are present along the entirety of the corridor primarily on the west side of the roadway.

Visual

17th Street N appears to be a low-density commercial corridor from 1st Avenue N to 4th Avenue N. Views from the street include store fronts and commercial parking lots. From 4th Avenue to 15th Avenue, the corridor appears to be a single-family residential street. Views include single-family homes, mature trees and foliage, and driveways. The only exception to this is Moorhead Manor, a retirement home, on the Northeast corner of 17th Street N and 13th Avenue N.

Air, Noise, and Cumulative Potential Effects

Air, noise, and cumulative potential effects will be considered in a future NEPA analysis once a project is funded.

IV. References

Executive Order 12898. (1994).

FHWA Office of Human Environment (2012). Webinar Series on Environmental Justice: Guidance for Conducting Community Impact Assessments.

U.S. Census Bureau. (2017). American Community Survey 5-year Estimate. <u>www.data.census.gov/cedsci/</u>.

U.S. Department of Transportation (DOT) Order 5610.2(a). (2012). Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

U.S. Environmental Protection Agency (EPA). (2019). EJSCREEN. <u>www.epa.gov/ejscreen</u>.







17th St N Corridor Study - Figure 1

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2AVEN

1 AVEN

Ø

Project Location



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CENTER AVE

Legend

Study Area

600



17th St N Corridor Study - Figure 2

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Future Land Use

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Natural Features

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SIGNAL WARRANTS ANALYSIS

FOR

Real People. Real Solutions.

17th St N at 1st Ave N (Moorhead, MN) **Existing Volumes**

LOCATION:	17th St N at 7	1st Ave N							
COUNTY:	Clay								
REF. POINT:			Speed	Approach De	scription				Lanes
DATE:	9/15/2020		30	Major App1:	EASTBOUN	ND			3
			30	Major App3:	WESTBOU	ND			2
OPERATOR:	KR		30	Minor App2:	SOUTHBO	UND			1
				Minor App4:					
0.70 FACTOR L	JSED?	No	_						
POPULATION <	< 10,000?	No 📼	1						
N/A		No 🔽							
THRESHOLDS	1A/1B:			600/900			150/75	-	
	MAJOR	MAJOR	TOTAL	MAJOR	MINOR	MINOR 2	MINOR	MINOR 4	MET SAME
HOUR	APP. 1	APP. 3	1+3	1A/1B	APP. 2	1A/1B	APP. 4	(1A/1B
0:00 - 1:00			0	/		/			1
1:00 - 2:00			0	/		/			/
2:00 - 3:00			0	/		/			/
3:00 - 4:00			0	/		/			/
4:00 - 5:00			0	/		/			1
5:00 - 6:00			0	/		/			1
6:00 - 7:00	113	314	427	/	28	/			/
7:00 - 8:00	321	683	1004	X/X	34	/			1
8:00 - 9:00	256	365	621	X/	35	/			1
9:00 - 10:00	244	259	503	/	17	/			1
10:00 - 11:00	260	284	544	/	15	/			1
11:00 - 12:00	353	371	724	X/	33	/			/
12:00 - 13:00	433	433	866	X/	32	/			/
13:00 - 14:00	322	391	713	X/	36	/			/
14:00 - 15:00	442	426	868	X/	43	/			/
15:00 - 16:00	480	410	890	X/	58	/			/
16:00 - 17:00	571	469	1040	X/X	59	/			/
17:00 - 18:00	588	499	1087	X/X	56	/			/
18:00 - 19:00	345	97	442	/	23	/			/
19:00 - 20:00			0	/		/			1
20:00 - 21:00			0	/		/			/
21:00 - 22:00			0	/		/			1
22:00 - 23:00			0	/		/			/
23:00 - 24:00			0	/		/			/
•	Met (Hr)	Required (Hr)	-		-		-	
Warrant 1A	0	8		Not satisfied	1				
Warrant 1B	0	8		Not satisfied	1				
Warrant 2	0	4		Not satisfied	1				

Varrant 2 Warrant 3 Warrant 7

0

0

1

8

Not satisfied Not satisfied Not satisfied





Note: For data points outside the graph range, check the minor street volume against the lower thresholds

	Warrant Criteri	а	Actual	Hourly Count
Major	Warrant 2,	Warrant 3, Pe	Major	Actual Hourly Count
200			0	0
300	440		0	0
400	390	570	0	0
500	340	520	0	0
600	290	465	0	0
700	245	420	0	0
800	205	370	427	28
900	170	330	1004	34
1000	145	285	621	35
1100	120	250	503	17
1200	100	220	544	15
1300	83	190	724	33
1400	80	160	866	32
1500	80	140	713	36
1600	80	115	868	43
1700	80	100	890	58
1800	80	100	1040	59
			1087	56
			442	23
			0	0
			0	0
			0	0
			0	0
			0	0



SIGNAL WARRANTS ANALYSIS

FOR

17th St N at 15th Ave N (Moorhead, MN) Real People. Real Solutions.

Existing Volumes

LOCATION:	17th St N at 7	15th Ave N							
COUNTY:	Clay								
REF. POINT:			Speed	Approach Des	scription				Lanes
DATE:	9/15/2020		30	Major App1:	EASTBOUN	ND			1
			30	Major App3:	WESTBOU	ND			1
OPERATOR:	KR		30	Minor App2:	NORTHBO	UND			1
				Minor App4:					
0.70 FACTOR L	JSED?	No	-						
POPULATION <	< 10,000?	No 🔽	1						
N/A		No 🔻							
THRESHOLDS	1A/1B:			500/750			150/75	T	
	MAJOR	MAJOR	TOTAL	MAJOR	MINOR	MINOR 2	MINOR	MINOR 4	MET SAME
HOUR	APP. 1	APP. 3	1+3	1A/1B	APP. 2	1A/1B	APP. 4	(1A/1B
0:00 - 1:00			0	/		/			/
1:00 - 2:00			0	/		/			1
2:00 - 3:00			0	/		/			/
3:00 - 4:00			0	/		/			1
4:00 - 5:00			0	/		/			1
5:00 - 6:00			0	/		/			1
6:00 - 7:00	87	136	223	/	37	/			1
7:00 - 8:00	163	308	471	/	74	/			/
8:00 - 9:00	186	165	351	/	33	/			1
9:00 - 10:00	148	144	292	/	18	/			1
10:00 - 11:00	143	137	280	/	25	/			1
11:00 - 12:00	176	168	344	/	28	/			1
12:00 - 13:00	216	181	397	/	28	/			1
13:00 - 14:00	215	188	403	/	28	/			1
14:00 - 15:00	238	188	426	/	35	/			1
15:00 - 16:00	316	242	558	X/	40	/			1
16:00 - 17:00	399	255	654	X/	40	/			1
17:00 - 18:00	326	263	589	X/	27	/			1
18:00 - 19:00	206	199	405	/	25	/			1
19:00 - 20:00			0	/		/			1
20:00 - 21:00			0	/		/			1
21:00 - 22:00			0	/		/			1
22:00 - 23:00			0	/		/			1
23:00 - 24:00			0	/		/			1
	Met (Hr)	Required (Hr)						
Warrant 1A	ò	8	,	Not satisfied	I				
Warrant 1B	0	8		Not satisfied	1				
Warrant 2	0	4		Not satisfied					

Warrant 3 Warrant 7

1

8

0

0

Not satisfied Not satisfied





Note: For data points outside the graph range, check the minor street volume against the lower thresholds

	Warrant Criteri	а	Actual I	Hourly Count
Major	Warrant 2,	Warrant 3, Pe	Major	Actual Hourly Count
200			0	0
300	360		0	0
400	310	475	0	0
500	260	425	0	0
600	215	370	0	0
700	180	330	0	0
800	150	280	223	37
900	125	240	471	74
1000	100	204	351	33
1100	85	175	292	18
1200	80	150	280	25
1300	80	130	344	28
1400	80	115	397	28
1500	80	100	403	28
1600	80	100	426	35
1700	80	100	558	40
1800	80	100	654	40
			589	27
			405	25
			0	0
			0	0
			0	0
			0	0
			0	0



Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS FOR 17th St N at 1st Ave N (Moorhead, MN) 2045 Volumes

LOCATION:	17th St N at 7	1st Ave N							
COUNTY:	Clay								
REF. POINT:			Speed	Approach De	scription				Lanes
DATE:	11/6/2020		30	Major App1:	EASTBOUN	٧D			3
			30	Major App3:	WESTBOU	ND			2
OPERATOR:	KR		30	Minor App2:	SOUTHBO	UND			1
				Minor App4:					
0.70 FACTOR L	JSED?	No							
POPULATION <	< 10,000?	No 🔫							
N/A		No 🔫							
THRESHOLDS	1A/1B:			600/900			150/75		-
	MAJOR	MAJOR	TOTAL	MAJOR	MINOR	MINOR 2	MINOR	MINOR 4	MET SAME
HOUR	APP. 1	APP. 3	1+3	1A/1B	APP. 2	1A/1B	APP. 4	(1A/1B
0:00 - 1:00			0	/		/			1
1:00 - 2:00			0	/		/			1
2:00 - 3:00			0	/		/			1
3:00 - 4:00			0	/		/			1
4:00 - 5:00			0	/		/			1
5:00 - 6:00			0	/		/			1
6:00 - 7:00	158	435	593	/	31	/			1
7:00 - 8:00	430	938	1368	X/X	38	/			1
8:00 - 9:00	354	504	858	X/	39	/			1
9:00 - 10:00	339	361	700	X/	18	/			1
10:00 - 11:00	360	392	752	X/	17	/			1
11:00 - 12:00	487	512	999	X/X	37	/			1
12:00 - 13:00	592	599	1191	X/X	36	/			1
13:00 - 14:00	448	540	988	X/X	40	/			1
14:00 - 15:00	607	577	1184	X/X	48	/			1
15:00 - 16:00	658	561	1219	X/X	64	/			1
16:00 - 17:00	790	635	1425	X/X	66	/			1
17:00 - 18:00	809	678	1487	X/X	62	/			1
18:00 - 19:00	473	476	949	X/X	25	/			1
19:00 - 20:00			0	/		/			1
20:00 - 21:00			0	/		/			1
21:00 - 22:00			0	/		/			1
22:00 - 23:00			0	/		/			1
23:00 - 24:00			0	/		/			1
	Met (Hr)	Required (Hr)						
Warrant 1A	ò		,	Not satisfied	b				
Warrant 1B	0	8		Not satisfied	b				
Warrant 2	0	4		Not satisfied	b				
Warrant 3	0	1		Not satisfied	b				

Warrant 3 Warrant 7

3

8

Not satisfied Not satisfied



Linura 1		and Deals Hour	Marrant Analysia
Floure L.	FOUL HOUL A	по Реак поцг	vvariani Anaivsis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

	Warrant Criteri	а	Actual	Hourly Count
Major	Warrant 2,	Warrant 3, Pe	Major	Actual Hourly Count
200			Ō	0
300	440		0	0
400	390	570	0	0
500	340	520	0	0
600	290	465	0	0
700	245	420	0	0
800	205	370	593	31
900	170	330	1368	38
1000	145	285	858	39
1100	120	250	700	18
1200	100	220	752	17
1300	83	190	999	37
1400	80	160	1191	36
1500	80	140	988	40
1600	80	115	1184	48
1700	80	100	1219	64
1800	80	100	1425	66
			1487	62
			949	25
			0	0
			0	0
			0	0
			0	0
			0	0



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SIGNAL WARRANTS ANALYSIS FOR 17th St N at 15th Ave N (Moorhead, MN) 2045 Volumes

LOCATION:	17th St N at 7	15th Ave N							
REF POINT	Clay		Sneed	Annroach De	escription				Lanes
	11/6/2020		30	Major Ann1	FASTBOUI				1
D/(TE.	11/0/2020		30	Major App 1: Major App 3:	WESTBOU				1
OPERATOR.	KR		30	Minor App2:	NORTHBO				1
			00	Minor App2:	Northeo	one			·
0.70 FACTOR L	JSED?	No		Millor App I.					
POPULATION <	< 10.000?	No -	1						
N/A	,	No T							
THRESHOLDS	1A/1B:		1	500/750			150/75		
	MAJOR	MAJOR	TOTAL	MAJOR	MINOR	MINOR 2	MINOR	MINOR 4	MET SAME
HOUR	APP. 1	APP. 3	1+3	1A/1B	APP. 2	1A/1B	APP. 4	(1A/1B
0:00 - 1:00			0	/		/			1
1:00 - 2:00			0	/		/			1
2:00 - 3:00			0	/		/			1
3:00 - 4:00			0	/		/			1
4:00 - 5:00			0	/		/			1
5:00 - 6:00			0	/		/			1
6:00 - 7:00	104	199	303	/	51	/			1
7:00 - 8:00	198	447	645	X/	101	/X			1
8:00 - 9:00	227	240	467	/	45	/			1
9:00 - 10:00	181	209	390	/	25	/			1
10:00 - 11:00	174	199	373	/	34	/			1
11:00 - 12:00	215	245	460	/	38	/			1
12:00 - 13:00	261	263	524	X/	38	/			1
13:00 - 14:00	264	274	538	X/	38	/			1
14:00 - 15:00	290	269	559	X/	48	/			1
15:00 - 16:00	385	347	732	X/	55	/			1
16:00 - 17:00	489	368	857	X/X	55	/			1
17:00 - 18:00	400	378	778	X/X	37	/			1
18:00 - 19:00	248	285	533	X/	34	/			1
19:00 - 20:00			0	/		/			1
20:00 - 21:00			0	/		/			1
21:00 - 22:00			0	/		/			1
22:00 - 23:00			0	/		/			1
23:00 - 24:00			0	/		/			1
R.	Met (Hr)	Required (Hr)						-
Warrant 1A	0 Í	8		Not satisfied	b				
Warrant 1B	0	8		Not satisfied	d				
Warrant 2	0	4		Not satisfied	d				
Warrant 3	0	1		Not satisfied	d				
Warrant 7	1	8		Not satisfied	b				



Figure 1	Four Hour and	Poak Hour	Warrant Analy	veie
riguie i.		I Car Hour	vianant Anar	yoia

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria		Actual Hourly Count		
Major	Warrant 2,	Warrant 3, Pe	Major	Actual Hourly Count
200			Ō	Ő
300	360		0	0
400	310	475	0	0
500	260	425	0	0
600	215	370	0	0
700	180	330	0	0
800	150	280	303	51
900	125	240	645	101
1000	100	204	467	45
1100	85	175	390	25
1200	80	150	373	34
1300	80	130	460	38
1400	80	115	524	38
1500	80	100	538	38
1600	80	100	559	48
1700	80	100	732	55
1800	80	100	857	55
			778	37
			533	34
			0	0
			0	0
			0	0
			0	0
			0	0

Appendix C: Purpose and Need



17th Street N Corridor Study FINAL Purpose + Need Statement

Date:	November 9, 2020
То:	Luke Champa, Assistant Planner, FM Metro COG
	Dan Farnsworth, Transportation Planner, FM Metro COG
From:	Cody Christianson, PE, Project Manager, Bolton & Menk, Inc.
	Jim Mertz, GISP, Project Planner, Bolton & Menk, Inc.
	Connor Cox, Project Planner, Toole Design
Subject:	Purpose and Need Statement
	17 th Street N Corridor Study
	Fargo-Moorhead Metropolitan Council of Governments (Metro COG)





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- Table 2 2040 No Build Traffic Operations Analysis Results
- Table 3 Intersections with Safety Concerns

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Figure 1 – Study Area





I. Introduction

This corridor study purpose and need statement defines the transportation concerns or deficiencies along 17th Street N from 1st Avenue N to 15th Avenue N. The formation of the purpose and need statement is based upon existing conditions data and stakeholder input received early in the study process. The identification of needs helps build a common focus among stakeholders on the scope and timing of improvements through defining the "who, what, where, why, and when" of the transportation needs. This also provides project partners and stakeholders with direction on the need for additional analysis required in the next phase of the project development process.

The identified needs and opportunities within the study area will also serve as the cornerstone for finalizing evaluation criteria, which will be used to create and evaluate a full range of alternatives and design options that satisfy the specific project area needs.

Since any major future improvements along the 17th Street N will likely seek federal funding, pertinent Federal Highway Administration (FHWA) transportation purpose and need guidance was used, in part, to help outline transportation needs (and other considerations) in the study area. It is anticipated that standalone purpose and need statements will be required for each future action and that the study needs documented will be utilized to the extent practicable.

Study Area Background

The 17th Street N project corridor extends from the downtown Moorhead business area at 1st Avenue N to the recently improved intersection at 15th Avenue N within the primarily residential area. The corridor has 140 feet of platted right-of-way and approximately 60 feet of curb-to-curb pavement. For ease in describing key study area needs in more depth, the corridor is split into a north segment and a south segment based on their different settings and needs.

Figure 1: Study Area







Segment 1 – 1st Avenue N to 4th Avenue N, the commercial and institutional segment, is generally characterized by a low speed (30 mph), three-lane urban section with a center left turn lane and onstreet parking on both sides of the roadway. Pedestrian facilities are incomplete and limited. The Park Christian School zone along the corridor generates high peak hour volumes of bus, student driver, and parent drop off and pick up traffic. D-S Beverages generates heavy commercial truck traffic between their location just north of 2nd Avenue and US Highway 10. Traffic generation is further increased by direct access to 1st Avenue N and close proximity access to US Highway 10.

Segment 2 – 4th Avenue N to 15th Avenue N, the residential segment with primarily single-family homes, is a 30 mph, two-lane urban section with on-street parking on both sides of the roadway. The pedestrian network includes a continuous and connected sidewalk throughout, however several ADA ramps are missing or inadequate. The far north part of this segment, from approximately 10th Avenue N to 15th Avenue N, falls within a 500-year floodplain. Drainage is an issue in this area as sections of curb and gutter have settled, there are limited number of inlets along the corridor, and the boulevard slopes are very flat. The segment is a major local traffic trip generator as it serves connections to several single-family, multiple vehicle households. North of 15th Avenue N, the zoned Industrial area would be most conveniently served by US Highway 75 and 15th Avenue N (County Road 83) and should result in little to no heavy truck traffic on 17th Street N.

As a major collector roadway, the 17th Street N corridor is important for area residents and the businesses it serves. An important commuter route, it provides a direct north-south connection and has an annual average daily traffic (AADT) of 1100 vehicles in the northern portion and 3550 in the southern section. The Metro COG 2020-2023 Transportation Improvement Program and the City of Moorhead 2020 to 2024 Pavement Management and Capital Improvement Projects Plan identify this roadway as a locally funded rehabilitation project being constructed in 2022.

Purpose

The purpose of the 17th Street N Corridor Study is to identify context-sensitive transportation improvements along 17th Street N that will safely accommodate all users, provide efficient mobility and access for all modes of travel, preserve community connections, and encourage economic vitality. Future corridor improvements should also include financially responsible infrastructure that is compatible with the natural and built environment.

II. 17th Street N Corridor Study Area Needs

This section lists the study area needs that will be refined based on existing conditions data and future conditions analysis. The determination of primary needs, secondary needs, and additional considerations will be completed after review of the data/analysis and in consultation with the Study Review Committee (SRC).

Primary needs include the transportation shortfalls that have been substantiated and recognized by the project partners as priority issues to be resolved. Primary needs lead to the initiation of specific improvements/project(s) that resolve current or future concerns. Secondary needs include other transportation shortfalls and opportunities in the study area that may be able to be addressed, if feasible, at the same time that the primary needs are addressed. Additional considerations are other important factors that may have an influential effect on project decisions or project elements. Below is



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an assessment of 17th Street N corridor needs and/or additional considerations. The determination of whether a need is considered primary and/or secondary will be determined on a project by project basis and at the scoping and preliminary design phase of project development.

Modal Interrelationships

Walkability/Bikeability

Within and connecting to the study area, there are many destinations for pedestrians and bicyclists to travel to/from. The study area is served by an incomplete and mostly non-ADA compliant pedestrian sidewalk system and two east-west local bicycle facility connections that intersect 17th Street N at 15th and 2nd Avenue N. These bicycle facility connections provide both pedestrian and bicycle connections to and from 17th Street N. Complete descriptions of existing facilities and maps illustrating the existing and planned network of sidewalks and trails can be found in the 17th Street N Corridor Study Existing Conditions Report.

Listed below is a summary of pedestrian and bicycle facility needs within the study area. These system needs are further discussed and mapped in the 17^{th} Street N Corridor Study Existing Conditions Report.

- ADA Compliant Feature several sidewalk connections and curb ramps in the project area are in poor condition or absent at intersections along 17th St. These are listed below:
 - Northwest corner of 17th St and 4th Ave, crossing 17th St
 - Northwest and Southwest corners of 17th St and 5th Ave, crossing 17th St and 5th Ave
 - Northeast corner of 17th Street N and 7th Ave, crossing 17th Street N
 - Northwest corner of 17th Street N and 8th Ave, crossing 17th Street
 - Southeast corner of 17th Street and 11th Ave, crossing 17th Street
- System Gaps/Barriers Connectivity for pedestrian and bicycle movements is a need within the study area as the existing wide corridor promotes higher traffic speeds and can create barriers for non-motorized travelers to travel along and cross. Currently the only marked and signed crosswalks exist at 5th Avenue and 10th Avenue.

Several gaps and missing connections have been identified in the study area:

- Pedestrian facilities do not exist along the corridor from 1st Ave N to 4th Ave N except for recent improvements near Park Christian School.
- A planned bicycle facility along the 17th Street N study area will fill a north-south gap for bicycle commuters and recreational bicyclists between 2nd Avenue N and 15th Avenue N.
- A planned bicycle facility along 7th Avenue, between 13th Street N and US Highway 75, would cross 17th Street N.
- Side street north-south marked crosswalks are limited in the study area. While a marked crosswalk may not be warranted at every local street intersection it will be important to





bring awareness to pedestrian activity surrounding the school, commercial area, and transit stop locations.

 The City of Moorhead Comprehensive Plan recommends a pedestrian crossing on the east side of the intersection of 1st Ave N and 17th Street N.

Pedestrian and Bicycle Crashes

A crash analysis showed there were no reported fatal crashes or pedestrian crashes in the last ten years (2010-2019). While the frequency and severity of crashes involving these vulnerable modes of travel does not demonstrate a substantial safety concern there was a possible injury bicycle crash at the intersection of 1st Ave N and 17th Street N in 2011. The bicyclist was crossing 17th Street N and was hit by a driver along southbound 17th Street N attempting to turn right onto 1st Ave N.

Transit Service

MATBUS, Fargo-Moorhead Metropolitan Area's public transportation service, offers Route 4, which runs along 17th Street from 7th Ave N to 13th Ave N. Route 4 connects the corridor to both downtown Moorhead and downtown Fargo. Current stops along 17th Street are unimproved and do not contain any amenities such as shelters, benches, lighting, or bus bulbs. The lack of ADA accommodations near bus stop locations limits the accessibility to the transit service.

Roadway lighting is limited, and pedestrian lighting does not exist on the corridor. Lack of corridor lighting to enhance pedestrian and bicyclist safety creates challenges for the success of improving Moorhead night route on-time and service by extending routes 1, 3, 4, and 5 end times to 11:00 PM and adding a second bus to Route 4 to provide 30 minute service on weekday and Saturday nights. This community need is recognized in the Fargo-Moorhead Metropolitan Area 2016-2020 Transit Development Plan.

Heavy Commercial Vehicle Movements

A few heavy commercial vehicle generating businesses/developments have been identified in the south end of study corridor (Segment 1). According to 2019 traffic data, heavy commercial vehicles account for approximately 9 to 12 percent of all trips on 17th Street N.

Safe and reliable access to existing and future freight generating developments as well as efficient connections to the highway road network is important to the long term viability of these industries to deliver and receive goods to/from regional markets outside the study area. While existing access conditions appear to adequately serve heavy commercial vehicle operations, there are local circulation issues, intersection geometry constraints, and connectivity opportunities within Segment 1 that need to be considered in evaluating future improvements in order to ensure safe and efficient freight movements to current and future commercial, industrial, and manufacturing land uses. Below is a brief description of the important freight access points and routes within each segment of the corridor study area:





Segment 1: 1st Avenue N to 4th Avenue N, the commercial and institutional segment.

1st Avenue N provides sufficient access between 17th Street N and US Highway 10 for heavy commercial movements. Existing geometrics (lane/shoulder widths, sight distance, lack of turn lanes, and turning radii) do not create any apparent challenges for freight movements.

D-S Beverages generates heavy commercial truck traffic between their location just north of 2nd Avenue and US Highway 10. Stenerson Bros. Lumber Co truck traffic generation is primarily between 2nd Avenue N and 1st Avenue North. Stenerson customer traffic uses access locations near the intersection of 1st Avenue North and 17th Street North. The Park Christian School zone generates high peak hour volumes of bus traffic mixed with student driver and parent drop off and pick up traffic.

Segment 2: 4th Avenue N to 15th Avenue N, the residential segment.

North of 15th Avenue N, the zoned Industrial area would be most conveniently served by US Highway 75 and 15th Avenue N (County Road 83) and should result in little to no heavy truck traffic on 17th Street N.

Vehicle Mobility

The 17th Street N corridor is an important north-south connection facilitating travel between local residential streets to 1st Avenue N (a Minor Arterial roadway) and 15th Avenue N (a Major Collector roadway). Nine Local Streets, two Minor Arterials, and one Collector Street intersects the 17th Street N study corridor. The 1st Avenue N corridor and Downtown Moorhead has experienced infill and redevelopment growth is transforming into more of a destination for Moorhead residents.

Corridor Operations

Within the study extents, north of US Highway 10, the 17th Street N corridor serves as a Collector roadway between 1st Avenue North and 15th Avenue North. The existing annual average daily traffic (AADT) ranges from 1,100 vehicles at the north end to 3,500 at the southern end of the corridor, according to MnDOT's 2015 and 2017 traffic counts. South of US Highway 10, and outside the study extents, 17th Street South serves as a Minor Arterial roadway between Main Avenue and 12th Avenue S. The 17th Street N corridor is an important north-south connection facilitating travel between local residential streets to minor arterial commercial corridors and ultimately to US Highway 10, a vital eastwest Principal Arterial.

Since 17th Street N is a collector roadway through a developed residential and commercial business area it has several private driveway and local street access points. The east-west local streets that intersect the 17th Street N study area includes 13th Avenue, 11th Avenue, 10th Avenue, 8th Avenue, 7th Avenue, 6th Avenue, 5th Avenue, 3rd Avenue, and 2nd Avenue. 4th Avenue is an east-west Collector roadway that intersects 17th Street N in the study area. 15th Avenue at the north extent and 1st Avenue at the south extent of the study area are both Minor Arterial roadways.

Existing Traffic Operations

Turning movement counts were completed at the intersections of 17th St N at 15th Ave, 8th Ave and 1st Ave on Tuesday, September 15, 2020. Park Christian School was in session when the count was taken.



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Additionally, tube counts were collected Tuesday, September 22nd through Thursday the 24th along 17th St N. The traffic data collected in September 2020 was compared to previous count data available to determine if edits were needed or if the data was reflective of normal traffic. All recommended changes to the count data were approved by the project team. The methodology is presented in this study's Traffic Count Analysis Memorandum. Once the counts were updated to accurately reflect normal traffic patterns an operational analysis was completed. An analysis of existing AM and PM peak hour intersection operations was completed in Synchro/SimTraffic. All intersections in the study area are stop controlled. 15th Avenue at the north extent and 1st Avenue at the south extent of the study area have stop controls that stop traffic on 17th Street N and give right of way to the east-west Minor Arterial roadways. 8th Avenue at 17th Street N is all way stop controlled. All other intersections are side street stop controlled giving right of way to 17th Street N traffic.

The average intersection delay is a volume-weighted average of delay experienced by all motorists entering the intersection on all intersection approaches. Intersections and each intersection approach are given a ranking from Level of Service (LOS) A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS A through D are generally perceived to be acceptable to drivers. LOS E indicates that an intersection is operating at, or very near, its capacity and that travelers experience considerable delays. LOS F indicates an intersection where demand exceeds capacity resulting in substantial delays. **Table 1** shows the intersection delay as well as the maximum delay of all movements at each intersection.

Intersection	Peak Hour	Intersection (Delay* - LOS)	Maximum Movement	
Intersection			Mvmt	Delay* - LOS
1st Ave & 17th St Two-Way Stop Controlled	AM	3 - A	SBL	26 - D
	PM	2 - A	SBL	22 - C
17th St & 8th Ave	AM	6 - A	WBT	8 - A
All-Way Stop Controlled	PM	6 - A	NBT	7 - A
17th St & 15th Ave Two-Way Stop Controlled	AM	2 - A	NBL	9 - A
	PM	2 - A	NBL	11 - B

Table 1 – Existing Traffic Operations Analysis Results

*Delay is in seconds per vehicle

Based on the existing conditions operational analysis, all intersections operate with LOS A overall. The southbound left at 1st Avenue and 17th Street N operates with LOS D during the AM peak hour and LOS C during the PM peak hour. All other movements operate with LOS A or B.

A 2008 documented review of 1st Avenue from the Red River to 21st Street recommends a traffic signal at the intersection of 1st Avenue and 17th Street N to alleviate significant side street delays. The existing traffic analysis indicates that the southbound left delay is currently acceptable, but approaching capacity. A signal warrant analysis was completed which indicates that with the existing volumes a signal is not justified at the intersection of 1st Avenue and 17th Street N.





2045 No-Build Traffic Operations

Using the traffic forecasting methodology detailed in this study's Traffic Forecasting Memorandum, an analysis of forecasted 2045 AM and PM peak hour intersection operations was also completed in Synchro/SimTraffic. The results are show in **Table 2**.

Intersection	Peak	Intersection (Delay* - LOS)	Maximum Movement	
Intersection	Hour		Mvmt	Delay* - LOS
1st Ave & 17th St	AM	6 - A	SBL	113 - F
Two-Way Stop Controlled	PM	4 - A	SBL	56 - F
17th St & 8th Ave	AM	5 - A	WBT/SBT	6 - A
All-Way Stop Controlled	PM	5 - A	NBL	6 - A
17th St & 15th Ave	AM	3 - A	NBL	12 - B
Two-Way Stop Controlled	PM	2 - A	NBL	14 - B

Table 2 – 2045 No Build Traffic Operations Analysis Results

*Delay is in seconds per vehicle

The results of the 2045 No Build operational analysis indicate that the intersection delay overall remains acceptable with LOS A during both peak hours. The southbound left movement at 1st Avenue and 17th Street N is anticipated to operate with LOS F during both peak hours with the average delay nearly two minutes per vehicle during the AM peak hour and nearly one minute per vehicle during the PM peak hour. All other movements operate with LOS C or better. A signal warrant analysis was completed which indicates that with the 2045 volumes a signal is not justified at the intersection of 1st Avenue and 17th Street N.

Vehicle Safety

The intersection of 1st Ave N and 17th Street N operates outside the normal range compared to similar intersections statewide for both total number of crashes and for fatal and serious crashes with one serious injury crash. There were 13 crashes in the project area over the last five years (2015-2019). Right angle crashes were the most common accounting for 9 of the 13 crashes. No fatal or pedestrian and bicycle crashes were reported (2015-2019) however there was one possible injury bicycle crash reported in the last ten years (2010-2019).

Crash Analysis

A crash analysis was completed for the study area to understand the existing safety concerns. The key results of the crash analysis for the timeframe between 2015-2019 include:

- 13 intersection crashes
- 9 of the 13 crashes were right angle crashes
- There were no reported fatal crashes
- There was one reported non-fatal severe crash
- There were no reported pedestrian or bicycle crashes





- The intersection of 1st Ave N and 17th Street N operates outside the normal range compared to similar intersections statewide for both total number of crashes and for fatal and serious crashes with one serious injury crash.
- All other intersections operate within the normal range compared to similar intersections statewide.
- The overall corridor operates within the normal range compared to other two lane roadways with similar ADT.

A ten-year (2010-2019) crash analysis was completed for fatal crashes in addition to crashes involving a pedestrian and/or bicycle. There was a possible injury bicycle crash at the intersection of 1st Ave N and 17th Street N in 2011. The bicyclist was crossing 17th Street N and was hit by a vehicle along southbound 17th Street N attempting to turn right onto 1st Ave N. There were no reported fatal crashes or pedestrian crashes in the last ten years.

Contributing Conditions

The physical characteristics of corridors and intersections can contribute to safety issues. Below is a list of geometric conditions that may have contributed to past safety concerns.

A key component can be the inadequate spacing of access points. Since 17th Street N is a collector roadway through a developed residential and commercial business area it has several private driveway and local street access points. The access spacing analysis indicated that all full access intersections meet the recommended spacing except between 10th Ave N and 11th Ave N. The spacing of driveways along the corridor, however, does not meet the recommended spacing lengths except between 13th Ave N and 15th Ave N.

Infrastructure Conditions

Pavement/Maintenance Reduction

The existing pavement typical section on the 17th Street N corridor is approximately 60 feet curb-tocurb from 1st Ave N to 15th Ave N. The entire platted right-of-way is approximately 140 feet. This excessive width is nearly double the widths of similar adjacent roadways and provides unique challenges compared to similar two and three-lane roadways in the city. Existing bituminous surface maintenance requires more materials, time, and cost. Likewise, winter roadway maintenance requires additional sand/salt material and snowplow trips compared to similar roadways. The Metro COG 2020-2023 Transportation Improvement Program and the City of Moorhead 2020 to 2024 Pavement Management and Capital Improvement Projects Plan identify projects in the community. Future projects in the study area, as depicted in the Capital Improvement Plans, include:

- 17th Street N Rehabilitation from 1st Avenue N to 15th Avenue N, Planned 2022. This capital maintenance project initiated the study to explore long-term options that result in a fiscally responsible maintenance program moving forward while improving safety, mobility, and aesthetics.
- 15th Avenue N Rehabilitation, Completed 2019





• 4th Avenue N Rehabilitation from 14th Street N to 17th Street N, Planned 2022

Drainage Concerns

The far north part of Segment 2 (4th Avenue N to 15th Avenue N, the residential segment), from approximately 10th Avenue N to 15th Avenue N, falls within a 500-year floodplain with relatively flat topography. Drainage is an issue in this area as sections of curb and gutter have settled, there are a limited number and inconsistent inlets along the corridor, and the boulevard slopes are very flat. Areas of ponding occur during spring melt and storm events. Anecdotal evidence of ponding on adjacent properties has also been received, but not observed. The alternatives development and evaluation processes for future projects will need to conduct an in-depth review and consideration of these features, along with assessing potential impacts to existing drainage systems, future flood risks, sensitive waters, impacts to vegetation, soil and groundwater contamination, and regulatory requirements.

Additional Considerations: Social, Economic, and Environmental (SEE) Factors

This section is intended to provide a high level description of the existing conditions and potential SEE factors within the 17th Street N study area that will need to be considered as alternatives are developed and evaluated as part of the project development process. This section is not an in-depth analysis and the topics to be considered during future phases of project development will depend on the scope of planned projects and the type of funding being used, as a project may be required to undertake state and/or federal environmental review.

A more detailed inventory and assessment of the SEE factors associated with the study area can be found in the 17th Street N Corridor Study Environmental Screening within the 17th Street N Corridor Existing and No Build Conditions Report.

An important social factor needing to be considered early in alternatives development is the presence of Environmental Justice (EJ) populations as all federal actions are required to comply with Executive Order 128981. EJ populations are minority and/or low-income populations that are meaningfully greater than those of the general population. For EJ, "meaningfully greater" is defined as a minority or low-income population that is either 10 percent higher than the county average, or greater than 50 percent of the total geographic unit, or determined based on input from local officials or stakeholders.

Social

Based on a review of U.S. Census data – 2018 American Community Survey 5-year Estimates, there are several block groups within or near the study area that include minority and low-income environmental justice populations. Further determination will be needed on a project basis to determine if these populations have the potential to experience disproportional impacts due to construction activity. Generally, permanent impacts of transportation projects are intended to improve the transportation corridor for all users. While future improvements to the 17th Street N corridor would unlikely disproportionately impact any of the identified environmental justice populations, a robust public/stakeholder engagement effort is strongly recommended in future stages of the project development process and prior to the evaluation of alternatives.




Economic

17th Street N is an important route for residential neighborhoods and commercial freight to connect to commercial, industrial, and institutional areas in the south end of the study corridor and along 1st Avenue N into Downtown Moorhead. Safe and efficient access to commerce destinations (retail shops, restaurants, entertainment, office, and manufacturing/industry) are key factors in the long-term vitality of the local and regional economies.

Traffic counts collected through MetroCOG and StreetLight[®] data from 2019 indicate that heavy commercial truck volumes account for approximately 9 to 12 percent of all daily traffic exiting US Highway 10 for commercial and industrial areas along 1st Avenue N, including those at the south end of the 17th Street N study corridor. Operational and safety benefits for freight operators, including last mile connections to and from the highway system, can translate into real dollar savings for businesses that ship items via commercial trucking. By reducing freight shipping costs, a real efficiency benefit can accrue to the business shipping the product, and a potential cost savings can be realized by the receiving business. Shipping cost savings can lower the overall product cost for consumers, in turn making local businesses more competitive compared with their outside competition, and better able to expand to new markets.

In addition to the business expansion benefit related to shipping cost savings, system multimodal connectivity improvements can extend the market area that businesses can serve, as well as the areas from which they can access customers and/or suppliers. By extending the distance range over which local businesses effectively compete with their regional or state competitors can provide opportunities for substantial market expansion and attraction of commercial and industrial industries.

Investments in transportation-related improvements for all modes result in several types of economic impacts. The magnitude of the economic impact for the study area and the adjacent economic destinations is most influenced by increased safety and mobility for all modes of travel. Providing safe, and accessible travel along and across the 17th Street N corridor will promote economic competitiveness, expand employment opportunities, and increase community health and livability for the local and regional economies.

Environmental

The study area does not include NWI Wetlands, impaired lakes or streams, rare natural features, or MnDNR native plant communities, and there are no water resources along the 17th Street N corridor. The far north part of this segment, from approximately 10th Avenue N to 15th Avenue N, falls within a 500-year floodplain. As previously mentioned, drainage is an issue in this area as sections of curb and gutter have settled, there are a limited number of inlets along the corridor, and the boulevard slopes are very flat. The alternatives development and evaluation processes for future projects will need to conduct an in-depth review and consideration of these features, along with assessing potential impacts to existing drainage systems, future flood risks, sensitive waters, impacts to vegetation, soil and groundwater contamination, and regulatory requirements not only within but impacted by the study area.





Stakeholder Support

In 2020, the 17th Street N Corridor Study Review Committee (SRC) was formed, which consists of representatives from the City of Moorhead Engineering, Public Works, Transit, and Planning; Moorhead Public Service, Park Christian School, Metro COG, NDDOT, and FHWA. The SRC is tasked with guiding the study process and serving as a conduit to their governing bodies and constituents. A goal of the SRC is to develop a unified vision for transportation priorities/recommendations that are locally accepted in order to pursue funding and future municipal consent.





Appendix D: Goals and Objectives

17th Street N Corridor Study Goals & Objectives



Goal	Objective						
Safely accommodate all	Eliminate serious injury crashes						
users (motor vehicles,	Reduce all crashes in both frequency and severity						
freight, transit,	Provide safe pedestrian and bicycle facilities along 17 th Street N						
pedestrians, bicyclists)	and at all crossings						
	Provide acceptable system reliability serving existing and						
	planned growth						
	Manage access consistent with roadway functional class and						
	access spacing guidelines when applicable						
Brovido officiant mobility	Provide a connected transportation system that accommodates						
and access for all modes of	trips consistent with roadway functional class						
travel	Accommodate business delivery and freight needs						
	Accommodate future transit plans and needs						
	Provide convenient access for pedestrians and bicyclists to						
	serve demand						
	Provide convenient access for vulnerable populations including						
	youth and elderly						
	Develop projects and phasing that meet schedule and funding						
Dovelop a financially	constraints						
	Minimize right-of-way costs						
implementation plan	Minimize maintenance and lifecycle costs						
	Maximize benefit-cost of improvements						
	Maximize potential to secure competitive funding						
	Provide reasonable access and connectivity for businesses and						
	neighborhoods						
Brosonyo community	Maintain sustainable access for local trips into/out of						
connections and economic	Downtown Moorhead and to/from Highway 10						
vitality	Support existing and future land use plans						
Vitality	Serve the neighborhood livability for all populations including						
	elderly and youth						
	Seek consistency with regional and local plans						
Provide infrastructure	Avoid, minimize, and mitigate impacts to the built environment						
improvements compatible	Avoid, minimize, and mitigate impacts to sensitive						
with the natural and built	environmental resources.						
environment	Avoid, minimize, and mitigate impacts for flood risks and						
environment	stormwater issues.						





Appendix E: Alternatives



SEGMENT 1 // ALTERNATIVE 1A

THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION

ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN





SEGMENT 1 // ALTERNATIVE 1B (RECOMMENDED ALTERNATIVE)

ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN





SEGMENT 2 // ALTERNATIVE 2A







SEGMENT 2 // ALTERNATIVE 2B







SEGMENT 2 // ALTERNATIVE 2C

SEGMENT 2 // ALTERNATIVE 2D

SEGMENT 2 // ALTERNATIVE 2E (RECOMMENDED ALTERNATIVE)

Appendix F: Opinions of Probable Cost

The following pages include planning-level opinions of probable costs for each of the alternatives shown in Section VII. The opinions of probable costs are based on <u>MnDOT 2019 statewide average bid prices</u>. To develop planning-level opinions of probable costs, it was necessary to make some assumptions about construction. The opinions of probable costs include typical construction materials and costs such as excavation, grading, base, pavement, pavement markings, and signing and markings. They also include the construction of new curb extensions as well as new ADA-compliant curb ramps at each intersection.

Each alternative includes a range for the opinions of probable costs. The high end of the range includes an allowance for design and engineering. Each opinion of probable cost also includes a 25% contingency that may account for unexpected costs or unknown project-specific cost items at this planning-level phase. These opinions of probable costs also include lump sum allowances for construction cost incidentals such as landscaping/ turf establishment, drainage/utilities, and erosion and sediment control. Individual project costs may vary; these opinions of probable costs are only intended to be used at a planning level and should be refined throughout project development.

Disclaimer

Opinions of probable cost were developed by identifying major pay items and establishing rough quantities to determine a rough order of magnitude cost. Additional pay items have been assigned approximate lump sum prices based on a percentage of the anticipated construction cost. Planning-level cost opinions include a 25% contingency to cover items that are undefined or are typically unknown early in the planning phase of a project. Unit costs are based on 2019 dollars and were assigned based on historical cost data from MnDOT Average Bid Prices. Cost opinions do not include permitting, inspection, or construction management; surveying, geotechnical investigation, environmental documentation, special site remediation, escalation, or the cost for ongoing maintenance. A cost range has been assigned; however, these costs can vary widely depending on the exact details and nature of the work. The overall cost opinions are intended to be general and used only for planning purposes. Toole Design Group, LLC makes no guarantees or warranties regarding the cost estimate herein. Construction costs will vary based on the ultimate project scope, actual site conditions and constraints, schedule, and economic conditions at the time of construction.

Alternative 1A - Path and Sidewalk

Assumes construction of a 10' shared-use path, 6' sidewalk, and curb extensions.

Assumes all modifications can occur within existing right-of-way.

Assumes the only curb and gutter modifications occur at intersections for the added curb extensions.

Assumes removal and reconstruction of all driveway aprons on both sides of the road.

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Mill and Overlay	SF	77078	\$3.00	\$231,234	
Saw Cut Bituminous Pavement (Full Depth)	LF	877	\$1.43	\$1,254	
Remove Bituminous Pavement	SF	6139	\$0.82	\$5,034	
Remove Curb and Gutter	LF	877	\$4.40	\$3,859	
Remove Concrete Driveway Pavement	SF	6728	\$1.24	\$8,343	
Install Curb and Gutter Design B624	LF	877	\$23.53	\$20,636	
Type SP 12.5 Non Wearing Course Mixture (3, B)	TON	176	\$77.80	\$13,707	113 lbs/sy*in, assume 4" thick for curb extensions
Type SP 12.5 Wearing Course Mixture (3, B)	TON	88	\$58.30	\$5,136	113 lbs/sy*in, assume 2" thick for curb extensions
Common Excavation	CY	857	\$15.00	\$12,849	
Concrete Pavement 8"	SY	498	\$65.40	\$32,561	Commercial driveways
Aggregate Base (CV) Class 5	CY	306	\$33.67	\$10,301	
4" Concrete Walk	SF	7542	\$6.26	\$47,213	
Type SP 12.5 Wearing Course Mixture (3, B)	TON	156	\$58.30	\$9,069	113 lbs/sy*in, assume 3" thick for shared use path
Geotextile Fabric Type V	SY	1285	\$1.87	\$2,403	
ADA Ramps	EA	15	\$7,000.00	\$105,000	
Construction Cost Subtotal				\$508,597	
Erosion and Sediment Control (2%)				\$10,172	
Landscaping/Turf Establishment (10%)				\$50,860	
Signing/Markings (10%)				\$50,860	
Drainage/Utilities (20%)				\$101,719	
Contingency (25%)				\$127,149	
Design and Engineering Estimate (25%)]
Low Rounded Total Cost (no design and engineerin	g)			\$850,000	
High Rounded Total Cost				\$980,000	

Alternative 1B - Path, Sidewalk and Buffered Bike Lanes

Assumes construction of buffered bike lanes, 10' shared-use path, 6' sidewalk, and curb extensions.

Assumes all modifications can occur within existing right-of-way.

Assumes the only curb and gutter modifications occur at intersections for the added curb extensions.

Assumes removal and reconstruction of all driveway aprons on both sides of the road.

			-	-	
Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Mill and Overlay	SF	77078	\$3.00	\$231,234	
Saw Cut Bituminous Pavement (Full Depth)	LF	877	\$1.43	\$1,254	
Remove Bituminous Pavement	SF	6139	\$0.82	\$5,034	
Remove Curb and Gutter	LF	877	\$4.40	\$3,859	
Remove Concrete Driveway Pavement	SF	6728	\$1.24	\$8,343	
Install Curb and Gutter Design B624	LF	877	\$23.53	\$20,636	
Type SP 12.5 Non Wearing Course Mixture (3, B)	TON	176	\$77.80	\$13,707	113 lbs/sy*in, assume 4" thick for curb extensions
Type SP 12.5 Wearing Course Mixture (3, B)	TON	88	\$58.30	\$5,136	113 lbs/sy*in, assume 2" thick for curb extensions
Common Excavation	CY	857	\$15.00	\$12,849	
Concrete Pavement 8"	SY	498	\$65.40	\$32,561	Commercial driveways
Aggregate Base (CV) Class 5	CY	306	\$33.67	\$10,301	
4" Concrete Walk	SF	7542	\$6.26	\$47,213	
Type SP 12.5 Wearing Course Mixture (3, B)	TON	156	\$58.30	\$9,069	113 lbs/sy*in, assume 3" thick for shared use path
Geotextile Fabric Type V	SY	1285	\$1.87	\$2,403	
ADA Ramps	EA	19	\$7,000.00	\$133,000	
4" Solid Line Epoxy (Bike Lane Markings)	LF	2,370	\$0.33	\$782	Lane Lines - 4 solid lines entire length, each side
8" Solid Line Epoxy (Buffer Hatching)	LF	89	\$1.80	\$160	Buffer Lines - 1 solid line, 3 feet long, every 40 feet
Pavement Message Preform Thermoplastic Ground In					
(Bike Symbol)	SF	142	\$32.40	\$4,607	Bike Symbol - 1 Symbol every 250 feet, each side of road
Construction Cost Subtotal				\$542,146	
Erosion and Sediment Control (2%)				\$10,843	
Landscaping/Turf Establishment (10%)				\$54,215	
Signing/Markings (10%)				\$54,215	
Drainage/Utilities (20%)				\$108,429	
Contingency (25%)				\$135,537	
Design and Engineering Estimate (25%)				\$135,537]
Low Rounded Total Cost (no design and engineering)				\$910,000]
High Rounded Total Cost				\$1,040,000	1

Segment 1 - No Build

Assumes pavement mill and overlay, ADA curb ramps, and restriping existing pavement markings. Assumes all modifications can occur within existing right-of-way. Does not include any driveway apron removal or reconstruction work.

Item	Unit	Quantity	Unit Cost	Total Cost	
Pavement Mill and Overlay	SF	77078	\$3.00	\$231,234	
ADA Ramps	EA	15	\$7,000.00	\$105,000	
Construction Cost Subtotal				\$336,234	
Erosion and Sediment Control (2%)				\$6,725	
Landscaping/Turf Establishment (10%)					
Signing/Markings (10%)		\$33,623			
Drainage/Utilities (20%) \$67					
Contingency (25%)	ngency (25%) \$84,059				
Design and Engineering Estimate (25%)					
Low Rounded Total Cost (no design and engineering)			\$560,000	
High Rounded Total Cost				\$650.000	

Alternative 2A - Buffered Bike Lanes

Assumes construction of buffered bike lanes and curb extensions.

Assumes all modifications can occur within existing right-of-way.

Assumes the only curb and gutter modifications occur at intersection for curb extensions.

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Mill and Overlay	SF	257280	\$3.00	\$771,840	
Saw Cut Bituminous Pavement (Full Depth)	LF	3670	\$1.43	\$5,248	
Remove Bituminous Pavement	SF	25690	\$0.82	\$21,066	
Remove Curb and Gutter	LF	3670	\$4.40	\$16,148	
Install Curb and Gutter Design B624	LF	3670	\$23.53	\$86,355	
Type SP 12.5 Non Wearing Course Mixture (3, B)	TON	737	\$77.80	\$57,359	113 lbs/sy*in, assume 4" thick for curb extensions
Type SP 12.5 Wearing Course Mixture (3, B)	TON	369	\$58.30	\$21,491	113 lbs/sy*in, assume 2" thick for curb extensions
4" Concrete Walk	SF	8394	\$6.26	\$52,546	Bus stop pads and sidewalk extensions at all intersections
ADA Ramps	EA	57	\$7,000.00	\$399,000	
4" Solid Line Epoxy (Bike Lane Markings)	LF	8,128	\$0.33	\$2,682	Lane Lines - 4 solid lines entire length, each side
8" Solid Line Epoxy (Buffer Hatching)	LF	305	\$1.80	\$549	Buffer Lines - 1 solid line, 3 feet long, every 40 feet
Pavement Message Preform Thermoplastic Ground In					
(Bike Symbol)	SF	488	\$32.40	\$15,801	Bike Symbol - 1 Symbol every 250 feet, each side of road
Construction Cost Subtotal				\$1,450,085]
Erosion and Sediment Control (2%)				\$29,002	
Landscaping/Turf Establishment (10%)				\$145,009	
Signing/Markings (10%)				\$145,009	
Drainage/Utilities (20%)				\$290,017	
Contingency (25%)				\$362,521	
Design and Engineering Estimate (25%) \$362,]
Low Rounded Total Cost (no design and engineering)				\$2,420,000]
High Rounded Total Cost				\$2,780,000	

Alternative 2B - Center Median and Path

Assumes construction of a 10' shared use path, curb extensions, and center median.

Assumes all modifications can occur within existing right-of-way.

Assumes curb and gutter modifications occur at intersections for curb extensions and at the center median.

Assumes removal and reconstruction for all driveways on east side.

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Mill and Overlay	SF	257280	\$3.00	\$771,840	
Saw Cut Bituminous Pavement (Full Depth)	LF	9625	\$1.43	\$13,764	
Remove Bituminous Pavement	SF	25690	\$0.82	\$21,066	Curb extension
Remove Bituminous Pavement	SF	119100	\$0.82	\$97,662	Center median
Remove Curb and Gutter	LF	9625	\$4.40	\$42,350	
Remove Concrete Driveway Pavement	SF	15080	\$1.24	\$18,699	
Install Curb and Gutter Design B624	LF	9625	\$23.53	\$226,476	
Type SP 12.5 Non Wearing Course Mixture (3, B)	TON	737	\$77.80	\$57,359	113 lbs/sy*in, assume 4" thick for curb extensions
Type SP 12.5 Wearing Course Mixture (3, B)	TON	369	\$58.30	\$21,491	113 lbs/sy*in, assume 2" thick for curb extensions
Common Excavation	CY	3898	\$15.00	\$58,473	
Concrete Pavement 4"	SY	419	\$65.40	\$27,395	Residential driveways
Aggregate Base (CV) Class 5	СҮ	1392	\$33.67	\$46,876	
4" Concrete Walk	SF	8394	\$6.26	\$52,546	Bus stop pads and sidewalk extensions at all intersections
Type SP 12.5 Wearing Course Mixture (3, B)	TON	708	\$58.30	\$41,273	113 lbs/sy*in, assume 3" thick for shared use path
Geotextile Fabric Type V	SY	5847	\$1.87	\$10,935	
ADA Ramps	EA	57	\$7,000.00	\$399,000	
Construction Cost Subtotal				\$1,907,206]
Erosion and Sediment Control (2%)				\$38,144]
Landscaping/Turf Establishment (10%)				\$190,721	
Signing/Markings (10%)				\$190,721	
Drainage/Utilities (20%)				\$381,441	
Contingency (25%)				\$476,802	
Design and Engineering Estimate (25%)			\$476,802]	
Low Rounded Total Cost (no design and engineerin	g)			\$3,190,000	
High Rounded Total Cost				\$3,660,000	

Alternative 2C - Center Median and Shared Lanes

Assumes construction of curb extensions, center median, and shared lane markings. Assumes all modifications can occur within existing right-of-way. Assumes curb and gutter modifications occur at intersections for curb extensions and at the center median.

					1
Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Mill and Overlay	SF	257280	\$3.00	\$771,840	
Saw Cut Bituminous Pavement (Full Depth)	LF	9625	\$1.43	\$13,764	
Remove Bituminous Pavement	SF	25690	\$0.82	\$21,066	Curb extension
Remove Bituminous Pavement	SF	119100	\$0.82	\$97,662	Center median
Remove Curb and Gutter	LF	9625	\$4.40	\$42,350	
Install Curb and Gutter Design B624	LF	9625	\$23.53	\$226,476	
Type SP 12.5 Non Wearing Course Mixture (3, B)	TON	737	\$77.80	\$57,359	113 lbs/sy*in, assume 4" thick for curb extensions
Type SP 12.5 Wearing Course Mixture (3, B)	TON	369	\$58.30	\$21,491	113 lbs/sy*in, assume 2" thick for curb extensions
4" Concrete Walk	SF	8394	\$6.26	\$52,546	Bus stop pads and sidewalk extensions at all intersections
ADA Ramps	EA	57	\$7,000.00	\$399,000	
Pavement Message Preform Thermoplastic Ground In					Shared Lane Symbol - 1 Symbol every 250 feet, each side
(Bike Symbol)	SF	455	\$32.40	\$14,747	of road
Construction Cost Subtotal \$1,718,302]
Erosion and Sediment Control (2%)				\$34,366]
Landscaping/Turf Establishment (10%)				\$171,830	1
Signing/Markings (10%)	·			\$171,830	1
Drainage/Utilities (20%)			. <u> </u>	\$343,660	
Contingency (25%)				\$429,575]
Design and Engineering Estimate (25%)	\$429,575]			
Low Rounded Total Cost (no design and engineering)				\$2,870,000]
High Rounded Total Cost				\$3,300,000	

Alternative 2D - Path and Center Turn Lane

Assumes construction of a 10' shared use path and curb extensions.

Assumes all modifications can occur within existing right-of-way.

Assumes the only curb and gutter modifications occur at intersections for the added curb extensions.

Assumes removal and reconstruction for all driveways on east side.

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Mill and Overlay	SF	257280	\$3.00	\$771,840	
Saw Cut Bituminous Pavement (Full Depth)	LF	3670	\$1.43	\$5,248	
Remove Bituminous Pavement	SF	25690	\$0.82	\$21,066	Curb extension
Remove Curb and Gutter	LF	3670	\$4.40	\$16,148	
Remove Concrete Driveway Pavement	SF	15080	\$1.24	\$18,699	
Install Curb and Gutter Design B624	LF	3670	\$23.53	\$86,355	
Type SP 12.5 Non Wearing Course Mixture (3, B)	TON	737	\$77.80	\$57,359	113 lbs/sy*in, assume 4" thick for curb extensions
Type SP 12.5 Wearing Course Mixture (3, B)	TON	369	\$58.30	\$21,491	113 lbs/sy*in, assume 2" thick for curb extensions
Common Excavation	CY	3898	\$15.00	\$58,473	
Concrete Pavement 4"	SY	419	\$65.40	\$27,395	Residential driveways
Aggregate Base (CV) Class 5	CY	1392	\$33.67	\$46,876	
4" Concrete Walk	SF	8394	\$6.26	\$52,546	Bus stop pads and sidewalk extensions at all intersections
Type SP 12.5 Wearing Course Mixture (3, B)	TON	708	\$58.30	\$41,273	113 lbs/sy*in, assume 3" thick for shared use path
Geotextile Fabric Type V	SY	5847	\$1.87	\$10,935	
ADA Ramps	EA	57	\$7,000.00	\$399,000	
Construction Cost Subtotal				\$1,634,705	
Erosion and Sediment Control (2%)				\$32,694	
Landscaping/Turf Establishment (10%)				\$163,471	
Signing/Markings (10%)				\$163,471	
Drainage/Utilities (20%)				\$326,941	
Contingency (25%)				\$408,676	
Design and Engineering Estimate (25%)				\$408,676]
Low Rounded Total Cost (no design and engineering	;)			\$2,730,000	
High Rounded Total Cost				\$3,140,000	

Alternative 2E - Path and Buffered Bike Lanes

Assumes construction of buffered bike lanes, 10' shared use path, and curb extensions.

Assumes all modifications can occur within existing right-of-way.

Assumes the only curb and gutter modifications occur at intersections for the added curb extensions.

Assumes removal and reconstruction for all driveways on east side.

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Pavement Mill and Overlay	SF	257280	\$3.00	\$771,840	
Saw Cut Bituminous Pavement (Full Depth)	LF	3670	\$1.43	\$5,248	
Remove Bituminous Pavement	SF	25690	\$0.82	\$21,066	Curb extension
Remove Curb and Gutter	LF	3670	\$4.40	\$16,148	
Remove Concrete Driveway Pavement	SF	15080	\$1.24	\$18,699	
Install Curb and Gutter Design B624	LF	3670	\$23.53	\$86,355	
Type SP 12.5 Non Wearing Course Mixture (3, B)	TON	737	\$77.80	\$57,359	113 lbs/sy*in, assume 4" thick for curb extensions
Type SP 12.5 Wearing Course Mixture (3, B)	TON	369	\$58.30	\$21,491	113 lbs/sy*in, assume 2" thick for curb extensions
Common Excavation	CY	3898	\$15.00	\$58,473	
Concrete Pavement 4"	SY	419	\$65.40	\$27,395	Residential driveways
Aggregate Base (CV) Class 5	CY	1392	\$33.67	\$46,876	
4" Concrete Walk	SF	8394	\$6.26	\$52,546	Bus stop pads and sidewalk extensions at all intersections
Type SP 12.5 Wearing Course Mixture (3, B)	TON	708	\$58.30	\$41,273	113 lbs/sy*in, assume 3" thick for shared use path
Geotextile Fabric Type V	SY	5847	\$1.87	\$10,935	
ADA Ramps	EA	57	\$7,000.00	\$399,000	
4" Solid Line Epoxy (Bike Lane Markings)	LF	8,128	\$0.33	\$2,682	Lane Lines - 4 solid lines entire length, each side
8" Solid Line Epoxy (Buffer Hatching)	LF	305	\$1.80	\$549	Buffer Lines - 1 solid line, 3 feet long, every 40 feet
Pavement Message Preform Thermoplastic Ground In					
(Bike Symbol)	SF	488	\$32.40	\$15,801	Bike Symbol - 1 Symbol every 250 feet, each side of road
Construction Cost Subtotal				\$1,653,737]
Erosion and Sediment Control (2%)				\$33,075	
Landscaping/Turf Establishment (10%)				\$165,374	
Signing/Markings (10%)				\$165,374	
Drainage/Utilities (20%)				\$330,747	
Contingency (25%)				\$413,434]
Design and Engineering Estimate (25%)				\$413,434]
Low Rounded Total Cost (no design and engineering)				\$2,760,000]
High Rounded Total Cost				\$3,180,000	

Segment 2 - No Build

Assumes pavement mill and overlay, ADA curb ramps, and restriping existing pavement markings. Assumes all modifications can occur within existing right-of-way.

Item	Unit	Quantity	Unit Cost	Total Cost		
Pavement Mill and Overlay	SF	257280	\$3.00	\$771,840		
ADA Ramps	EA	57	\$7,000.00	\$399,000		
Construction Cost Subtotal				\$1,170,840		
Erosion and Sediment Control (2%)				\$23,417		
Landscaping/Turf Establishment (10%)	aping/Turf Establishment (10%) \$117,084					
Signing/Markings (10%)	igning/Markings (10%)					
Drainage/Utilities (20%)	ities (20%) \$234,168					
Contingency (25%)	\$292,710					
esign and Engineering Estimate (25%) \$292,				\$292,710		
Low Rounded Total Cost (no design and engineering)			\$1,960,000		
High Rounded Total Cost				\$2,250,000		

Segment 2 - Sidewalk Bend-In Option

Assumes construction of curb extensions and sidewalk bend in. Assumes all modifications can occur within existing right-of-way. Assumes the only curb and gutter modifications are for the added curb extensions. Assumes quantities for a single intersection quadrant.

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Saw Cut Bituminous Pavement (Full Depth)	LF	120	\$1.43	\$172	
Remove Bituminous Pavement	SF	840	\$0.82	\$689	
Remove Curb and Gutter	LF	120	\$4.40	\$528	
Install Curb and Gutter Design B624	LF	120	\$23.53	\$2,824	
Type SP 12.5 Non Wearing Course Mixture (3, B)	TON	24	\$77.80	\$1,875	113 lbs/sy*in, assume 4" thick for curb extensions
Type SP 12.5 Wearing Course Mixture (3, B)	TON	12	\$58.30	\$703	113 lbs/sy*in, assume 2" thick for curb extensions
Common Excavation	CY	71	\$15.00	\$1,067	
4" Concrete Walk	SF	450	\$6.26	\$2,817	
ADA Ramps	EA	2	\$7,000.00	\$14,000	
Evening and Sediment Central (20()				¢402	1
Erosion and Sediment Control (2%)				\$493	
Landscaping/Turf Establishment (10%)				\$2,467	
Signing/Markings (10%)				\$2,467	
Drainage/Utilities (20%)				\$4,935	
Contingency (25%)				\$6,168]
Design and Engineering Estimate (25%)				\$6,168]
Low Rounded Total Cost (no design and engineerin	g)			\$40,000]
High Rounded Total Cost				\$50,000	

Appendix G: Traffic Analysis

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MEMORANDUM

Date:	October 14, 2020
To:	Luke Champa
	Dan Farnsworth
From:	Kelsey Retherford, P.E.
Subject:	17 th St N Corridor Study – Traffic Count Analysis Metropolitan Council of Governments

Project No.: T49.120979

Introduction

Turning movement counts were completed at the intersections of 17th St N at 15th Ave, 8th Ave and 1st Ave on Tuesday, September 15, 2020. Park Christian School was in session when the count was taken. Additionally, tube counts were collected Tuesday, September 22nd through Thursday the 24th along 17th St N at the following locations:

- Between 11th Ave and 13th Ave
- Between 5th Ave and 6th Ave •
- Between 2nd Ave and 3rd Ave •

This memorandum summarizes the volume data collected, compares the data to previous or historic counts available, and recommends if edits should be made to the data or if it is reflective of normal traffic.

15th Ave at 17th St Intersection

The counts obtained on 9/15/2020 are very similar to the 11/19/2015 counts provided by the City of Moorhead. Table 1 below shows the peak hour counts. The full 13-hour count is included in the Appendix.

0									
Sourco	17th St N at	Time	NORTHBOUND		EASTBOUND		WESTBOUND		Total
Source	15th Ave N	Time	L	R	Т	R	L	Т	Entering
Actual Data	9/15/2020	AM	68	19	157	32	25	274	575
	11/19/2015	Peak	78	14	159	35	14	324	624
	9/15/2020	PM	40	30	347	52	25	230	724
	11/19/2015	Peak	38	16	327	75	21	187	664

Table 1. 17th St N at 15th Ave N Peak Hour Turning Movement Counts

The ADT was estimated from the 13-hour count completed on 9/15/2020. The volumes were estimated assuming 85% of the daily traffic is accounted for between 6:00am and 7:00pm. The estimated ADT is shown below.

- 17th St south of 15th Ave: 1,554
- 15th Ave west of 17th St: 6,593
- 15th Ave east of 17th St: 6,149

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Additionally, tube count data to the south of the 15^{th} Ave and 17^{th} St N intersection between 11^{th} and 13^{th} Ave was analyzed. Tube count data from 2015 was provided by MetroCOG for comparison. All three days of the September 2020 data were found to be higher than the 2015 data. The data is shown in **Table 2** below.

Location	7/15/2015	7/16/2015	9/22/2020	9/23/2020	9/24/2020
Ebcation	(Wednesday)	(Thursday)	(Tuesday)	(Wednesday)	(Thursday)
17 th St between 11 th and 13 th Ave	1,200	1,220	1,366	1,290	1,395

Table 2. Tube Count Data Between 11th and 13th Ave

Historical volumes were obtained from the MnDOT Traffic Mapping Application. The historical AADT along 17th north of 11th Ave has remained between 1,079 and 1,153 between 2005 and 2015. The historical AADT along 15th Ave remained between 2,100 and 3,357 between 2001 and 2014, but the 2017 volumes show significantly more traffic in 2017. This is likely due to the fact that the 12th Ave/15th Ave bridge between Fargo and Moorhead went from a toll bridge to a non-toll bridge between the 2013 and 2017 counts.

<u>17th St nort</u>	h of 11th Ave
Year	AADT
2001	1,300
2003	1,419
2004	1,429
2005	1,100
2006	1,079
2007	1,079
2008	1,085
2009	1,150
2010	1,151
2011	1,153
2012	1,153
2013	1,150
2014	1,152
2015	1,100

15th Ave west of 17th St		
Year	AADT	
2001	2,500	
2003	2,946	
2004	2,967	
2005	2,850	
2006	2,796	
2007	2,796	
2008	2,813	
2009	3,050	
2010	3,053	
2011	3,059	
2013	3,350	
2014	3,357	
2017	7,300	

15th A	ve ec	ist of	17th	St
--------	-------	--------	------	----

Year	AADT
2001	2,100
2005	2,350
2009	2,550
2013	3,050
2017	6,200

Recommendation

The turning movement count completed at the intersection of 15th Ave and 17th St is assumed to have normal traffic volumes since the peak hour turning movement counts were very similar to the previous count obtained in 2015 and the estimated ADT's were found to be similar to latest counts published by MnDOT. No edits are recommended to the counts since the volumes appear to be showing normal traffic volumes.

8th Ave at 17th St N Intersection

The ADT was estimated at 8^{th} Ave and 17^{th} St N from the 13-hour count completed on 9/15/2020. The estimated ADT is shown below.

- 17th St north of 8th Ave: 1,893
- 17th St south of 8th Ave: 2,120

- 8th Ave west of 17th St: 231
- 8th Ave east of 17th St: 323

The full 13-hour count is included in the Appendix.

Tube count data between 5th and 6th Ave south of the 8th Ave and 17th St N intersection was analyzed. Tube count data from 2015 was provided by MetroCOG for comparison. All three days of the September 2020 data were found to be close to the 2015 data, but slightly lower. Comparing the average of tube counts in 2015 and 2020 indicates that 2020 volumes are 4% lower than the 2015 volumes. The data is shown in **Table 3** below.

Table 3. Tube Count Data Between 5th and 6th Ave

Location	6/30/2015	7/1/2015	9/22/2020	9/23/2020	9/24/2020
Ebcation	(Tuesday)	(Wednesday)	(Tuesday)	(Wednesday)	(Thursday)
17 th St between 5 th and 6 th Ave	2,617	2,630	2,546	2,399	2,622

Historical volumes along 17th St N between 6th and 7th Ave were obtained from the MnDOT Traffic Mapping Application. The historical AADT along 17th north of 6th Ave has remained between 2,400 and 2,550 between 2005 and 2015. There are no historic counts along 8th Ave to compare with the estimated ADTs.

Year	AADT		
2001	2,700		
2003	2,948		
2004	2,969		
2005	2,550		
2006	2,502		
2007	2,502		
2008	2,517		
2009	2,400		
2010	2,402		
2011	2,407		
2012	2,407		
2013	2,400		
2014	2,405		
2015	2,400		

17th St north of 6th Ave

Recommendation

Based on the historic volumes and tube count data collected near the intersection of 8th Ave and 17th St N the turning movement counts seem to be showing normal traffic volumes, however since the average tube counts in 2020 were found to be 4% lower than the 2015 tube counts we recommend inflating the turning movement counts by an even 5%.

1st Ave at 17th St N Intersection

The ADT was estimated at 1st Ave and 17th St N from the 13-hour count completed on 9/15/2020. The estimated ADT is shown below.

- 17th St north of 1st Ave: 3,294
- 1st Ave west of 17th St: 8,835
- 1st Ave east of 17th St: 7,983

The full 13-hour count is included in the Appendix.

Tube count data between 2nd and 3rd Ave north of the 1st Ave and 17th St N intersection was analyzed. Tube count data from 2015 was provided by MetroCOG for comparison. All three days of the September 2020 data were found to be lower than the 2015 data. Comparing the average of tube counts in 2015 and 2020 indicates that 2020 volumes are about 12% lower than the 2015 volumes. The data is shown in **Table 4** below.

Table 4. Tube Count Data Between 2nd and 3rd Ave

Location	10/12/2015	10/13/2015	9/22/2020	9/23/2020	9/24/2020
Location	(Monday)	(Tuesday)	(Tuesday)	(Wednesday)	(Thursday)
17 th St between 2 nd and 3 rd Ave	3,649	3,834	3,280	3,155	3,395

Historical volumes at 17th St N and 1st Ave were obtained from the MnDOT Traffic Mapping Application. The historical AADT on 17th St north of 2nd Ave has remained between 3,400 and 3,950 between 1997 and 2017. The latest available AADT along 1st Ave east and west of the intersection with 17th St N were found to be lower than they had been in recent years with volumes ranging from 10,500 to 13,139 between 2001 and 2017. Comparing the estimated ADTs along 1st Ave from the 13-hour count to the latest MnDOT counts it can be seen that volumes in 2020 are about 25-27% lower.

17th St north of 2nd Ave

Year	AADT
1997	3,400
2001	3,800
2005	3,950
2009	3,750
2013	3,550
2017	3.500

1st Ave west of 15th St		
Year	AADT	
2001	11,600	
2003	12,667	
2004	12,756	
2005	13,100	
2006	12,851	
2007	12,851	
2008	12,928	
2009	13,100	
2010	13,113	
2011	13,139	
2012	13,139	
2013	11,700	

1st Ave west of 21st St			
Year	AADT		
2001	10,500		
2005	12,200		
2009	11,500		
2013	12,100		
2014	12,124		
2017	11.000		

Additionally, there are three recently developed apartment buildings along 1st Ave near the intersection of 17th St N as shown in **Figure 1**.

Figure 1. New Development near 1st Ave and 17th St N intersection

The apartments have access to 1st Ave from 16th St and 18th St. Based on google maps imagery the buildings were not complete as of May 2017, so it was assumed that the 2017 historic count did not include trips from the new development. Without the development accounted for in the historic counts, new baseline volumes are needed along 1st Ave. The ITE Trip Generation Manual was used to determine what the baseline 1st Ave volumes should be with the apartment buildings complete.

The ITE Trip Generation Manual (10th Edition) provides a rate for the peak period and daily trips estimated depending on land use. The ITE Land Use 221 for "Multifamily Housing (Mid-Rise)" was used to estimate trips associated with the newly constructed apartment buildings based upon the assumption of 132 units. The number of units was assumed based on the number of balconies each building has (floor plans available online indicated that each unit has a balcony). **Table 5** below shows the estimated number of trips generated.

Time of Day	Traffic	Trips	
	Entering	26%	13
AIVI PEAK HOUT	Exiting	74%	35
DM Dook Hour	Entering	61%	35
PIVI PEAK HOUI	Exiting	39%	23
Daily	Entering	50%	314
Dally	Exiting	50%	314

Table 5. Estimated Trips Generated by The Grove Apartments

Although the historic MnDOT counts are not directly adjacent to our intersection, we recommend using these volumes as a base to adjust the turning movement count data collected at the 1st Ave and 17th St N intersection. The existing breakdown of volumes on the three intersection legs were used to determine how the 628 new daily trips would be added to the roadways surrounding the intersection.

Table 6 shows the latest MnDOT count, existing breakdown of traffic volumes, added trips from development, estimated ADT at the intersection based on the 13-hour count, and the proposed 2020 ADT based on the historic counts with trips added for the recent development.

Location	Estimated ADT (1)	Latest Published MnDOT Count	Percent Breakdown	Added Trips from Development	Proposed ADT (2)
17 th St north of 1 st Ave	3,294	3,500	13.4%	84	3,600
1 st Ave west of 17 th St	8,835	11,700	44.6%	280	12,000
1 st Ave east of 17 th St	7,983	11,000	42%	264	11,300

Table 6. Estimated and Pro	posed ADT at the 17 th	N and 1 st Ave Intersection
----------------------------	-----------------------------------	--

1. The estimated ADT is derived from the 9/15/2020 turning movement count

2. The proposed ADT is the latest published MnDOT count plus the added trips from the development (rounded to the nearest hundred).

In order to correctly inflate the Tuesday, 9/15/2020 counts to account for the difference between the current estimated ADT and proposed ADT we will use the TurnsW32 program. This program allows you to enter the existing turning movement counts along with the anticipated peak hour traffic entering and exiting along each leg. The peak hour entering and exiting traffic would be estimated based the peak hour portion of the proposed 2020 ADT and the current entering and exiting split from the 13-hour count.

Recommendation

Since the traffic volumes from the 9/15/2020 count were significantly lower along 1st Ave than the historic volumes show we recommend increasing the volumes at this intersection. The latest counts along 1st Ave are from 2013 and 2017. These counts were assumed to be taken prior to the construction of the three apartment building complex south of 1st Ave near the intersection of 17th St N and 1st Ave. The ITE Trip Generation Manual was used to estimate the number of daily trips added to 1st Ave with this additional development and the volume was distributed to the surrounding roadway network based on the existing volume distribution from the latest historic counts. The proposed ADT was determined by adding the daily trips from the development to the latest historic counts. These proposed ADT's would then be used to inflate the existing turning movement counts so that they are better representative of normal traffic conditions.

Appendix

Turning Movement Counts

File Name : 17th St N & 15th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 1

 	Groups Printed- Cars + - Trucks																		
			15th /	Ave N					17th	St N					15th /	Ave N			
			West	oound					North	bound					Eastb	bound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
06:00 AM	0	18	2	0	1	21	0	0	6	0	1	7	3	12	0	0	0	15	43
06:15 AM	0	24	1	0	0	25	0	0	3	0	0	3	5	7	0	0	0	12	40
06:30 AM	0	48	0	0	0	48	5	0	13	0	0	18	1	23	0	0	0	24	90
06:45 AM	0	42	1	0	0	43	9	0	15	0	0	24	9	27	0	0	0	36	103
Total	0	132	4	0	1	137	14	0	37	0	1	52	18	69	0	0	0	87	276
07:00 AM	0	59	1	0	0	60	6	0	10	0	1	17	4	22	0	0	0	26	103
07:15 AM	0	69	5	0	0	74	3	0	13	0	0	16	2	31	0	0	0	33	123
07:30 AM	0	101	5	0	0	106	6	0	24	0	0	30	9	28	0	0	0	37	173
 07:45 AM	0	56	12	0	1	69	7	0	27	0	0	34	11	56	0	0	0	67	170
Total	0	285	23	0	1	309	22	0	74	0	1	97	26	137	0	0	0	163	569
08:00 AM	0	48	3	0	0	51	3	0	4	0	0	7	10	42	0	0	1	53	111
08:15 AM	0	29	2	0	0	31	5	0	11	0	0	16	10	53	0	0	0	63	110
08:30 AM	0	31	3	0	0	34	1	0	10	0	0	11	4	26	0	0	0	30	75
 08:45 AM	0	46	3	0	0	49	5	0	8	0	1	14	3	38	0	0	0	41	104
Total	0	154	11	0	0	165	14	0	33	0	1	48	27	159	0	0	1	187	400
09:00 AM	0	43	1	0	0	44	3	0	9	0	0	12	3	32	0	0	0	35	91
09:15 AM	0	32	3	0	0	35	2	0	4	0	0	6	9	37	0	0	0	46	87
09:30 AM	0	27	2	0	1	30	2	0	4	0	0	6	4	30	0	0	0	34	70
 09:45 AM	0	34	2	0	0	36	4	0	1_	0	0	5	5	28	0	0	0	33	74
Total	0	136	8	0	1	145	11	0	18	0	0	29	21	127	0	0	0	148	322
																			I.
10:00 AM	0	45	0	0	0	45	3	0	4	0	1	8	5	25	0	0	0	30	83
10:15 AM	0	23	3	0	0	26	5	0	6	0	0	11	2	34	0	0	0	36	73
10:30 AM	0	25	2	0	0	27	5	0	8	0	0	13	5	32	0	0	0	37	77
 10:45 AM	0	34	5	0	0	39	1	0	7	0	0	8	9	31	0	0	0	40	87
Total	0	127	10	0	0	137	14	0	25	0	1	40	21	122	0	0	0	143	320
1						1													L
11:00 AM	0	43	2	0	0	45	2	0	11	0	0	13	3	49	0	0	1	53	111
11:15 AM	0	42	2	0	0	44	4	0	7	0	0	11	5	33	0	0	0	38	93
11:30 AM	0	38	3	0	0	41	4	0	2	0	0	6	10	38	0	0	0	48	95
 11:45 AM	0	38	0	0	0	38	5	0	8	0	0	13	8	30	0	0	0	38	89
Total	0	161	7	0	0	168	15	0	28	0	0	43	26	150	0	0	1	177	388

Turning Movement Counts

File Name : 17th St N & 15th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 2

	Groups Printed- Cars + - Trucks																		
			15th /	Ave N					17th	St N			15th Ave N						
			West	bound					North	bound									
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
12:00 PM	0	39	3	0	0	42	4	0	6	0	0	10	7	35	0	0	0	42	94
12:15 PM	0	30	4	0	0	34	3	0	6	0	0	9	11	46	0	0	0	57	100
12:30 PM	0	49	5	0	0	54	3	0	7	0	0	10	14	51	0	0	0	65	129
12:45 PM	0	48	3	0	0	51	7	0	9	0	0	16	5	47	0	0	0	52	119
Total	0	166	15	0	0	181	17	0	28	0	0	45	37	179	0	0	0	216	442
01:00 PM	0	58	2	0	0	60	8	0	6	0	0	14	7	42	0	0	0	49	123
01:15 PM	0	39	2	0	0	41	4	0	10	0	0	14	5	41	0	0	0	46	101
01:30 PM	0	42	2	0	0	44	4	0	7	0	0	11	7	52	0	0	0	59	114
01:45 PM	0	39	4	0	0	43	2	0	5	0	0	7	7	54	0	0	0	61	111
Total	0	178	10	0	0	188	18	0	28	0	0	46	26	189	0	0	0	215	449
02:00 PM	0	40	10	0	0	50	5	0	8	0	0	13	5	52	0	0	0	57	120
02:15 PM	0	40	8	0	0	48	11	0	6	0	0	17	9	46	0	0	0	55	120
02:30 PM	0	45	5	0	1	51	3	0	6	0	0	9	9	47	0	0	0	56	116
02:45 PM	0	35	5	0	0	40	5	0	15	0	1	21	11	59	0	0	0	70	131
Total	0	160	28	0	1	189	24	0	35	0	1	60	34	204	0	0	0	238	487
03:00 PM	0	55	8	0	0	63	5	0	9	0	0	14	10	62	0	0	0	72	149
03:15 PM	0	51	8	0	0	59	7	0	10	0	2	19	8	65	0	0	2	75	153
03:30 PM	0	45	5	0	0	50	7	0	12	0	0	19	14	64	0	0	0	78	147
03:45 PM	0	61	9	0	0	70	4	0	9	0	0	13	14	79	0	0	0	93	176
Total	0	212	30	0	0	242	23	0	40	0	2	65	46	270	0	0	2	318	625
04:00 PM	0	68	4	0	0	72	6	0	12	0	0	18	10	85	0	0	0	95	185
04:15 PM	0	58	5	0	0	63	7	0	11	0	0	18	11	87	0	0	0	98	179
04:30 PM	0	55	10	0	0	65	7	0	10	0	0	17	15	86	0	0	0	101	183
04:45 PM	0	49	6	0	0	55	10	0	7	0	0	17	16	89	0	0	0	105	177
Total	0	230	25	0	0	255	30	0	40	0	0	70	52	347	0	0	0	399	724
05:00 PM	0	63	6	0	0	69	7	0	6	0	0	13	14	78	0	0	0	92	174
05:15 PM	0	58	7	0	0	65	7	0	6	0	0	13	13	91	0	0	0	104	182
05:30 PM	0	58	8	0	0	66	10	0	9	0	0	19	8	71	0	0	0	79	164
05:45 PM	0	53	10	0	0	63	7	0	6	0	0	13	3	48	0	0	0	51	127
Total	0	232	31	0	0	263	31	0	27	0	0	58	38	288	0	0	0	326	647

Turning Movement Counts

File Name : 17th St N & 15th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 3

	Groups Printed- Cars + - Trucks																		
			15th	Ave N					17th	St N			15th Ave N						
			West	bound					North	bound			Eastbound						
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
06:00 PM	0	52	6	0	0	58	3	0	10	0	0	13	15	51	0	0	0	66	137
06:15 PM	0	40	7	0	1	48	5	0	8	0	0	13	6	42	0	0	1	49	110
06:30 PM	0	32	8	0	0	40	1	0	2	0	0	3	12	31	0	0	0	43	86
06:45 PM	0	50	4	0	0	54	3	0	5	0	0	8	6	43	0	0	0	49	111
Total	0	174	25	0	1	200	12	0	25	0	0	37	39	167	0	0	1	207	444
Grand Total	0	2347	227	0	5	2579	245	0	438	0	7	690	411	2408	0	0	5	2824	6093
Apprch %	0	91	8.8	Õ	0.2	2010	35.5	0	63.5	0	. 1		14.6	85.3	Õ	Õ	0.2		
Total %	0	38.5	3.7	0	0.1	42.3	4	0	7.2	0	0.1	11.3	6.7	39.5	0	0	0.1	46.3	
Cars +	0	2292	212	0	0	2504	226	0	434	0	5	665	400	2358	0	0	5	2763	5932
% Cars +	0	97.7	93.4	0	0	97.1	92.2	0	99.1	0	71.4	96.4	97.3	97.9	0	0	100	97.8	97.4
Trucks	0	55	15	0	5	75	19	0	4	0	2	25	11	50	0	0	0	61	161
% Trucks	0	2.3	6.6	0	100	2.9	7.8	0	0.9	0	28.6	3.6	2.7	2.1	0	0	0	2.2	2.6

Turning Movement Counts

File Name : 17th St N & 15th Ave N 0600-1900_09152020

Site Code : Start Date : 9/15/2020 Page No : 4 Out In Total 0 0 0 0 0 0 0 0 0 000 North 9/15/2020 06:00 AM 9/15/2020 06:45 PM Cars + Trucks 8805 Right 226 Thru Peds Left 434 0 19 245 438 0 7 612 665 1277 <u>26</u> 638 Out <u>51</u> <u>1328</u> Total 25 690 In 17th St N

Turning Movement Counts

File Name : 17th St N & 15th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 5

			15th A	Ave N					17th	St N			15th Ave N						
			West	bound			Northbound						Eastbound						
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
Peak Hour Analysis	From 06:00) AM to 11	:45 AM -	Peak 1 of	1														
Peak Hour for Entire	e Intersectio	n Begins a	at 07:15 A	M															
07:15 AM	0	69	5	0	0	74	3	0	13	0	0	16	2	31	0	0	0	33	123
07:30 AM	0	101	5	0	0	106	6	0	24	0	0	30	9	28	0	0	0	37	173
07:45 AM	0	56	12	0	1	69	7	0	27	0	0	34	11	56	0	0	0	67	170
08:00 AM	0	48	3	0	0	51	3	0	4	0	0	7	10	42	0	0	1	53	111
Total Volume	0	274	25	0	1	300	19	0	68	0	0	87	32	157	0	0	1	190	577
% App. Total	0	91.3	8.3	0	0.3		21.8	0	78.2	0	0		16.8	82.6	0	0	0.5		
PHF	.000	.678	.521	.000	.250	.708	.679	.000	.630	.000	.000	.640	.727	.701	.000	.000	.250	.709	.834
Peak Hour Analysis	From 12:00) PM to 06	6:45 PM -	Peak 1 of	1														
Peak Hour for Entire	e Intersectio	n Begins a	at 04:00 P	M		1													
04:00 PM	0	68	4	0	0	72	6	0	12	0	0	18	10	85	0	0	0	95	185
04:15 PM	0	58	5	0	0	63	7	0	11	0	0	18	11	87	0	0	0	98	179
04:30 PM	0	55	10	0	0	65	7	0	10	0	0	17	15	86	0	0	0	101	183
04:45 PM	0	49	6	0	0	55	10	0	7	0	0	17	16	89	0	0	0	105	177
Total Volume	0	230	25	0	0	255	30	0	40	0	0	70	52	347	0	0	0	399	724
% App. Total	0	90.2	9.8	0	0		42.9	0	57.1	0	0		13	87	0	0	0		
PHF	.000	.846	.625	.000	.000	.885	.750	.000	.833	.000	.000	.972	.813	.975	.000	.000	.000	.950	.978
Turning Movement Counts

File Name : 17th St N & 8th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 1

										G	Groups I	Printed- C	Cars + - ⁻	Trucks											
			17th	St N					8th A	Ave N					17th	St N					8th A	Ave N			
			South	bound					West	bound					North	bound					East	bound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
06:00 AM	0	4	0	0	0	4	0	0	2	0	0	2	1	6	0	0	0	7	1	0	0	0	0	1	14
06:15 AM	0	15	0	0	0	15	1	0	0	0	0	1	0	5	0	0	0	5	0	0	0	0	0	0	21
06:30 AM	0	12	0	0	0	12	1	0	3	0	0	4	0	6	1	0	0	7	0	0	0	0	0	0	23
06:45 AM	0	13	0	0	0	13	0	0	0	0	0	0	1	12	0	0	0	13	2	0	0	0	0	2	28
Total	0	44	0	0	0	44	2	0	5	0	0	7	2	29	1	0	0	32	3	0	0	0	0	3	86
07:00 AM	1	13	1	0	0	15	0	2	4	0	0	6	0	9	2	0	0	11	0	0	1	0	0	1	33
07:15 AM	2	15	0	0	0	17	0	0	2	0	1	3	0	10	0	0	1	11	2	0	0	0	1	3	34
07:30 AM	3	28	0	0	1	32	3	0	3	0	0	6	0	19	4	0	1	24	2	1	1	0	0	4	66
07:45 AM	0	38	0	0	0	38	1	0	2	0	1	4	1	26	1	0	1	29	1	0	0	0	1	2	73
Total	6	94	1	0	1	102	4	2	11	0	2	19	1	64	7	0	3	75	5	1	2	0	2	10	206
08:00 AM	1	14	2	0	1	18	0	1	3	0	0	4	1	7	0	0	0	8	2	0	1	0	0	3	33
08:15 AM	1	11	1	0	1	14	0	0	3	0	0	3	2	13	0	0	0	15	0	0	1	0	1	2	34
08:30 AM	0	12	0	0	0	12	0	0	3	0	0	3	2	10	1	0	0	13	2	0	1	0	1	4	32
08:45 AM	0	9	0	0	0	9	1	0	0	0	1	2	0	4	0	0	0	4	0	0	1	0	0	1	16
Total	2	46	3	0	2	53	1	1	9	0	1	12	5	34	1	0	0	40	4	0	4	0	2	10	115
09:00 AM	0	7	0	0	0	7	1	1	1	0	0	3	1	13	0	0	0	14	1	0	0	0	0	1	25
09:15 AM	1	13	1	0	0	15	1	0	1	0	0	2	2	13	0	0	0	15	2	0	0	0	0	2	34
09:30 AM	0	5	0	0	0	5	0	0	1	0	0	1	1	7	0	0	0	8	1	0	0	0	0	1	15
09:45 AM	0	6	0	0	0	6	0	1	3	0	0	4	0	3	0	0	0	3	0	0	0	0	0	0	13
Total	1	31	1	0	0	33	2	2	6	0	0	10	4	36	0	0	0	40	4	0	0	0	0	4	87
10:00 AM	0	6	1	0	0	7	1	0	0	0	0	1	1	2	1	0	0	4	0	0	0	0	0	0	12
10:15 AM	0	3	0	0	0	3	0	0	1	0	0	1	0	12	0	0	0	12	0	0	0	0	0	0	16
10:30 AM	0	10	1	0	2	13	0	0	0	0	0	0	3	3	1	0	0	7	1	0	1	0	0	2	22
10:45 AM	0	10	0	0	0	10	0	1	2	0	0	3	2	11	2	0	0	15	0	0	0	0	0	0	28
Total	0	29	2	0	2	33	1	1	3	0	0	5	6	28	4	0	0	38	1	0	1	0	0	2	78
11:00 AM	0	14	0	0	0	14	1	0	1	0	0	2	1	15	0	0	0	16	1	0	3	0	0	4	36
11:15 AM	1	10	1	0	1	13	0	0	0	0	0	0	2	20	0	0	0	22	1	0	0	0	0	1	36
11:30 AM	0	18	1	0	0	19	1	1	2	0	2	6	2	8	1	0	0	11	1	0	0	0	0	1	37
11:45 AM	0	13	1	0	0	14	0	2	1	0	0	3	3	13	2	0	0	18	0	0	2	0	0	2	37
Total	1	55	3	0	1	60	2	3	4	0	2	11	8	56	3	0	0	67	3	0	5	0	0	8	146

Turning Movement Counts

File Name : 17th St N & 8th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 2

										C	Groups I	Printed- C	Cars + - ⁻	Trucks											
			17th	n St N					8th A	Ave N					17th	St N					8th A	Ave N			
			South	hbound					West	bound					North	bound					East	bound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
12:00 PM	2	10	0	0	0	12	1	0	5	0	0	6	2	18	0	0	0	20	0	0	0	0	0	0	38
12:15 PM	0	15	0	0	1	16	0	0	0	0	0	0	0	17	4	0	0	21	0	0	1	0	2	3	40
12:30 PM	1	19	0	0	1	21	1	0	4	0	0	5	0	13	3	0	0	16	2	0	2	0	0	4	46
12:45 PM	0	15	0	0	1	16	0	0	2	0	0	2	3	11	0	0	0	14	0	1	0	0	0	1	33
Total	3	59	0	0	3	65	2	0	11	0	0	13	5	59	7	0	0	71	2	1	3	0	2	8	157
01.00 PM	1	8	0	0	0	9	1	0	0	0	0	1	1	7	0	0	0	8	2	2	1	0	0	5	23
01:15 PM	0	15	Ő	0	Ő	15	1	0	Ő	Ő	1	2	0	17	3	0	0	20	0	0	0	0	1	1	38
01:30 PM	2	16	Ő	0	Ő	18	0	0	2	Ő	0	2	1	14	3	0	0	18	1	Ő	2	0	1	4	42
01:45 PM	0	16	1	0	2	19	0	0	1	0	Ő	1	1	6	2	0	1	10	2	1	0	Ő	0	3	33
Total	3	55	1	0	2	61	2	0	3	0	1	6	3	44	8	0	1	56	5	3	3	0	2	13	136
02:00 DM		47	0	0	0	47	0	0	0	0	0	0	2	10	4	0	0	20	4	2	0	0	0	2	40
02:00 PIVI	0	17	0	0	0	17	1	0	0	0	0	0	3	10	1	0	0	20		2	0	0	0	3	40
02:15 PW	0	10	2	0	0	11	1	2	3	0	0	0	0	12	1	0	1	13		1	0	0	0	2	30
02.30 FIVI		10	1	0	0	14	1	0	3	0	1	5 1	2	10	0	0	1	19		1	1	0	1	2	40
Total	1	61	3	0	0	65	2	2	7	0	1	12	6	69	2	0	3	80	3	6	1	0	1	11	168
													1												
03:00 PM	1	18	0	0	1	20	0	0	1	0	0	1	0	20	2	0	1	23	0	0	0	0	0	0	44
03:15 PM	2	15	0	0	1	18	0	1	2	0	0	3	3	33	2	0	0	38	2	3	0	0	0	5	64
03:30 PM	1	15	0	0	0	16	0	0	0	0	0	0	3	22	0	0	1	26	2	0	1	0	0	3	45
03:45 PM	1	20	1	0	0	22	2	0	4	0	0	6	4	18	2	0	0	24	0	0	0	0	1	1	53
Total	5	68	1	0	2	76	2	1	7	0	0	10	10	93	6	0	2	111	4	3	1	0	1	9	206
04:00 PM	1	14	0	1	0	16	0	1	0	0	0	1	1	21	1	0	0	23	1	0	1	0	0	2	42
04:15 PM	0	21	0	0	0	21	1	0	2	0	0	3	3	33	6	0	0	42	3	0	0	0	0	3	69
04:30 PM	2	16	0	0	0	18	2	1	3	0	3	9	6	31	1	0	0	38	3	1	0	0	0	4	69
04:45 PM	0	17	1	0	0	18	0	0	1	0	0	1	4	21	4	0	0	29	0	0	2	0	1	3	51
Total	3	68	1	1	0	73	3	2	6	0	3	14	14	106	12	0	0	132	7	1	3	0	1	12	231
05:00 PM	1	21	3	0	0	25	1	0	1	0	0	2	4	30	2	0	0	36	0	2	0	0	0	2	65
05:15 PM	1	20	1	Ő	1	23	1	1	3	õ	õ	5	2	24	4	Ő	Ő	30	1	0	1	Ő	Ő	2	60
05:30 PM	1	14	2	Ő	0	17	2	O	3	õ	õ	5	6	25	3	Ő	1	35	, o	õ	O	Ő	1	1	58
05:45 PM	1	13	0	0 0	Ő	14	0	Ő	2	Ő	Ő	2	4	17	2	0	0	23	2	õ	Ő	0 0	0	2	41
Total	4	68	6	0	1	79	4	1		0	0	14	16	96	11	0	1	124	3	2	1	0	1	7	224

Turning Movement Counts

File Name : 17th St N & 8th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 3

										G	Groups	Printed- C	ars + - ⁻	Trucks											
			17th	St N					8th A	Ave N					17th	St N					8th A	Ave N			
			South	bound					West	bound					North	bound					East	bound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
06:00 PM	1	16	2	0	0	19	0	0	1	0	3	4	3	17	1	0	0	21	2	0	1	0	0	3	47
06:15 PM	0	13	1	0	0	14	0	0	1	0	2	3	6	21	2	0	1	30	2	0	0	0	0	2	49
06:30 PM	0	8	1	0	0	9	1	0	2	0	1	4	4	15	2	0	0	21	1	0	0	0	0	1	35
06:45 PM	0	7	1	0	0	8	0	1	3	0	0	4	5	10	1	0	0	16	0	0	0	0	0	0	28
Total	1	44	5	0	0	50	1	1	7	0	6	15	18	63	6	0	1	88	5	0	1	0	0	6	159
One of Tetal	20	700	07	4		704	20	40	00	0	40	4.40	00		<u> </u>	0		054	40	47	05	0	40	100	4000
Grand Total	30	122	21	1	14	794	28	10	88	0	10	148	98	111	68	0	11	954	49	17	25	0	12	103	1999
Apprch %	3.8	90.9	3.4	0.1	1.8		18.9	10.8	59.5	0	10.8		10.3	81.4	7.1	0	1.2		47.6	16.5	24.3	0	11.7		
Total %	1.5	36.1	1.4	0.1	0.7	39.7	1.4	0.8	4.4	0	0.8	7.4	4.9	38.9	3.4	0	0.6	47.7	2.5	0.9	1.3	0	0.6	5.2	
Cars +	29	711	27	1	9	777	28	16	88	0	12	144	98	734	68	0	4	904	49	17	24	0	8	98	1923
% Cars +	96.7	98.5	100	100	64.3	97.9	100	100	100	0	75	97.3	100	94.5	100	0	36.4	94.8	100	100	96	0	66.7	95.1	96.2
Trucks	1	11	0	0	5	17	0	0	0	0	4	4	0	43	0	0	7	50	0	0	1	0	4	5	76
% Trucks	3.3	1.5	0	0	35.7	2.1	0	0	0	0	25	2.7	0	5.5	0	0	63.6	5.2	0	0	4	0	33.3	4.9	3.8

Turning Movement Counts

File Name : 17th St N & 8th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 4



Turning Movement Counts

File Name : 17th St N & 8th Ave N 0600-1900_09152020 Site Code : Start Date : 9/15/2020 Page No : 5

			17th	St N					8th /	Ave N					17th	n St N					8th	Ave N		ſ	
			South	bound					West	bound	_				North	bound					East	bound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
Peak Hour Ana	lysis Fro	m 06:00	AM to	11:45 A	M - Pea	k 1 of 1																			
Peak Hour for E	Intire Int	ersectio	n Begin	s at 07:	00 AM																				
07:00 AM	1	13	1	0	0	15	0	2	4	0	0	6	0	9	2	0	0	11	0	0	1	0	0	1	33
07:15 AM	2	15	0	0	0	17	0	0	2	0	1	3	0	10	0	0	1	11	2	0	0	0	1	3	34
07:30 AM	3	28	0	0	1	32	3	0	3	0	0	6	0	19	4	0	1	24	2	1	1	0	0	4	66
07:45 AM	0	38	0	0	0	38	1	0	2	0	1	4	1	26	1	0	1	29	1	0	0	0	1	2	73
Total Volume	6	94	1	0	1	102	4	2	11	0	2	19	1	64	7	0	3	75	5	1	2	0	2	10	206
% App. Total	5.9	92.2	1	0	1		21.1	10.5	57.9	0	10.5		1.3	85.3	9.3	0	4		50	10	20	0	20		
PHF	.500	.618	.250	.000	.250	.671	.333	.250	.688	.000	.500	.792	.250	.615	.438	.000	.750	.647	.625	.250	.500	.000	.500	.625	.705
Peak Hour Ana	lysis Fro	m 12:00	PM to	06:45 P	M - Pea	ak 1 of 1																			
Peak Hour for E	Intire Int	ersectio	n Begin	s at 04:	15 PM																				
04:15 PM	0	21	0	0	0	21	1	0	2	0	0	3	3	33	6	0	0	42	3	0	0	0	0	3	69
04:30 PM	2	16	0	0	0	18	2	1	3	0	3	9	6	31	1	0	0	38	3	1	0	0	0	4	69
04:45 PM	0	17	1	0	0	18	0	0	1	0	0	1	4	21	4	0	0	29	0	0	2	0	1	3	51
05:00 PM	1	21	3	0	0	25	1	0	1	0	0	2	4	30	2	0	0	36	0	2	0	0	0	2	65
Total Volume	3	75	4	0	0	82	4	1	7	0	3	15	17	115	13	0	0	145	6	3	2	0	1	12	254
% App. Total	3.7	91.5	4.9	0	0		26.7	6.7	46.7	0	20		11.7	79.3	9	0	0		50	25	16.7	0	8.3		
PHF	.375	.893	.333	.000	.000	.820	.500	.250	.583	.000	.250	.417	.708	.871	.542	.000	.000	.863	.500	.375	.250	.000	.250	.750	.920

Turning Movement Counts

17th St N at 1st Ave N Moorhead, MN

								Groups P	rinted- Ca	ars + - Tru	icks								
			17th	St N					1st A	ve N					1st A	ve N			
			South	bound					West	bound					Eastb	bound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
06:00 AM	3	0	5	0	0	8	5	29	0	0	0	34	0	10	4	0	0	14	56
06:15 AM	14	0	6	0	0	20	9	37	0	0	0	46	0	16	1	0	0	17	83
06:30 AM	21	0	6	0	0	27	2	64	0	0	1	67	0	16	3	0	1	20	114
 06:45 AM	9	0	10	0	0	19	12	53	0	0	0	65	0	34	2	0	0	36	120
Total	47	0	27	0	0	74	28	183	0	0	1	212	0	76	10	0	1	87	373
07·00 AM	17	0	5	0	0	22	15	79	0	0	0	94	0	44	2	0	2	48	164
07:15 AM	14	Õ	7	0	1	22	10	82	Õ	Ő	0	93	Ő	30	19	Õ	0	49	164
07:30 AM	33	Õ	8	0	0	41	20	101	Õ	Ő	0	121	Ő	33	23	Õ	Ő	56	218
07:45 AM	60	õ	13	0	Ő	73	29	123	Õ	Ő	0	152	0	43	59	õ	Ő	102	327
 Total	124	0	33	0	1	158	75	385	0	0	0	460	0	150	103	0	2	255	873
00.00 414	07	0		0	0	00	0	00	0	0	0	75	0		7	0	0	10	404
08:00 AM	27	0	11	0	0	38	9	66	0	0	0	75	0	41	10	0	0	48	161
08:15 AN	9	0	6	0	0	15	14	62	0	0	0	76	0	39	13	0	0	52	143
08:30 ANI	18	0	0	0	1	24	5 5	45	0	0	0	50	0	44 24	12	0	1	5Z	120
 U0.45 AIVI	65	0	24	0	1	23	<u> </u>	212	0	0	0	245	0	159	20	0	1	40	<u> </u>
TOTAL	05	0	54	0	1	100	55	212	0	0	0	24J	0	150	39	0	1	190	545
09:00 AM	8	0	3	0	0	11	5	43	0	0	0	48	0	36	9	0	1	46	105
09:15 AM	12	0	5	0	0	17	3	38	0	0	0	41	0	36	11	0	0	47	105
09:30 AM	8	0	6	0	0	14	6	44	0	0	0	50	0	45	3	0	0	48	112
 09:45 AM	10	0	2	0	0	12	1	33	0	0	0	34	0	42	4	0	0	46	92
Total	38	0	16	0	0	54	15	158	0	0	0	173	0	159	27	0	1	187	414
10:00 AM	8	0	2	0	0	10	3	40	0	0	0	43	0	37	12	0	0	49	102
10:15 AM	9	0	3	0	0	12	4	45	0	0	0	49	0	35	8	0	0	43	104
10:30 AM	8	0	2	0	0	10	7	46	0	0	0	53	0	36	9	0	0	45	108
10:45 AM	12	0	8	0	0	20	9	36	0	0	0	45	0	50	14	0	0	64	129
Total	37	0	15	0	0	52	23	167	0	0	0	190	0	158	43	0	0	201	443
11.00 AM	10	0	10	0	0	22	7	10	0	0	0	50	0	40	0	0	0	57	100
11.00 AM	12	0	10	0	0	17	6	43	0	0	0	50	0	40 47	9 15	1	0	57	129
11.15 AM	15	0	0 11	0	0	17	12	40 60	0	0	0	51	0	41 64	10	1	0	03	120
11.30 AIVI	10	0	5	0	0	20	13	60	0	0	0	73	0	04 55	10	0	0	01 72	170
 Total	56	0	32	0	0	<u></u>	31	217	0	0	0	248	0	214	58	2	0	274	610
Total	50	0	52	0	0	00	51	<u> </u>	0	0	0	240	0	<u> </u>	50	2	0	217	010

Turning Movement Counts

17th St N at 1st Ave N Moorhead, MN

								Groups P	rinted- C	ars + - Tru	icks								
			17th	St N					1st A	ve N					1st A	ve N			
			South	bound					West	bound					Eastb	ound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
12:00 PM	20	0	7	0	0	27	7	65	0	0	0	72	0	72	32	0	0	104	203
12:15 PM	15	0	8	0	0	23	14	48	0	0	0	62	0	65	23	0	0	88	173
12:30 PM	14	0	6	0	0	20	11	76	0	0	0	87	0	49	17	0	0	66	173
12:45 PM	19	0	10	0	0	29	4	65	0	0	0	69	0	58	20	0	0	78	176
Total	68	0	31	0	0	99	36	254	0	0	0	290	0	244	92	0	0	336	725
01.00 PM	12	0	7	0	0	20	4	54	0	1	0	50	0	47	Q	0	0	55	12/
01.00 FIVI	13	0	5	1	0	20	4	54	0	0	0	59	0	47	12	0	0	55	134
	10	0	5 10	1	0	17	9	57	0	0	0	00	0	44	13	0	0	57	140
01:30 PIVI	10	0	10	0	0	20	8 10	61	0	0	0	69	0	22	11	0	0	60	101
		0	13	1	0		12	27	0	1	0	09	0	200	20	0	0	00	<u> </u>
Total	01	0	30	1	0	97	33	229	0	I	0	203	0	206	30	0	0	240	000
02:00 PM	12	0	11	0	0	23	10	46	0	0	0	56	0	47	14	0	0	61	140
02:15 PM	16	0	13	0	0	29	18	59	0	0	0	77	0	67	8	0	0	75	181
02:30 PM	18	0	5	0	2	25	17	64	0	0	0	81	0	73	24	0	0	97	203
02:45 PM	18	0	13	0	0	31	21	54	0	0	0	75	0	69	40	0	0	109	215
Total	64	0	42	0	2	108	66	223	0	0	0	289	0	256	86	0	0	342	739
																		1	
03:00 PM	36	0	16	0	0	52	10	68	0	0	0	78	0	69	34	0	0	103	233
03:15 PM	53	0	15	0	0	68	15	48	0	0	0	63	0	70	24	1	1	96	227
03:30 PM	21	0	10	0	1	32	17	61	0	0	0	78	0	61	13	0	0	74	184
03:45 PM	20	0	15	0	0	35	9	49	0	0	0	58	0	74	27	0	0	101	194
Total	130	0	56	0	1	187	51	226	0	0	0	277	0	274	98	1	1	374	838
04·00 PM	15	0	15	0	0	30	15	58	0	0	0	73	0	70	18	0	0	88	191
04:15 PM	18	Õ	12	Õ	1	31	23	62	Õ	Õ	Õ	85	Ő	73	26	Õ	0	99	215
04:30 PM	22	Ő	13	Ő	0	35	18	62	Õ	Õ	0	80	0	103	26	Ő	0	129	244
04·45 PM	18	Ő	17	Ő	1	36	17	63	Õ	Õ	Ő	80	Ő	107	16	Ő	Ő	123	239
Total	73	0	57	0	2	132	73	245	0	0	0	318	0	353	86	0	0	439	889
		•	•	-	_				-		•					-	-		
05:00 PM	14	0	14	0	0	28	16	74	0	0	0	90	0	110	34	0	0	144	262
05:15 PM	19	0	14	0	0	33	23	83	0	0	0	106	0	114	31	0	0	145	284
05:30 PM	20	0	11	0	0	31	13	60	0	0	0	73	0	78	27	0	1	106	210
05:45 PM	31	0	15	0	1	47	18	50	0	0	0	68	0	44	17	0	3	64	179
Total	84	0	54	0	1	139	70	267	0	0	0	337	0	346	109	0	4	459	935

Turning Movement Counts

17th St N at 1st Ave N Moorhead, MN

								Groups F	Printed- Ca	ars + - Tru	ucks								
			17th	St N					1st A	ve N					1st A	ve N			
			South	bound					West	bound					East	bound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Int. Total
06:00 PM	24	0	3	0	0	27	15	48	0	0	0	63	0	61	19	0	0	80	170
06:15 PM	14	0	9	0	0	23	14	43	0	0	0	57	0	47	17	0	2	66	146
06:30 PM	10	0	4	0	0	14	14	51	0	0	0	65	0	49	17	0	1	67	146
06:45 PM	10	0	6	0	0	16	7	45	0	0	0	52	0	42	15	0	0	57	125
Total	58	0	22	0	0	80	50	187	0	0	0	237	0	199	68	0	3	270	587
Grand Total	905	0	454	1	8	1368	584	2953	0	1	1	3539	0	2795	857	3	13	3668	8575
Apprch %	66.2	0	33.2	0.1	0.6		16.5	83.4	0	0	0		0	76.2	23.4	0.1	0.4		
Total %	10.6	0	5.3	0	0.1	16	6.8	34.4	0	0	0	41.3	0	32.6	10	0	0.2	42.8	
Cars +	882	0	426	0	8	1316	556	2871	0	1	1	3429	0	2684	835	3	11	3533	8278
% Cars +	97.5	0	93.8	0	100	96.2	95.2	97.2	0	100	100	96.9	0	96	97.4	100	84.6	96.3	96.5
Trucks	23	0	28	1	0	52	28	82	0	0	0	110	0	111	22	0	2	135	297
% Trucks	2.5	0	6.2	100	0	3.8	4.8	2.8	0	0	0	3.1	0	4	2.6	0	15.4	3.7	3.5

Turning Movement Counts

17th St N at 1st Ave N Moorhead, MN



Turning Movement Counts

17th St N at 1st Ave N Moorhead, MN

			17th South	St N bound					1st A Westl	Ave N bound					1st A Eastt	Ave N bound			
Start Time	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds	App. Total	Right	Thru	Left	uturn	Peds /	App. Total	Int. Total
Peak Hour Analysis	From 06:0	0 AM to 1	1:45 AM ·	Peak 1 c	of 1														
Peak Hour for Entire	e Intersection	on Begins	at 07:00	AM															
07:00 AM	17	Ō	5	0	0	22	15	79	0	0	0	94	0	44	2	0	2	48	164
07:15 AM	14	0	7	0	1	22	11	82	0	0	0	93	0	30	19	0	0	49	164
07:30 AM	33	0	8	0	0	41	20	101	0	0	0	121	0	33	23	0	0	56	218
07:45 AM	60	0	13	0	0	73	29	123	0	0	0	152	0	43	59	0	0	102	327
Total Volume	124	0	33	0	1	158	75	385	0	0	0	460	0	150	103	0	2	255	873
% App. Total	78.5	0	20.9	0	0.6		16.3	83.7	0	0	0		0	58.8	40.4	0	0.8		
PHF	.517	.000	.635	.000	.250	.541	.647	.783	.000	.000	.000	.757	.000	.852	.436	.000	.250	.625	.667
Peak Hour Analysis Peak Hour for Entire	From 12:00 Intersectio) PM to 06 n Begins a	:45 PM - I at 04:30 P	Peak 1 of M	1														
04:30 PM	22	0	13	0	0	35	18	62	0	0	0	80	0	103	26	0	0	129	244
04:45 PM	18	0	17	0	1	36	17	63	0	0	0	80	0	107	16	0	0	123	239
05:00 PM	14	0	14	0	0	28	16	74	0	0	0	90	0	110	34	0	0	144	262
05:15 PM	19	0	14	0	0	33	23	83	0	0	0	106	0	114	31	0	0	145	284
Total Volume	73	0	58	0	1	132	74	282	0	0	0	356	0	434	107	0	0	541	1029
% App. Total	55.3	0	43.9	0	0.8		20.8	79.2	0	0	0		0	80.2	19.8	0	0		
PHF	.830	.000	.853	.000	.250	.917	.804	.849	.000	.000	.000	.840	.000	.952	.787	.000	.000	.933	.906

Appendix H: Evaluation Matrix



17th Street N Corridor Study

Alternative Matrix

Concept Layout Overview February 2021

			Segment 1				S	egment 2		
	Criteria	No Build	Shared Use Path	Buffered Bike Lanes	No Build	Buffered Bike Lanes	Median w/ Shared Use Path	Median w/ Shared Roadway	Buffered Bike Lanes w/ Shared Use Path	3-Lane Roadway w/ Shared Use Path
	Safety	0	+	++	0	++	+			
	Mobility	0	+	+	0	++	+	+	++	+
Evaluation Matrix Goals	Cost	0	+	+	0	+	0	+	+	+
	Sustainability	0	+	+	0	+	0	0	+	+
	Environmental Impacts	-	+	+	-	+			+	+

	Leg	end	
-	0	+	
Does Not Meet Measure	Minimally Meets Measure	Meets Measure	Exceeds Measure



17th Street N Corridor Study

Alternative Matrix

Detailed Concept Layout Evaluation February 2021

				514419 2021							
				Segment 1				Segm	ent 2		
	Objectives	Performance Measure	No Build	Shared Use Path	Buffered Bike Lanes	No Build	Buffered Bike Lanes	Median w/ Shared Use Path	Median w/ Shared Roadway	Buffered Bike Lanes w/ Shared Use Path	3-Lane Roadway w/ Shared Use Path
	Eliminate serious injury crashes						Not Applicable				
	Daduse such frequencia and succiti	Forecasted crash and severity rates	+	+	+	+	+	+	+	+	+
Goal 1: Safely accommodate all users	Reduce crash frequency and sevency	Vehicle to vehicle conflict points	+		++	+	++				
	Provide safe pedestrian and bicycle	Safe pedestrian crossing facilities	-		++	-	++				
	facilities	Perceived bicycle level of comfort	-	+	++	-	++	+	+		+
Goa	il #1 Summary		0	+	++	0	++	+	++	++	++
	Manage access consistent with roadway funcitional class and access spacing guidelines	Proposed access locations, spacing and treatments	0	0	0	0	0	-	-	0	0
	Provide connected transportation system	Planned roadway capacity and forecasted volumes	✓	~	✓	✓	~	~	✓	1	~
Goal 2: Provide officient mobility and	Accommodate business delivery and freight needs	Roadway design standards	+	+	0			Not Ap	olicable		
access for all modes of travel	Accommodate future transit plans and needs	Potential to accommodate future transit routes and facilities	++			++	++	+	+		
	Provide convenient access for pedestrians and bicyclists	Safe and accessible connections to area transit routes	-		++	-	++				
	Provide convenient access for vulnerable populations	Universal Design	0	~	✓	0	~	~	✓	1	~
Goa	II #2 Summary		0	+	+	0	++	+	+	++	+
	Project meets schedule and funding constraints	Funding eligibility and availability	++	++	++	++	++	0	0	++	++
	Minimize ROW costs		~	~	✓	\checkmark	~	~	\checkmark	√	~
Goal 3: Develop a financially responsible infrastructure implementation plan	Minimize maintenance and lifecycle costs		-	0	0	-	0	++	++	0	0
	Maximize benefit-cost of improvements	Cost effectiveness	+	+	++	+	+	0	0	++	+
	Maximize potential to secure competetive funding		~	~	✓	✓	✓	~	~	~	~
Goa	Il #3 Summary		0	+	+	0	+	0	+	+	+

	Provide access and connectivity for businesses and neighborhoods	Business and neighborhood access and connectivity	+	++	++	+	+	0	0	++	+
	Maintain access for local trips into/out of Downtown Moorhead and to/from Highway 10	Downtown Moorhead and Highway 10 Access	+	+	+	+	+	0	0	+	+
Goal 4: Preserve community connections and economic vitality	Support existing and future land use plans		√	1	√	✓	✓	√	1	1	✓
	Serve neighborhoods livability		0	+	+	0	+			+	+
	Consistent with regional and local plans		√	1	1	✓	✓	√	1	1	✓
Goa	al #4 Summary		0	+	+	0	+	0	0	+	+
Garlis	Avoid, minimize and mitigate impacts to built environment	Acquisition of property	~	~	~	~	✓	✓	~	~	✓
Provide infrastructure improvements compatible with the natural and built	Provide opportunities for environmetnal enhancements	Opportunities for streetscaping and/or landscaping	-	+	+	-	+	++	++	+	+
environment	Avoid, minimize and mitigate impacts for flood risks and stormwater issues	Effectiveness of stormwater management features to meet standards	~	1	~	~	✓	\checkmark	1	1	✓
Goa	al #5 Summary		-	+	+	-	+	++	++	+	+
Public	Support/Feedback										
Ag	ency Support										

Legend				
-	0	+		
Does Not Meet Measure	Minimally Meets Measure	Meets Measure	Exceeds Measure	

Appendix I: Public Engagement Summaries



PUBLIC INPUT SUMMARY

WHEN

Feedback collected from August 7 - August 31, 2020 *103 Responses to Goals + Objectives Survey* 73 Responses to Design Options Survey

PURPOSE OF THE ONLINE PUBLIC INPUT OPPORTUNITY

SPONSES

SURVEY

The purpose of the Online Public Input Opportunity was to gather community feedback on:

- the project goals »
- top priorities for the corridor »
- existing conditions »
- a tool box of improvement ideas »

FEEDBACK ABOUT EXISTING CONDITIONS

- Most respondents drive the corridor and feel safe driving »
- About 1/3 of the respondents walk and/or bike the corridor, and generally feel safe » walking and biking
- Top concerns for walking include the lack of lighting, car/truck speeds, and lack of » sidewalks south of 4th Ave
- Some people bicycling feel unsafe due to high vehicle speeds »

FEEDBACK ABOUT FUTURE DESIGN OPTIONS

What pedestrian and bicycle options would you like to see added to 17 St N?





Landscaped Median

Mini Roundabout

Gateways



Which transit options would you like to see added to 17th St N?



Which streetscape options would you like to see added to 17th St N?



TOP PRIORITIES

Add Roadway / Pedestrian Lighting

Connect the sidewalk network

Develop safer pedestrian crossings

Add landscaping and street trees

Maintain on-street parking for residents

ADDITIONAL COMMENTS

- Desire for intersection » improvements and dedicated turn lanes at 1st Ave N
- Create safer/shorter street » crossings; Add marked crosswalks and improve the curb ramps
- Slow down motor vehicle traffic »
- Interest in adding street trees and » landscaped boulevards
- Improve drainage / repair curb and » autter
- Widen the sidewalks »

Sign up for email updates and future engagement opportunities at: www.fmmetrocog.org/Moorhead-17th-st-n

52%

41%

16%

7%

Project Contact: Luke Champa (701) 532-5107







17th Street N Corridor Study

Public Engagement Period Two Results – Corridor Alternatives Survey



Date:	January 4, 2021
То:	Luke Champa, Assistant Planner, FM Metro COG
	Dan Farnsworth, Transportation Planner, FM Metro COG
From:	Cody Christianson, PE, Project Manager, Bolton & Menk, Inc.
	Jim Mertz, GISP, Project Planner, Bolton & Menk, Inc.
	Connor Cox, Project Planner, Toole Design
Subject:	Public Engagement #2 Results – Corridor Alternatives Survey 17 th Street N Corridor Study Fargo-Moorhead Metropolitan Council of Governments (Metro COG)







Public Input - Segment 1 Alternatives



SEGMENT 1 // ALTERNATIVE 1A



























Public Input - Segment 2 Alternatives













SEGMENT 2 // ALTERNATIVE 2B









SEGMENT 2 // ALTERNATIVE 2C



Hide table

Empty categories 1 Sort

Answers	Count	Percentage
Strongly Oppose	74	54.41%
Oppose	25	18.38%
Neutral	8	5.88%
Support	15	11.03%
Strongly Support	6	4.41%
		Answered: 128 Skipped: 8







SEGMENT 2 // EXISTING CONDITIONS







Public Input - Sidewalk Alternatives



Option 1: Existing Sidewalk Crossing Location







Option 2: Sidewalk Bends in Closer to Street









Study Review Committee – Segment 1 Alternatives



























Study Review Committee – Segment 2 Alternatives



























<u>Hide table</u>

Empty categories 1 Sort

Answers	Count	Percentage
Strongly Oppose	2	25%
Oppose	1	12.5%
Neutral	1	12.5%
Support	2	25%
Strongly Support	2	25%
		Answered: 8 Skipped: 0





SEGMENT 2 // EXISTING CONDITIONS





Study Review Committee – Sidewalk Alternatives



Option 1: Existing Sidewalk Crossing Location







Option 2: Sidewalk Bends in Closer to Street











17th Street N Corridor Study

Public Engagement Period Three Results – Segment 2 Corridor Alternatives Survey



Date:	February 26, 2021
То:	Luke Champa, Assistant Planner, FM Metro COG
	Dan Farnsworth, Transportation Planner, FM Metro COG
From:	Cody Christianson, PE, Project Manager, Bolton & Menk, Inc.
	Jim Mertz, GISP, Project Planner, Bolton & Menk, Inc.
	Connor Cox, Project Planner, Toole Design
Subject:	Public Engagement #3 Results – Corridor Alternatives Survey 17 th Street N Corridor Study Fargo-Moorhead Metropolitan Council of Governments (Metro COG)






Public Input - Segment 2 Alternatives













SEGMENT 2 // PATH w/ BUFFERED BIKE LANES



