



# APPENDIX A

## EXISTING CONDITIONS, ISSUES & NEEDS

### REPORT

Prepared by SRF Consulting Group, Inc.

Quality review provided by Transportation Collaborative & Consultants

July 2022

*Bismarck-Mandan Metropolitan Planning Organization*



*City of Bismarck*



Contents

- Study Overview .....5
- Introduction.....5
- Study Area .....5
- Related Planning Efforts .....6
  - Bismarck Comprehensive Plan.....6
  - 2045 Metropolitan Transportation Plan (Arrive 2045) .....7
  - Bis-Man Transit Development Plan 2020.....7
  - Bismarck-Mandan Regional Freight Study.....7
  - Bismarck Mandan Bicycle and Pedestrian Plan .....8
  - Bismarck Infill and Redevelopment Plan .....8
  - Downtown Bismarck Subarea Plan.....8
  - Bismarck Zoning Ordinance.....9
  - City of Bismarck Downtown Streetscape Standards .....9
- Existing Conditions..... 10
  - Transportation System Overview..... 10
    - Typical Section..... 10
  - Jurisdiction ..... 10
  - Functional Classification ..... 11
  - Right-of-Way ..... 12
  - Utilities..... 13
  - Pavement Conditions..... 17
  - Access ..... 18
  - Traffic Control..... 20
  - Parking..... 21
  - Bicycle, Pedestrian, and Transit System..... 21
- Transportation Operations ..... 24
  - Data Collection ..... 24
  - Historic Daily Traffic Volumes ..... 25

2045 Traffic Forecast Methodology .....	26
Roadway Capacity.....	26
Intersection Capacity.....	28
Corridor Safety.....	31
Crash History.....	31
Social, Environmental, and Economic Considerations.....	36
Land Use .....	36
Zoning.....	38
Draft Future Land Use.....	42
Resources and Hazards .....	43
Potentially Contaminated Sites .....	43
Environmental Justice Populations .....	44
Issues & Needs Summary .....	47

#### List of Tables

Table 1   East Main Avenue IRI Ranges.....	18
Table 2   City of Bismarck Access Control Policy.....	20
Table 3   Access Spacing Compliance Review.....	20
Table 4   Traffic Control .....	21
Table 5   Historic East Main Avenue Traffic Counts (AADT).....	25
Table 6   Planning-Level Roadway Capacities by Facility Type.....	28
Table 7   Existing Year 2022 ADT and V/C Ratio .....	28
Table 8   Level of Service Criteria for Signalized and Unsignalized Intersections.....	29
Table 9   Existing Peak Hour Capacity Analysis - East Main Avenue .....	30
Table 10   Year 2045 No Build Scenario Peak Hour Capacity Analysis - East Main Avenue .	31
Table 11   Highest Crash Frequency Intersections, 2013-2017 .....	32
Table 12   East Main Avenue Crash Severity Summary .....	32
Table 13   Crash Type Total.....	34
Table 14   East Main Avenue Safety Analysis.....	36

#### List of Figures

Figure 1   Project Area Map.....	6
Figure 2   Roadway Cross Section .....	10

Figure 3   Roadway Ownership.....	11
Figure 4   Functional Classification .....	12
Figure 5   Right-of-Way .....	13
Figure 6   Streetlights .....	14
Figure 7   Water .....	14
Figure 8   Sanitary Sewer .....	15
Figure 9   Stormwater .....	16
Figure 10   Private Utilities .....	16
Figure 11   PCI Ranges .....	17
Figure 12   Access Inventory .....	19
Figure 13   Sidewalks & Ramps.....	23
Figure 14   Multimodal Systems .....	23
Figure 15   Strava Heat Map.....	24
Figure 16   Historic East Main Avenue Traffic Counts (AADT).....	26
Figure 17   Existing and No Build Traffic Forecast .....	27
Figure 18   Existing LOS .....	30
Figure 19   Year 2045 No Build Scenario LOS.....	31
Figure 20   Crash Severity.....	33
Figure 21   Crash Frequency .....	34
Figure 22   Existing Land Use.....	38
Figure 23   Zoning and Vacant Property .....	41
Figure 24   Off-Street Parking and Circulation .....	41
Figure 25   Draft Future Land Use.....	43
Figure 26   Population Below Poverty .....	44
Figure 27   Senior Population .....	45
Figure 28   Non-Driving Population .....	45
Figure 29   Population with a Disability.....	46
Figure 30   Non-White Population.....	46



# Study Overview

## Introduction

The City of Bismarck and the Bismarck-Mandan Metropolitan Planning Organization (MPO), including partners from the North Dakota Department of Transportation (NDDOT), Bis-Man Transit, and Burleigh County are conducting the East Main Avenue Corridor Study. The East Main Avenue Corridor Study, hereafter referred to as the “Study”, will document existing conditions along East Main Avenue and identify strategies to ensure safety, mobility, and access for all future users. The Study will consider historic, current, and projected future traffic impacts, multimodal transportation options such as walking, bicycling, and transit, and will also explore future development opportunities along the corridor to support economic development.

This corridor study will focus on East Main Avenue between 7<sup>th</sup> Street on the west, and 26<sup>th</sup> Street on the east. The Study will include an in-depth analysis of current and future operations, access, multimodal safety, and land use conditions along the corridor. Ultimately, the Study will provide a plan to improve safety, mobility, efficiency, and reliability of the corridor and explore potential future land use or redevelopment areas along the corridor.

The existing conditions memorandum provides a summary of current conditions including related planning efforts, overview of the transportation system, operations, safety, environmental context, and other important contextual characteristics.

## Study Area

The East Main Avenue study area is approximately 1.5 miles, as shown in Figure 1. The limits of the study are from 7<sup>th</sup> Street to 26<sup>th</sup> Street. In addition, some areas outside of the Study area will be reviewed to understand transportation system impacts and connectivity. The Study area segment is located entirely within Bismarck city limits and the segment from 7<sup>th</sup> Street to 12<sup>th</sup> Street is within Bismarck’s defined Downtown Subarea.

The Study includes the following key East Main Avenue intersections:

- 7<sup>th</sup> Street
- 9<sup>th</sup> Street
- 12<sup>th</sup> Street
- 17<sup>th</sup> Street
- Airport Road
- 24<sup>th</sup> Street
- 26<sup>th</sup> Street

Figure 1 | Project Area Map



**Legend**

-  Study Area Intersections
-  E Main Ave Project Corridor
-  BNSF Railway

**Project Area Map**



## Related Planning Efforts

Several planning efforts are ongoing or were recently completed which will have an impact on the corridor. The Study will align with identified goals and decisions made in previous efforts by reviewing and integrating applicable guidance from the following plans into the study recommendations. Recent planning efforts include:

### Bismarck Comprehensive Plan

The City of Bismarck Community Development Department is conducting an update of the comprehensive plan titled *Together 2045*. The comprehensive plan will be used by the community as the guiding document for future growth and development of the physical, social, and economic environment of the community. The plan will also set forth a variety of goals, policies, and recommendations to guide present and future development of Bismarck. It is anticipated that the plan will be completed in December 2022.

## 2045 Metropolitan Transportation Plan (Arrive 2045)

*Arrive 2045* is the Metropolitan Transportation Plan (MTP), for the Bismarck-Mandan Metropolitan Planning Organization (BMMPO) area. The plan is designed to help realize BMMPO's adopted outcomes to meet current and future transportation needs and to gauge the success of efforts with established performance targets. *Arrive 2045* guides the development of multimodal transportation systems throughout the Bismarck-Mandan metropolitan area for the next 25 years. Key goals from the MTP include:

- Increase the safety and security of the transportation system for motorized and non-motorized users.
- Preserve the existing transportation system and promote efficient system management and operations.
- Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
- Support the economic vitality of the metropolitan area and increase accessibility and mobility of people and freight.
- Increase accessibility and mobility through alternative modes to automobile travel.
- Improve environmental sustainability.
- Reduce project delivery delay.

## Bis-Man Transit Development Plan 2020

The Transit Development Plan (TDP) is a short- to medium-range strategic plan intended to identify transit needs and proposed improvements for a five-year planning horizon.

## Bismarck-Mandan Regional Freight Study

The freight study aims to improve freight movement in the Bismarck-Mandan region by examining existing freight conditions, identifying issues and trends, developing performance measures, and providing strategic recommendations to identify key initiatives to understand and support freight movement. NDDOT classifies East Main Avenue as a Critical Urban Freight Corridor and the City of Bismarck specifies the corridor as a designated truck route for vehicles with an actual or gross vehicle weight of 10,000 pounds or more. The Bismarck-Mandan Regional Freight Study identifies East Main Avenue as a proposed Urban Strategic Freight Level 2, which would be classified as freight transportation infrastructure necessary to sustaining the state's economic growth and competitiveness relative to international/interstate (Level 1), regional/intrastate (Level 2), and local movements of freight (Level 3). Specific freight-related projects were recommended as part of the plan however, none were identified in the short-, mid-, or long-term for East Main Avenue.

## **Bismarck Mandan Bicycle and Pedestrian Plan**

BMMPO and its partners collaborated on the bicycle and pedestrian plan to support, grow, and advance bicycling and walking as safe, comfortable, and reliable modes of transportation in the region. East Main Avenue was identified by the public as a top (second) priority connection. 12<sup>th</sup> Street, which bisects the corridor was also ranked as a top priority connection. Key goals from the bicycle and pedestrian plan include:

- Increase the number of bicycling and walking trips made by people in the region.
- Connect bicycling and walking routes to community destinations and other transportation systems, including transit.
- Build and maintain safe and comfortable bicycling and walking facilities for people of all ages and abilities.
- Protect the public's investment in the bicycling and walking system over the long-term and ensure system accessibility all year round.

## **Bismarck Infill and Redevelopment Plan**

The 2016 Infill and Redevelopment Plan is a component of the City of Bismarck's current comprehensive plan for growth and development. The infill and redevelopment plan addresses growth within the City's existing footprint through either of two means: (1) infill, the development of vacant or underutilized remnant lands that have been passed over by previous urban development; and (2) redevelopment, or the replacing, remodeling, or reusing existing structures and land to accommodate new development, often changing form and function. This plan forwarded a few ideas for infill and redevelopment in the East Main Avenue Corridor Study general area:

- "The New Galleria" - Mixed use development underway on the northwest corner of 7<sup>th</sup> Street and East Main Ave.
  - Includes 1<sup>st</sup> floor commercial office and retail space.
  - Includes 2<sup>nd</sup> and 3<sup>rd</sup> floor residential apartment homes.
- The plan also identifies underutilized surface parking areas south and east of the "New Galleria" as future downtown development sites.

## **Downtown Bismarck Subarea Plan**

The Bismarck Subarea Plan is the product of a yearlong study to revitalize Downtown. The plan identifies urban design and complete streets frameworks that guide the development of the public and private realm. The Downtown Subarea Plan has an emphasis on implementation and identifies game-changing public projects that will stimulate private investment and fundamentally change the public's perception of downtown.

Some projects identified within the Downtown Bismarck Subarea Plan have been completed or are underway, and momentum continues to build on the redevelopment-

front in this area. There are several sites fronting East Main Avenue between 7<sup>th</sup> Street and 12<sup>th</sup> Street that were identified as future downtown development sites. A couple recent projects include:

- Main Avenue construction project from west of Washington Street to 7<sup>th</sup> Street.
  - Included road diet from 4-lane to 2-lane plus center left-turn-lane. Project also included bulb-outs, signals, ADA ramps, and pavement markings.
- Mixed use development underway on the northwest corner of 7<sup>th</sup> Street and East Main Ave (see Bismarck Infill and Redevelopment Plan).

### **Bismarck Zoning Ordinance**

Title 14 of Bismarck City Ordinances, is also known as the Bismarck Zoning Ordinance and provides the statutory basis for the organization of different land uses across the City. The zoning ordinance is the statutory mechanism used by the City to regulate the character, uses, lot size, building setbacks, building coverage, and building height in a variety of different districts.

### **City of Bismarck Downtown Streetscape Standards**

Provides adopted standards for downtown Bismarck's streetscape to enhance and preserve the quality of the public right-of-way in the core of the community and provide an attractive, coherent, and safe experience for all visitors, residents, and workers in the downtown area. These standards are built upon previously adopted plans and guidelines, such as the 1995 Streetscape Guidelines for Downtown Bismarck, the 2013 Downtown Bismarck Subarea Plan, and the 2015 Downtown Design Guidelines. The Streetscape Standards are intended to facilitate coordination between private-sector developers, the City Engineering Department, and the Downtown Design Review Committee, to enhance the efficiency of the overall development process, from initial design to final construction. East Main Avenue between 7<sup>th</sup> and 9<sup>th</sup> Streets is identified as a "signature street", which means this segment of the corridor should function as the epicenter of commercial and entertainment activity, and a public gathering space. A balance of vehicular and pedestrian activity is also anticipated.

# Existing Conditions

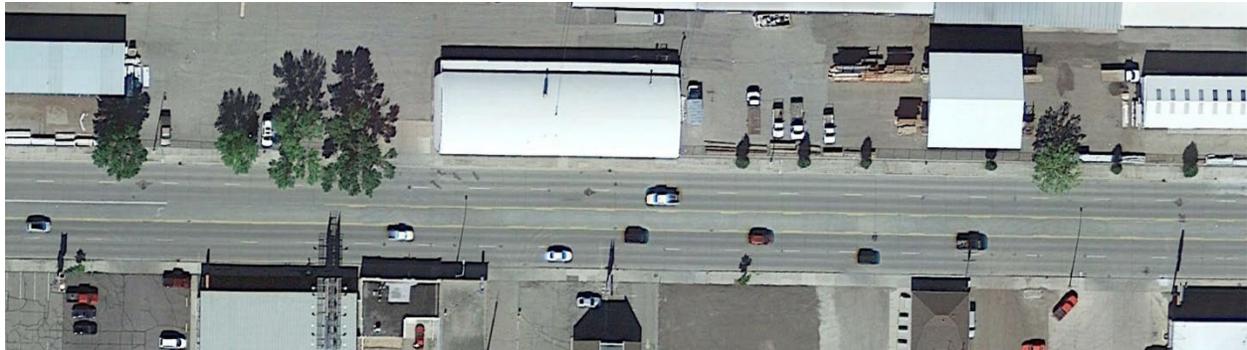
To develop foundational transportation solutions, it is important to understand and quantify the existing characteristics of the Study area. By doing so, the process helps identify transportation issues and needs necessary to provide safe and efficient operations for all users and future users, while supporting economic development. The forthcoming information provides a summary of the existing conditions evaluation.

## Transportation System Overview

### Typical Section

The East Main Avenue corridor is a five-lane urban street comprised of two travel-lanes (four total), center left-turn lane, and select turn-lanes at intersections (see Figure 2). The curb-to-curb width is over 60-feet and becomes even wider at certain intersections, depending upon the turn-lane configuration. For traffic control, there are five traffic signals at the intersections of 7<sup>th</sup> Street, 9<sup>th</sup> Street, 12th Street, Airport Road, and 26<sup>th</sup> Street; the remaining intersections of 17<sup>th</sup> Street and 24<sup>th</sup> Street are side-street stop-controlled. The posted speed limit is 35 miles per hour (mph) east of 9<sup>th</sup> Street and 25 mph west of 9<sup>th</sup> Street.

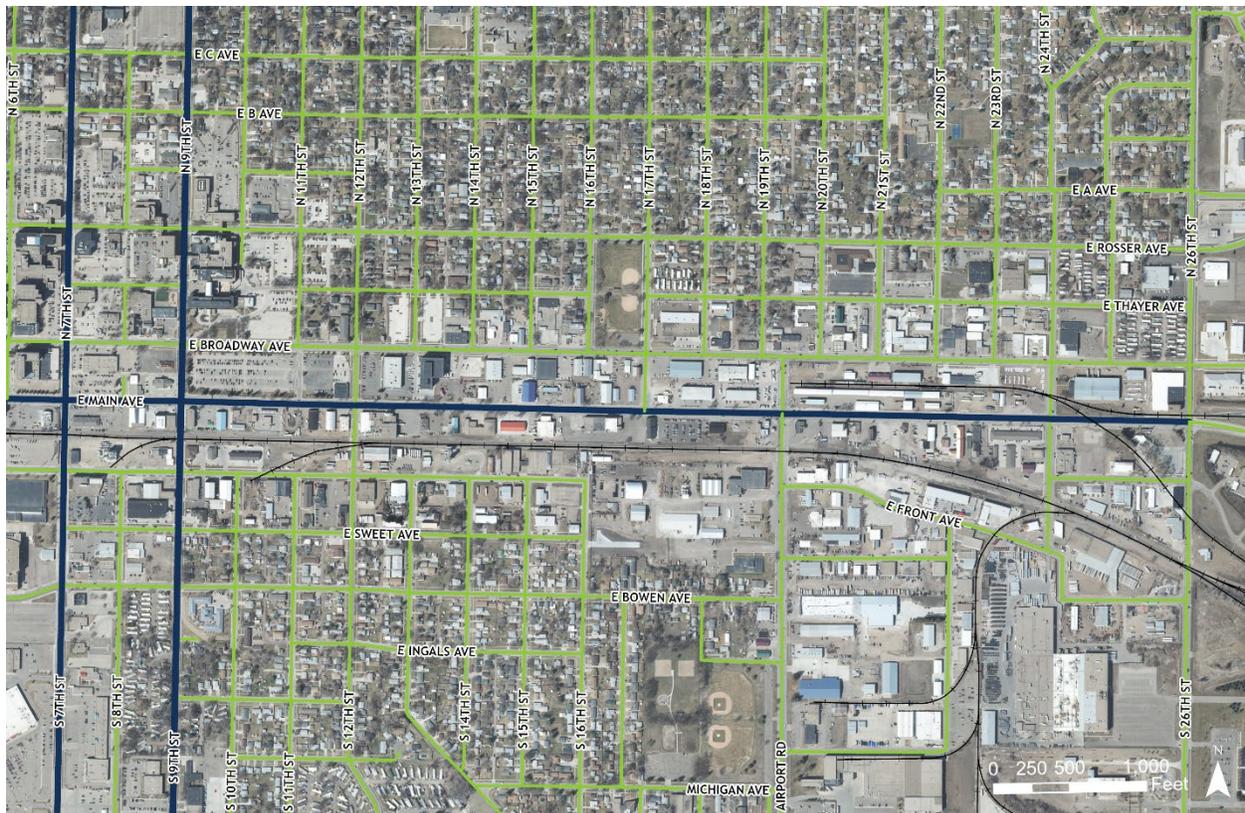
*Figure 2 | Roadway Cross Section*



### Jurisdiction

Roadway jurisdictions include three categories: (1) State, (2) County, and (3) City. East Main Avenue falls under State of North Dakota jurisdiction, as do 7<sup>th</sup> Street and 9<sup>th</sup> Street which are under State jurisdiction (see Figure 3). All other intersecting and nearby parallel streets fall under City of Bismarck jurisdiction.

Figure 3 | Roadway Ownership



**Legend**

- |                       |                                  |
|-----------------------|----------------------------------|
| <b>Ownership</b>      | Town or Township Highway Agency  |
| State Highway Agency  | City or Municipal Highway Agency |
| County Highway Agency | BNSF Railway                     |

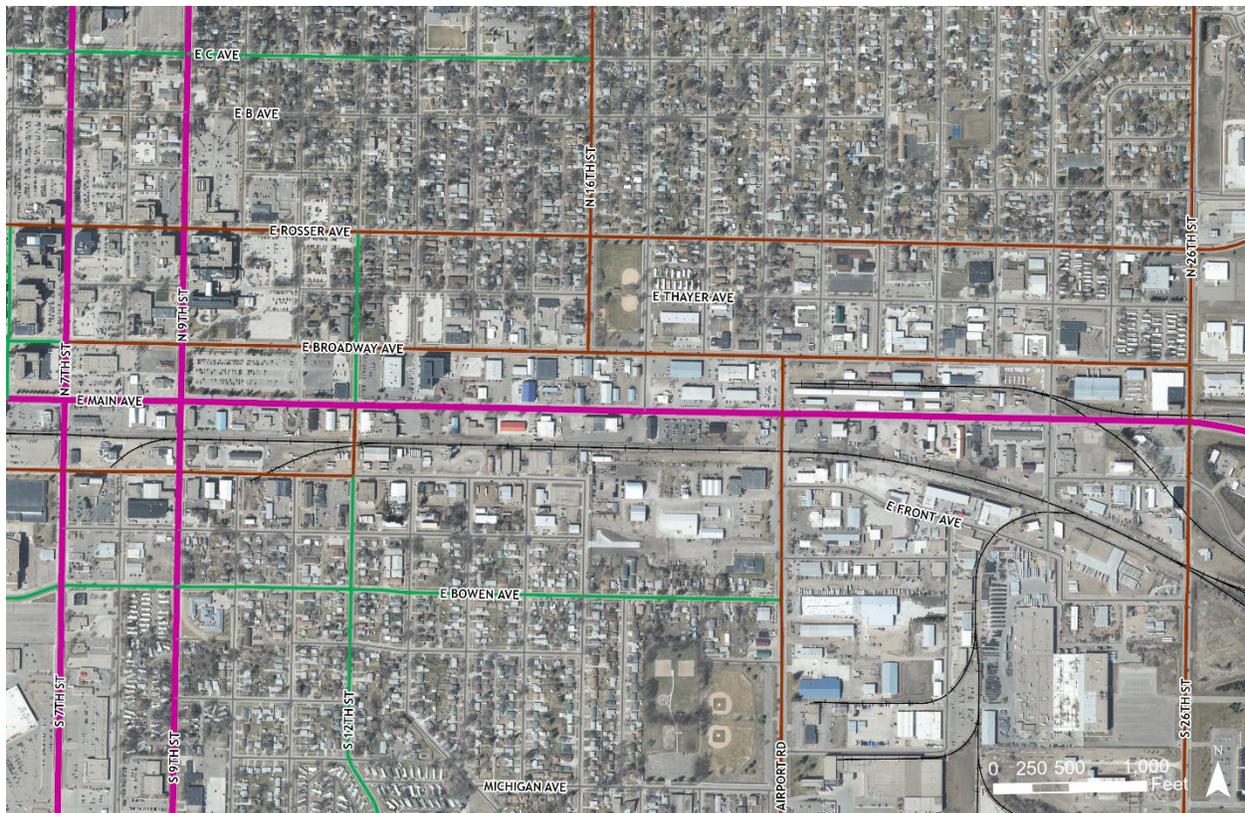
**Roadway Ownership**



**Functional Classification**

The functional classification of East Main Avenue defines the roadway's function, including access, speed, and regional connectivity. East Main Avenue is classified as a Principal Arterial road with functionality characterized by a mobility focus, controlled access, higher speed, and strong regional and system connectivity. The street provides connection to other Principal Arterials of 7<sup>th</sup> Street and 9<sup>th</sup> Street, a one-way pair with 7<sup>th</sup> Street providing southbound and 9<sup>th</sup> Street providing northbound mobility. East Main Avenue also connects to Minor Arterial roads including 12<sup>th</sup> Street, Airport Road and 26<sup>th</sup> Street. The only Local roads that intersects East Main Avenue in the Study area are 17<sup>th</sup> Street and 24<sup>th</sup> Street (see Figure 4).

Figure 4 | Functional Classification



**Legend**

- |   |           |
|---|-----------|
| Functional System                                   | Collector |
| Principal Arterial - Other Freeways and Expressways | Local     |
| Minor Arterial                                      |           |

**Functional Classification**



**Right-of-Way**

Based on available Burleigh County parcel data, the typical right-of-way along the East Main Avenue corridor ranges from 80 to 130-feet. From 7<sup>th</sup> Street to just west of 26<sup>th</sup> Street, the right-of-way is consistently 80-feet. West of 7<sup>th</sup> Street the right-of-way is also 80-feet however, at the 26<sup>th</sup> Street intersection and east, the East Main Avenue right-of-way is 130-feet (see Figure 5).

Figure 5 | Right-of-Way



## Utilities

There are existing private and public utilities within the Study area. Public utilities include streetlights, water, sanitary sewer, stormwater, and associated infrastructure. Private utilities include overhead electricity and associated infrastructure.

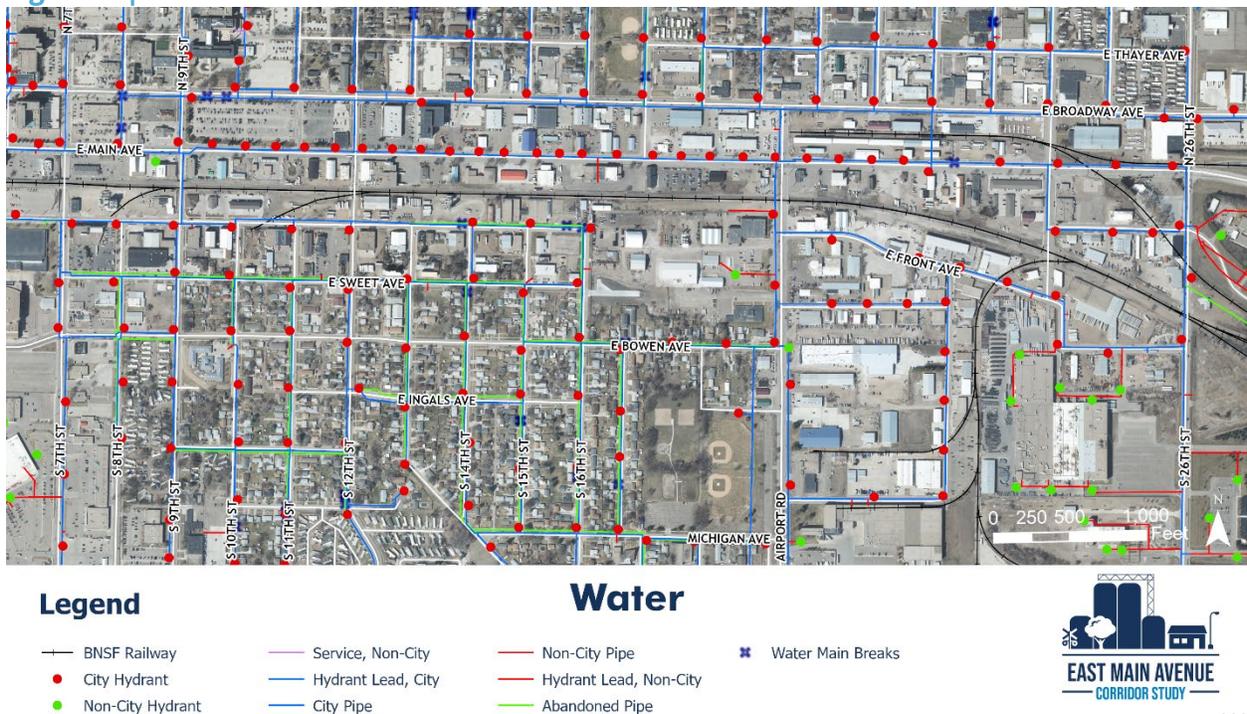
East Main Avenue has a staggered streetlight system on both sides of the road. The steel light standard poles are 40-feet tall with an eight-foot mounting arm and are connected by underground conduit. At intersections with existing traffic signals, there are combination poles (see Figure 6).

Figure 6 | Streetlights



For water distribution, there are numerous hydrants, City hydrant leads, City pipe, and non-City pipe. The water pipe runs on the north side of East Main Avenue from 26<sup>th</sup> Street to 9<sup>th</sup> Street where it crosses the road and runs on the south side from 9<sup>th</sup> Street to west of 7<sup>th</sup> Street (see Figure 7). There has been one occurrence of a water main break in the 2200-block of East Main Avenue.

Figure 7 | Water



Sanitary sewer and standard manholes run along the entire Study area on the South side of East Main Avenue. Existing sanitary sewer is gravity pipe. There is sanitary sewer that crosses the road in the 1600-block of East Main Avenue, and runs down the center of 7<sup>th</sup> Street, 9<sup>th</sup> Street, and 26<sup>th</sup> Street, also crossing the corridor in those locations (see Figure 8).

**Figure 8 | Sanitary Sewer**



**Legend**

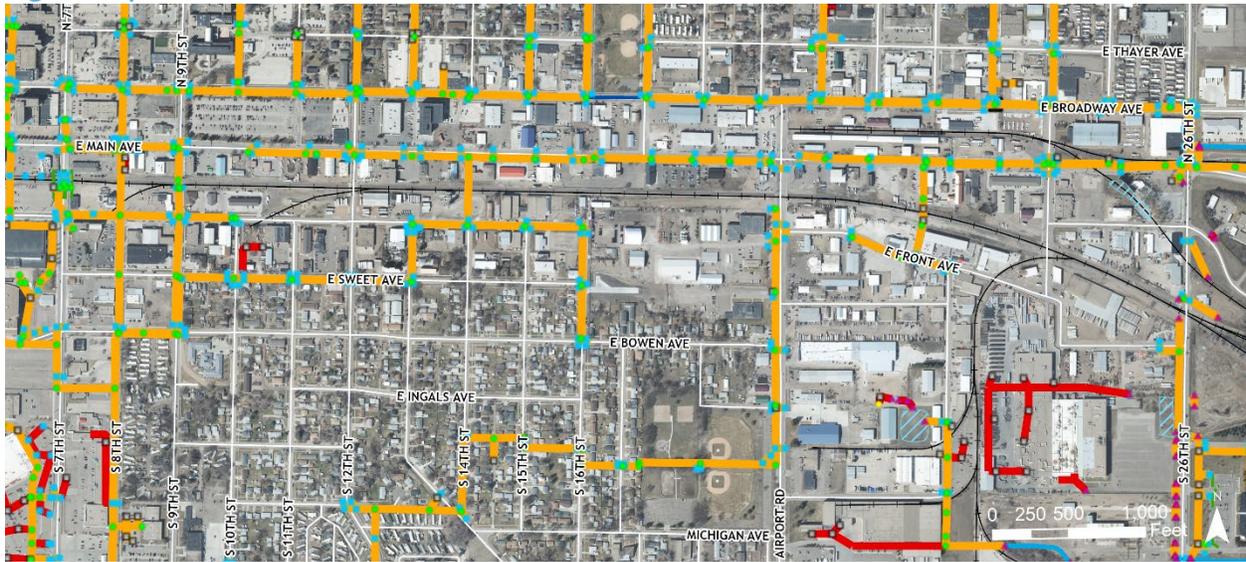
- BNSF Railway
- Standard Manhole
- Force Main
- Lamphole
- Gravity Pipe

**Sanitary Sewer**



Stormwater infrastructure also exists along the East Main Avenue corridor from 7<sup>th</sup> Street to 26<sup>th</sup> Street. Stormwater pipe runs along the entire corridor except for the 900-block and at the airport road intersection. Cross streets 7<sup>th</sup> Street, 8<sup>th</sup> Street, 14<sup>th</sup> Street alignment, 22<sup>nd</sup> Street Alignment, and 26<sup>th</sup> Street also have stormwater pipe that cross or intersect the East Main Avenue stormwater pipe. There are numerous inlets, manholes, and vaults along the corridor (see Figure 9).

Figure 9 | Stormwater



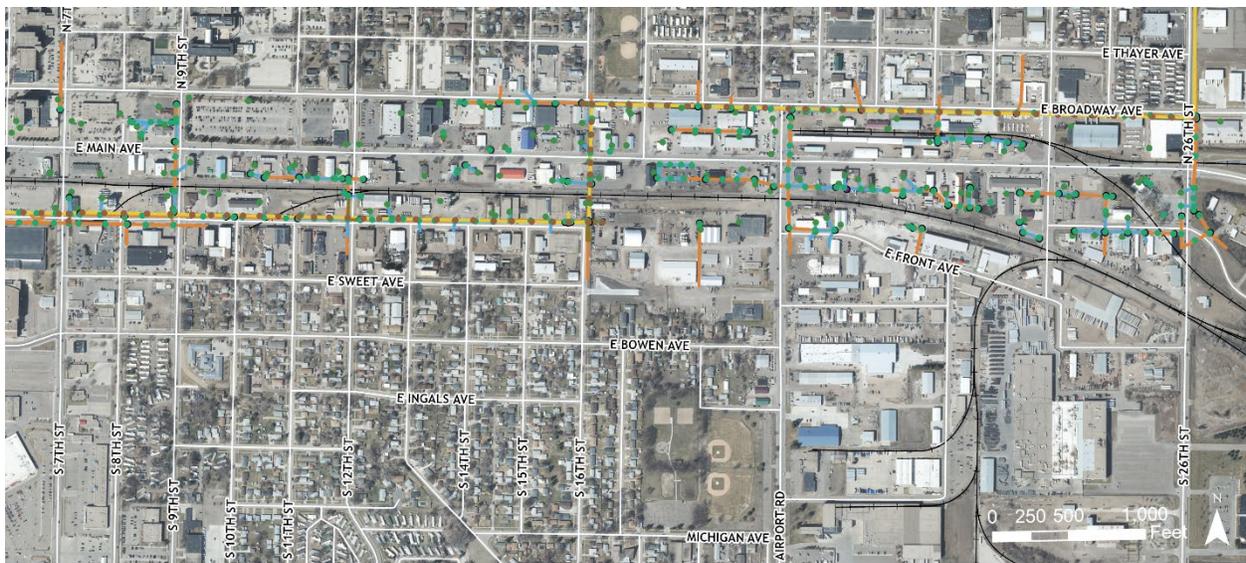
**Legend**

- BNSF Railway
- ▲ Storm Outfall
- Storm Manhole
- Catchbasin
- Inlet
- Slotted Drain
- Box Culvert
- Overflow Pipe
- Pipe
- Non-City Pipe
- Groundwater Collection
- Channels
- ▨ Detention Ponds
- Vault

**Stormwater**



Figure 10 | Private Utilities



**Legend**

- BNSF Railway
- Primary Electricity Overhead
- Secondary Electricity Overhead
- Electricity Service Point
- Electricity Transmission Line Overhead
- Poles
- Span Guy
- Anchor Guy
- Transmission Structure

**Private Utilities**



## Pavement Conditions

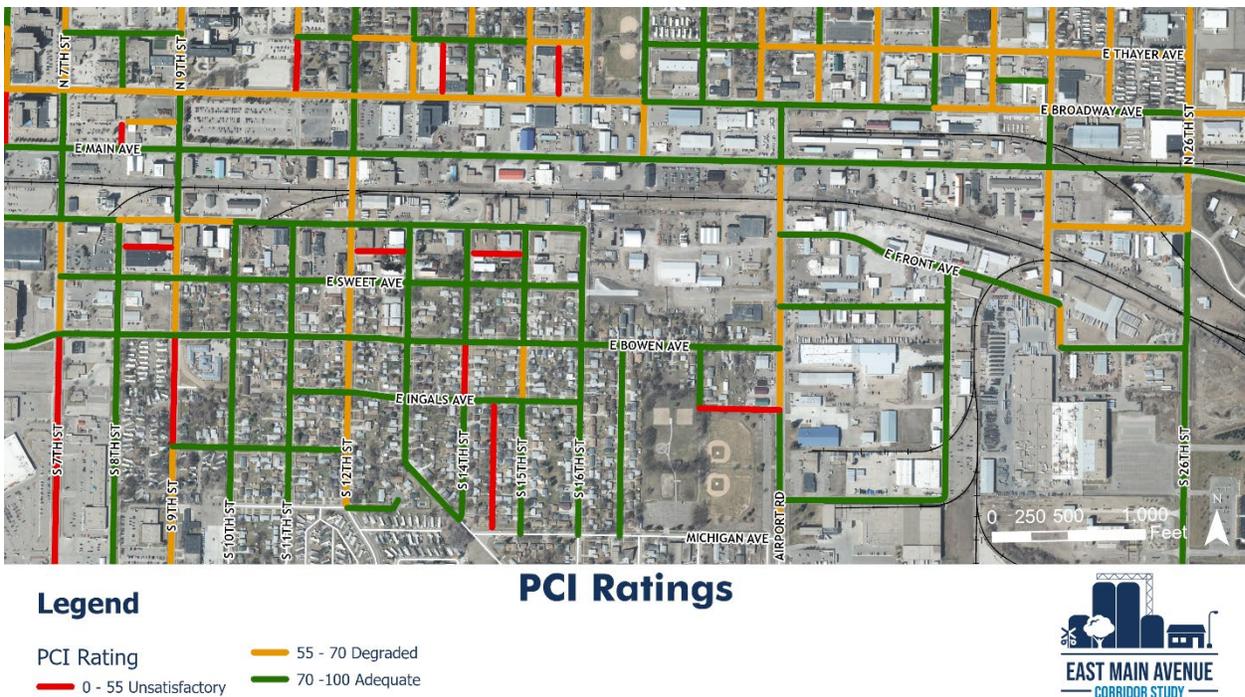
BMMPO collected pavement condition data on roadways within the Bismarck-Mandan metropolitan area in 2020. Two measures of pavement condition were collected in 2020: (1) the International Roughness Index (IRI), which describes the rideability (e.g., smoothness) of the roadway as experienced by the driver, and (2) the Pavement Condition Index (PCI), which provides an indication of both the structural integrity and surface operational condition of the roadway.

Based on the 2020 “State of the Streets” Final Report, the following pertains to the East Main Avenue:

- The PCI rating is adequate
  - Rating score between 71 and 100
- The IRI ranges from marginal to smooth
  - Marginal value between 201 and 400
  - Smooth value between 0 and 200

See Figure 11 for PCI ratings in the Study area. See Table 1 for PCI and IRI ranges.

**Figure 11 | PCI Ranges**



**Table 1 | East Main Avenue IRI Ranges**

East Main Avenue Segment		Length (ft)	IRI	IRI Range	PCI	PCI Range
From	To					
6 <sup>th</sup> Street	7 <sup>th</sup> Street	372.42	276.85	Marginal	83.18	Adequate
7 <sup>th</sup> Street	8 <sup>th</sup> Street	384.91	239.40	Marginal	72.18	Adequate
8 <sup>th</sup> Street	9 <sup>th</sup> Street	378.79	225.60	Marginal	72.18	Adequate
9 <sup>th</sup> Street	12 <sup>th</sup> Street	1,145.21	204.10	Marginal	77.18	Adequate
12 <sup>th</sup> Street	17 <sup>th</sup> Street	1,897.9	214.75	Marginal	78.18	Adequate
17 <sup>th</sup> Street	Airport Road	904.38	198.20	Smooth	80.18	Adequate
Airport Road	24 <sup>th</sup> Street	1,757.46	182.20	Smooth	86.18	Adequate
24 <sup>th</sup> Street	90' E of 26 <sup>th</sup> Street	1,003.01	233.10	Marginal	84.18	Adequate

### Access

Within the Study area there are approximately 86 private access points including 70 commercial, eight industrial, and eight dirt lot or other access points along the East Main Avenue corridor (see Figure 12). Access points are all full access and there is no partial access (e.g., right-in/right-out) except for the intersections of East Main Avenue and 7<sup>th</sup> Street, which restricts any northbound movements onto 7<sup>th</sup> (southbound one-way), and East Main Avenue and 9<sup>th</sup> Street, which restricts any southbound movements onto 9<sup>th</sup> (northbound one-way). The amount of private access has a correlation between the safety and overall function of the roadway (i.e., mobility versus access).

The East Main Avenue Corridor also includes seven side-street (public) access points. The City of Bismarck provides guidance for a variety of intersection types based upon functional classification (see Table 2). The area surrounding the East Main Avenue corridor is currently urban. Access point types as shown in Figure 12, were determined through field review by existing land use characteristics (i.e commercial or industrial). In the future, there is potential for the area to see redevelopment and commercial or industrial expansion.

Figure 12 | Access Inventory



**Legend**

- Access Type
- Industrial
- Side Street
- Commercial
- Other
- ☞ Parcel Boundary

**Access Inventory**



**Table 2 | City of Bismarck Access Control Policy**

Type of Intersection	Location of Access Point	Minimum Distance from Intersection		
		Low Density Residential	Commercial/ High Density	ETA/ Rural Residential
Principal Arterial	Principal Arterial	660 Feet	1320 Feet (2)	1320 Feet (2)
Minor Arterial	Principal Arterial	660 Feet	1320 Feet	NA
Collector	Principal Arterial	660 Feet	1320 Feet (2)	1320 Feet (2)
Local	Principal Arterial	660 Feet	1320 Feet (2)	1320 Feet (2)

(2) On Principal Arterials, access will be considered at ¼-mile spacing or five access per mile per side including crossing arterial routes.

As shown in Table 3, the spacing between several public street intersections is considered non-compliant. Given the historic platting of the East Main Avenue Study area, the non-compliant public access spacing predates the Bismarck access spacing guidance. Private access points may be more of a concern, although there are no specific standards for private access spacing in Bismarck, access consolidation or relocation may be considered to improve operations of East Main Avenue as a Principal Arterial. The corridor runs directly through the historic core of the City of Bismarck therefore, an appropriate balance between mobility and access must be struck to maintain roadway functionality but also respect the urban context.

**Table 3 | Access Spacing Compliance Review**

East Main Avenue Corridor		Distance	Compliance of Commercial/ High Density Spacing
From	To		
7 <sup>th</sup> Street	9 <sup>th</sup> Street	764 Feet	Not Compliant
9 <sup>th</sup> Street	12 <sup>th</sup> Street	1,145 Feet	Not Compliant
12 <sup>th</sup> Street	17 <sup>th</sup> Street	1,912 Feet	Compliant
17 <sup>th</sup> Street	Airport Road	908 Feet	Not Compliant
Airport Road	24 <sup>th</sup> street	1,757 Feet	Compliant
24 <sup>th</sup> Street	26 <sup>th</sup> Street	910 Feet	Not Compliant

### Traffic Control

All public street intersections with East Main Avenue have some level of traffic control as summarized in Table 4.

**Table 4 | Traffic Control**

<b>Intersection</b>	<b>E Main Ave Direction of Travel</b>	<b>Traffic Control</b>	<b>E Main Ave Lane Configuration</b>
7 <sup>th</sup> Street	Eastbound	Traffic Signal	2 through-lanes, 1 right-turn lane
7 <sup>th</sup> Street	Westbound	Traffic Signal	1 through-lane, 1 left turn lane, center left-turn lane
8 <sup>th</sup> Street	Eastbound	Stop Sign on 8 <sup>th</sup> (north)	2 through-lanes, 1 left-turn lane
8 <sup>th</sup> Street	Westbound		2 through-lanes
9 <sup>th</sup> Street	Eastbound	Traffic Signal	1 left-turn lane, 2 through-lanes
9 <sup>th</sup> Street	Westbound	Traffic Signal	1 right-turn lane, 1 through-lane
12 <sup>th</sup> Street	Eastbound & Westbound	Traffic Signal	2 through-lanes, 1 left-turn lane
17 <sup>th</sup> Street	Eastbound & Westbound	Stop Sign on 17 <sup>th</sup> (north)	2 through-lanes, center left-turn lane
Airport Road	Eastbound & Westbound	Traffic Signal	2 through-lanes, 1 left-turn lane
24 <sup>th</sup> Street	Eastbound & Westbound	Stop Signs (north & south)	2 through-lanes, center left-turn lane
26 <sup>th</sup> Street	Eastbound	Traffic Signal	1 through-lane, 1 left-turn lane, 1 right-turn lane
26 <sup>th</sup> Street	Westbound	Traffic Signal	2 through-lanes, 1 left-turn lane

### **Parking**

There is abundant parking near East Main Avenue in the Study area including on-street and off-street parking. Off-street parking consists of surface, ramp, and garage options. On-street parking consists of parallel and angle options. On-street parking is restricted on East Main Avenue throughout the Study area except for 16 on-street parallel parking spaces located on the north side of the street between 7<sup>th</sup> Street and 9<sup>th</sup> Street.

### **Bicycle, Pedestrian, and Transit System**

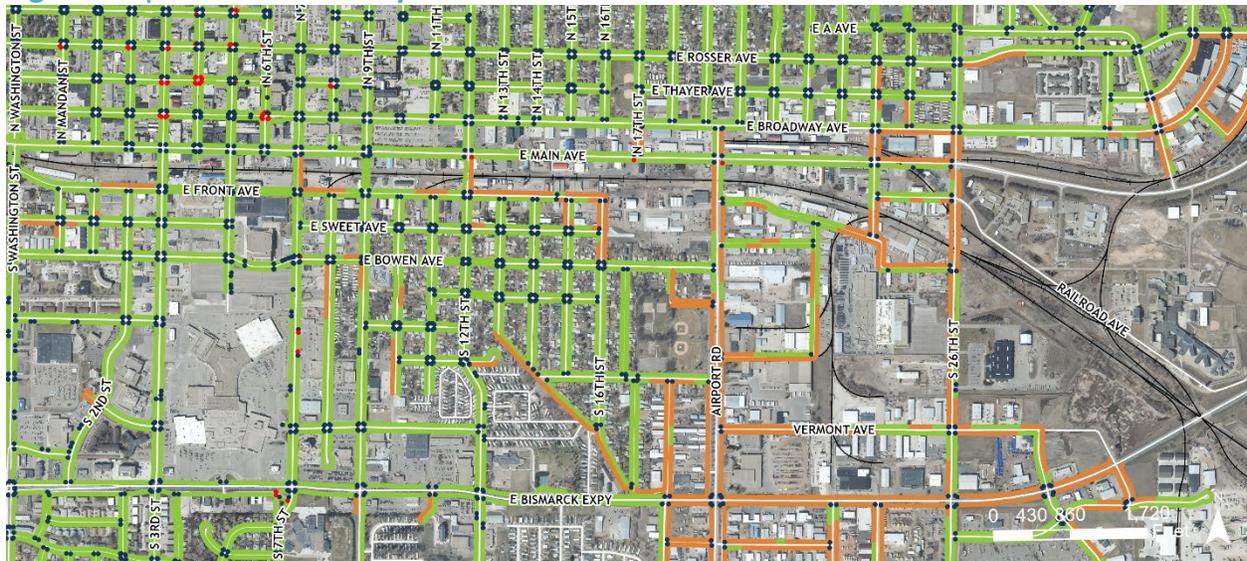
Most users of the East Main Avenue corridor in the Study area utilize personal vehicles. However, increasing multimodal systems connecting to Downtown and the corridor will interact directly with the operations of East Main Avenue and help shape future development in the area. Currently there are two eight-foot sidewalks along the entire length of the corridor to accommodate pedestrians, except for the north side of East Main Avenue between 24<sup>th</sup> and 26<sup>th</sup> Street, where there is currently no sidewalk. A complete sidewalk network, for purposes of this Study, is one in which sidewalks are provided on either side of the street network (i.e. similar mobility as vehicular network). The only intersecting streets with complete sidewalk network are 8<sup>th</sup> and 9<sup>th</sup> Street. Currently, there

are incomplete or partial sidewalk networks on 7<sup>th</sup> Street, 12<sup>th</sup> Street, 17<sup>th</sup> Street, Airport Road, 24<sup>th</sup> Street, and 26<sup>th</sup> Street. The gaps in sidewalk may further be challenged by BNSF Railroad infrastructure located in the area (e.g. north side of the corridor between 24<sup>th</sup> and 26<sup>th</sup> Street). Curb ramp data from the City of Bismarck also shows area for improvement, including hazardous curb ramps at the southeast corner of East Main Avenue and 12<sup>th</sup> Street, south side of East Main Avenue across from 17<sup>th</sup> Street, and the southeast corner of East Main Avenue and Airport Road. The inconsistency of the intersecting sidewalk network and abundant private vehicular access points along the East Main Corridor, decreases pedestrian mobility and can create safety concerns (see Figure 13).

There are no multi-use trails or on-street bike facilities existing along the corridor. Three blocks north of the East Main Avenue, East Rosser Avenue, has on-street bike lanes for enhanced east-west bicyclist mobility however, there are no bicycle facilities connecting north-south through the Study area. There is one segment of existing multi-use trail on the west side of 7<sup>th</sup> Street running south from East Main Avenue to the Kirkwood Mall. East Main Avenue is identified in the Bismarck-Mandan Bicycle and Pedestrian Plan as a planned bicycle and pedestrian facility, ranked as the second highest connection priority by the public. 12<sup>th</sup> Street was also ranked as a priority connection for north-south multimodal mobility through the Study area (see Figure 14).

Transit is also a strong multimodal consideration along the East Main Avenue corridor with routes 1 and 5 running along the corridor, as shown in Figure 14. Route 1 travels between 7<sup>th</sup> Street and 9<sup>th</sup> Street, and route 5 travels through the 7<sup>th</sup> Street intersection heading west of the Study area and travels between 26<sup>th</sup> Street and Airport Road. Bis-Man Transit, also known as Capital Area Transit, provides one-hour bus intervals and can pick up passengers at any street corner along fixed-routes however, there are some “no stop zones” along certain areas where it may be unsafe for a bus to stop. The Downtown Bismarck Subarea Plan recommended a multimodal transit hub just south of East Main Avenue, on the northwest corner of 7<sup>th</sup> Street and Front Avenue. The current Bis-Man Transit Development Plan also recommends 30-minute bus intervals for select routes to enhance the viability and mobility of public transit for the region.

Figure 13 | Sidewalks & Ramps



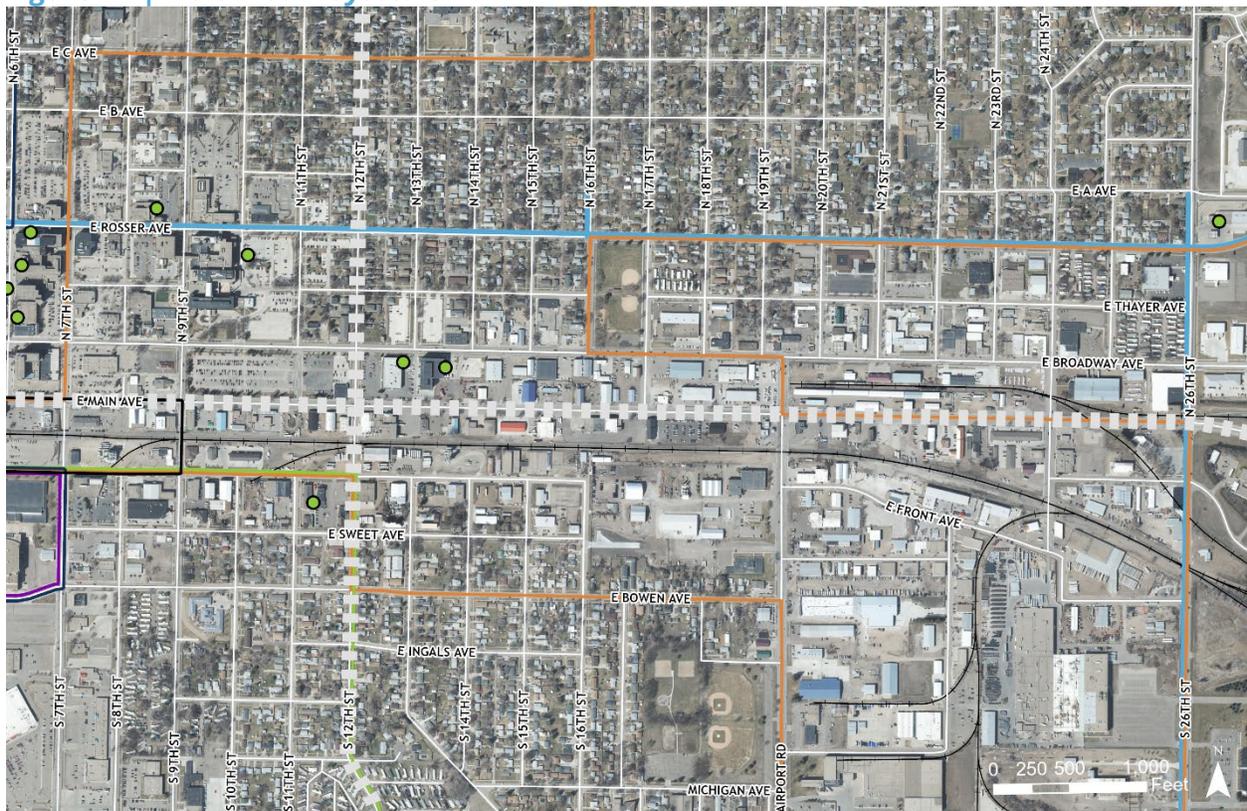
**Legend**

- No Ramp Hazard
- Ramp Hazard
- Null Ramp Hazard Value
- Existing Sidewalk
- No Sidewalk
- BNSF Railway

**Sidewalks & Ramps**



Figure 14 | Multimodal Systems



**Legend**

- Bike Rack
- Bicycle Lanes
- Bike and Ped Plan Priority Connections
- Transit Routes
- 1 Black Route
- 2 Blue Route
- 3 Green Route
- 5 Route Orange
- 6 Purple Route

**Multimodal Systems**



### Strava Heat Map

The Strava heat map shown in Figure 15 shows active transportation activity based on data derived from users of the mobile application. The mobile application is a free or subscription-based tool used for people to track and geolocate bicycle, walking, hiking, and other active transportation trips.

Figure 15 | Strava Heat Map



## Transportation Operations

To quantify current transportation operations, the following data collection and roadway capacity analyses were conducted.

### Data Collection

To estimate current traffic volumes along the corridor, peak hour traffic counts were obtained for all corridor intersections except for 26<sup>th</sup> Street. 13 hours of traffic video was processed at 26<sup>th</sup> Street.

## Historic Daily Traffic Volumes

Historic traffic counts have been conducted on East Main Avenue, dating from 2006 to 2019. Table 5 shows historic daily traffic volume estimates from data collected through traditional methods such as video or pneumatic tube counters, and Miovision, a video analysis technology that reliably and accurately collects traffic data from NDDOT's publicly available data.

**Table 5 | Historic East Main Avenue Traffic Counts (AADT)**

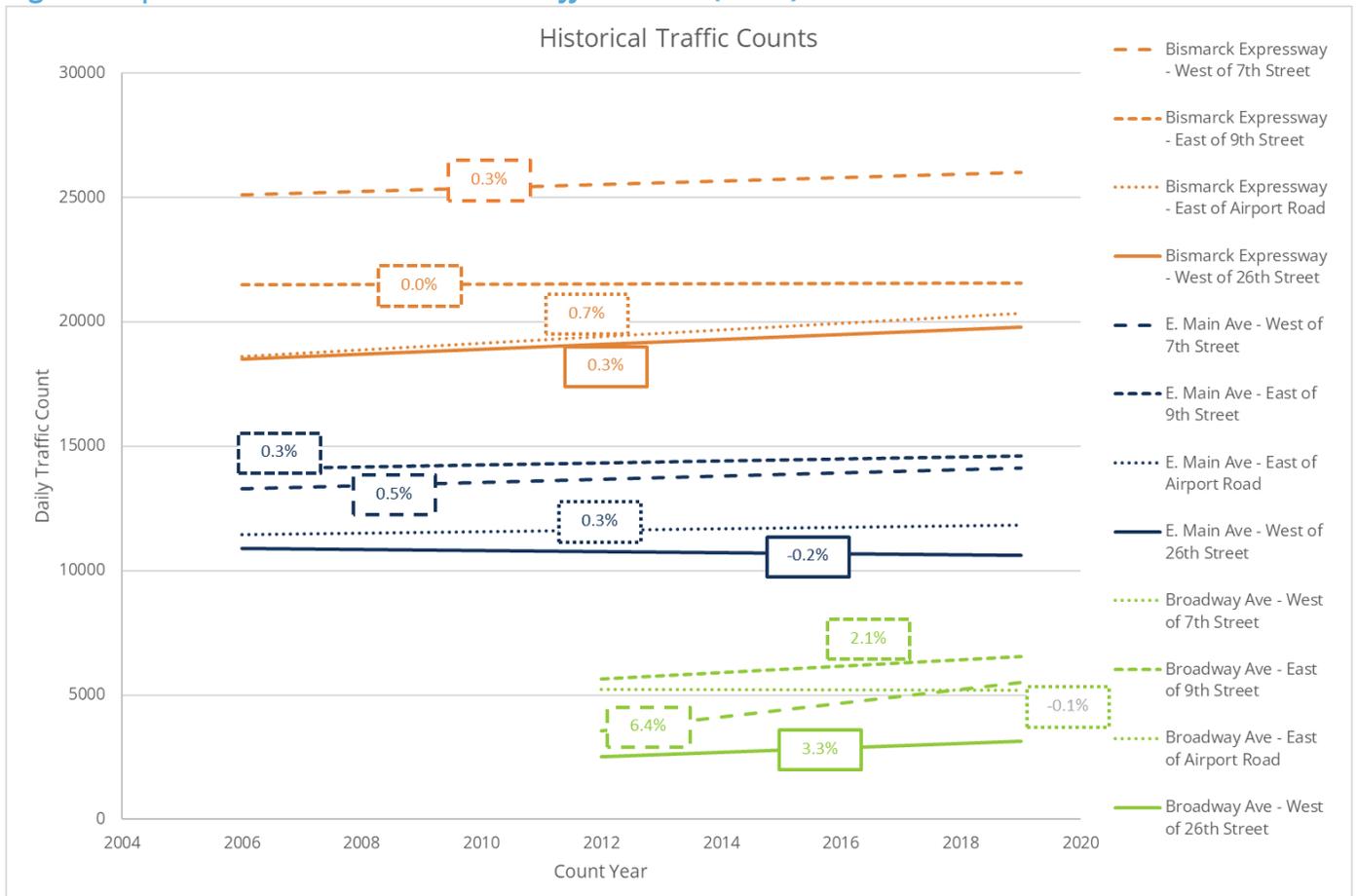
Location	2006	2009	2012	2014 <sup>1</sup>	2016 <sup>1</sup>	2019
West of 7 <sup>th</sup> St	13,285	13,675	12,520	14,685	-	14,110
West of 9 <sup>th</sup> St	6,800 <sup>2</sup>	-	-	14,650	14,750	14,315
East of 9 <sup>th</sup> St	14,105	14,105	12,465	15,225	15,435	14,610
West of 12 <sup>th</sup> St	-	-	-	14,750	14,810	-
East of 12 <sup>th</sup> St	6,750 <sup>2</sup>	7,065 <sup>2</sup>	-	-	-	13,525
West of 17 <sup>th</sup> St	19,334 <sup>2</sup>	-	-	-	-	-
East of 17 <sup>th</sup> St	12,335	12,970	-	-	-	12,535
West of Airport Rd	-	-	-	13,215	12,555	-
East of Airport Rd	11,460	12,305	10,005	12,355	11,710	11,845
West of 24 <sup>th</sup> St	11,100 <sup>2</sup>	-	-	-	-	-
West of 26 <sup>th</sup> St	10,875	11,240	8,765	-	-	10,615

<sup>1</sup>Miovision

<sup>2</sup>No truck data

Historic traffic data was also gathered for parallel corridors, see Figure 16 below.

**Figure 16 | Historic East Main Avenue Traffic Counts (AADT)**



### 2045 Traffic Forecast Methodology

The year 2045 is used as a forecast year to align with the current Bismarck-Mandan Metropolitan Transportation Plan forecast year. Year 2045 forecasts are generated by the Bismarck-Mandan MPO’s travel demand model. The travel demand model is a tool that forecasts travel behavior in the future. Modeling uses computer software and takes into consideration the demand on the transportation system anticipated by planned changes in land use, notably the location and scale of jobs and households. North Dakota State University’s Advanced Traffic Analysis Center (ATAC) evaluated the region’s travel demand model specific to East Main Avenue traffic volumes forecasted in 2045.

### Roadway Capacity

Congestion on the existing roadway system is deemed to exist when the ratio of traffic volume to roadway capacity (v/c ratio) approaches or exceeds 1.0. The ratio of volume to capacity provides a measure of congestion along a stretch of roadway and can help determine where roadway improvements, access management, transit service, or demand management strategies should be implemented. It does not however, provide a basis for

determining the need for specific improvements. In order to provide perspective regarding the amount of traffic along these corridors, Figure 17 presents the latest existing daily traffic volumes for East Main Avenue in the Study area and no build traffic forecasts for 2045, which assumes an annual growth rate along Main Avenue of 0.25 percent in line with the travel demand model forecast.

**Figure 17 | Existing and No Build Traffic Forecast**

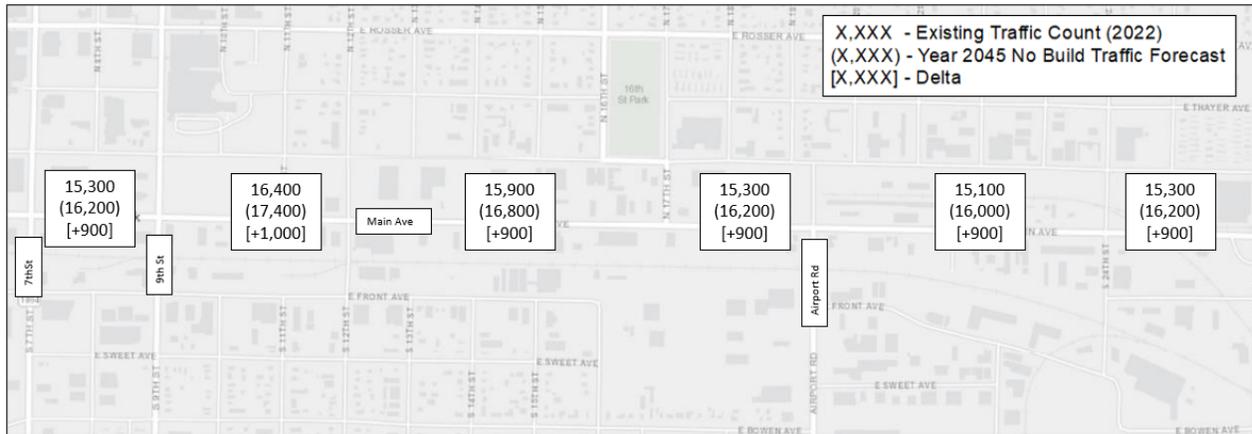


Table 6 provides a method to evaluate roadway capacity. The typical planning-level, average daily traffic (ADT) capacity ranges and maximum ADT volume ranges are listed for each facility type. These volume ranges are based upon guidance from the Highway Capacity Manual and professional engineering judgement. A range is used since the maximum capacity of any roadway design ( $v/c = 1$ ) is a theoretical measure that can be affected by its functional classification, traffic peak characteristics, access spacing, speed, intersection node geometry and other roadway characteristics. Further, to define a facility's 'daily capacity', it is recommended that the top of each facility type's volume range be used. This allows for capacity improvements that can be achieved by roadway performance enhancements.

Another useful capacity analysis index is the level of traffic that a facility can accommodate before it is defined as approaching its capacity limit. A segment of road is noted as 'approaching capacity' when the observed daily volume equals or exceeds 85 percent of daily capacity ( $v/c > 0.85$ ).

**Table 6 | Planning-Level Roadway Capacities by Facility Type**

Facility Type	Daily Capacity Ranges (AADT)	Approaching Capacity (85% of ADT)
Two-lane undivided urban	8,000 – 10,000	8,500
Two-lane undivided rural	14,000 – 15,000	12,750
Three-lane urban (two-lane divided with turn lanes)	14,000 – 17,000	14,450
Four-lane undivided urban	18,000 – 22,000	18,700
<b>*Five-lane urban (four-lane divided with turn lanes)</b>	<b>28,000 – 32,000</b>	<b>27,200</b>
Four-lane divided rural	35,000 – 38,000	32,300

*This chart is intended for use as an approximation for planning purposes.*

\*East Main Avenue Facility Type within the Study area

The Main Avenue corridor falls within the five-lane (four-lane divided with turn lanes) roadway classification. The existing year 2022 ADT and v/c ratios for segments along Main Avenue are shown in Table 7. The existing five-lane section provides sufficient capacity to accommodate current traffic volumes.

**Table 7 | Existing Year 2022 ADT and V/C Ratio**

Main Avenue Segment	Daily Capacity Ranges (AADT)	Approaching Capacity (85% of ADT)	Existing ADT (2022)	V/C Ratio
7th Street to 9th Street	28,000 - 32,000	27,200	15,300	0.48
7th Street to 12th Street	28,000 - 32,000	27,200	16,400	0.51
12th Street to 17th Street	28,000 - 32,000	27,200	15,900	0.50
17th Street to Airport Road	28,000 - 32,000	27,200	15,300	0.48
Airport Road to 24th Street	28,000 - 32,000	27,200	15,100	0.47
24th Street to 26th Street	28,000 - 32,000	27,200	15,300	0.48

### Intersection Capacity

Existing and Year 2045 No Build intersection capacity analysis were analyzed using VISSIM (VISSIM is a microscopic multi-modal traffic flow simulation software).

### Existing Intersection Capacity Analysis

An existing intersection capacity analysis was completed to establish baseline conditions to which future traffic operations can be compared. The capacity analysis was completed for the a.m. and p.m. peak hours at the study intersections.

Capacity analysis results identify a Level of Service (LOS) which indicates the quality of traffic flow through an intersection. Intersections are given a ranking from LOS A through LOS F. The LOS results are based on average delay per vehicle, which correspond to the delay threshold values shown in Table 8. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS F indicates an intersection where demand exceeds capacity, or a breakdown of traffic flow. According to the *NDDOT Traffic Operations Manual* (October 2021), the NDDOT guidance is to meet or exceed an overall LOS D. LOS A through D is generally considered acceptable by drivers in the Bismarck area.

**Table 8 | Level of Service Criteria for Signalized and Unsignalized Intersections**

<b>LOS Designation</b>	<b>Signalized Intersection Average Delay/Vehicle (seconds)</b>	<b>Unsignalized Intersection Average Delay/Vehicle (seconds)</b>
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

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

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

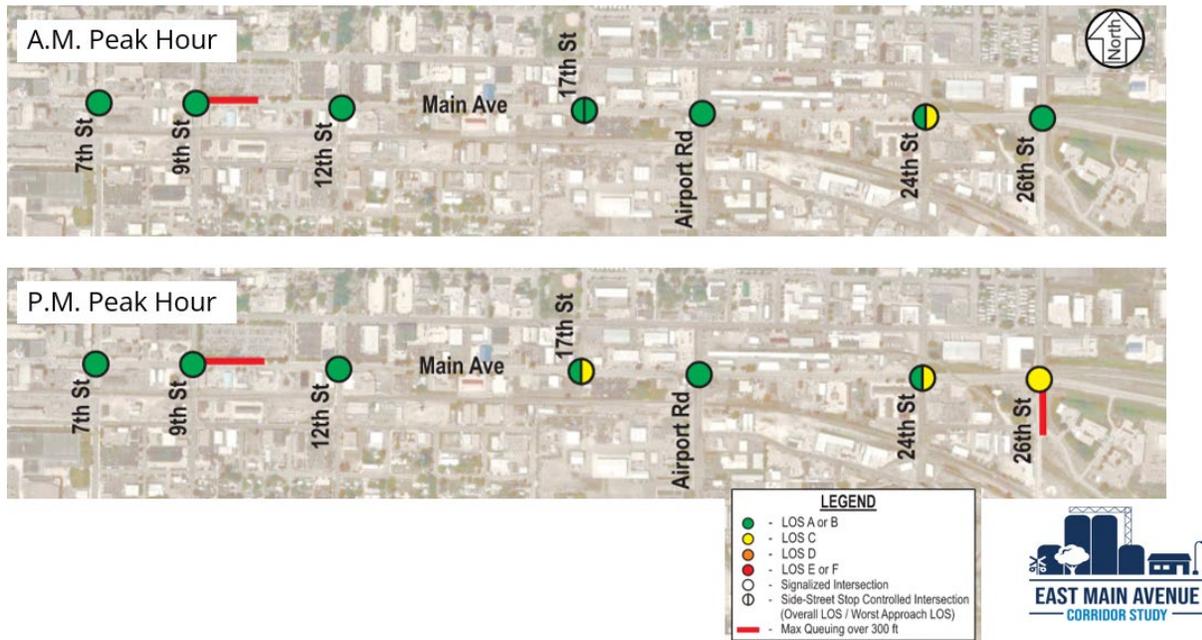
Results of the existing operations analysis shown in Table 9 and Figure 18 indicate that all key intersections currently operate at an acceptable overall LOS C or better during the a.m. and p.m. peak hours, with existing traffic controls and geometric layout.

**Table 9 | Existing Peak Hour Capacity Analysis - East Main Avenue**

East Main Avenue Intersection	Level of Service (LOS)	
	A.M. Peak Hour	P.M. Peak Hour
7th Street	B	B
9th Street	B	B
12th Street	B	B
17th Street <sup>(1)</sup>	A/B	A/C
Airport Road	B	B
24th Street <sup>(1)</sup>	A/C	A/C
26th Street	B	C

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS.

**Figure 18 | Existing LOS**



**Year 2045 No Build Intersection Capacity Analysis**

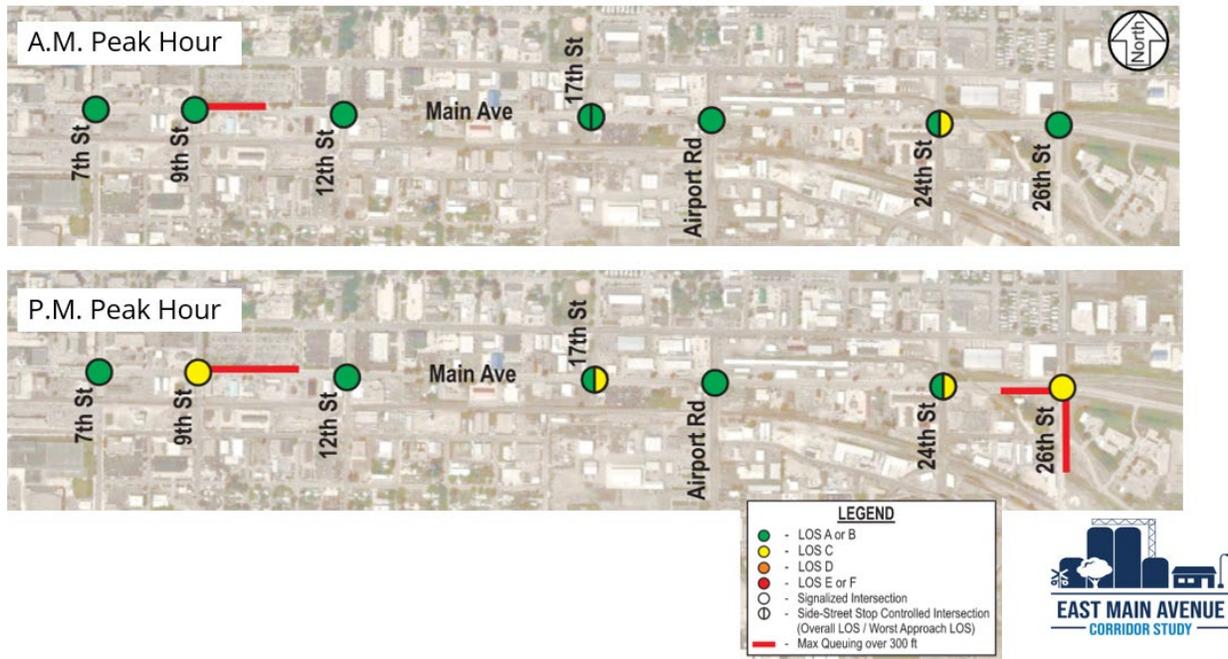
To determine how the existing roadway network will be able to accommodate the future year 2045 traffic forecasts, a detailed intersection capacity analysis was completed. No geometric or traffic control improvements were assumed from the existing conditions as part of the Year 2045 Scenario intersection capacity analysis.

Results of the Year 2045 No Build Scenario analysis shown in Table 10 and Figure 19 indicate that all key intersections currently operate at an acceptable overall LOS C or better during the a.m. and p.m. peak hours, with existing traffic controls and geometric layout.

**Table 10 | Year 2045 No Build Scenario Peak Hour Capacity Analysis - East Main Avenue**

East Main Avenue Intersection	Level of Service (LOS)	
	A.M. Peak Hour	P.M. Peak Hour
7th Street	B	B
9th Street	B	C
12th Street	B	B
17th Street <sup>(1)</sup>	A/B	A/C
Airport Road	B	B
24th Street <sup>(1)</sup>	A/C	A/C
26th Street	B	C

**Figure 19 | Year 2045 No Build Scenario LOS**



## Corridor Safety

### Crash History

The NDDOT has identified the intersection of East Main Avenue with 7<sup>th</sup> Street and 9<sup>th</sup> Street as “Urban High Crash Locations” (2018-2020). Additionally, the current BMMPO MTP identifies the intersections of East Main Avenue and 9<sup>th</sup> Street and East Main Avenue and 7<sup>th</sup> Street as high crash locations (see Table 11).

**Table 11 | Highest Crash Frequency Intersections, 2013-2017**

Bismarck	Number of Crashes	Crash Rate (Crashes per MEV)	2015 LRTP Crash Rate (Crashes per MEV)	Serious Injury Crashes	Percent of Crashes with Serious Injuries
E Main Ave & 9 <sup>th</sup> St	70 <sup>2</sup>	1.42 <sup>1</sup>	1.87 <sup>4</sup>	2 <sup>1</sup>	3% <sup>2</sup>
E Main Ave & 7 <sup>th</sup> St	60 <sup>3</sup>	1.12 <sup>4</sup>	1.85 <sup>5</sup>	1 <sup>2</sup>	2% <sup>3</sup>

XX<sup>X</sup> = Ranking out of 10, per column criteria, with <sup>10</sup> being the lowest and <sup>1</sup> being the highest.

Source: Bismarck-Mandan Metropolitan Transportation Plan (2020)

For this Study, NDDOT crash data from March, 2017 through February, 2022 was reviewed. Within the past five years, 444 crashes have occurred on East Main Avenue between 7<sup>th</sup> Street and 26<sup>th</sup> Street. 322, or 73 percent of the total crashes occurred within 150-feet of intersections. 83 percent of incapacitating injury crashes along the corridor occurred at intersections, with 7<sup>th</sup> Street contributing 50 percent of all incapacitating injury crashes.

Table 12 summarizes the severity of crashes by location along the corridor.

**Table 12 | East Main Avenue Crash Severity Summary**

Location	Fatal	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	PDO	Total	%
Corridor <sup>1</sup> (7 <sup>th</sup> to 26 <sup>th</sup> Street)	0	6	51	58	329	444	100%
Intersections <sup>2</sup>							
7 <sup>th</sup> St	0	3	10	12	78	103	23%
9 <sup>th</sup> St	0	1	9	11	76	97	22%
12 <sup>th</sup> St	0	0	0	5	23	28	6%
17 <sup>th</sup> St	0	0	1	1	2	4	1%
Airport Rd	0	0	7	5	30	42	9%
24 <sup>th</sup> St	0	0	4	4	12	20	5%
26 <sup>th</sup> St	0	1	5	5	17	28	6%
Totals							
Intersections	0	5	36	43	238	322	73%
Rest of Study Area	0	1	15	15	91	122	27%

<sup>1</sup>crashes within 250' of the Study area

<sup>2</sup>crashes within 150' of intersections

The severity of crashes within the study area are illustrated in Figure 20. Note that of the crashes reviewed between 2017 and 2022, zero were fatal, and six involved serious injuries. 74 percent of crashes during the most recent timeframe analyzed involved property damage only.

**Figure 20 | Crash Severity**



**Legend**

- Incapacitating Injury
- Non-incapacitating injury
- PDO
- Possible Injury

**Crash Severity**

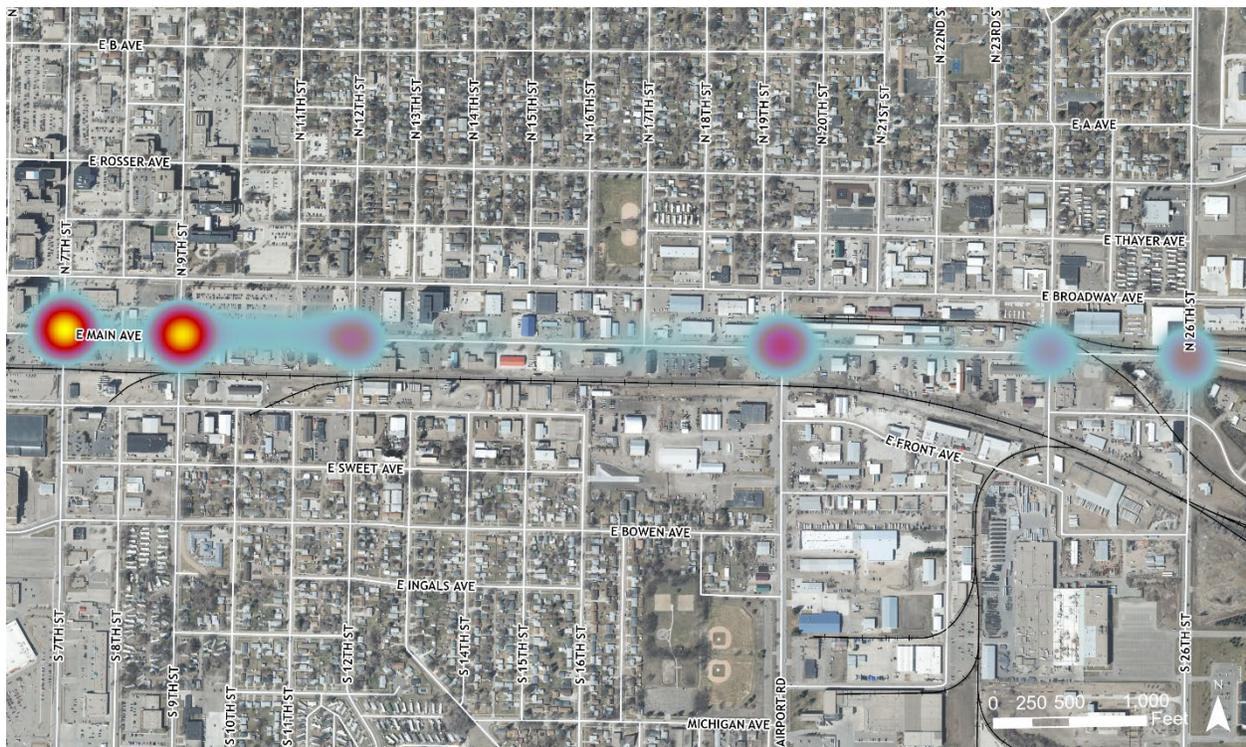


Most of the crashes in the Study area were rear end (37.4 percent) or angle (36.3 percent) crashes, with the third most common crash being same direction sideswipe (15.8 percent) (see Table 13). Eastbound crashes were most prevalent (33 percent), followed closely by westbound (31 percent), southbound (18 percent), and northbound (18 percent). Figure 21 shows the crash frequency within the Study area.

**Table 13 | Crash Type Total**

Crash Description		Number of Crashes	Percentage
Object	Curb	5	1.1%
	Other Fixed object	2	0.5%
	Traffic Signal Support	2	0.5%
	Utility Post	2	0.5%
MV in Transport	Angle (Not Specific)	161	36.3%
	Cargo Loss or Shift	1	0.2%
	Head On	14	3.2%
	Non-Coll. w/Motor Veh.	1	0.2%
	Rear End	166	37.4%
	Right Angle	1	0.2%
	Sideswipe (opp. dir.)	4	0.9%
	Sideswipe (same dir.)	70	15.8%
Other Non-Collision		2	0.5%
Overturn / Rollover		1	0.2%
Bicycle		7	1.6%
Pedestrian		5	1.1%
Total		444	100%

**Figure 21 | Crash Frequency**



**Legend**



**Crash Frequency**



### *Crash Analysis*

There are numerous ways to evaluate safety along the corridor and at intersections, and through this Study the actual crash and severity rates were calculated and compared to the expected and critical crash and severity rates for intersections and segments with similar characteristics (see Table 14). As NDDOT does not maintain a dataset for expected, critical, and severity rates based on roadway characteristics, a robust Minnesota Department of Transportation (MnDOT) crash rate analysis tool was used. The MnDOT tool is available for any planning agency performing crash analyses and has applicability to North Dakota. The analysis was used to determine the statistical significance of the amount and severity of the crashes that have occurred. In general, the expected crash and severity rates represent the average rates for intersections with similar characteristics. An above expected crash rate does not necessarily indicate a crash issue, however a crash or severity rate above the critical rate indicates an issue area that needs to be investigated further to determine if there are any engineering solutions to address the statistically significant crash issue.

Based on this approach, the study corridor has both crash and severity rates above the respective critical rates, which indicates a crash issue. The intersections of 7<sup>th</sup> Street, 9<sup>th</sup> Street, 12<sup>th</sup> Street, Airport Road, and 24<sup>th</sup> Street have both an above average crash rate and above the critical crash rate. The intersection of 26<sup>th</sup> Street has an above average crash rate but is below the critical crash rate. 17<sup>th</sup> Street is the only intersection neither above the average crash rate nor critical crash rate. All segments on East Main Avenue also have above average crash rate and above critical crash rates. As part of the alternative development process, potential solutions to these issues will be identified and evaluated.

**Table 14 | East Main Avenue Safety Analysis**

Intersection	Observed Crash Rate	Average Crash Rate	Critical crash Rate
7 <sup>th</sup> Street	2.26	0.52	0.79
9 <sup>th</sup> Street	2.73	0.52	0.80
12 <sup>th</sup> Street	1.07	0.52	0.84
17 <sup>th</sup> Street	0.09	0.18	0.43
Airport Road	1.12	0.52	0.85
24 <sup>th</sup> Street	0.83	0.18	0.44
26 <sup>th</sup> Street	0.84	0.52	0.84
Segment	Observed Crash Rate	Average Crash Rate	Critical Crash Rate
9 <sup>th</sup> Street to 12 <sup>th</sup> Street	1.86	0.76	1.21
12 <sup>th</sup> Street to 17 <sup>th</sup> Street	1.46	0.76	1.23
17 <sup>th</sup> Street to Airport Road	3.60	0.76	1.25
Airport Road to 26 <sup>th</sup> Street	1.57	0.76	1.27
	<i>Above Average Crash Rate</i>		<i>Above Critical Crash Rate</i>

\*Crash rate in Million Entering Vehicles (MEV)

\*\*MN statewide average crash rates were used

## Social, Environmental, and Economic Considerations

Consideration of the social, environmental, and economic context within which East Main Avenue is located is a vital component of the corridor study. Land Use contributes directly to traffic volumes, safety, and economic impacts. The urban context and identification of historically and emerging vulnerable populations also plays a key role in shaping the future of East Main Avenue, as impacts from future projects on the corridor will affect the urban environment and surrounding community. Additionally, understanding community and economic context is essential and provides insight into the existing use and future needs of the corridor.

### Land Use

There are a variety of land use types immediately adjacent to the East Main Avenue Corridor Study area. Most land use along the Study corridor is commercial or industrial however, there are other scattered adjacent uses fronting the corridor such as commercial mixed use, office, health and medical, and institutional. All these land use types drive users onto the road and have specific needs from the transportation system.

### *Commercial Mixed*

The northwest corner of the intersection of East Main Avenue and 7<sup>th</sup> Street is a commercial mixed use land use. Comprised of first-floor retail, second-floor residential, and third-floor residential, the development and land use are a direct result of newly prioritized investment in Downtown Bismarck. Future commercial mixed land uses are anticipated to become more prevalent within the Study area, as more infill and redevelopment occurs with the implementation of the Downtown Bismarck Subarea Study and Infill and Redevelopment Plan.

### *Commercial & Industrial*

Commercial or industrial land uses make up a vast majority of the adjacent land uses along East Main Avenue. These land use types are more often heavy commercial or light industrial in nature and prioritize vehicular accommodation. Buildings and uses are oriented toward East Main Avenue to maximize access and efficiency of transportation and freight needs. The businesses in the Study area rely on East Main Avenue to provide a critical connection between Downtown Bismarck, Mandan, I-94, the Bismarck Expressway, and beyond.

### *Office*

There are a few existing office land uses mixed into the East Main Avenue corridor. Office uses generally contribute a higher proportion of trips during the typical morning and evening peak times, when employees commute to and from the office.

### *Health and Medical*

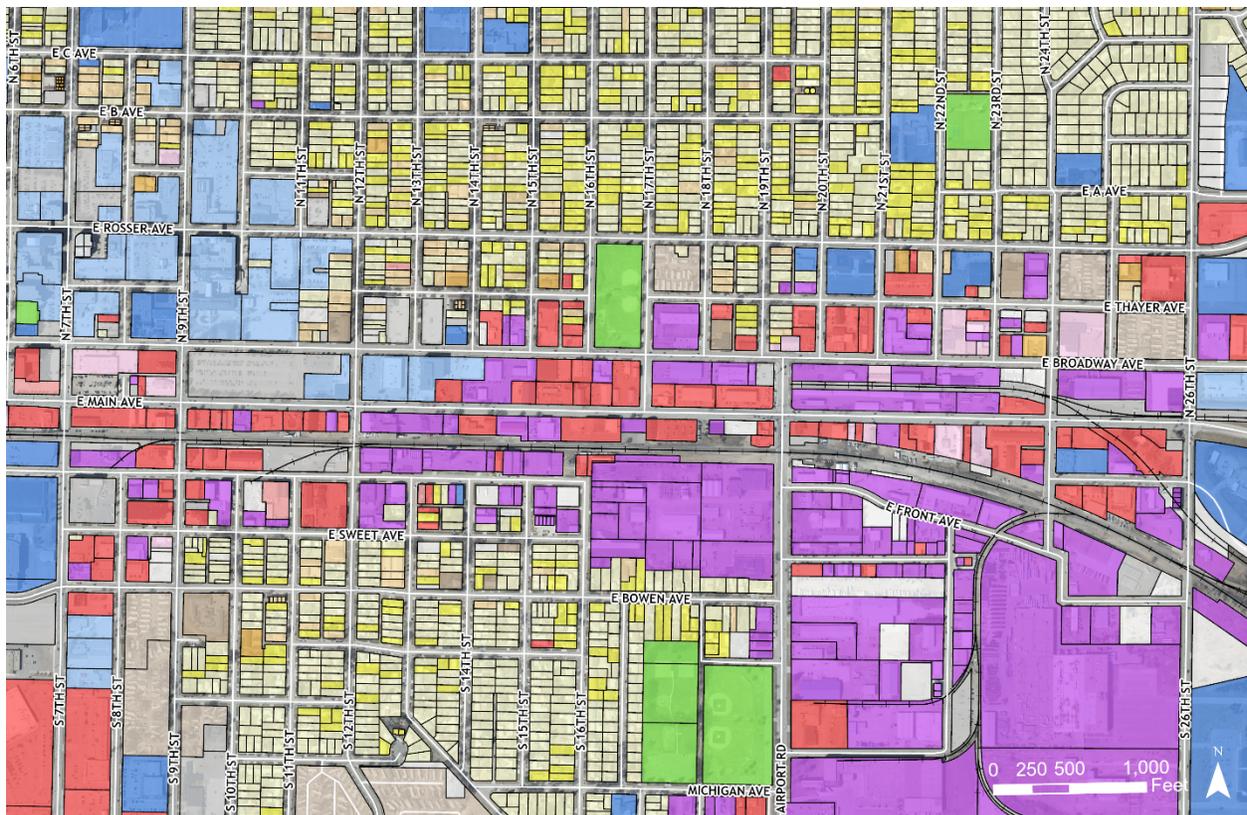
Health and medical land uses are in a couple locations along the East Main Avenue corridor and contribute to some of the largest employment sectors in the region. In the 1200-1300 block on the north side of East Main Avenue, there is a series of three CHI St. Alexius Health Care buildings, which are associated with the CHI St. Alexius Hospital and medical campus just north of the Study area. There is a large surface parking lot located on the north side of East Main Avenue between 9<sup>th</sup> Street and 12<sup>th</sup> Street, which serves the CHI St. Alexius medical campus. There is also a medical clinic located near the northeast corner of East Main Avenue and 26<sup>th</sup> Street although, there is no direct access from East Main Avenue. Health and medical land uses rely on the safety and reliability of East Main Avenue to accommodate numerous and frequent traffic for not only employees, but also for patients and visitors throughout the entire day.

### *Institutional*

The southeast corner of East Main Avenue and 26<sup>th</sup> Street has an institutional land use related to North Dakota State Government. This location is comprised of the Health Department Microbiology Lab and Department of Environmental Quality Lab, ND State Forensic Examiner, State Crime Laboratory, and Environmental Training Center.

Institutional uses such as these, highlight the importance of East Main Avenue as a safe multimodal commuter corridor.

**Figure 22 | Existing Land Use**



**Legend**

- BNSF Railway
- City Parcels
- Commercial
- Commercial Mixed
- Health & Medical
- Industrial
- Institutional
- Leisure
- Office
- Residential High Density
- Residential Institutional
- Residential Manufactured
- Residential Medium Density
- Residential Single Family
- Residential Two Family
- Transportation & Infrastructure
- Undeveloped

**Figure 20 | Existing Land Use**



**Zoning**

The current zoning of fronting properties along the East Main Avenue corridor within the Study area falls into one of two categories:

**Downtown Core (DC)**

Between 7<sup>th</sup> Street and 9<sup>th</sup> Street, the zoning classification is Downtown Core on either side of East Main Avenue. According to the City of Bismarck Code of Ordinances, Title 14, Zoning:

The purpose of the Downtown Core District is to preserve and enhance the mixed-use, pedestrian-oriented nature of the City's downtown area. The district allows a wide range of mutually supportive uses to enhance downtown Bismarck's role as a commercial, cultural, governmental, health/medical, entertainment, and residential

center. The district standards also facilitate the creation of a strong and distinctive sense of place through the inclusion of open space and public plazas. The use of design standards will maintain the historical integrity, enhance the quality of design, and preserve the human-scale development of downtown. (p. 238)

Downtown Core design standards within Bismarck's zoning code provide guidance for the following:

- Intent of the design standards
- Review and approval process
- Restoration or rehabilitation of historically significant buildings
- New construction
- Renovation or rehabilitation of existing structures
- Building additions
- Building materials
- Building design aspects
- Entrances
- Windows
- Rooftop equipment
- Demolition and vacant lots
- Work in the public right-of-way
- Off-street parking and loading
- Landscaping and screening
- Signage

Regulations for the Downtown Core district also reference the 2019 City of Bismarck Downtown Streetscape Standards. Between 7<sup>th</sup> Street and 9<sup>th</sup> Street, East Main Avenue is identified as a Signature Street:

Signature streets function as the epicenter of commercial and entertainment activity, as well as a public gathering place. In addition, they are the primary gateways into the downtown, where the aesthetic impression on visitors is most important. The signature streets are distinctively multimodal and must balance significant pedestrian activity with vehicular travel into and through the downtown. Several landmarks and amenities are located along these streets, including the Bismarck Depot and a planned plaza, Camp Hancock, the Patterson Building, and the Bismarck Event Center. The southern end of 5<sup>th</sup> Street is anchored by Kirkwood Mall, the region's largest retail shopping mall, and efforts should be taken to strengthen the connection between downtown and this commercial center. The streetscape elements should be selected to support and emphasize the importance of these central corridors through downtown. (p. 8)

East Main Avenue intersects with three Secondary Urban Streets, as defined by the streetscape standards document which includes 7<sup>th</sup> Street, 8<sup>th</sup> Street, and 9<sup>th</sup> Street. Other guidance also includes helpful streetscape zone definitions, streetscape selection matrix, and streetscape elements.

### *Light Industrial (MA)*

Between 9<sup>th</sup> Street and 26<sup>th</sup> Street, the zoning classification is Light Industrial on either side of East Main Avenue. According to the City of Bismarck Code of Ordinances, Title 14,

Zoning, the MA or Light Industrial district is established for heavy commercial establishments and non-nuisance industries. Specific purposes of the district include:

- Encourage the construction of and continued use of the land for commercial and industrial buildings.
- Prohibit use of the land for heavy nuisance industry or any other use which would substantially interfere with the development or continuation of commercial and industrial establishments in the district.
- Encourage the discontinuance of existing uses that would not be permitted as new uses under current regulations.
- Discourage the use of the land for residences for the purpose of both preserving the area for its appropriate use and for preventing the location of residences in an area inappropriate for residential use.

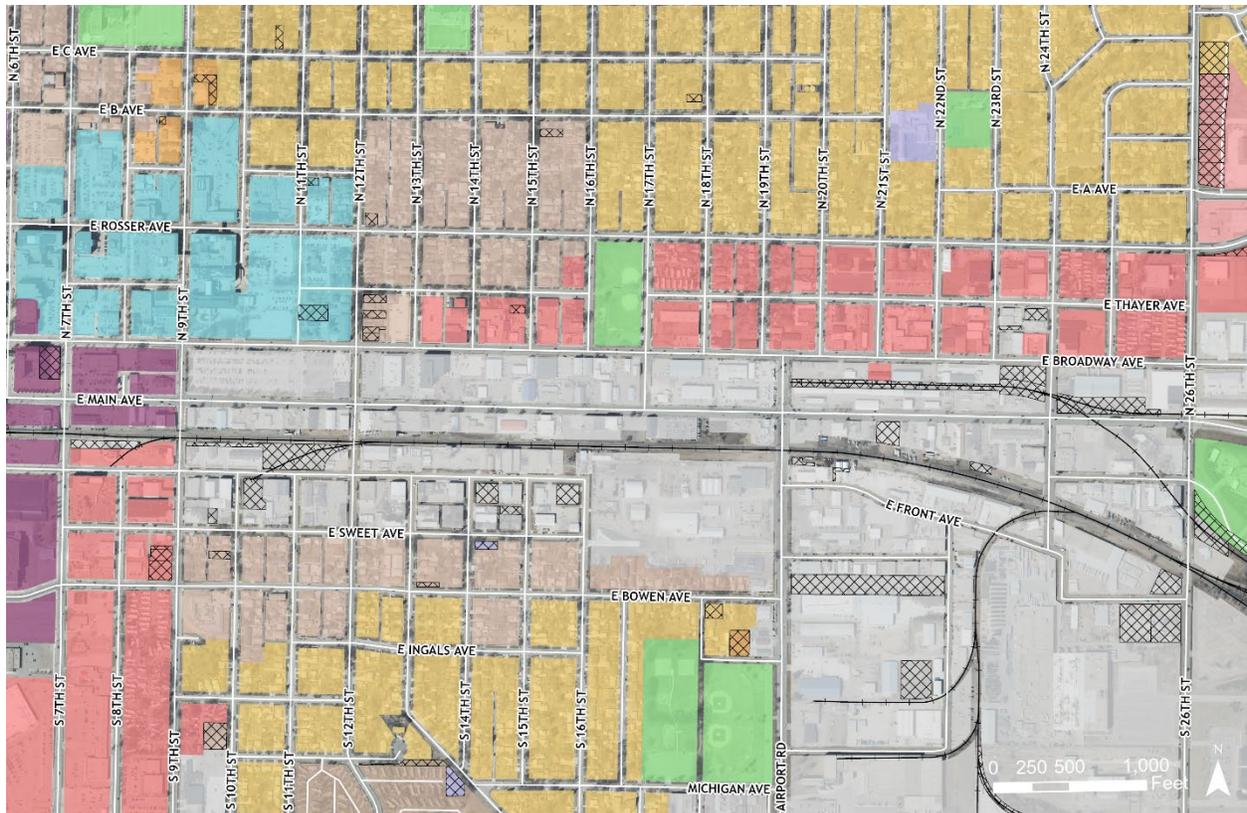
Permitted uses in the Light Industrial district include classifications such as retail, service, wholesale, and light industrial uses among numerous others.

#### *Vacant Properties*

There are several vacant properties within the study area, however adjacent to the East Main Avenue corridor, there are only a few. On the corridor near the 24<sup>th</sup> Street intersection, there are vacant Soo Line Railroad properties on the north side of the street. There is currently railroad infrastructure including track on the properties. The railroad property may be less likely to see redevelopment, as the spur provides critical future heavy commercial or light industrial opportunities which may be looking for railroad spur access.

There appears to be one vacant property with redevelopment potential along East Main Avenue, located at 2103 East Main Avenue. The property has no building or structure, has gravel surfacing, and appears to be used for miscellaneous storage of vehicles, trailers, and/or storage containers.

Figure 23 | Zoning and Vacant Property



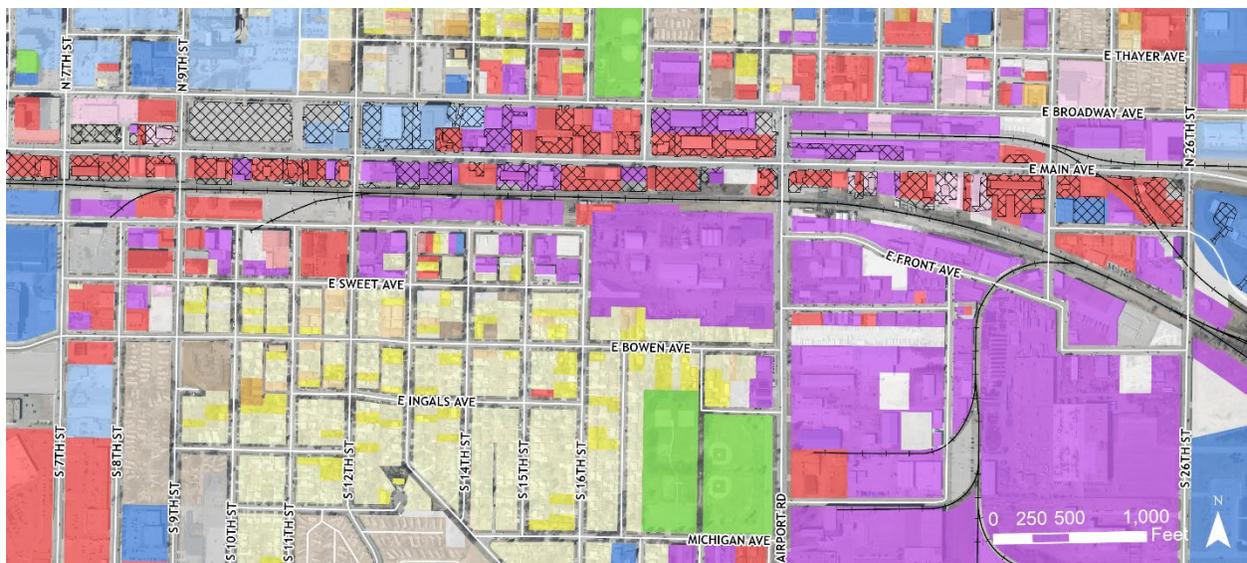
**Legend**

- + BNSF Railway
- Neighborhood Commercial
- Downtown Fringe
- Health-Medical
- Public Use
- Planned Unit Development
- Manufactured Home Park
- Office-Multi-Family Residential
- Heavy Commercial
- Light Industrial
- Two Family Residential
- Multi-Family Residential
- Downtown Core
- N/A
- Vacant

**Zoning and Vacant Property**



Figure 24 | Off-Street Parking and Circulation



**Legend**

- + BNSF Railway
- Commercial
- Commercial Mixed
- Health & Medical
- Industrial
- Institutional
- Leisure
- Office
- Residential High Density
- Residential Institutional
- Residential Manufactured
- Residential Medium Density
- Residential Single Family
- Residential Two Family
- Transportation & Infrastructure
- Undeveloped
- Off-Street Parking and Circulation

**Off-Street Parking & Circulation**



Off-street parking and circulation, as shown in Figure 24, is abundant on properties fronting East Main Avenue and may represent unfriendly pedestrian areas or areas with increased pedestrian-vehicular conflict. However, larger parking areas and areas contiguous to one another present opportunities for redevelopment. The City recently revised its off-street parking regulations, which may encourage redevelopment with some parking requirements reduced.

### **Draft Future Land Use**

A draft future land use plan has been developed through Bismarck's ongoing Comprehensive Plan Update. Currently in draft form, the update to the comprehensive plan is expected to be finished in December 2022. Designations in the project area include:

#### *Downtown*

Between 7<sup>th</sup> Street and 9<sup>th</sup> Street, the future land use is identified as Downtown on either side of East Main Avenue. The Downtown future land use is characterized as the heart of the community and the historic center of Bismarck.

#### *Industrial Mixed Use*

On either side of East Main Avenue, from 9<sup>th</sup> Street and Airport Road, the future land use is Industrial Mixed Use. The Industrial Mixed Use future land use is characterized as a vibrant mixed use district with an emphasis on arts and entertainment.

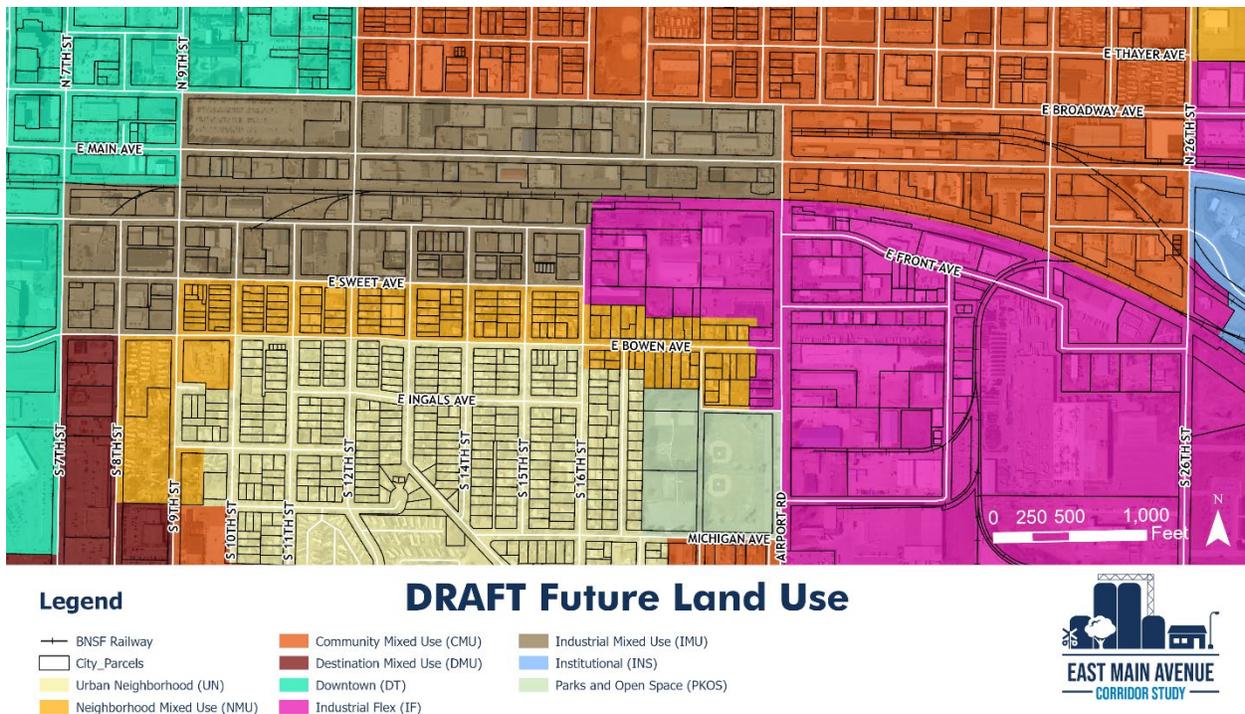
#### *Community Mixed Use*

North of East Main Avenue, from Airport Road to 26<sup>th</sup> Street, the future land use is Community Mixed Use. The Community Mixed Use future land use is characterized as a place of commerce, employment, and residence for the Bismarck community.

#### *Industrial Flex*

South of East Main Avenue, from Airport Road to 26<sup>th</sup> Street, the future land use is Industrial Flex. The Industrial Flex future land use is characterized as an employment center for a range of businesses.

Figure 25 | Draft Future Land Use



## Resources and Hazards

A table-top analysis of existing resources and potential hazards adjacent to or in close proximity to the corridor was conducted:

- There are no natural resources located within the project area.
- There are no State or Federal threatened or endangered species in the project area.
- There are no properties listed on the National Register of Historic Places located within the project area. However, further investigation may reveal properties of concern related to Section 106 of the National Historic Preservation Act.
- The Section 4(f) legislation provides protection for publicly owned parks, recreation areas, historic sites (in public and private ownership), and wildlife and waterfowl refuges. There is one State of North Dakota owned site in the southeast corner of the intersection of East Main Avenue and 26th Street however, the site is not a public park or recreation area and is classified as an institutional use (see Land Use subsection above).

## Potentially Contaminated Sites

The North Dakota Department of Environmental Quality (NDDEQ) does not maintain a list of potentially contaminated sites. However, there exists a possibility of contaminated sites based on current land uses including but not limited to automotive, recycling, freight, machinery, manufacturing, mining, government, irrigation, and construction along East Main Avenue. Future coordination with NDDEQ should be conducted to understand contaminant remediation requirements and regulations. With the redevelopment priority

in and around Bismarck’s downtown, changes of property use may occur, which may trigger remediation activities. In older commercial and industrial corridors similar to East Main Avenue, underground storage tanks are common occurrences and may also be an issue within the study area.

### Environmental Justice Populations

Digital data from the American Community Survey (ACS) published by the U.S. Census Bureau in 2020 was evaluated to identify areas of proportionally low-income, minority, and other vulnerable populations such as senior (65+), youth (non-driving or less than 15), and disabled. Figures 26 through 30 illustrate said populations in the Study area. As part of any future environmental review process, a formal environmental justice analysis will be required to identify potential adverse and disproportionate impacts to low-income and minority populations as required by NEPA.

**Figure 26 | Population Below Poverty**

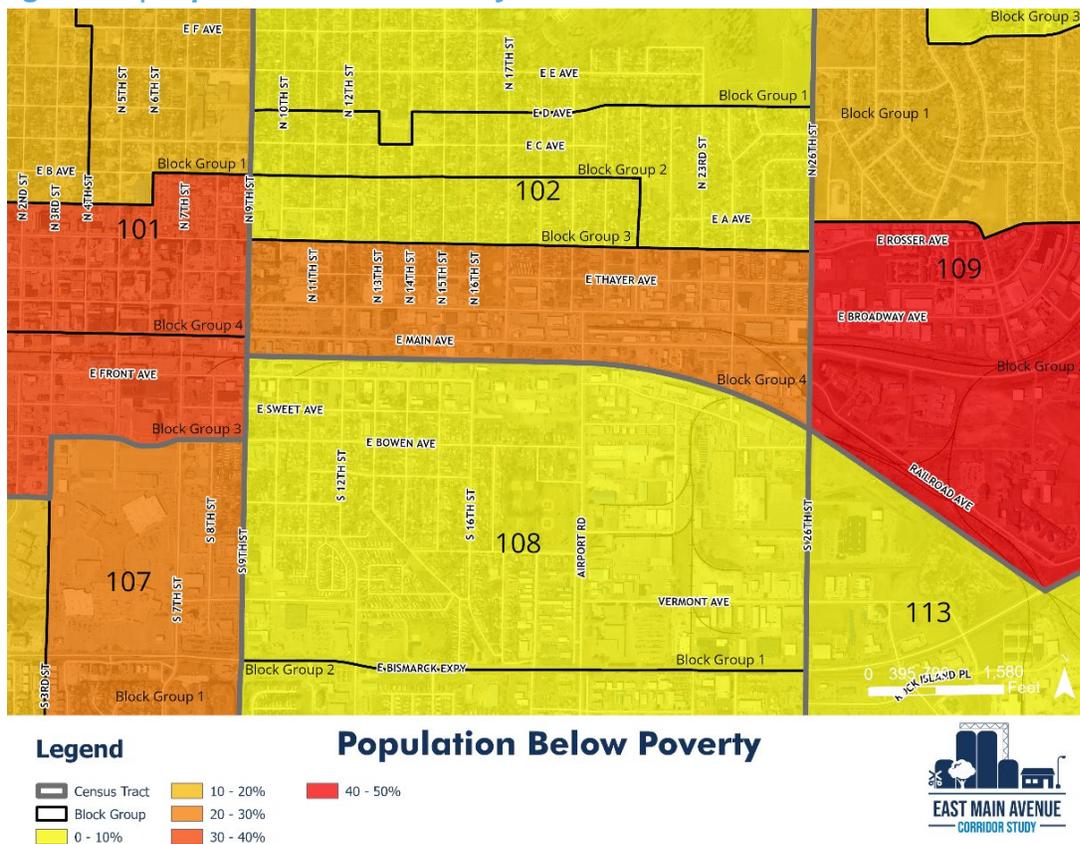


Figure 27 | Senior Population

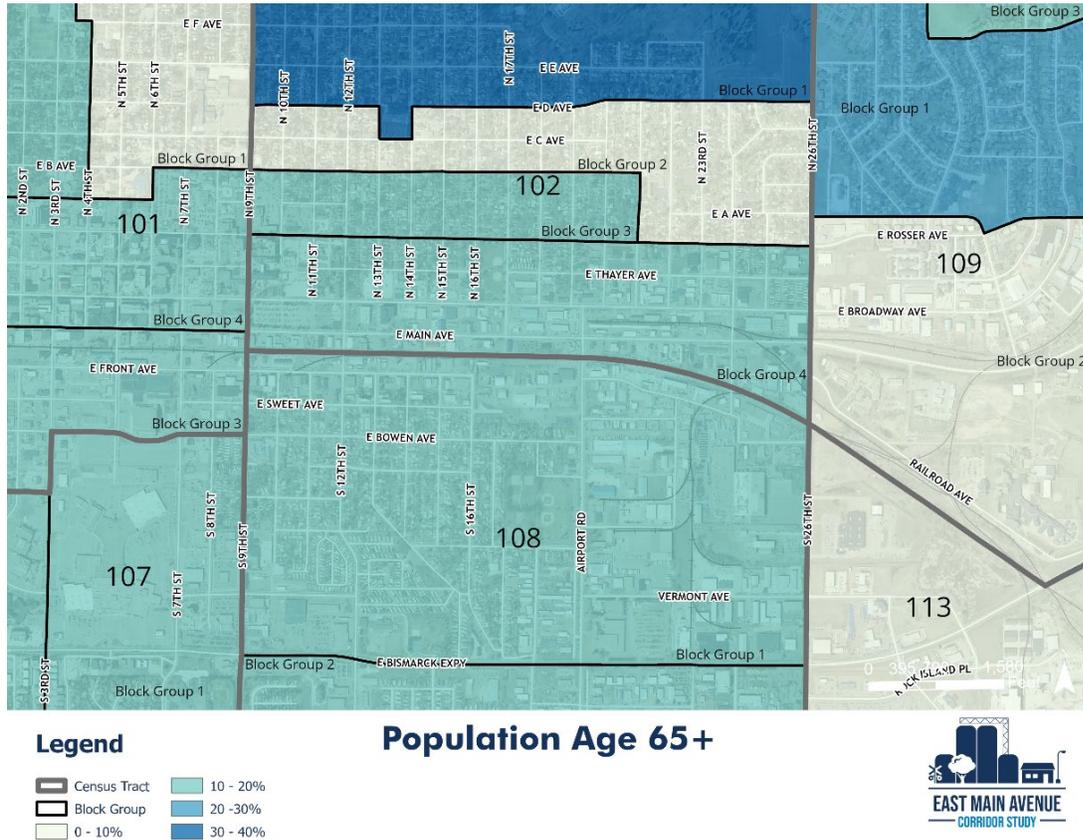


Figure 28 | Non-Driving Population

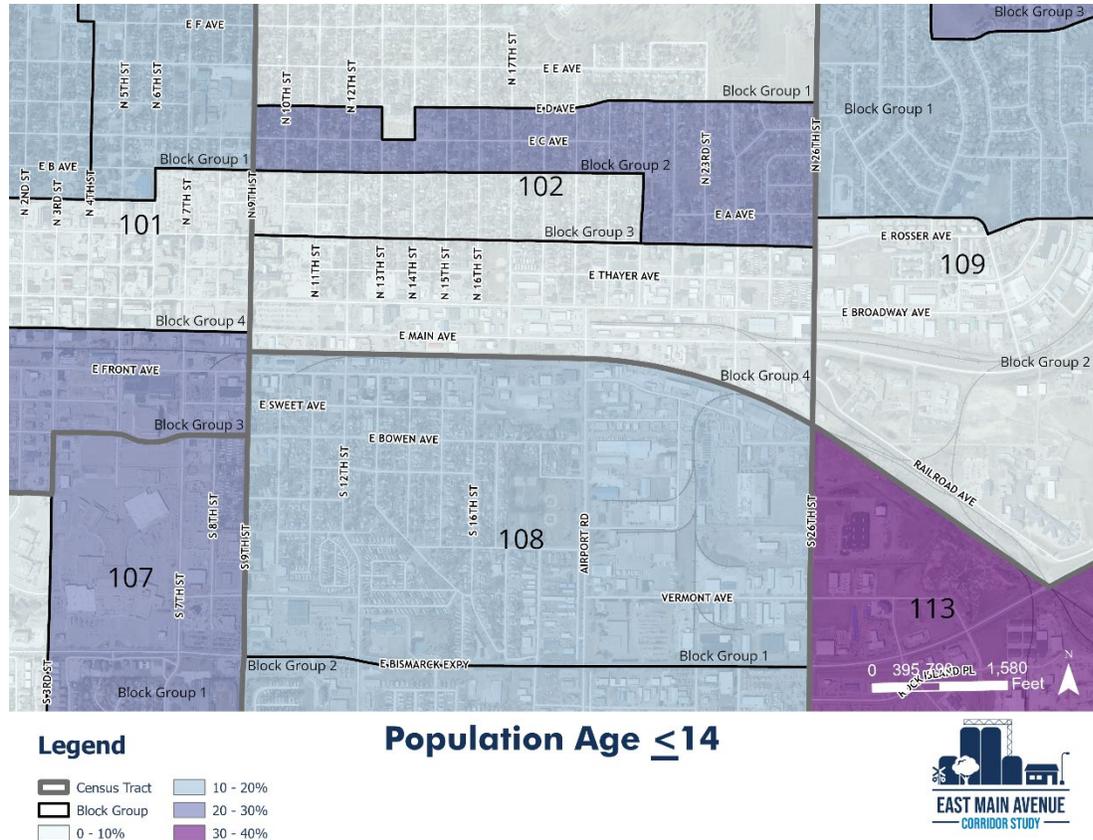
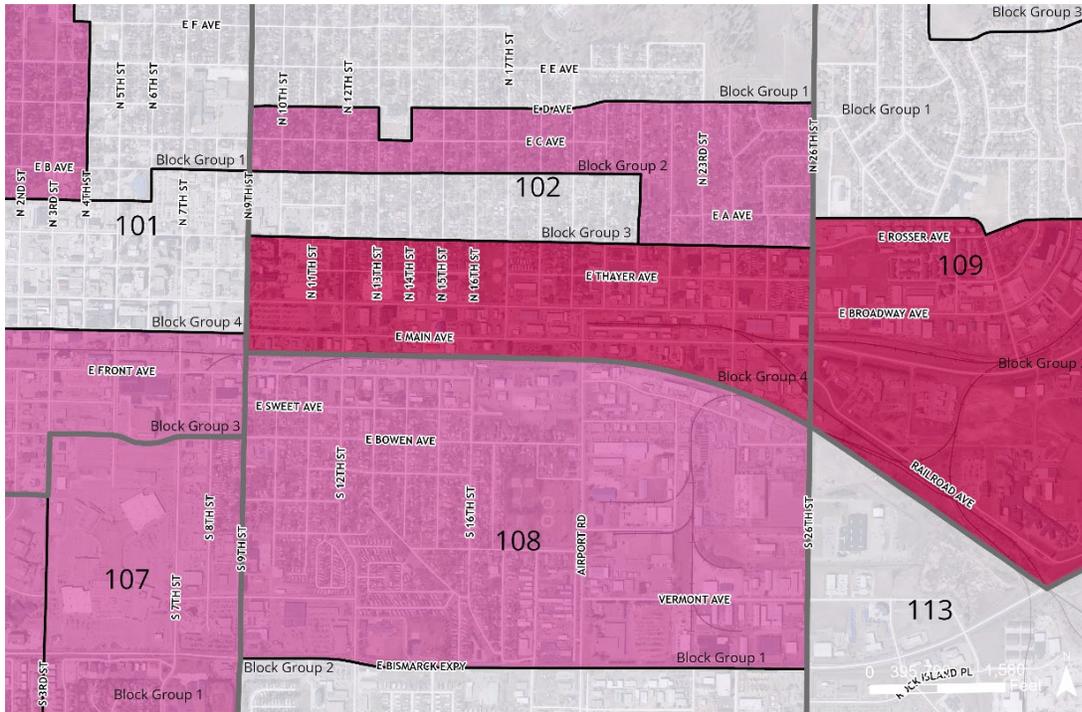


Figure 29 | Population with a Disability



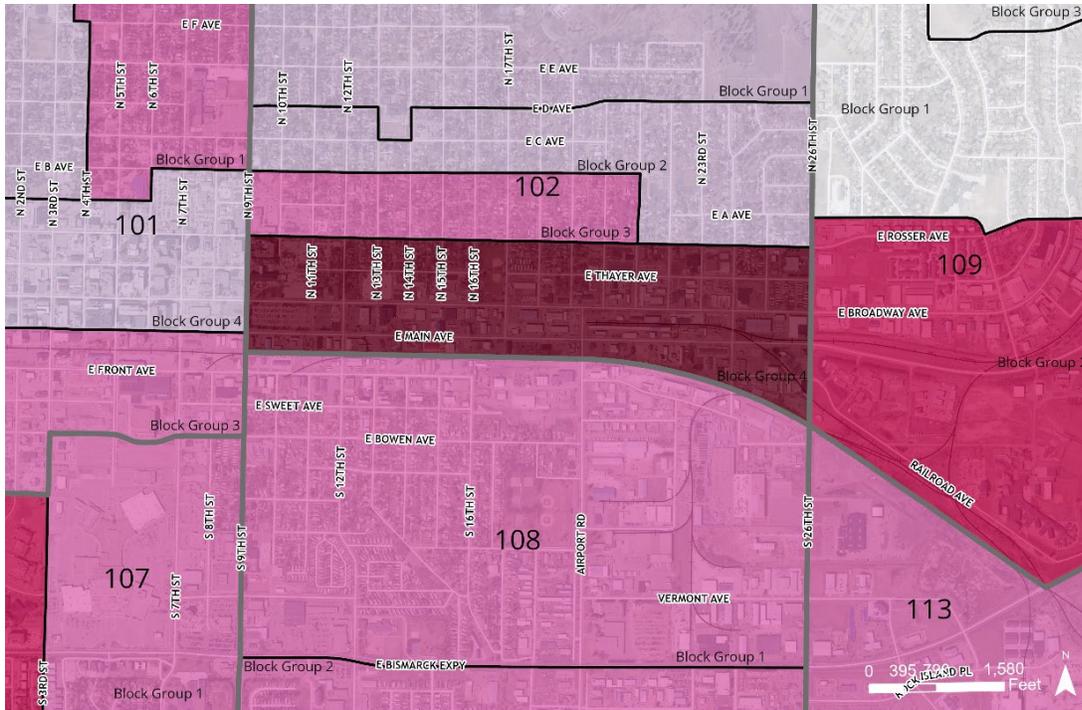
**Legend**

- Census Tract
- Block Group
- 0 - 10%
- 10 - 20%
- 20 - 30%

**Population with Disability**



Figure 30 | Non-White Population



**Legend**

- Census Tract
- Block Group
- 0 - 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%

**Non-White Population**



# Issues & Needs Summary

East Main Avenue is an important corridor for personal and freight transportation, connecting local and regional users to Downtown Bismarck and beyond. After analysis of the current conditions along the roadway, the following issues have been identified:

Transportation System	<ul style="list-style-type: none"><li>- Pavement Condition Index (PCI) and International Roughness Index (IRI) data are showing signs of deterioration</li><li>- Numerous and high concentration of private access points</li><li>- East Main Avenue is identified as a freight route within the Study area</li><li>- A balance between the Principal Arterial roadway classification and the urban context may be challenging</li><li>- Multimodal opportunities exist however, sidewalks are inconsistent in parts of study area, there are large gaps between dedicated pedestrian crossings, and dedicated bicycle infrastructure is limited</li></ul>
Transportation Operations	<ul style="list-style-type: none"><li>- Current 5-lane urban roadway configuration greatly exceeds the projected 2045 volumes (17,600/27,200 ADT)</li><li>- Results of the existing operations analysis indicate that all key intersections currently operate at an acceptable overall LOS C or better during the a.m. and p.m. peak hours, with existing traffic controls and geometric layout.</li><li>- Results of the Year 2045 No Build Scenario analysis indicate that all key intersections currently operate at an acceptable overall LOS C or better during the a.m. and p.m. peak hours, with existing traffic controls and geometric layout.</li></ul>
Safety	<ul style="list-style-type: none"><li>- 444 crashes have occurred within the Study area in the past five years</li><li>- The study corridor has crash and severity rates that are statistically significant compared to locations with similar characteristics</li><li>- A majority (73%) of crashes occurred within 150' of Study area intersections</li><li>- 50% of all incapacitating injury crashes occurred at the 7<sup>th</sup> Street intersection</li></ul>

Social, Environmental,  
and Economic Context

- 9<sup>th</sup> Street intersection has the highest observed crash rate of all intersections
- The crash rate between 17<sup>th</sup> Street and Airport Road has a crash rate nearly twice as high as other Study area segments
- Airport Road had the highest critical crash rate of all intersections and the segment between Airport Road and 26<sup>th</sup> Street had the highest critical crash rate of all segments in the Study area
- Proximity to Downtown and recent redevelopment momentum should be considered
- Heavy commercial and light industrial uses may conflict with downtown redevelopment efforts
- There are vulnerable populations within and adjacent to the Study area including communities of low-income, disabled, and non-white populations