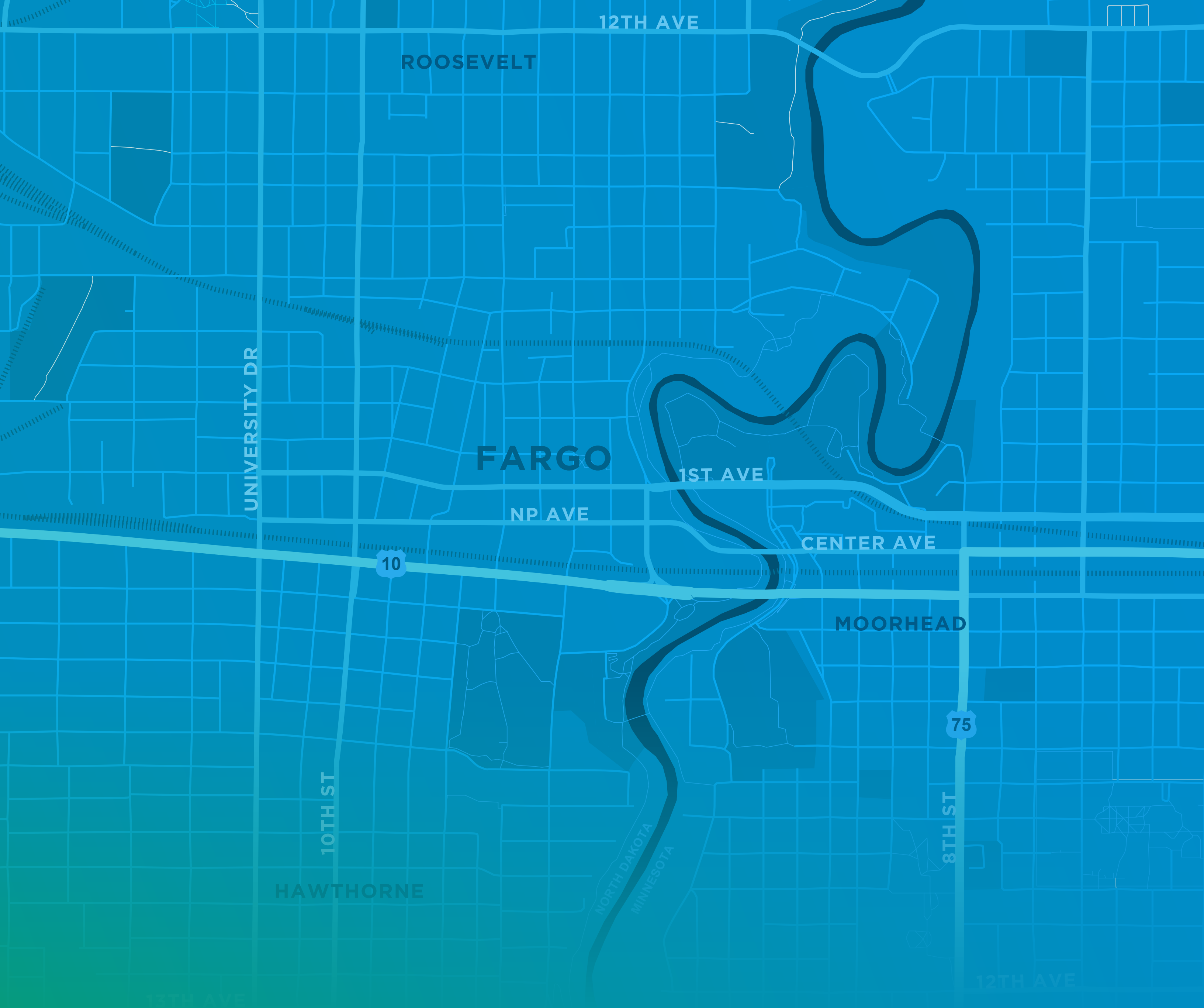


FARGO Transportation Plan

MULTIMODAL ASSESSMENT

PREPARED FOR **FARGO-MOORHEAD METROPOLITAN COUNCIL OF GOVERNMENTS** AND **CITY OF FARGO**

PREPARED BY Kimley»Horn · BOLTON & MENK

CONTENTS

TRANSPORTATION INVENTORY 2

INTRODUCTION 2
VEHICULAR NETWORK 3
BICYCLE AND PEDESTRIAN FACILITIES 12
TRANSIT 16

SAFETY 18

CRASH RATE ANALYSIS 18

MULTIMODAL LEVEL OF SERVICE 26

VEHICLE LEVEL OF SERVICE 28
PEDESTRIAN LEVEL OF SERVICE 30
BICYCLE LEVEL OF SERVICE 32
TRANSIT LEVEL OF SERVICE 34

ADDITIONAL CONSIDERATIONS 36

TRANSPORTATION INVENTORY

This document is a follow-up to Volume 1 of the Foundations Report, which set the stage for the Transportation Plan's goals, objectives, and previous planning context. Volume 2 includes a thorough analysis of the City's existing physical transportation infrastructure, including roadways, bicycle and pedestrian facilities, safety conditions, and multimodal level of service.

INTRODUCTION

The City of Fargo owns and manages an extensive network of transportation facilities. This includes nearly 1,380 miles of roadway, 945 miles of and bicycle pedestrian facilities, and 15 transit routes through Metro Area Transit (MATBUS). Historically, transportation planning in the City of Fargo has focused on one mode or one corridor at a time. Additionally, despite safety being a top priority of Metro COG and NDDOT, safety is rarely used to drive decisions in the local Capital Improvement Program (CIP) and Metropolitan Transportation Plan (MTP).

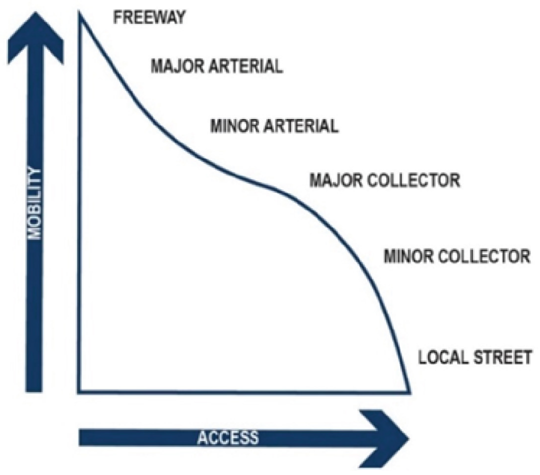
The intent of this plan is to evaluate each mode of travel along with safety to holistically understand needs and assess the balance of transportation modes provided throughout the network.

VEHICULAR NETWORK

Functional Classification

Roadways are designated based on two primary travel needs: travel mobility and land access to the roadway network using the functional classification system. This system is used to create a roadway network that efficiently collects and distributes traffic from individual properties and neighborhoods to the state highway system. A successful system coordinates and manages mobility, roadway design, and route alignment and 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 roadways. Each classification has a different function, with interstates or freeways prioritizing mobility with very strict access controls while a local road prioritizes property access over mobility, as shown in Figure 1. Most travel relies on a network of roads at multiple classification levels. Principal arterials provide the highest levels of travel mobility and very low land access and typically carry the highest traffic volumes. Minor collectors provide much higher land access with lower travel mobility and lower traffic volumes. All roads federally functionally classified are eligible for federal funding.

Figure 1: Access and Mobility for Each Functional Class



Examples of functionally classified roadways in Fargo are shown in Table 1. Figure 2 shows the existing functional classification and the most recently collected traffic volumes.

Table 1: Functional Classification Examples

INTERSTATES

I-94, I-29

High speed (55 miles per hour or higher), high traffic volume, access limited to every one-mile. Intended to serve very long, regional trips.

PRINCIPAL ARTERIALS

Main Avenue, University Drive, 45th Street

High speed (35-45 miles per hour), high traffic volume, access limited to one-quarter and one-half mile. Intended to serve longer local trips and connect to interstates.

MINOR ARTERIALS

25th Street, 40th Avenue

Moderate speed (30-40 mph), moderate traffic volumes. Access controlled, but less strict. Intended to connect to the local area's major destinations.

MAJOR COLLECTORS

17th Avenue S, 7th Avenue N

Moderate speed (30-40 mph), moderate traffic volumes. Less access control than arterials. Intended to connect from local neighborhoods and commercial zones to other destinations and facilities.

MINOR COLLECTORS

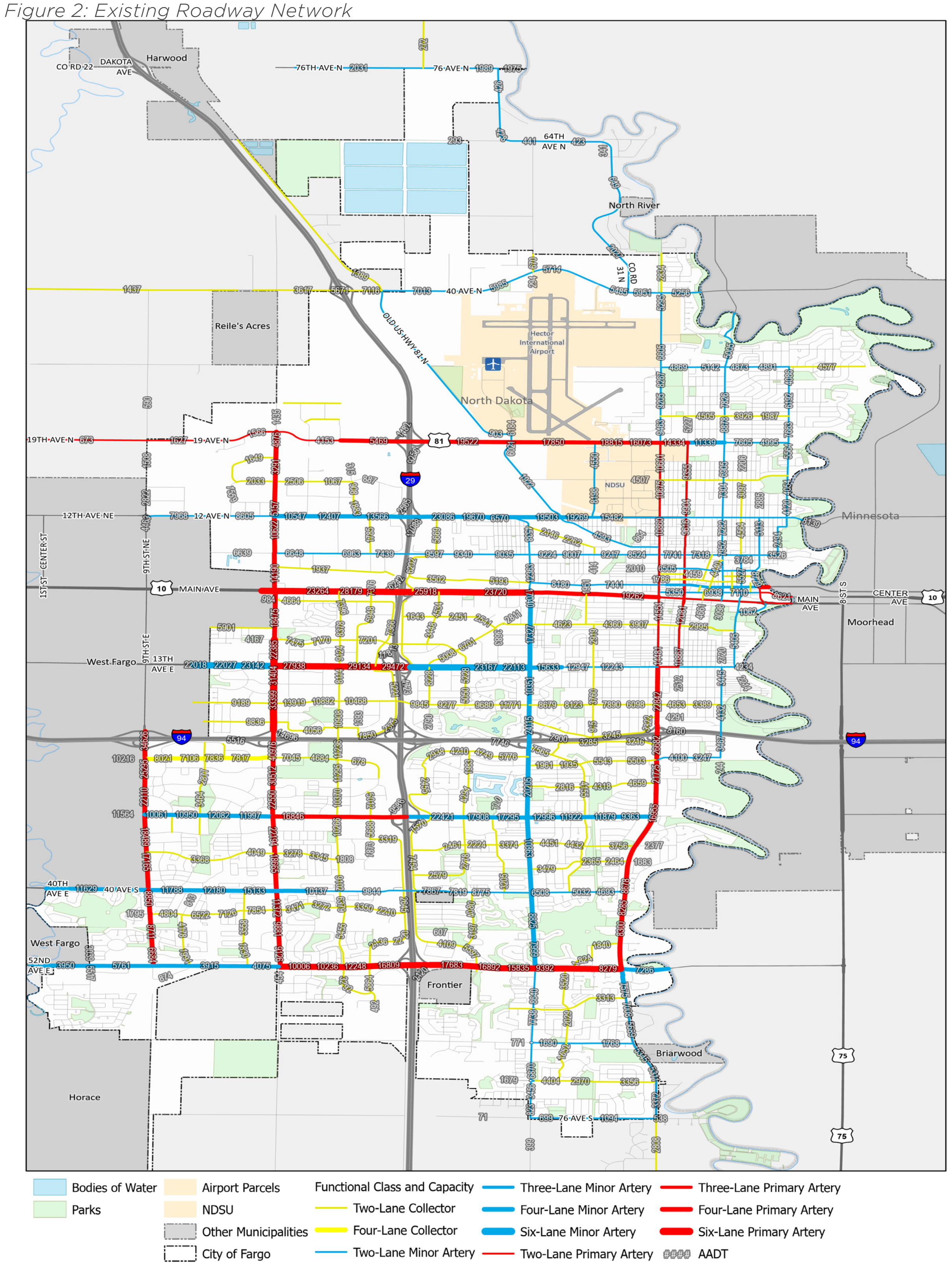
15th Avenue N, 32nd Street S

Low speed (30 mph), low traffic volumes, and limited access control. Collects local roadway traffic and connects to major collectors and arterials.

LOCAL ROADWAYS

Lowest speed (25 mph), lowest traffic volume roadways, with no access control. Provides direct access to land.

Figure 2: Existing Roadway Network



Local Classification & Typology Efforts

Two previous efforts have attempted to contextualize street classification network to better acknowledge the connection between transportation facilities and land use.

GO 2030

This plan established signature streets and active living streets as two street typologies with land use designations. Signature streets emphasize street activity over mobility and support an inviting urban environment while active living streets support multiple modes of transportation and become great public spaces.

These designations for streets apply to areas of all types of land use development and functional classification. While appropriate to determine the future vision of each corridor, it lacks the necessary context to make sound determinations of roadway design. One example is University Drive which runs the entire length of the city, but dramatically changes context from a multimodal corridor near North Dakota State University and Downtown to a six-lane divided arterial between 13th Avenue S and I-94. Additionally, this document is nearly a decade old and has not been updated to reflect the growth and change across the city, which has created conflicts between what was determined in the comprehensive plan and existing planning efforts, like the 32nd Avenue S reconstruction.

FARGO-WEST FARGO PARKING AND ACCESS REQUIREMENT STUDY

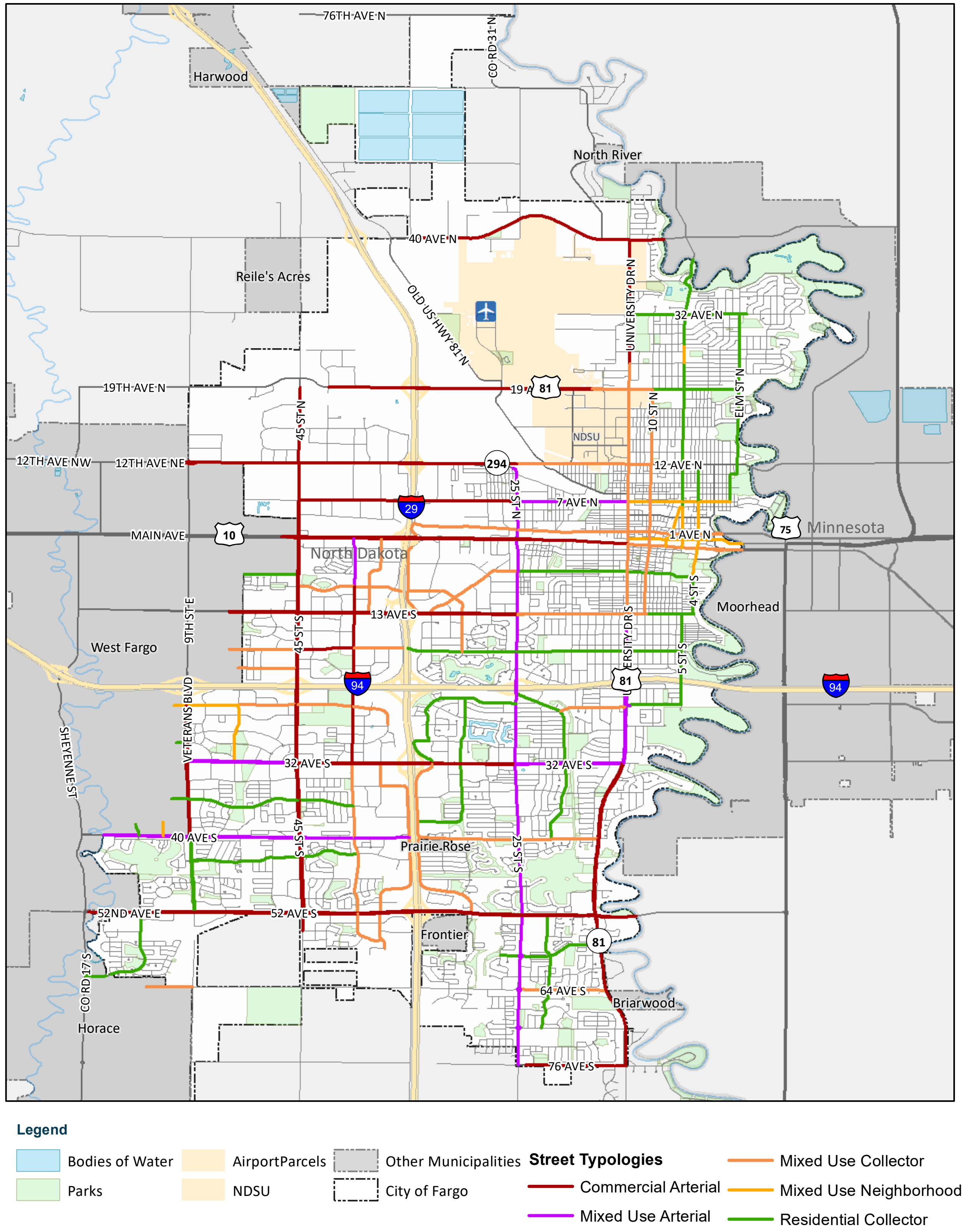
This study applied seven different typologies to the transportation network across Fargo and neighboring West Fargo, five of which are shown in Figure 3) on the facing page). Each typology had transportation mode priorities and desired function.

This effort more closely defined the relationship between roadway design and land use context. However, the roadway feature guidance did not match the current practices and expectations within the City of Fargo and did not provide information or guidance on facility selection and design types. One example of this conflict is on Veterans Boulevard, which is classified as a residential collector, appropriate for a 25 mile per hour speed and on-street parking. However, the design of the road is 35 miles per hour with suburban style residential development that does not front the roadway; no parking is necessary or likely to be permitted. Finally, this study included gaps in the network that lack local context and a system for regular revisions.

LOCAL PRIORITIES AND FUNCTIONAL CLASSIFICATION

The federal functional classification process is cumbersome and time-consuming, making it hard for cities to reclassify roadways in a timely manner as the surrounding context and mobility needs change. However, the previous efforts from Go 2030 and the Parking and Access Requirements Study established a baseline for how to blend the federal functional classification system with the local needs, priorities, and context. The Fargo Transportation Plan will build on these efforts to identify a local street typology system that ties together land use, street purpose, and travel mode priorities to develop a flexible framework that guides future projects.

Figure 3: Fargo-West Fargo Parking and Access Study Typlogy



Connection to Land Use

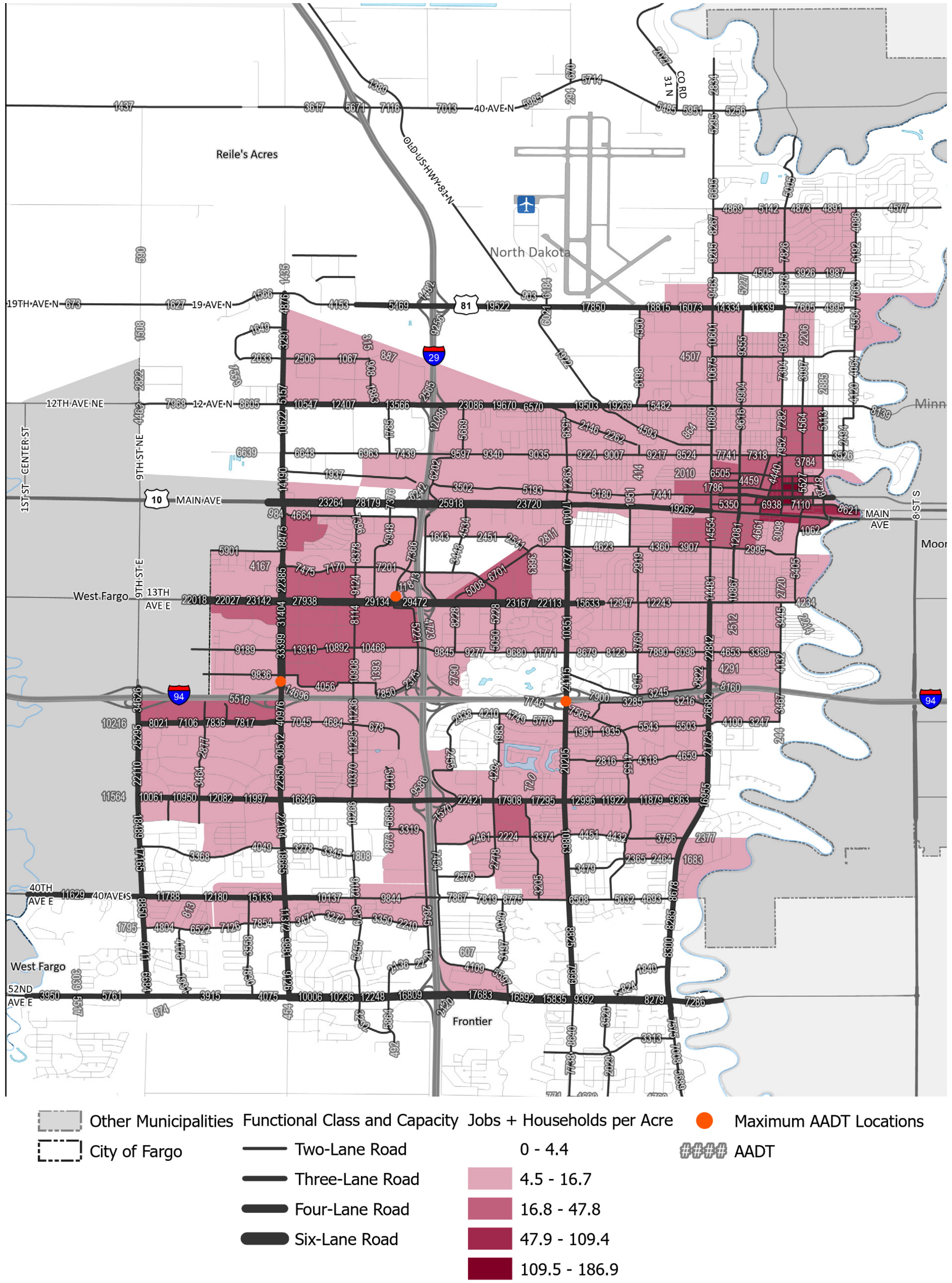
Land use and transportation are directly linked. Travel behavior is determined by the location of where people live in relation to where they work, shop, socialize, and recreate and the type and quality of transportation facilities available. Typically, low land use density is represented by large parcel size like half-acre residential units or big box stores with large parking lots; it requires longer trips and results in higher traffic volumes. A corridor like 52nd Avenue S west of I-29 is an example of an arterial roadway serving low land use density. Higher land use density is often represented by higher density residential developments, smaller commercial developments, and small parcel sizes. This development type typically allows for shorter trips spread out across multiple moderate volume roadways. A corridor like University between 13th Avenue S and 19th Avenue N is an example of an arterial serving high land use density. Figure 4 shows the 2025 expected land use density based on the jobs and household information from the traffic analysis zones and the functionally classified roadways by number of lanes.

Because low land use density typically includes a less dense roadway network and requires longer trips, roadways that serve these areas tend to have more travel lanes and carry more vehicles. The land use development patterns result in disconnected roadways, pushing vehicles to fewer roadways and creating undesirable and/or unavailable multimodal facilities. Table 2 shows the three primary functional classification types by average ADT and maximum ADT. Generally, the maximum traffic volumes for each classification occur in areas surrounded by the lowest land use densities.

Table 2: Functional Classification by Average Daily Traffic

	AVERAGE ADT	MAXIMUM ADT
Collector	4,545	15,108 | 38th Street
Minor Arterial	8,938	28,659 | 25th Street
Primary Arterial	16,536	45,724 | 45th Street

Figure 4: Functionally Classified Roadways and Land Use Density



Infrastructure Condition

Timely pavement rehabilitation has the potential to be six to 14 times more cost-effective than rebuilding a deteriorated road. Poor pavement conditions add nearly $600 to the annual cost of car ownership due to damaged tires, suspension, reduced fuel efficiency, and accelerated vehicle depreciation. Poor pavement also reduces bicycle safety and comfort for in-road bike facilities (sharrows, bike lanes, buffered bike lanes). The City of Fargo regularly collects pavement conditions to inform pavement maintenance activities and ensure roadways remain in a state of good repair.

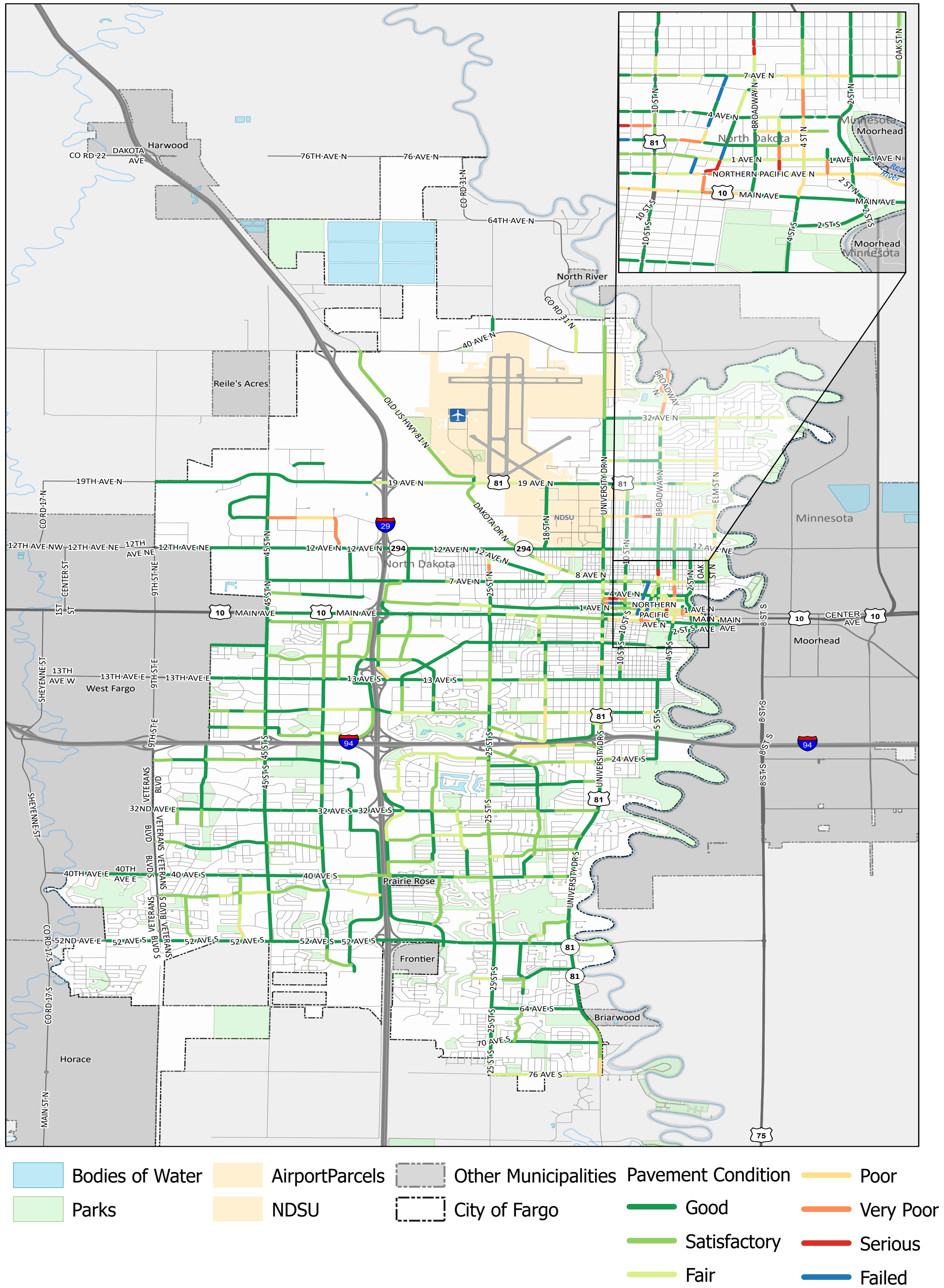
The City of Fargo uses the pavement condition index (PCI) to identify the general condition of pavement on a given roadway segment. PCI uses a range between zero, indicating failed pavement, and 100, indicating good pavement, to identify the pavement condition. Table 3 shows the number of miles and percent of total miles for each pavement condition for the City of Fargo's roadway network.

Generally, the pavement throughout the city is in satisfactory condition, with an average PCI of 83.4 and 87.1 percent in good or satisfactory condition. There are six segments of failed pavement, all located within the Downtown. There are an additional six segments of serious pavement, five of which are also located within the Downtown and one segment on 15th Avenue N by Ben Franklin Middle School. Pavement condition is shown in Figure 5.

Table 3: Pavement Condition

PCI RANGE	CLASSIFICATION	MILES	PERCENT OF TOTAL MILES
86-100	Good	119.12	61.4%
71-85	Satisfactory	49.83	25.7%
56-70	Fair	15.56	8.0%
41-55	Poor	6.31	3.3%
26-40	Very Poor	2.30	1.2%
11-25	Serious	0.40	0.2%
0-10	Failed	0.42	0.2%

Figure 5: Pavement Condition



BICYCLE AND PEDESTRIAN FACILITIES

Fargo's bicycle and pedestrian network consists of multiple facility types as shown in Table 4. In total there are more than 756 miles of sidewalks, 37 miles of bikeways (all types), and nearly 150 miles of shared use path. The existing pedestrian and bicycle network is shown in Figure 6.

Table 4: Pedestrian and Bicycle Facility Types and Mileage

SIDEWALKS

Paved pedestrian paths found adjacent or parallel to roadways. Bicyclists may or may not be permitted to use. Typically, 4' to 6' wide and appropriate for all roadway types.

BIKE LANES

Pavement markings that delineate a lane dedicated for cyclists. Typically 4' to 6' wide and appropriate for moderate volume roadways, depending on context.

SHARED USE PATHS

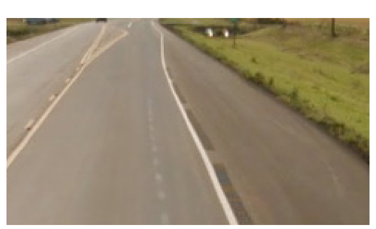
A paved path at least 8' (10 feet with shy zone preferred) that permits pedestrians and cyclists to use the space. Can be adjacent to roadways or other features (drains, river).

SHARED LANES/SHARROWS

Pavement markings to delineate that cyclists should use the full roadway width. Appropriate for low volume and low speed roadways.

SEPARATED BIKE LANES

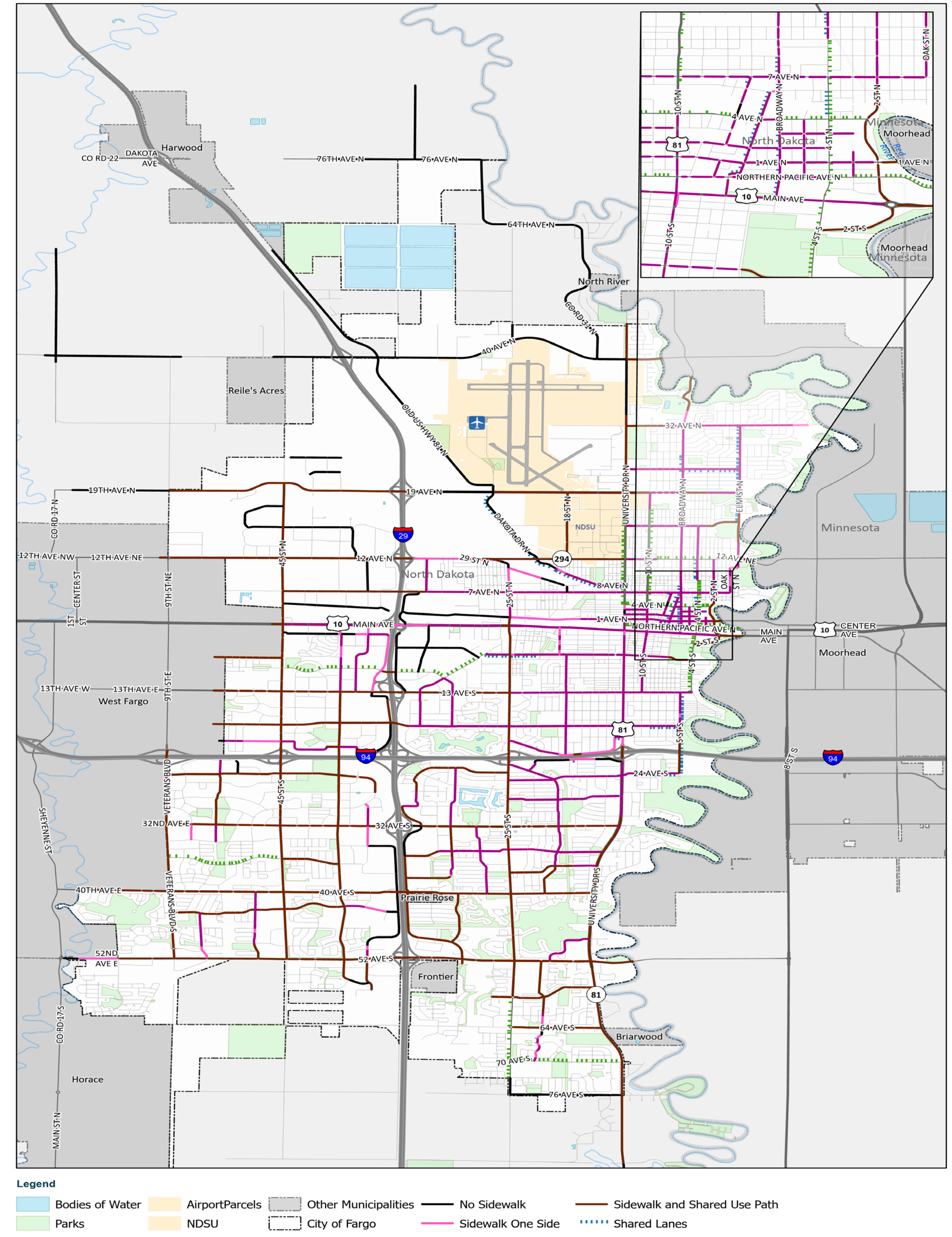
Separate space for bicyclists with paint or physical separation between the roadway and bike lane. Typically 4' to 6' wide and appropriate for moderate volume and moderate speed roadways.



WIDE SHOULDERS

Wide shoulders, generally 6' or wider (depending on traffic speed and volumes) that serve as pedestrian and bicycle facilities. This facility is typically found in rural areas.

Figure 6: Bike and Pedestrian Transportation Network



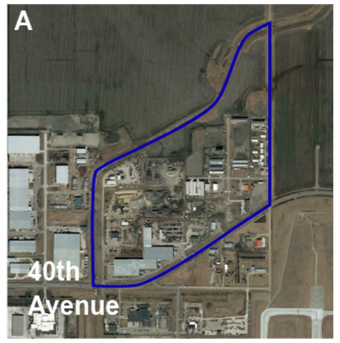
Connection to Land Use

Like vehicle trips, bicycle and pedestrian trips are strongly related to land use and transportation facilities. There is generally a stronger demand for bicycle and pedestrian trips, and thus facilities in denser areas of the city. Figure 7 shows the existing bicycle and pedestrian facilities, the job and household density, as well as the estimated trip lengths along functionally classified roadways, as collected by StreetLight data.

In recent years, national efforts have been made to reduce vehicle miles travelled. There are two key components of the built environment that can support reduced vehicle miles traveled: land use density and land use mix. Density is often described as the number of jobs or households per acre. Land use mix refers to the different types of land uses within a given area (schools, shopping, services, homes, jobs, etc.). For the purposes of this study, it is the relation of households and jobs per acre. The more balanced a subarea can become, the more likely people can live, work, and play in their neighborhood and reduce vehicle miles travelled.

Downtown Fargo has seen increased density and land use mix, which has spurred walking, biking, and transit use in the area, but as the central entertainment district it generates attractions from other areas within Fargo and neighboring cities, resulting in longer than expected vehicle miles travelled. To underscore this connection, three traffic analysis zones were selected to demonstrate the connectivity between vehicle miles travelled, density, and land use mix:

- A: the area north of 40th Avenue N between 32nd Street and 25th Street. This area sees very low density (2.5 jobs and households per acre) that serves almost exclusively industrial uses and includes no households. This area sees the longest average trip length in the entire City of Fargo at 23.8 miles.
- B: the area in the northwest quadrant of the I-29 and 13th Avenue intersection. This area sees relatively high density (16.0 jobs and households per acre), but it is primarily a job center with very little housing. This area sees very long trips despite its density, with an average trip length of 12.4 miles.
- C: the area between 32nd Avenue S and 35th Avenue S and 28th Street and 32nd Street, which includes Essentia Health and a mix of housing types. This area sees similar land use density as B (17.9 jobs and households per acre) but with a nearly equal mix of land uses. With this mix of land uses it sees relatively short trip lengths (7.5 miles), despite the hospital being a regional destination. This is 40 percent shorter average trip length than B.



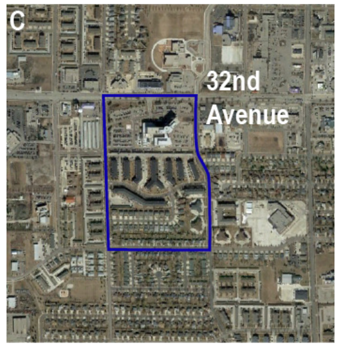
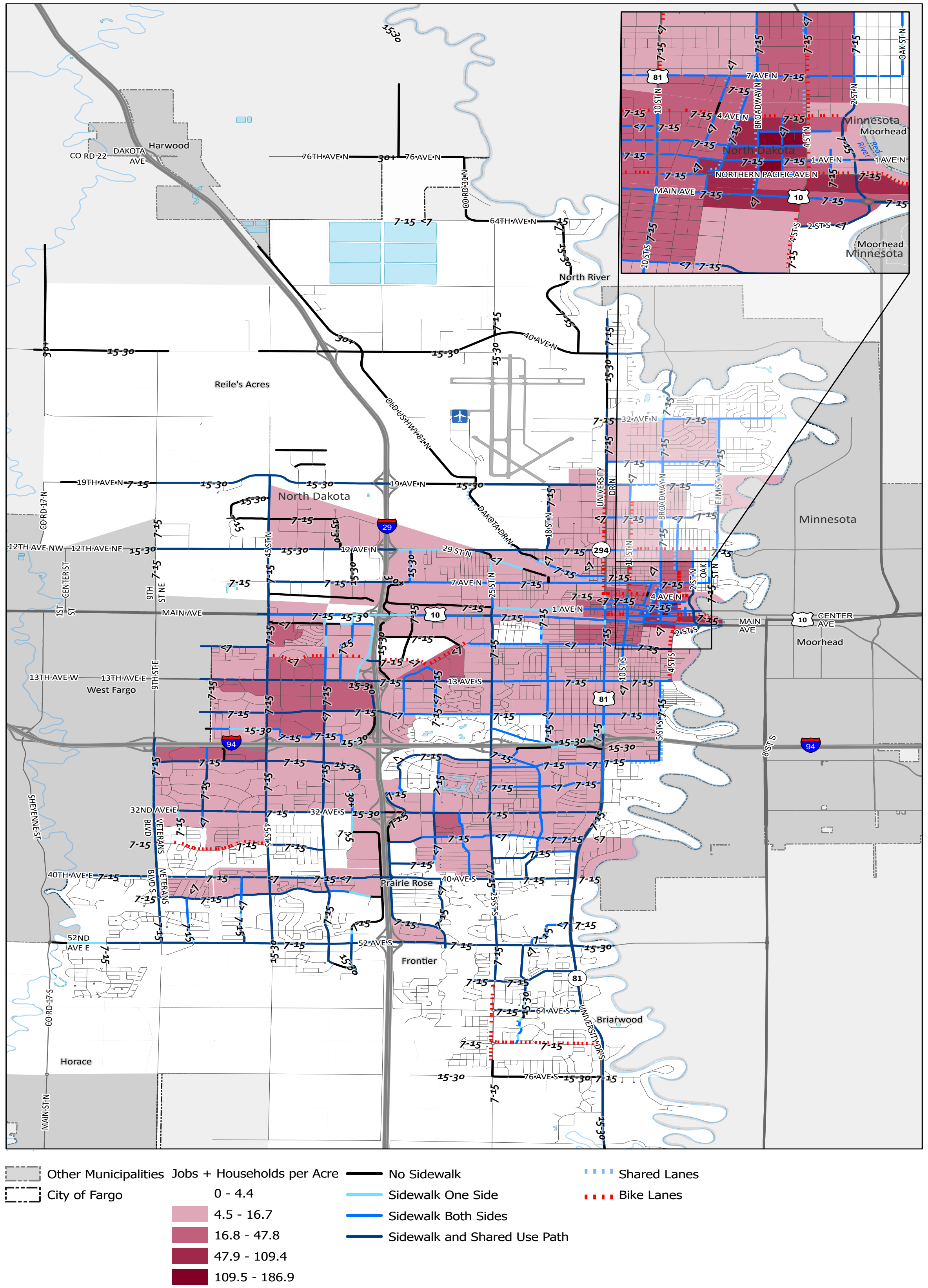


Figure 7: Pedestrian and Bicycle Network Overlaid on Land Use Density



TRANSIT

Metro Area Transit (MATBUS) is the transit service provider for Fargo and the surrounding metropolitan area. In total it operates 22 fixed routes, with 15 running within the City of Fargo. Some of these routes, including 13U, 31, 32E, 32W, 33, and 34 only operate during the academic year, August through May, primarily serving North Dakota State University students, staff, and faculty. Table 5 shows the routes that serve the City of Fargo and their frequency. The routes are shown in Figure 8.

Every five years, transit within the metro area receives an extensive review of operations, service frequency, route alignments, and other policies and initiatives. Because that review is recurring and comprehensive, the transit analysis presented in this plan is limited and focused on ensuring high quality transit facilities are supported through multimodal planning, including bicycle and pedestrian access and adequate vehicular level of service.

Table 5: MATBUS Route Frequencies

FREQUENCY	ROUTES
15 Minutes	15[2], 31[1], 33[1]
20 Minutes	34[1]
30 Minutes	11[3], 13[3], 13U[1], 14[3], 15, 32E[2], 32W[2]
60 Minutes	11[3], 13[3], 14[3], 16, 17, 18, 20, 24

[1]Only operates during academic year, August through May
[2]Operates with 15-minute headways until 5:45 PM, then with 30-minute headways
[3]Operates with 30-minute headways until 6:15 PM, then with 60-minute headways

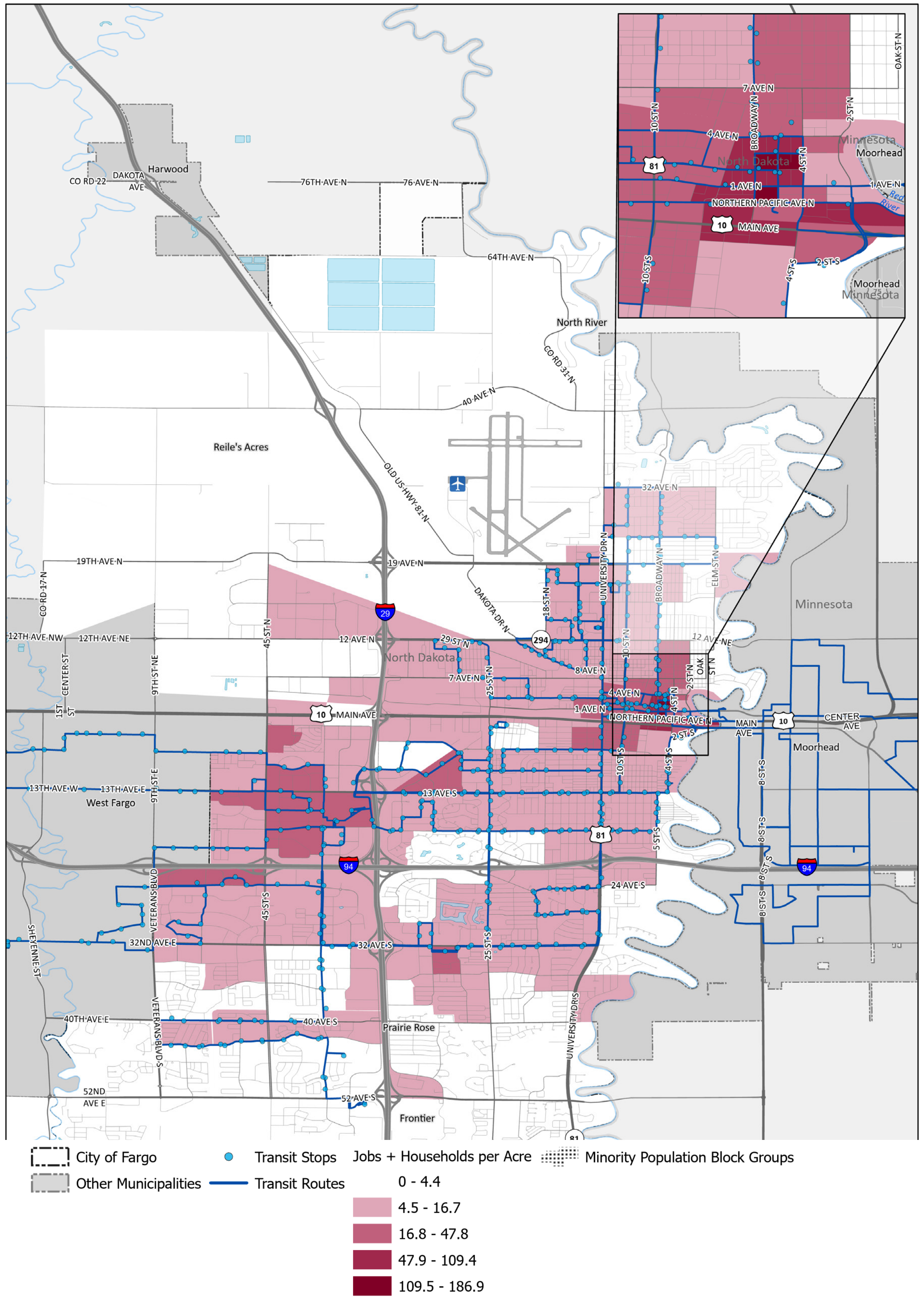
Connection to Land Use & Other Factors

Like other modes, transit use is often correlated with factors external to the transit facilities. Often, demand for transit is highly related to land use density, that is the number of jobs or households in any given area. Higher residential and job densities see higher transit use and lower residential and job densities tend to see lower transit use. Therefore, it is most functional to provide high quality transit through the densest areas of the City.

Other demographic factors, like age, (youth, college students, and the elderly), income, and race/ethnicity may also contribute to higher transit use. Often transit serves environmental justice populations (areas of poverty and non-white populations) to connect them to jobs and services they rely on and minimize the transportation burden these populations often experience.

Figure 8 shows the household and employment density throughout Fargo, environmental justice populations, and the transit routes.

Figure 8: Existing Transit Routes Overlaid on Land Use Density



SAFETY

Traffic safety is a high priority for all agencies responsible for managing transportation facilities. North Dakota Department of Transportation has adopted the Vision Zero traffic safety strategy that aims for zero traffic related fatalities. The City of Fargo supports this traffic safety strategy through the Metropolitan Transportation Plan, Metro Grow, and the targets established therein. Crash trends on roadway segments (roadways between two intersections) and at intersections are often a primary reason for a wide variety of roadway improvements. This plan evaluated five years of crash records between January 1, 2016 and December 31, 2020 which were collected from NDDOT.

From 2016 through 2020, there were 19,753 crashes reported during this period throughout the City of Fargo. This corresponds to an average 3,951 crashes per year. Of the total crashes, 20 percent resulted in a fatality or injury, including the possible injury classification. This corresponds to an average of 788 injury crashes each year, including 30 fatal crashes per year.

CRASH RATE ANALYSIS

Crash rate analysis was completed for all functionally classified roadway segments (roadway between two intersections) and intersections. Crash rate analysis incorporates roadway characteristics (number of lanes, traffic control) and traffic volumes into the analysis to normalize the data. This means that crash rates at an intersection that carries only 1,000 vehicles per day and an intersection that carries 10,000 vehicles per day can be compared equally. A location's crash rates are then compared to the average crash rate for that type of facility. Where a location's crash rate is higher than the average crash rate its index is greater than one and indicates a statistically significant crash trend.

Figure 9 shows the intersections and segments with crash rates above the average. Figure 10 shows the 10 highest crash rate intersections and segments.

Intersections

Table 6 shows the 10 highest crash rate intersections in the City of Fargo. The top four intersections experienced 339 crashes with no fatal or serious injury crashes. The top crash rate intersection list differs slightly from the 2018 – 2020 Urban High Crash Locations list published by NDDOT. This may occur because the reporting period is different (three years instead of five).

Eight of the top ten locations involve University Drive and 10th Street, the one-way pair that runs between 19th Avenue N and 13th Avenue S. One-way pairs should reduce conflict points, but relatively high traffic volumes and speeds have contributed to elevated crash trends on these corridors.

Table 6: Top 10 Crash Rate Intersections

INTERSECTION	TOTAL CRASHES	FATAL & SERIOUS INJURY CRASHES	CRASH RATE	RANK	REAR END	SIDE-SWIPE	LEFT TURN	BIKE/ PED	OTHER
University Drive & 19th Avenue N	104	0	2.9	1	25	4	43	2	30
University Drive & 8th Avenue N[2]	63	0	2.7	2	12	0	6	0	45
University Drive & 12th Avenue N	54	0	2.4	3	14	1	19	0	20
13th Avenue S & 25th Street[2]	118	0	2.0	4	40	5	36	1	36
University Drive & Main Avenue[2]	95	2	2.0	5	34	1	20	3	37
1st Avenue N & Broadway	58	1	1.9	6	14	1	7	1	35
University Drive & Interstate Ramps (WB)	46	0	1.7	-	19	0	13	1	13
10th Street N & 1st Avenue N[2]	61	1	1.7	7	3	2	16	2	38
13th Avenue S & 38th Street S[2]	80	1	1.6	8	43	0	13	0	24
University Drive & 7th Avenue N	41	0	1.6	9	17	2	7	0	15
University Drive & 15th Avenue N	30	0	1.5	10	12	1	4	1	12

INTERSECTIONS SEVERITY RATE

For intersections that experienced crash rates greater than the Citywide average, crash severity analysis was completed. Crash severity analysis normalizes the rate of fatal and injury crashes per million entering vehicles to allow for an equal comparison across segments and intersections regardless of traffic volumes.

Table 7 shows the top 10 highest crash severity rate intersections within the City of Fargo. Most intersections with high severity rates have relative low crash rates and are on the fringes of the city where traffic speeds tend to be higher. The intersection of 12th Avenue N & Elm Street involved a pedestrian and bicycle crash that resulted in an injury to the pedestrian. This is a highly unusual crash type. No fatalities occurred at any of the top 10 severity rate intersections.

Table 7: Top 10 Crash Severity Intersections

INTERSECTION	TOTAL CRASHES	FATAL CRASHES	INJURY CRASHES	SEVERITY RATE	RANK
15th Avenue N & 45th Street	11	0	2	17.3	1
34th Avenue S & 39th Street	8	0	1	8.3	2
40th Avenue S & 47th Street	14	0	2	7.6	3
7th Avenue N & 40th Street N	7	0	1	6.4	4
2nd Avenue S & 40th Street S	26	0	1	5.5	5
13th Avenue S & 45th Street	133	0	5	5.2	6
12th Avenue N & Elm Street	13	0	1	5.1	7
52nd Avenue & 45th Street	24	0	1	4.6	8
7th Avenue E & 45th Street	23	0	2	4.5	9
Main Avenue & University Drive	95	0	2	4.3	10

Segments

Table 8 shows the 10 highest crash rate segments in the City of Fargo. Each of these segments occur in Fargo's downtown. These areas of the city see the most significant multimodal activity from high pedestrian movements, in-street bicycle activities, stop-and-go bus activity, angle and parallel on-street parking, short blocks with frequent traffic control, and vehicle congestion with slow speeds. This creates frequent crashes of low severity. In fact, there were only two injury crashes in the top 10 highest crash rate segments.

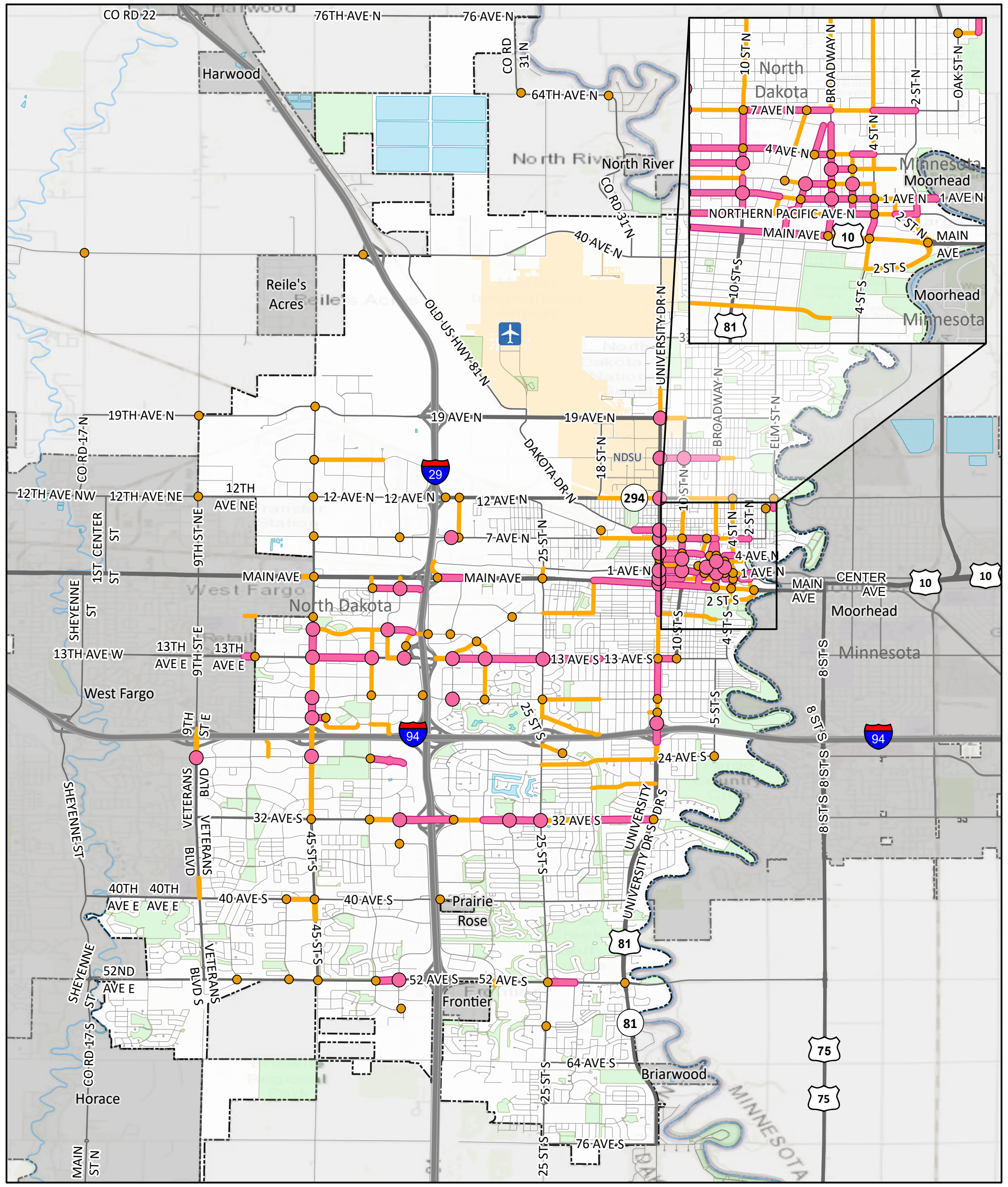
In addition to the top 10 segments, the crash rate analysis identified multiple corridors with above average crash rates that may warrant further investigation:

- 45th Street between 9th Avenue S and 32nd Avenue S (797 crashes)
- 32nd Avenue S between 42nd Street and University Drive (561 crashes)
- University Drive between 25th Avenue S and Main Avenue (625 crashes)
- 3rd Avenue S between the I-29 North Ramps and 17th Street S (344 crashes)
- 10th Street between NP Avenue and 12th Avenue N (228 crashes)
- 7th Avenue N between 18th Street N and 2nd Street N (164 crashes)
- 15th Avenue N between University Drive and 4th Street N (70 crashes)

Table 8: Top 10 Crash Rate Segments

SEGMENT	TOTAL CRASHES	FATAL & SERIOUS INJURY CRASHES	CRASH RATE	RANK	UNCRONTROLLED ACCESS	ON STREET PARKING
Broadway: NP Avenue to 1st Avenue N	48	1	39.3	1	1	Angle
4th Street: NP Avenue to 1st Avenue N	42	0	38.2	2	3	Parallel
NP Avenue: 5th Street N to 4th Street N	32	0	33.5	3	3	Parallel
Broadway: 1st Avenue N to 2nd Avenue N	36	0	31.6	4	0	Angle
5th Street N: NP Avenue to 1st Avenue N	18	0	31.5	5	5	Angle
Robert Street: 1st Avenue N to 2nd Avenue N	22	0	30.5	6	3	Parallel/ Angle
10th Street: NP Avenue to 1st Avenue N	59	1	29.2	7	7	None
4th Avenue N: Robert Street to Broadway	15	0	27.5	8	4	None
2nd Avenue N: Robert Street to Broadway	22	0	26.8	9	3	Parallel/ Angle
1st Avenue N: 5th Street N to 4th Street N	28	0	26.5	10	1	Parallel

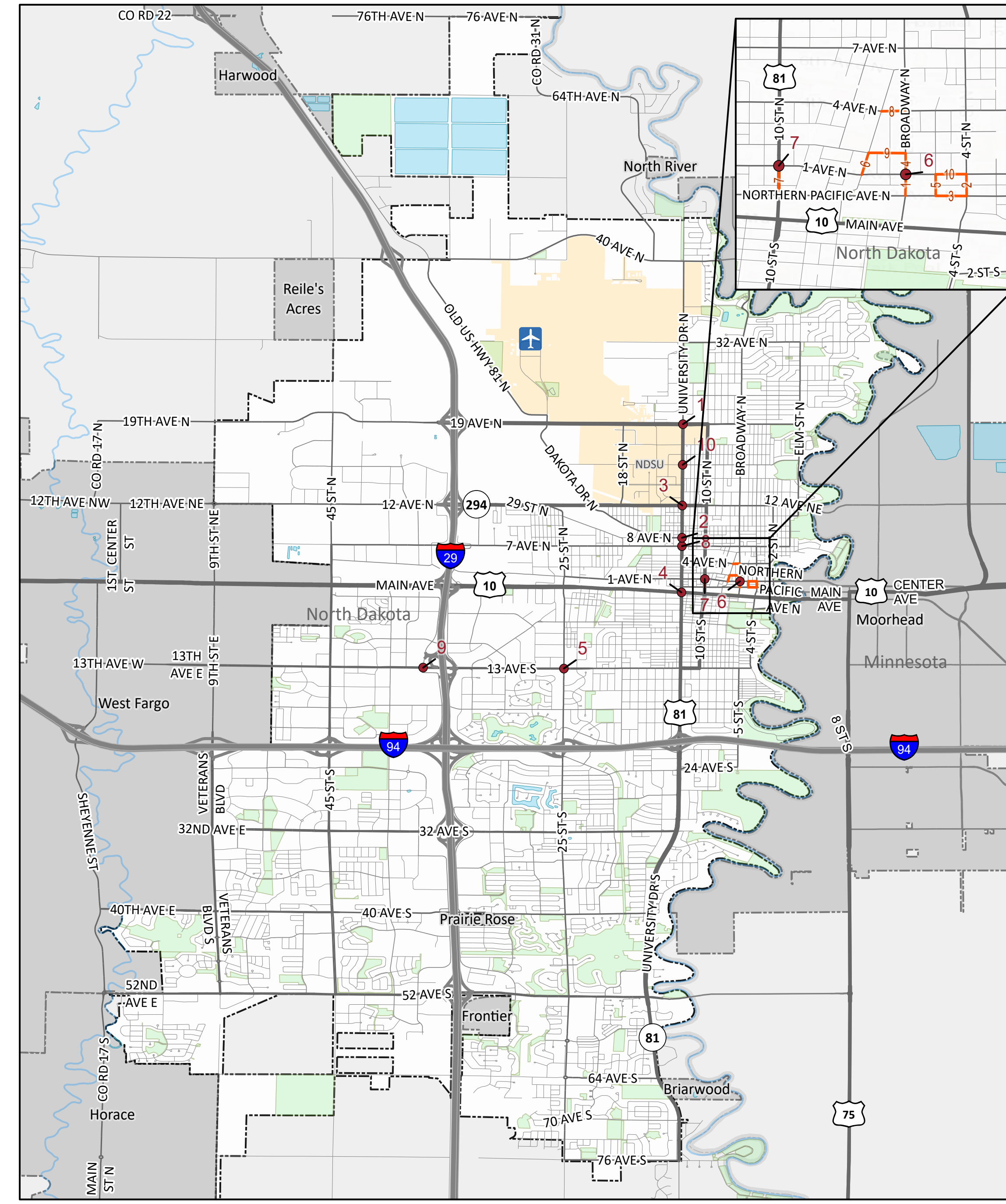
Figure 9: Above Average Crash Rate Intersections and Segments



Legend

- Bodies of Water
- Parks
- Airport Parcels
- NDSU
- Other Municipalities
- City of Fargo
- Intersections Above the Critical Crash Rate
- Intersections with Crash Rate Above Average
- Corridors Above the Critical Crash Rate
- Corridors with Crash Rate Above Average

Figure 10: Top 10 Highest Crash Rates for Intersections and Segments



Legend

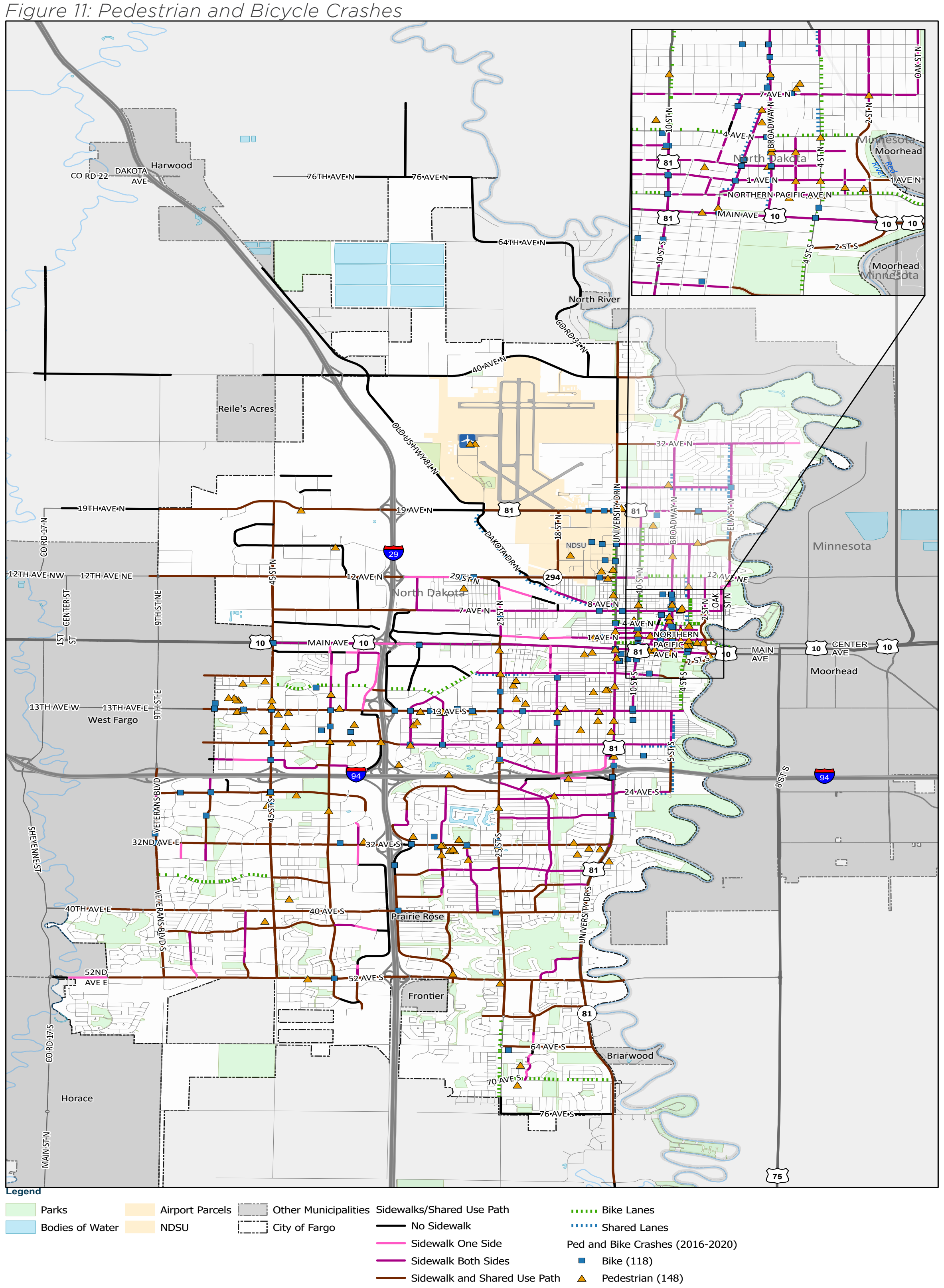
- Bodies of Water
- Parks
- Airport Parcels
- NDSU
- City of Fargo
- Other Municipalities
- Top 10 Intersection Crash Rates
- Top 10 Segment Crash Rates

Bicycle and Pedestrian Crashes

Over the last five years, there have been 266 bicycle and pedestrian crashes across the City of Fargo, as shown in Figure 11. This included three fatalities, two involving a bicycle and one pedestrian. The two bicycle fatalities occurred on 36th Street south of 32nd Avenue and the intersection of 45th Street and 17th Avenue S. The pedestrian fatality occurred at the intersection of 42nd Street and 10th Avenue S. In addition to the fatal crashes, there were 25 incapacitating injuries, 146 non-incapacitating injuries, and 78 possible injuries. Ultimately, just 5.3 percent of crashes involving bicycles and pedestrians did not result in an injury.

Nearly 55 percent of all bicycle and pedestrian occurred at intersections. Many of these crashes involved turning vehicles (53 percent) or intersections with traffic signals (49 percent). There are no time-of-day trends identified.

Figure 11: Pedestrian and Bicycle Crashes



MULTIMODAL LEVEL OF SERVICE

Every road in Fargo serves each mode of transportation in some way, depending on the roadway's function and the surrounding land use context. Because each functional classification serves a different purpose, and the surrounding land use influences the types of trips people make, the minimum acceptable level of service is different for the different types of roadways.

In transportation planning, level of service refers to a letter grade, A through F, to indicate the quality and/or capacity of service. For example, principal arterials focus on vehicle mobility and will prioritize vehicle level of service whereas collectors focus on land access and will prioritize bicycle, pedestrian, and transit level of service. Table 9 shows the draft minimum acceptable level of service for each mode based on the roadway's functional classification and local typology, as discussed in earlier sections of this chapter.

Each mode has different methodologies, as described below, which quantify the most important factors for that mode, generally including reliability, safety, and comfort. The analysis is unique for each mode following national guidance and industry best practices. Vehicle, bicycle, pedestrian, and transit facilities were evaluated independently for level of service on each functionally classified roadway. Interstates were excluded from this analysis because they are owned and operated by NDDOT.

Table 9: Draft Multimodal Level of Service by Classification

FARGO CLASSIFICATION	VEHICLE	BICYCLE	PEDESTRIAN	TRANSIT
Commercial Arterial	D	D	D	C
Mixed Use Arterial	D	C	C	A
Residential Arterial*	E	B	B	B
Commercial Collector*	E	B	B	D
Mixed Use Collector	F	A	A	C
Residential Collector	NA*	A	A	D
Local Priority Route*	NA*	A	A	E

**NA - Not Applicable - Vehicular LOS is not a critical metric on residental and local streets.*
**Additions to Parking & Access Study Typologies*

VEHICLE LEVEL OF SERVICE

Vehicle level of service is a measure of the operational vehicular traffic performance of roadways. It assigns a letter grade value that corresponds to specific traffic characteristics within the system. Typically, level of service focuses on traffic control and congestion related delays. However, for this analysis, the ratio between average travel speed and the free flow or posted speed was used. Federal Highway Administration's 2017 research publication Simplified Highway Capacity Calculation Method for the Highway Performance Monitoring System provided the speed thresholds that were used in this analysis, as shown in Table 10.

To calculate vehicle level of service, StreetLight travel speed data was used. StreetLight uses anonymized location records from smart phones and navigation devices in connected cars and trucks to capture average daily traffic, traffic speeds, average travel time/length, daily distributions, and origins and destinations. This information can then be used to calculate vehicle level of service.

Table 10: Level of Service Thresholds for Vehicles

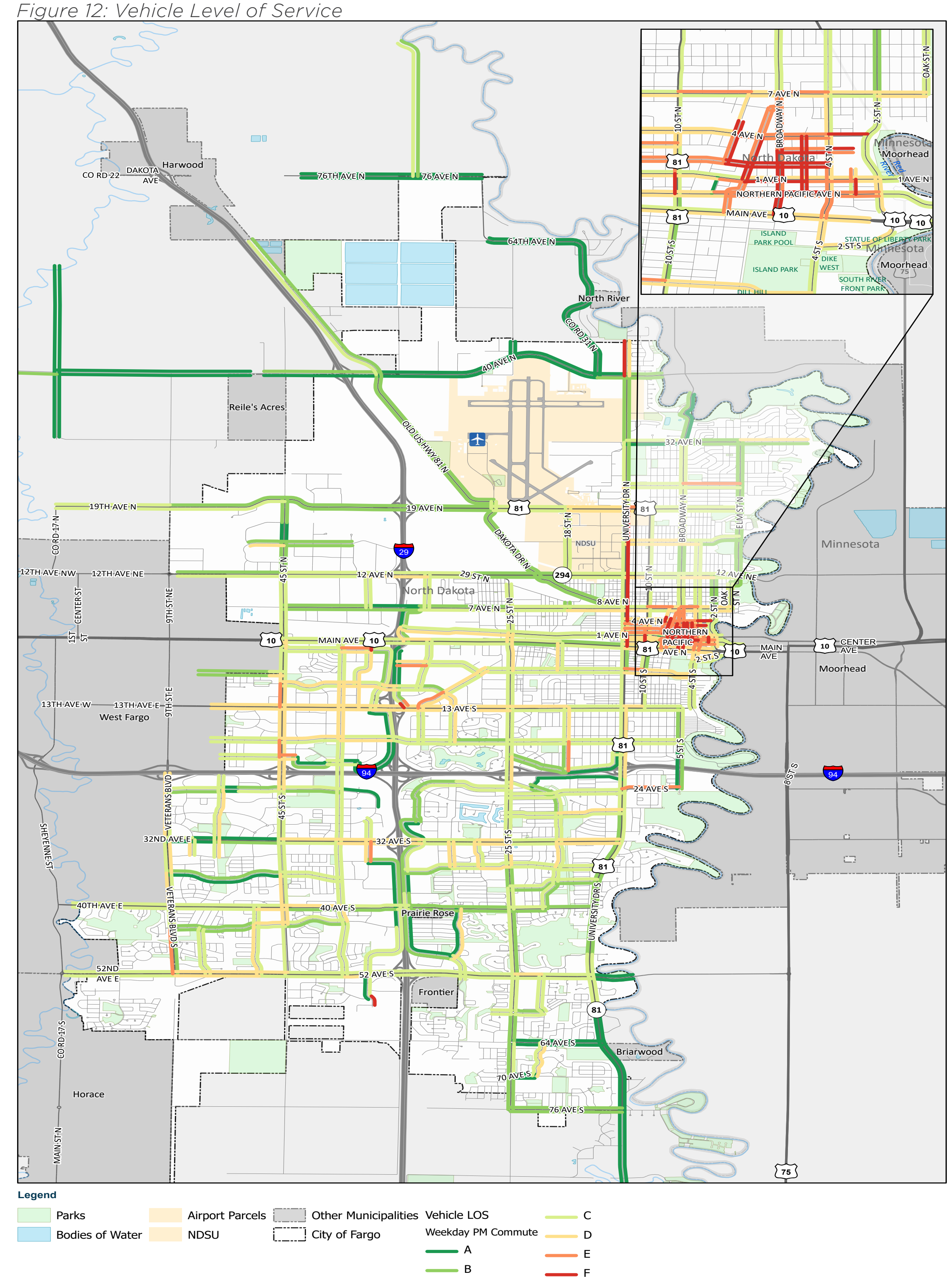
BASE FREE FLOW SPEED	AVERAGE TRAVEL SPEED-LOS A	AVERAGE TRAVEL SPEED-LOS B	AVERAGE TRAVEL SPEED-LOS C	AVERAGE TRAVEL SPEED-LOS D	AVERAGE TRAVEL SPEED-LOS E	AVERAGE TRAVEL SPEED-LOS F
55	>44	>37	>28	>22	>17	<17
50	>40	>34	>25	>20	>15	<15
45	>36	>30	>24	>18	>14	<14
40	>32	>27	>20	>16	>12	<12
35	>28	>23	>18	>14	>11	<11
30	>24	>20	>15	>12	>9	<9
25	>20	>17	>13	>10	>8	<8

VLOS is shown in Figure 12. In total, there were 76 segments identified with LOS E and F, which is presently considered deficient by industry and North Dakota Department of Transportation standards. Many of these segments are in downtown, where the street typology and travel behavior demand higher levels of service for all modes other than vehicles.

Table 11: VLOS Segments

VLOS	NUMBER OF SEGMENTS	PERCENT OF ALL SEGMENTS
A-C	581	66%
D	175	20%
E	67	8%
F	50	6%

Figure 12: Vehicle Level of Service



PEDESTRIAN LEVEL OF SERVICE

Pedestrian level of service (PLOS) is a measure of user comfort as a function of the roadway features and traffic conditions. This methodology incorporates number of traffic lanes, traffic volumes, traffic speeds, percentage of heavy vehicles and the presence and quality of buffers (road widths, paved shoulders, bike lanes, on-street parking, sidewalk buffers, etc.). This analysis also uses many of the same elements incorporated into the Highway Capacity Manual's methodology with more focus on pedestrian comfort. Based on these conditions, the model provides a letter grade output between level of service A and F, whereas LOS A is the best walking conditions with high comfort and safety, and LOS F is the worst walking conditions, generally represented by an absence of pedestrian facilities.

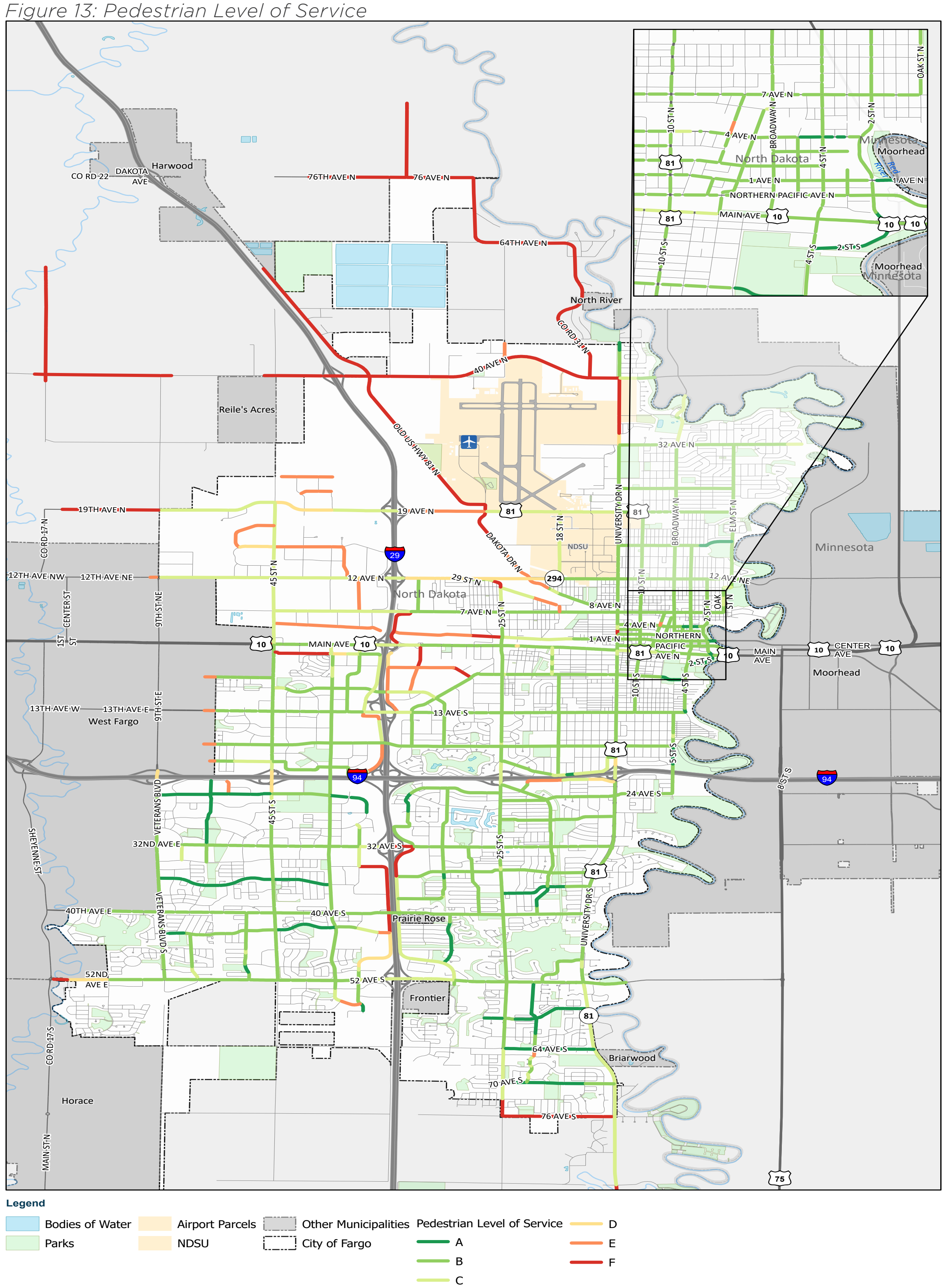
PLOS is shown in Figure 13. Generally, the City of Fargo has an extensive network of sidewalks, with most places having a sidewalk or shared use path on both sides of the roadway. This results in most roadways having a pedestrian LOS C or better.

- 102 segments with PLOS F, including 40th Avenue N, multiple I-29 frontage roads, portions of 1st Avenue N, 4th Avenue S and 34th Street S.
- 50 segments with PLOS E, including 34th Street S, 4th Avenue S, multiple I-29 frontage roads, 15th Avenue N, 40th Street N, and others.
- 24 segments with PLOS D, including 12th Avenue N and small segments of other roadways.

Table 12: PLOS Segments

PLOS	NUMBER OF SEGMENTS	PERCENT OF ALL SEGMENTS
A-C	1,201	87%
D	24	2%
E	50	4%
F	102	7%

Figure 13: Pedestrian Level of Service



BICYCLE LEVEL OF SERVICE

Bicycle level of service is a measure of user comfort as a function of the roadway features and traffic conditions. This methodology incorporates number of traffic lanes, lane width, shoulder/bike lane presence and width, traffic volumes, traffic speeds, percentage of heavy vehicles, and pavement conditions. This analysis uses many of the same elements incorporated into the Highway Capacity Manual's methodology but adds more elements of cyclist comfort. Based on these conditions, the model provides a letter grade output between level of service A and F, whereas LOS A is the best cycling conditions with high comfort and safety, and LOS F is the worst cycling conditions, generally represented by an absence of bicycle facilities.

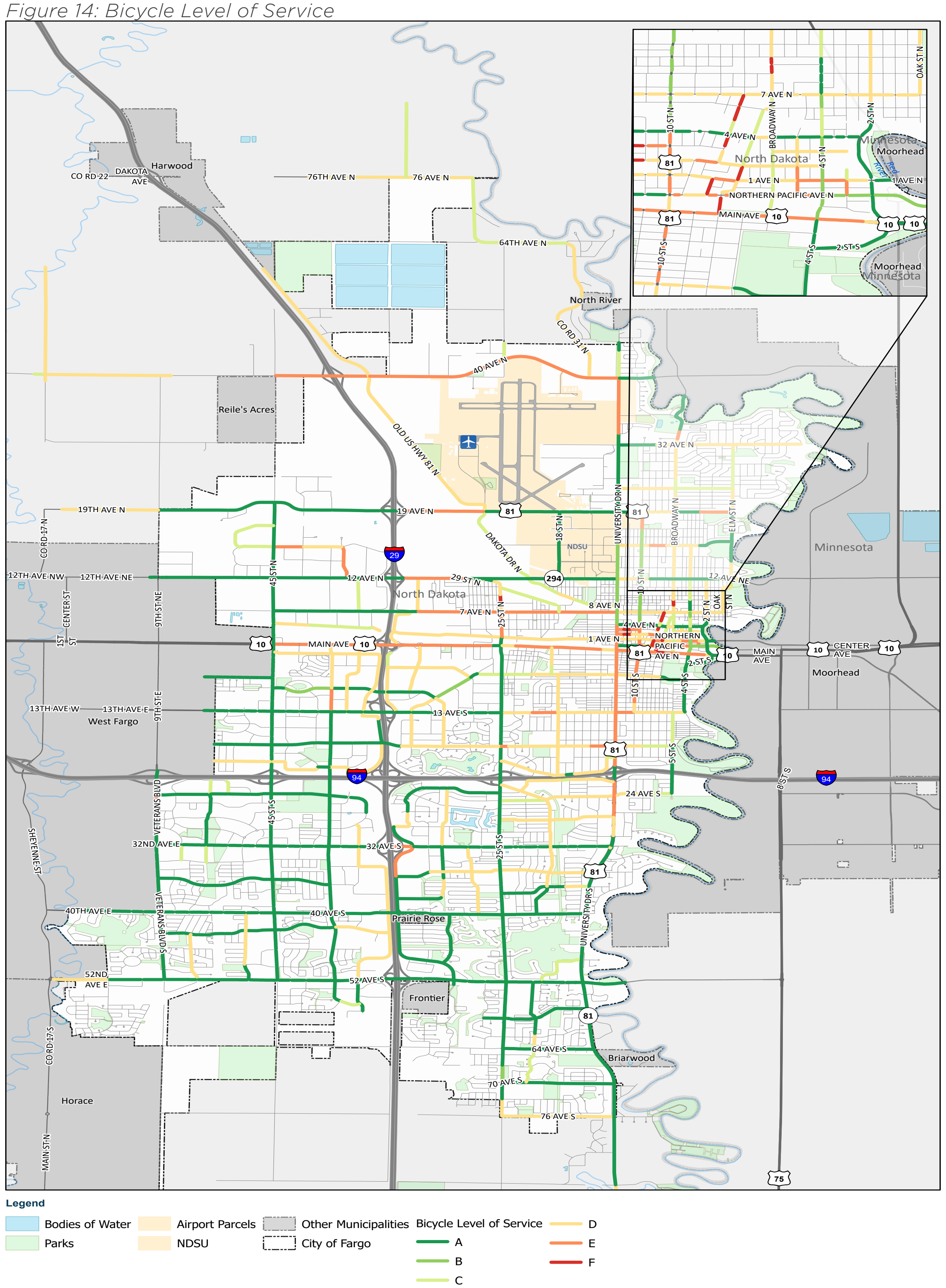
BLOS is shown in Figure 14. Fargo's bike network is less robust than its pedestrian network. Most arterials, and some collectors, have shared use paths on one side, especially in the newer areas of the city (west of I-29/south of I-94, east of I-29/south of 32nd Avenue). Areas in the older parts of town generally lack the right-of-way for shared use paths and have no dedicated facilities, shared lanes, or bike lanes.

- 12 segments with BLOS F, including multiple near downtown.
- 160 segments with BLOS E, including University Drive, Main Avenue, 7th Avenue N, 12th Avenue N, 19th Avenue N, and others.
- 463 segments with BLOS D, including multiple areas in downtown, Broadway, 15th Avenue N, 32nd Avenue N, 1st Avenue N, 17th Street S, 35th Avenue S, and 38th Street S.

Table 13: BLOS Segments

BLOS	NUMBER OF SEGMENTS	PERCENT OF ALL SEGMENTS
A-C	731	54%
D	463	34%
E	160	12%
F	12	<1%

Figure 14: Bicycle Level of Service



TRANSIT LEVEL OF SERVICE

Transit level of service is based on quantitative performance measures to describe a particular aspect of the transit service. There are multiple performance measures that can be used to describe the availability of transit service (frequency, hours of service, service coverage) and transit comfort (passenger load, reliability, and comparison to auto travel time). For this analysis, frequency was selected because it is one of the most common factors in selecting transit for a trip.

To calculate transit level of service the following methodology was used:

1. Apply a one-quarter mile buffer to all existing stops and remove areas with major barriers to access including interstates and rivers.
2. Apply to each roadway link to calculate the number of vehicles per hour.
3. Using Table 14, transit level of service is calculated based on the number of vehicles per hour.

Table 14: Transit Level of Service Thresholds

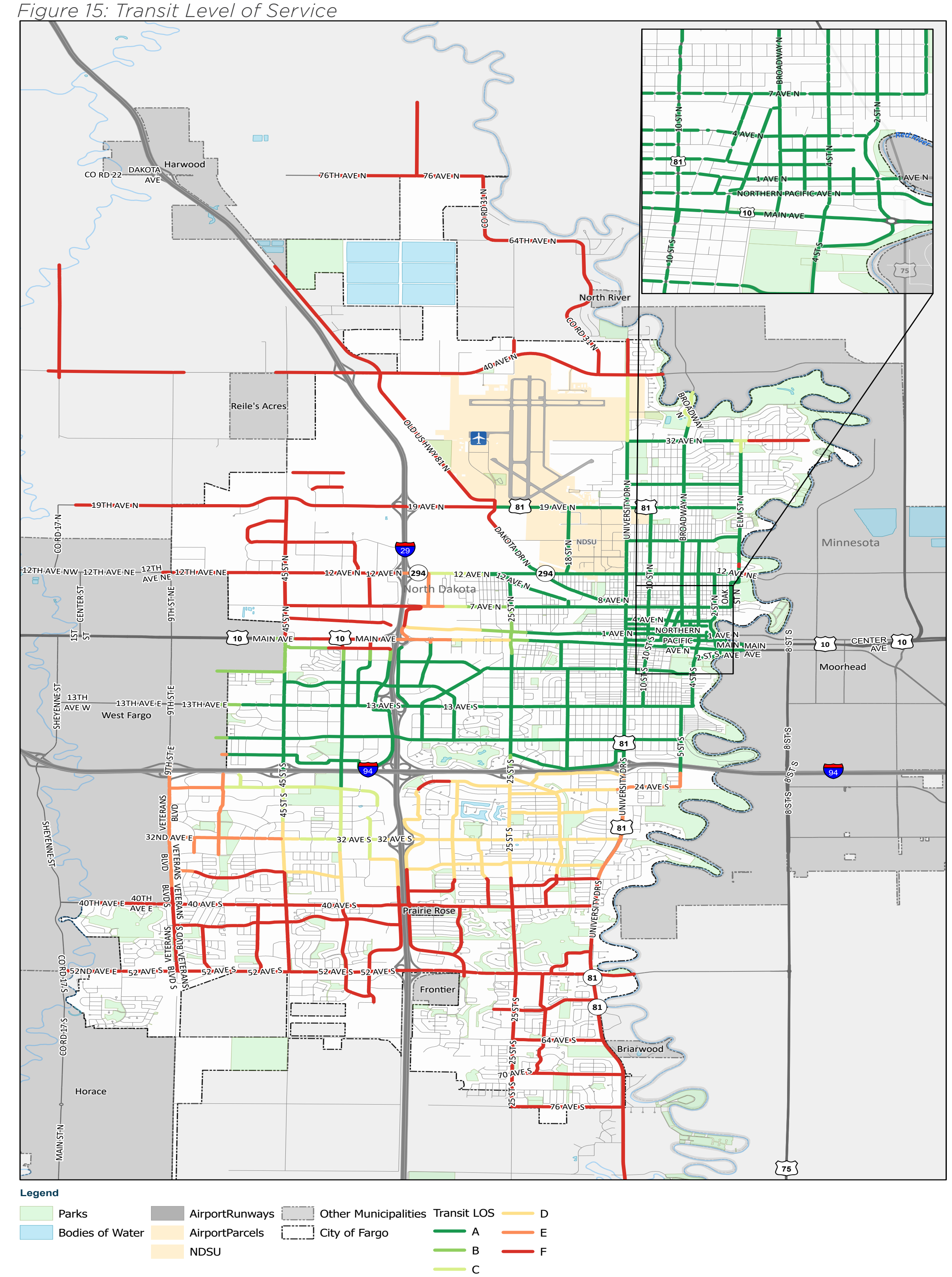
LOS	AVERAGE HEADWAY	VEHICLES PER HOUR	COMMENTS
A	<10	>6	Passengers do not need schedules
B	10-14	5-6	Frequent service, passengers consult schedules
C	15-20	3-4	Maximum desirable time to wait if bus missed
D	21-30	2	Service unattractive to choice riders
E	31-60	1	Service available during the hour
F	>60	<1	Service unattractive to all riders

TLOS is shown in Figure 15. Generally, transit service is LOS C or better in the oldest parts of Fargo, including north Fargo neighborhoods (connecting to NDSU and the Veterans hospital), downtown, and south Fargo between Main Avenue and I-94. Area's south of 32nd Avenue have extremely limited transit service if any at all. This is likely due to the low housing and employment density prevalent through these areas. Proposed system changes in the most recent Transit Development Plan (2021) will address some of these deficiencies with new routes down to 52nd Avenue S; service to the northwest parts of the city will remain deficient.

Table 15: TLOS Segments

TLOS	NUMBER OF SEGMENTS	PERCENT OF ALL SEGMENTS
A-C	721	52%
D	144	11%
E	66	5%
F	446	32%

Figure 15: Transit Level of Service



ADDITIONAL CONSIDERATIONS

In addition to the four modes of transportation discussed above, there are additional transportation considerations that impact the efficiency and safety of the system and its users.

- Truck Freight. Even before the pandemic, American's consumption habits were changing, with accelerated growth in online shopping and delivery causing a major increase in demand for freight shipments. Combine this with North Dakota's crude oil and agricultural production and managing freight demand becomes an incredibly important element. However, this multimodal analysis does not specifically address freight movements because the regional planning body (Metro COG) conducts a regular evaluation of freight and its needs at a regional level. At the most basic level, the vehicular level of service should address the most critical freight mobility needs.
- Parking, rideshare, micromobility, and curb space management. In the densest areas, managing parking, rideshare, micromobilty, and curb space is a growing consideration for cities across the country. Each requires specific, localized data that is inaccessible for a study at this scale. The recently completed Downtown InFocus plan addresses many of these concepts and therefore they were not included in this plan.