METROCOG Fargo-Moorhead Metropolitan Council of Governments

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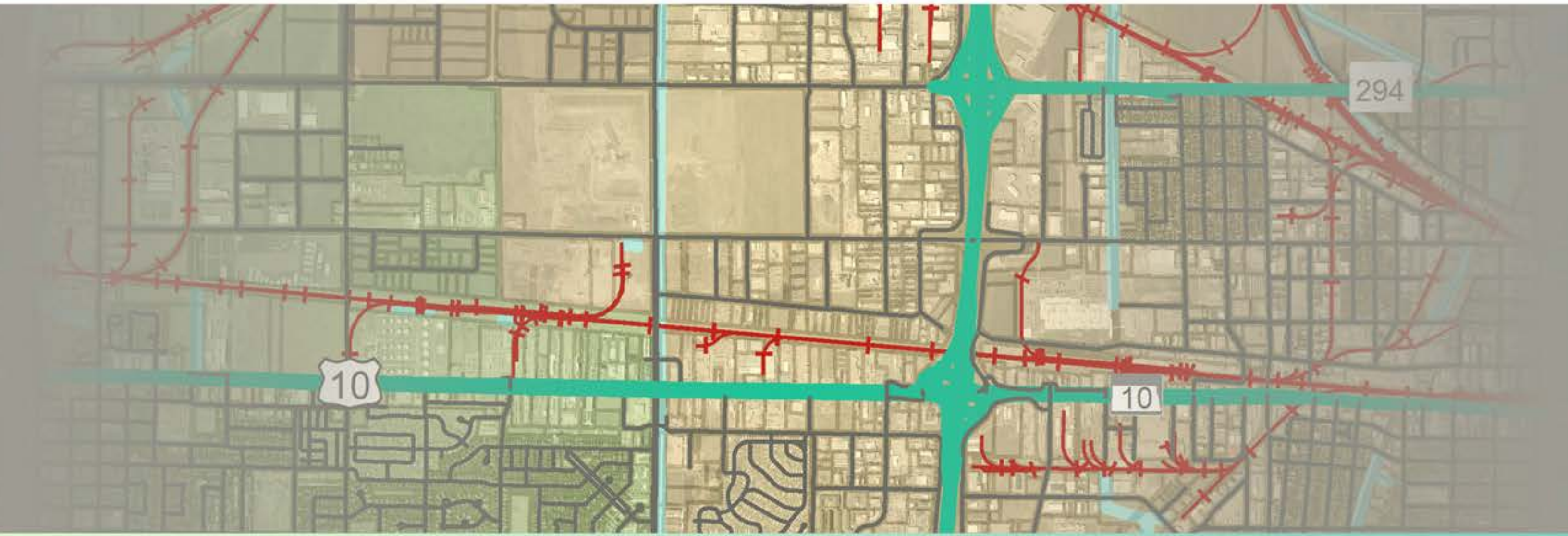
To: Cass County Board of Commissioners
From: Adam Altenburg, Metro COG
Date: November 9, 2020
Re: **Northwest Metro Transportation Plan**

Since the spring of 2019, Metro COG has been working with the City of Fargo, City of West Fargo, and Cass County on the Northwest Metro Transportation Plan. This joint plan seeks to provide a long-range blueprint for future expansion needs of the regional transportation network within the northwestern growth area of the Fargo-Moorhead metropolitan area.

The Northwest Metro Transportation Plan seeks to identify transportation needs for future development within the study area, including recommendations for future street capacity, traffic controls, and multimodal facilities, along with high-level planning estimates for infrastructure costs associated with future transportation facilities.

The Northwest Metro Transportation Plan can be viewed on Metro COG's website:

http://www.fmmetrocog.org/projects-rfps/nwmetro-transportation-plan



METROCOG

FM REGIONAL TRANSPORTATION PLANNING ORGANIZATION

Northwest Metro Transportation Plan

SEPTEMBER 2020

The preparation of this document was funded in part by the United States Department of Transportation with funding administered through the North Dakota Department of Transportation, the Federal Highway Administration, and the Federal Transit Administration. Additional funding was provided by the Minnesota Department of Transportation and through local contributions from the governments of Fargo, West Fargo, Horace, and Cass County in North Dakota; and Moorhead, Dilworth, and Clay County in Minnesota. The United States Government and the States of North Dakota and Minnesota assume no liability for the contents or use thereof.

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EXECUTIVE SUMMARY

Summary

The Northwest Subarea provides the unique opportunity to reinvent how land use and mobility should be planned in the metropolitan area. The primarily agricultural area has the potential to increase the metropolitan area's population by a staggering 25 percent, given the density priorities established by the Cities of Fargo and West Fargo. This density required an alternative view of how people and freight moved through the area.

The Northwest Subarea Study leveraged sketch-level land use planning, detailed computer forecasting modeling, and scenario analysis to understand the potential needs of the subarea. While this growth area will certainly evolve many times before it reaches full build out, likely more than 50 years into the future, this planning document provides the basis to support a transportation system that is built on community values and initiatives, tested through a rigorous scenario assessment and alternatives analysis. The final product should provide value to each community as they approve developments and plan for roadways into the future. **Figure 1.**

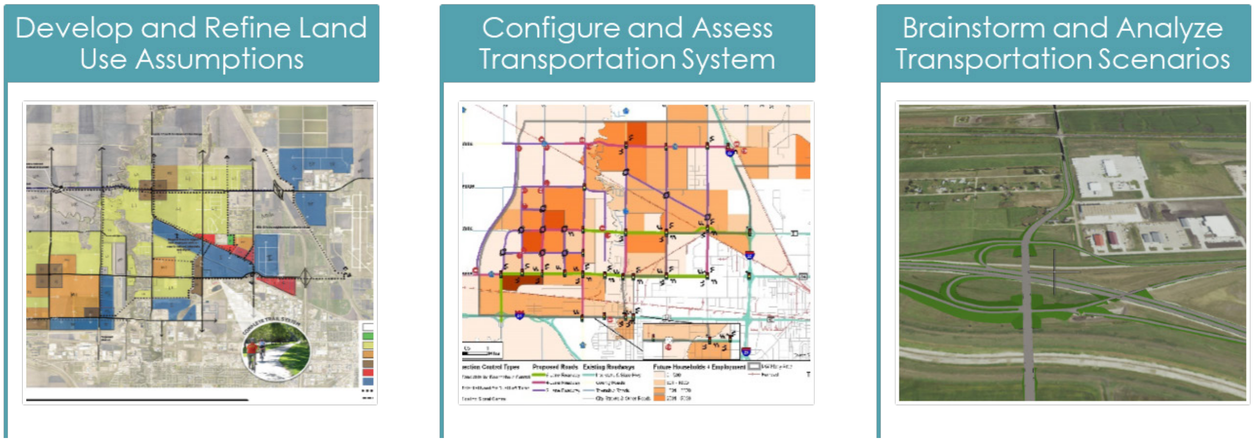


Figure 1 – Study Process

The primary products of this report includes the following key outputs. Each output is represented by a map below. Each map speaks for itself but supporting documents can be found in the referenced chapters .

- Land Use Plan. The land use plan establishes the primary land use typologies throughout the study area and establishes the primary transportation network. **Figure 2** shows the primary output. More details can be found in Chapter 2.
- Capacity and Traffic Control. As part of the Transportation Network Assessment and Transportation Alternatives, the recommended roadway capacity and traffic control for full build out was established. **Figure 3** shows the primary output. More details can be found in Chapter 3 and Chapter 4.
- Multimodal Facilities. As part of the Transportation Network Assessment and Transportation Alternatives, a comprehensive multimodal network for full build out was established. **Figure 4** shows the primary output. More details can be found in Chapter 3 and Chapter 4.
- Roadway Costs. The total infrastructure costs for roadway capacity, traffic control, and multimodal facilities were estimated for the full build out. **Figure 5** shows the primary output. More details can be found in Chapter 3 and Chapter 4.

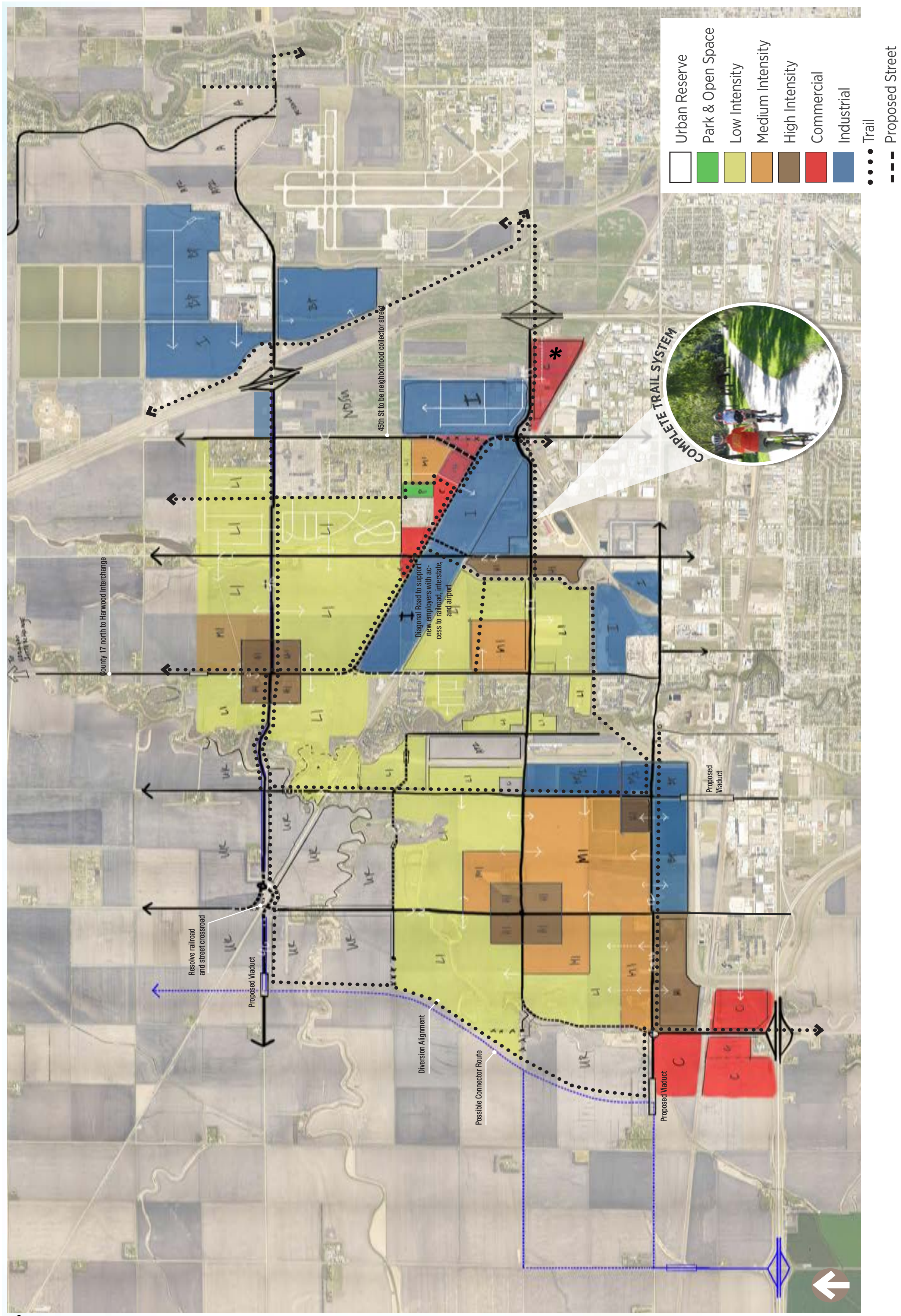


Figure 2 – Land Use Plan

**Unlikely to be commercial land use.*

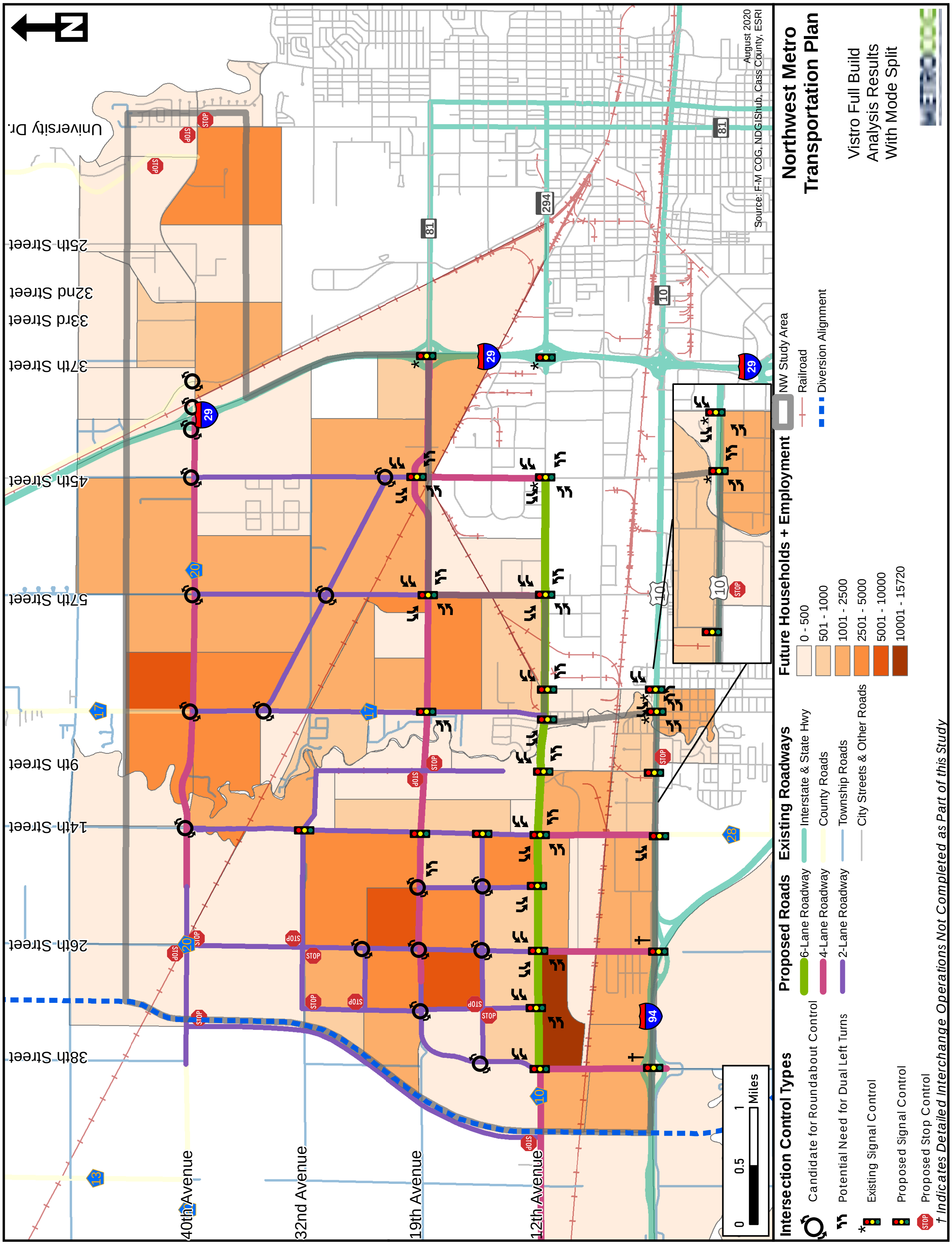


Figure 3 – Capacity and Traffic Control

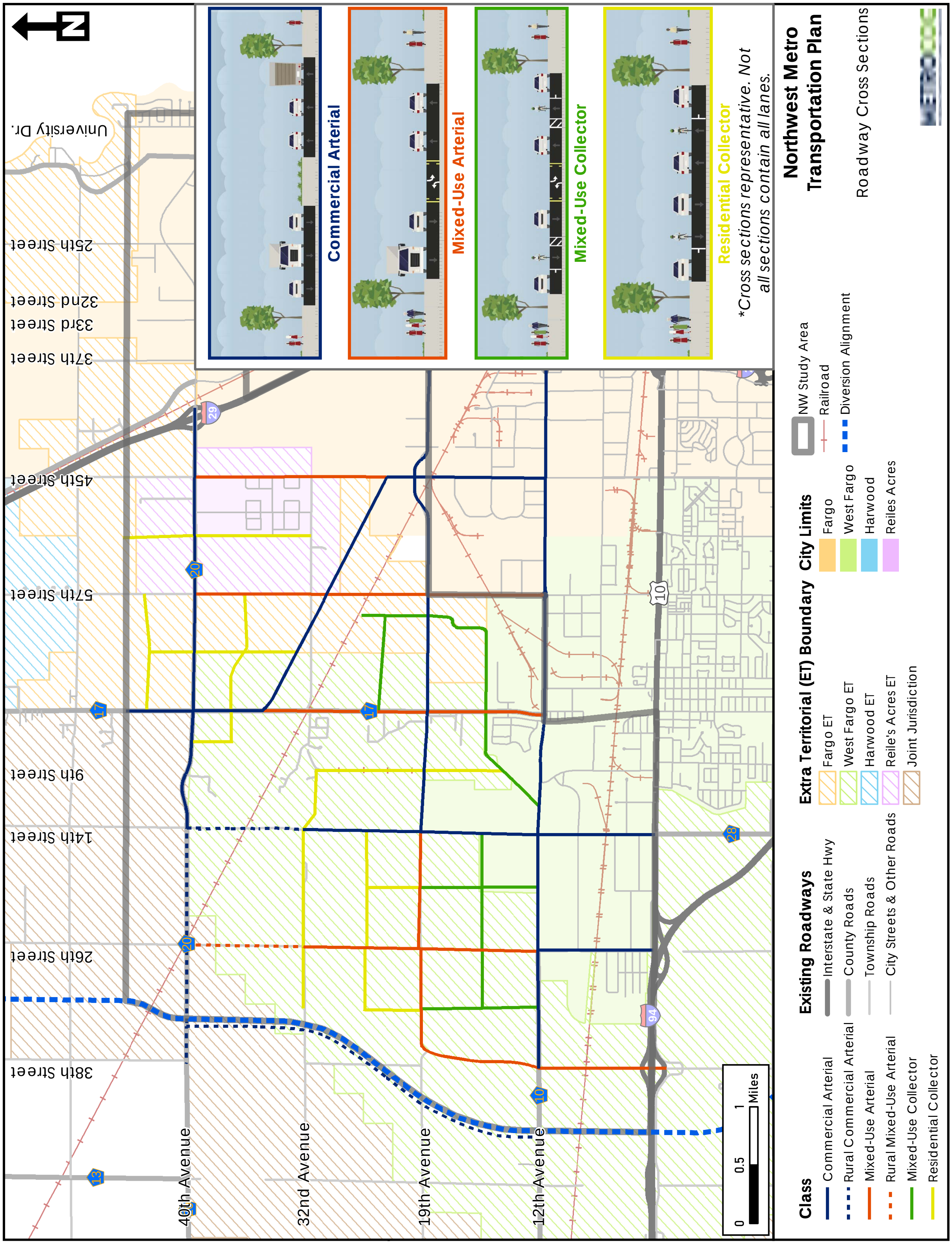


Figure 4 – Multimodal Facilities

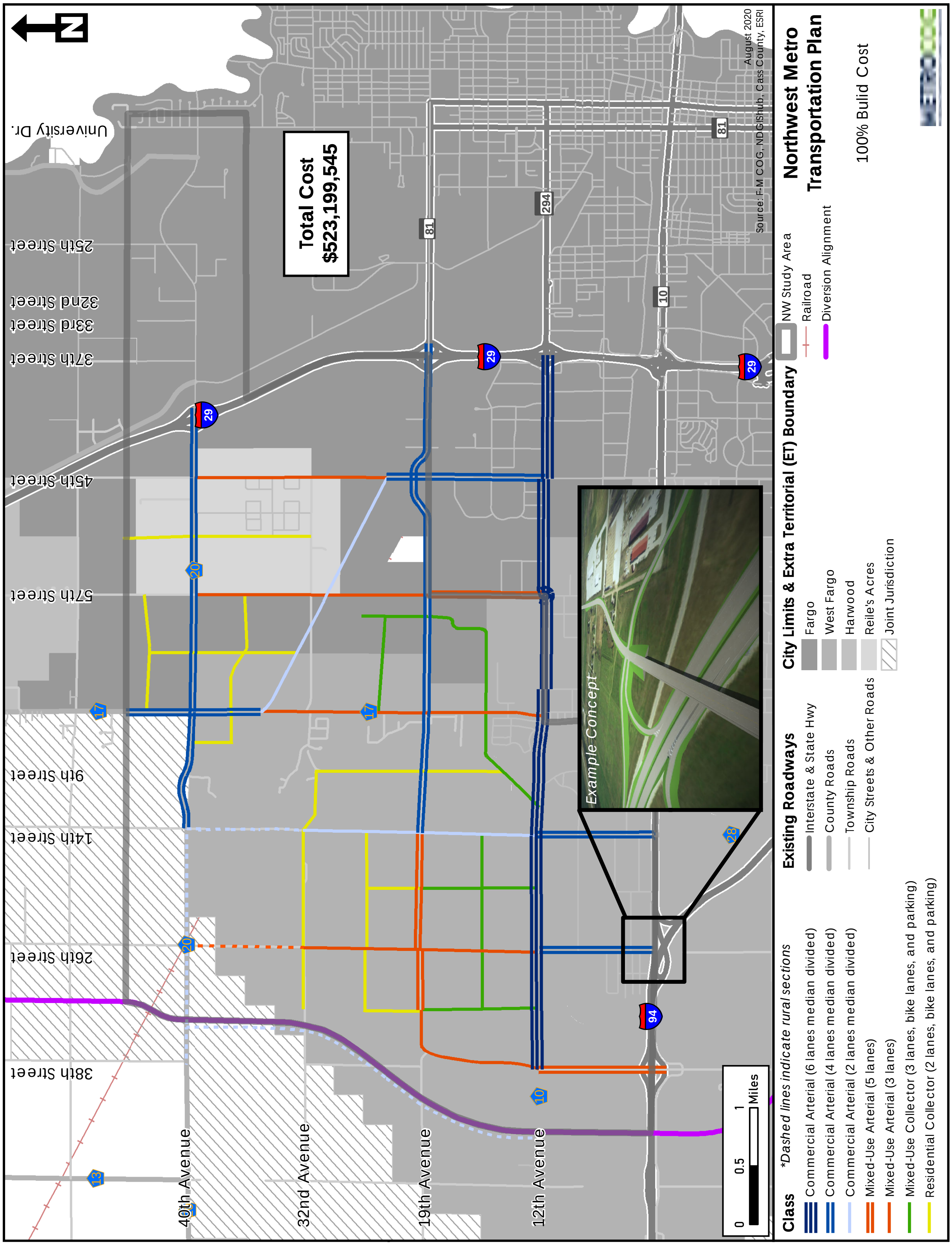


Figure 5 – Roadway Costs

Public and Stakeholder Engagement

The development of the Northwest Metro Transportation Plan was done with significant consultation with the public and key stakeholders, as detailed below.

Study Review Committee Meetings

The Study Review Committee provided the overall guidance to the land use and transportation planning process for this plan. Included on this committee include representatives from Cass County, City of West Fargo, City of Fargo, and Metro COG. This committee met four times throughout the study to provide guidance on the four key deliverables (Existing Conditions, Land Use Plan, Transportation Network Assessment, and Transportation Alternatives).

Study Area Workshops

KLJ met with the planning, engineering, and public works staff from the City of Fargo, City of West Fargo, and Cass County on two occasions early in the planning process. These meetings allowed for the development of a full build land use plan for the study area. These meetings assisted in the development of growth staging and phasing assumptions used later in the transportation planning process. Meetings also focused on identification of key existing transportation issues and limitations within the study area. Following both sessions, joint findings were presented as part of the first full Study Review Committee meeting for the Study. Outcomes of these meetings provided the foundations for developing the overall transportation planning process.

Stakeholder Outreach

KLJ and Metro COG staff coordinated in the development of outreach sessions with key stakeholders during the development of the planning concepts. Key stakeholders engaged included the following:

- North Dakota State University
- Fargo Airport Authority
- Reile's Acres
- Reed Township
- Raymond Township
- Riverwood Citizens Group

These meetings allowed key stakeholders to understand existing conditions in the study area as well an view an early blueprint for overall future land use and generalized transportation needs in the study area. Feedback from stakeholders was integrated into the development of the transportation planning process.

Public Input Meetings

In July of 2019, KLJ held two open house public meetings, one in North Fargo and one in West Fargo, to give residents and interested persons an opportunity to review existing conditions and future land use concepts for the study area. Direct notifications were sent to all property owners in the study area, including appointed and elected officials.

At the conclusion of the planning process, KLJ and Metro COG hosted a virtual public meeting. Details will be added once complete.

Plan Implementation & Coordination

The Northwest Metro Transportation Plan is a subarea wide evaluation of a set of long-range transportation related infrastructure needs. A significant number of details are still unknow about the study area. Thoughtful implementation of this plan requires a series of coordination actions on the part of the City of West Fargo, City of Fargo, Cass County, NDDOT, and Metro COG. What follows is a more detailed framework to assist with advancing key concepts discussed in the plan and to support short-range land use and transportation planning decision making.

Relationships to Local Comprehensive and Land Use Plans

The Northwest Metropolitan Transportation Plan is an aggregated generalization of locally developed land use and comprehensive and related infrastructure planning documents. This plan provides a regionally developed reference point to ensure that land use, density, roadway capacity, and cross-section needs are understood as local units of government consider future growth and development in the study area. Key elements of this report can be pulled forward to support and inform more localized land use decision making. Local land use and comprehensive plan level decision making need to pay special attention to critical corridor connections and improvements required to fully implement a comprehensive transportation network in the study area.

Continue to Refine Concepts

The planning level concepts development in this document have not factored in the potential challenges that come with the detailed design and environmental analysis. Several concepts should be continually advanced when it makes sense to refine programming allocations and identify potential environmental barriers.

- Consider development of a more detailed corridor level analysis along 40th Avenue/CR20 between 25th Street and CR 20. This would support future jurisdictional alignment considerations on the western edge of this corridor.
- Continue to refine and develop consent on details to support corridor preservation for the diagonal corridor between 45th Street and 57th Street, south of Reile's Acres.
- Further advance potential modifications and changes to the Interstate Highway System as part of upcoming analysis of the Interstate system through the FM Area. Included would be potential modifications to the junction of I-94 and US Highway 10; the Raymond Interchange (Exit 342); and future reliver/perimeter corridor concept supported by Cass County which generally parallels the outside of the FM Diversion corridor.

Maintain Lines of Communications

The study area includes the convergence of many jurisdictions and key stakeholders/property owners: Fargo, West Fargo, Reed Township, Raymond Township, Cass County, NDDOT, Reile's Acres, Hector International Airport, North Dakota State University, and others. The complex jurisdictional mosaic in the study area requires the need for ongoing communication between multiple jurisdictions and stakeholders. As discussed earlier, this plan should be a reference point for future decision making to ensure harmony between local decisions and larger subarea dynamics.

- Metro COG should annually add an agenda item to its Transportation Technical Committee (TTC) and Policy Board to allow for "project updates" on ongoing trends and conditions in the study area as a preemptive effort to stay ahead of projects requiring regional level coordination.
- Metro COG should champion future discussions to account for the need to continually consider issues of jurisdictional roadway alignment and the need to uses its Unified Planning Work Program (UPWP) to support further evaluation of corridor level needs within the study area.
- The City of Fargo and Reile's Acres should integrate key finds of this study into existing ongoing boundary discussions and considerations.

Jurisdictional Alignment

Transition of corridor ownership and management between either Cass County, Reed Township, and Raymond Township over to either the City of Fargo or City of West Fargo will be a key consideration as the study area develops.

- Corridors such as CR 17 and CR 20 will urbanize over the next several years. Consideration is needed to prepare appropriate framework for the conversion of these corridors from the County to the either City of Fargo or City of West Fargo.
- Given boundaries changes related to Reile's Acres, consideration is needed on how best to handle jurisdictional control for segments of CR 20 directly north of Reile's Acres.
- Future infrastructure and boundary agreements between the City of Fargo and Reile's Acres must clarify final ownership of segments of 45th Street and 57th Street which are with existing Reile's Acres city limits or their extraterritorial (ET) area.
- Transition of 19th Avenue to a city street between CR 17 and 57th Avenue is a high priority consideration for the City of Fargo and West Fargo.
- Cass County should put 38th Street (I-94 south frontage road to CR 10) on the County system to ensure preservation of this critical corridor which provides access to I-94 and the study area.

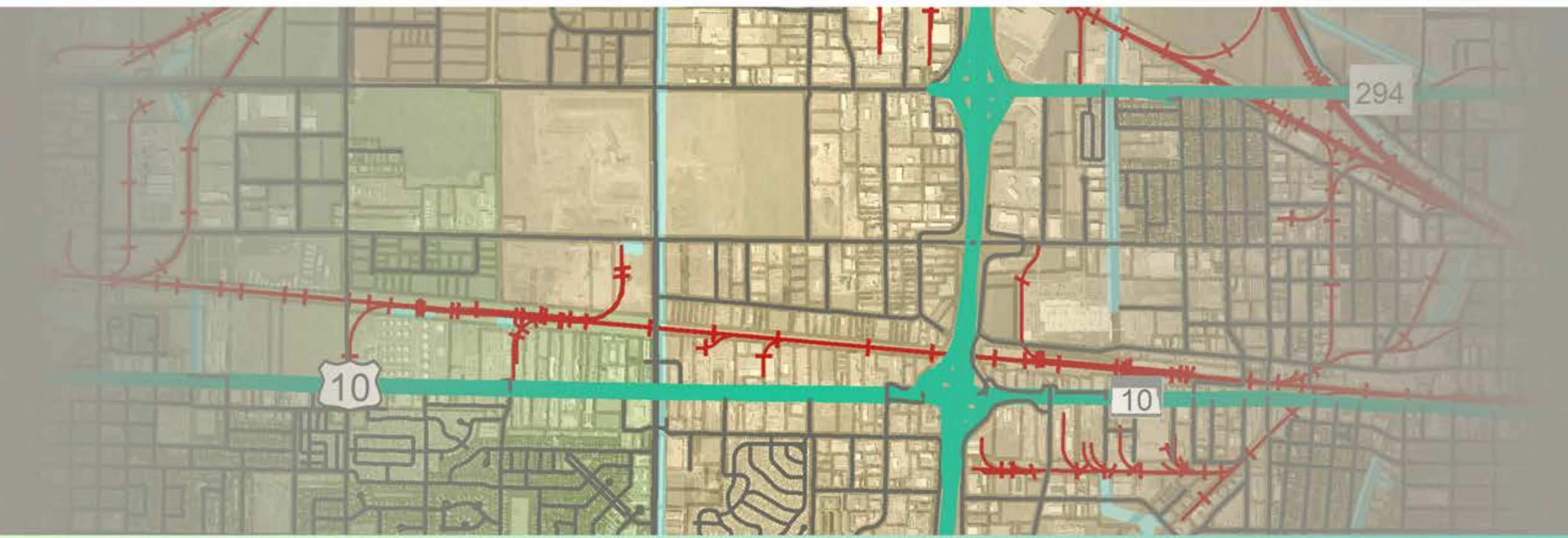
Future Functional Class

This plan pulls forward and expands on a more flexible and dynamic system of functional class. This approach was previously evaluated only within the MPO Urban area. This new functional class framework for the study area should be pulled forward into future functional class updates considered by Metro COG and NDDOT.

Urban Area Boundary

Following the 2020 Census, Metro COG should consider growth trends discussed in this study to help identify expansion of its Urban Area Boundary (UAB) to include recent and near-term development in the study area. Most importantly would be inclusion of the areas south and east of the intersection of CR 17 and CR 20.

Chapter 1
Study Area Profile



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Northwest Metro Transportation Plan

INTRODUCTION

Historically, the northwest portion of the Fargo-Moorhead metro has been largely rural and heavily oriented towards rural residential and agricultural uses, with industrial uses confined to the industrial parks in the City of Fargo and City of West Fargo. However, recent developments have led the City of Fargo to improve utility services, as well as other infrastructure planning efforts, which will further expand municipal infrastructure to areas north and northwest of the city. The City of Fargo and West Fargo have established a new extraterritorial agreement in coordination with a recent utility service agreement between the two cities. Additionally, the City of Reile's Acres has also seen a notable increase in residential development within its city limits. This Northwest Metro Transportation Plan will develop a land use and transportation plan for this study area to provide a framework for transportation system improvements and tie together infrastructure planning currently underway.

The Study Area Profile has been prepared to establish the existing study area characteristics to support subsequent analysis and recommendations for the northwest subarea of the Fargo-Moorhead metropolitan area.

STUDY AREA

The study area for the Northwest Metro Transportation Plan is a 25 square mile subarea in the northwest part of the Fargo-Moorhead metropolitan area. The general study area is west of Interstate 29 and north of Main Avenue/US 10, however there are some areas east of Interstate 29 that will be studied. A study area map can be seen in **Figure 6.**

Jurisdictions

The study area covers multiple jurisdictions. Parts of the study area are within:

- Fargo city limits and extraterritorial area
- West Fargo city limits and extraterritorial area
- Reile's Acres city limits and extraterritorial area

Land Use

The majority of the study area is currently agricultural, but there are some commercial and residential uses as well. The main commercial clusters areas are along Main Avenue and Cass County Road 17, with another cluster east of Interstate 29 along 40th Avenue North/Cass County Road 20. Residential areas are located along County Road 17, as well as in Reile's Acres near the junction of County Road 20 and Interstate 29. The land use breakdown in the study area is:

- Agricultural – 55 percent
- Commercial – 19 percent
- Residential – 9 percent
- Other – 17 percent
    - Mainly consists of Hector International Airport and research plots for North Dakota State University

A land use map can be seen in **Figure 7.**

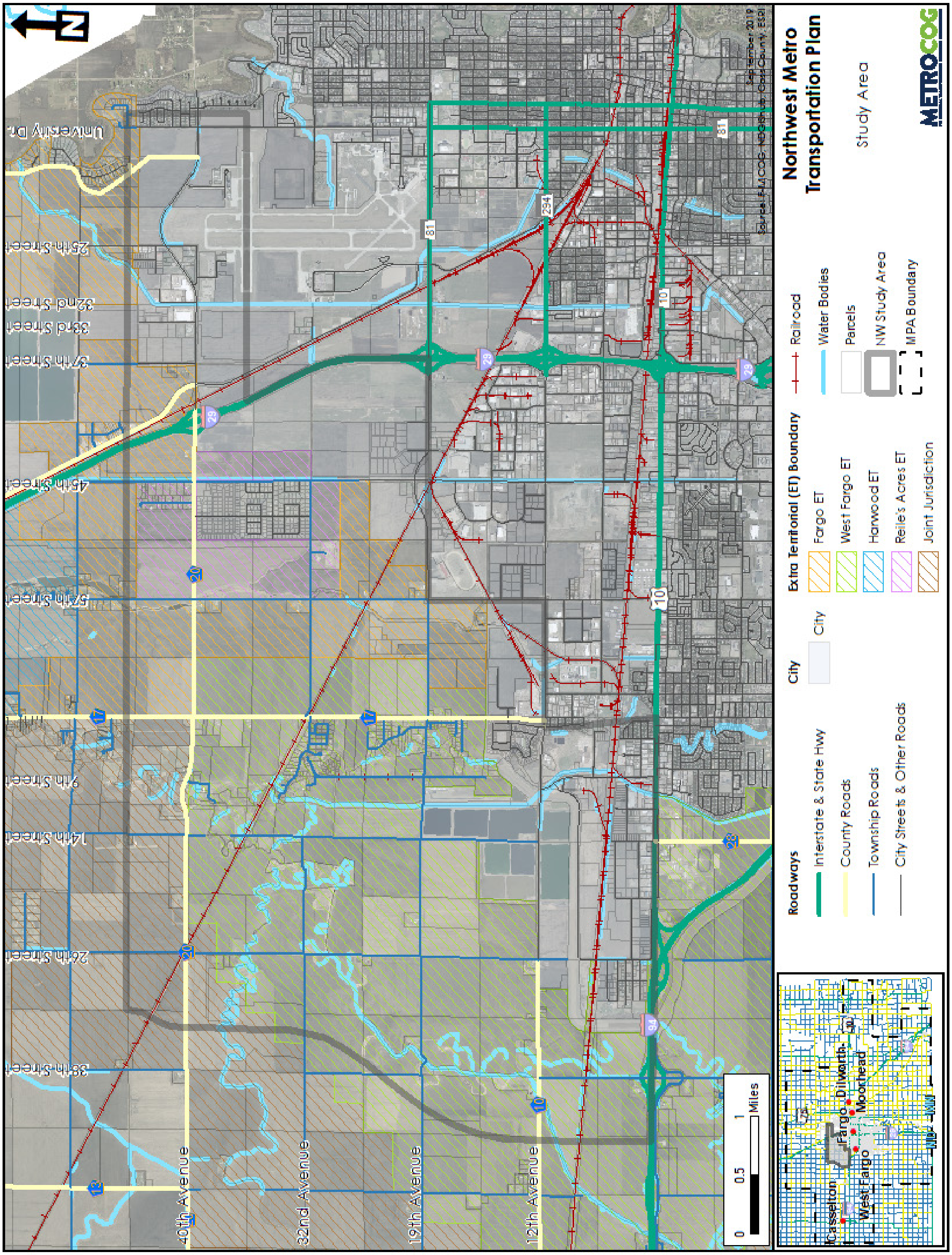


Figure 6 – Study Area

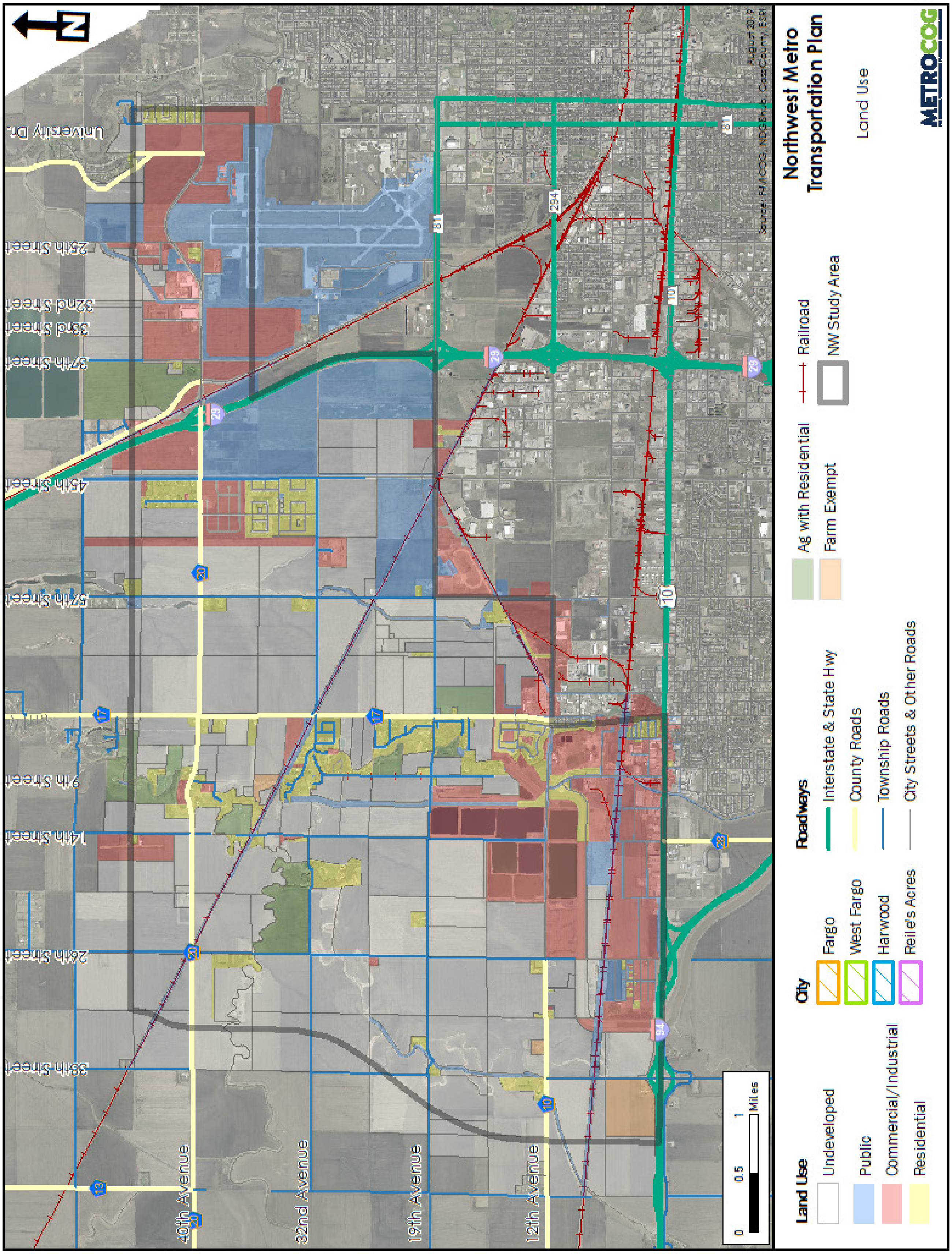


Figure 7 – Land Use

DEMOGRAPHIC INFORMATION

Demographic data that was compiled as part of the 2045 Fargo-Moorhead Long Range Transportation was evaluated to understand the existing and projected demographic characteristics of the study area.

Currently, there are around 1,000 households in the study area and 2,940 residents, which is expected to remain steady through 2045. Demographic data by household size can be seen in **Table 1.** Maps also showing household and employment data for 2015 and 2045 conditions can be seen in **Figure 8 on page 15** through **Figure 11 on page 18**.

Table 1 – Households and Population Estimates (2015–2045)

Household Type	2015 Estimate	2025 Estimate	2045 Estimate
1 Person HH	88	98	98
2 Person HH	365	383	383
3 Person HH	186	187	187
4 Person + HH	335	334	334
Total HH	**994**	**1,002**	**1,002**
Population (Estimate)*	**2,938**	**2,942**	**2,942**

**Household sizes were estimated using 2013–2017 American Community Survey data*

While the residential population is expected to remain approximately even through 2045, significant growth in employment is expected in the study area. Nearly 3,700 jobs are located in the area (as of 2015), with this expected to increase by 45 percent by 2025 and by 115 percent by 2045. Employment data by sector can be seen in **Table 2.**

Wholesale employment is currently the largest employment sector, followed by manufacturing and construction. Significant employment increases are expected across all sectors except agriculture and education, with especially large increases in manufacturing, and wholesale.

Table 2 – Employment Estimates (2015–2045)

Employment Type	2015 Estimate	2025 Estimate	2045 Estimate
Manufacturing	838	1,301	1,916
Construction	788	1,157	1,575
Retail	354	573	950
Service	574	788	1,184
Agricultural	46	52	58
Wholesale	1,054	1,427	2,207
Education	18	42	42
Total Employment	**3,672**	**5,340**	**7,930**

Land Use and Demographic Projections Updates

The demographic data for 2025 and 2045 conditions shown above was developed as part of the 2045 Long Range Transportation update. Throughout this Northwest Metro Transportation Plan, the projected land use plan and associated growth estimates in the area will be updated, which will likely result in updated household and job projections for 2025 and 2045.

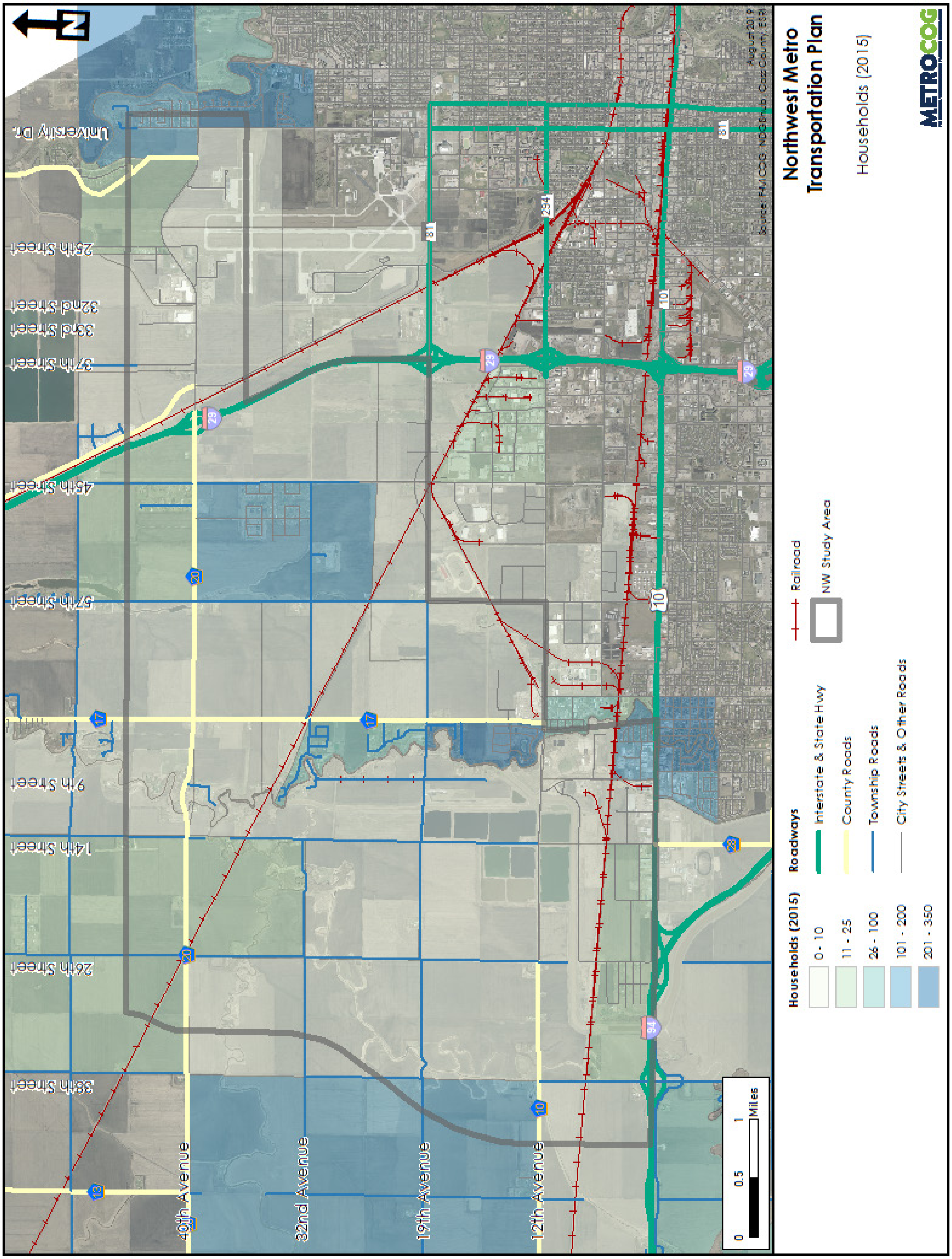


Figure 8 – 2015 Households

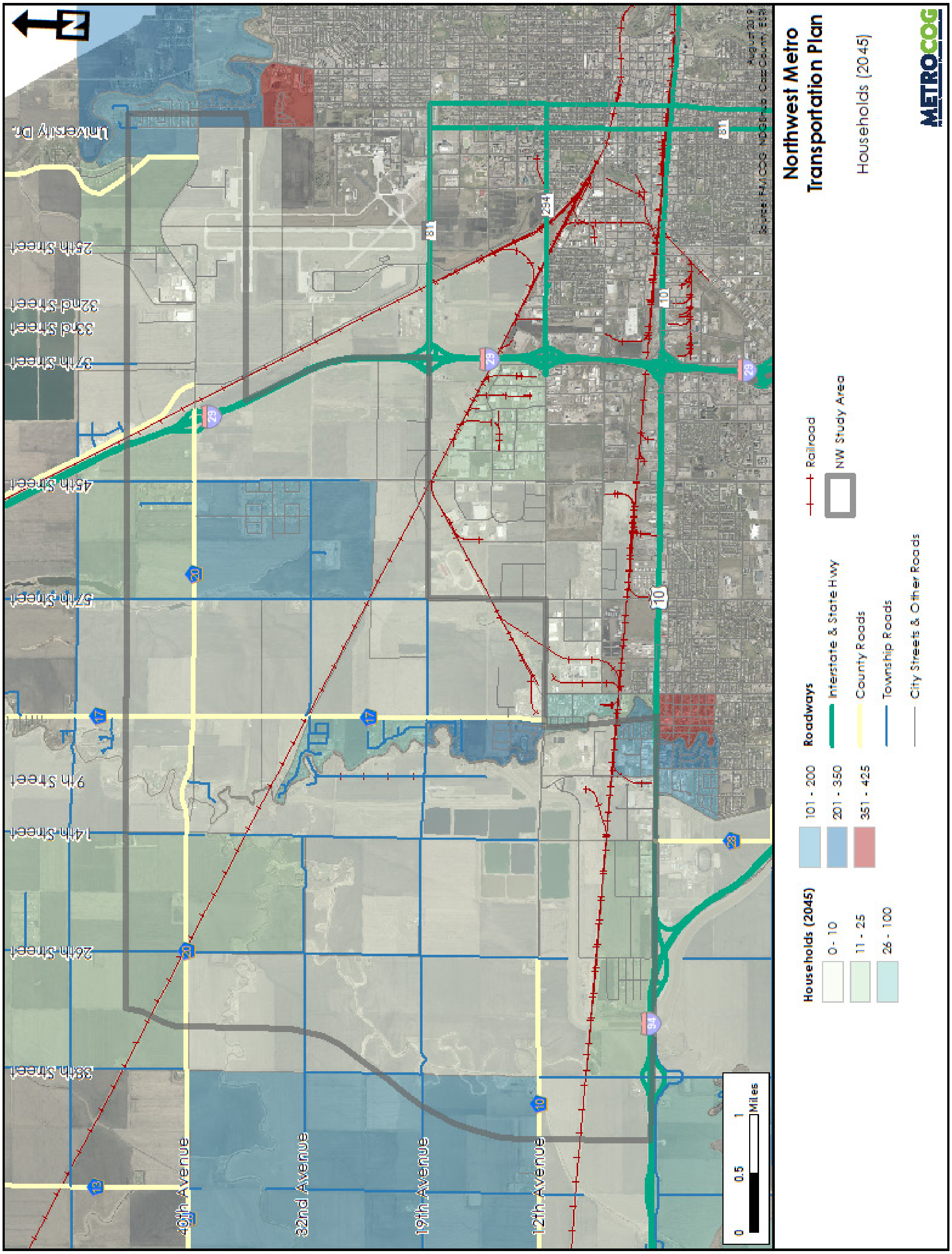


Figure 9 – 2045 Households

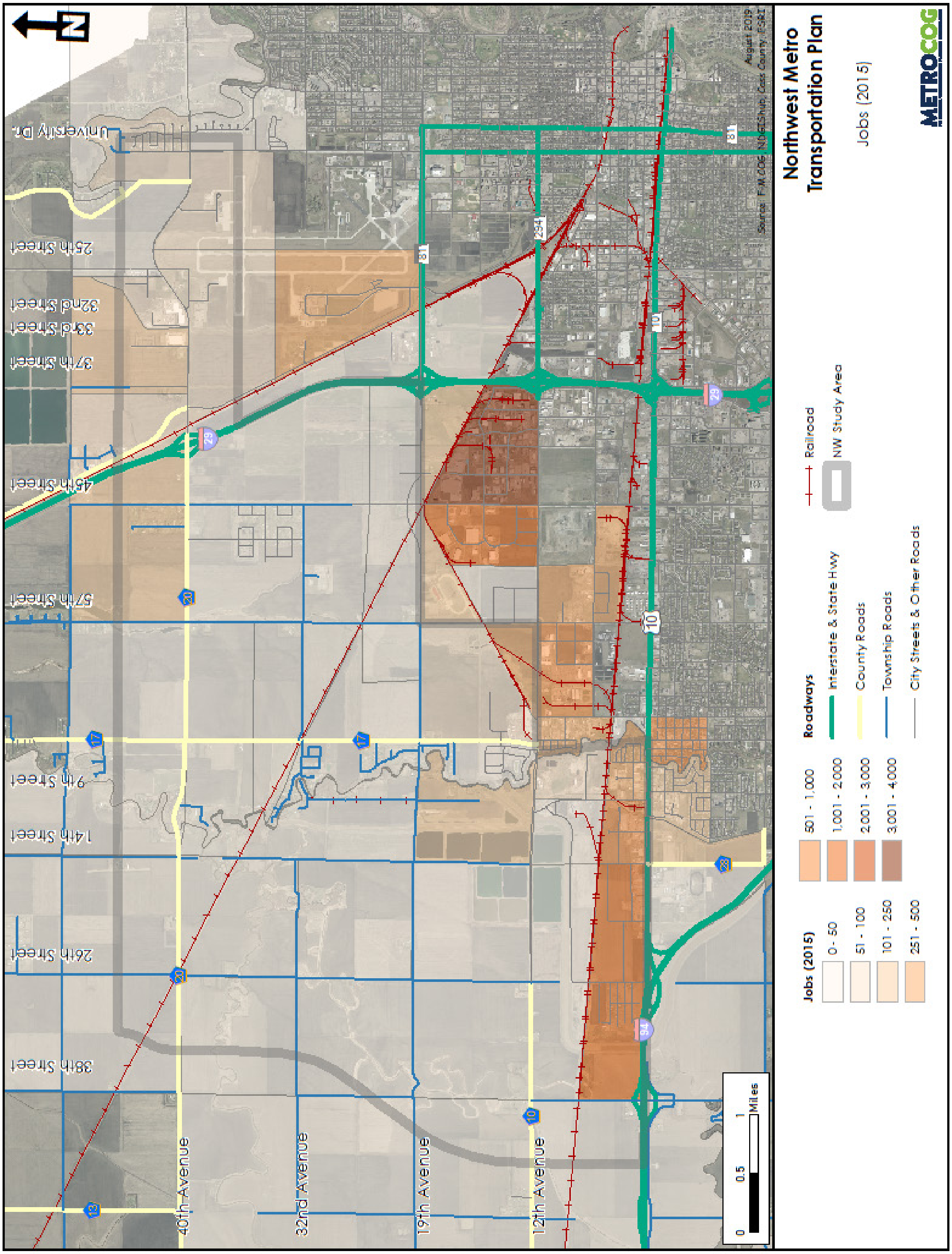


Figure 10 – 2015 Employment

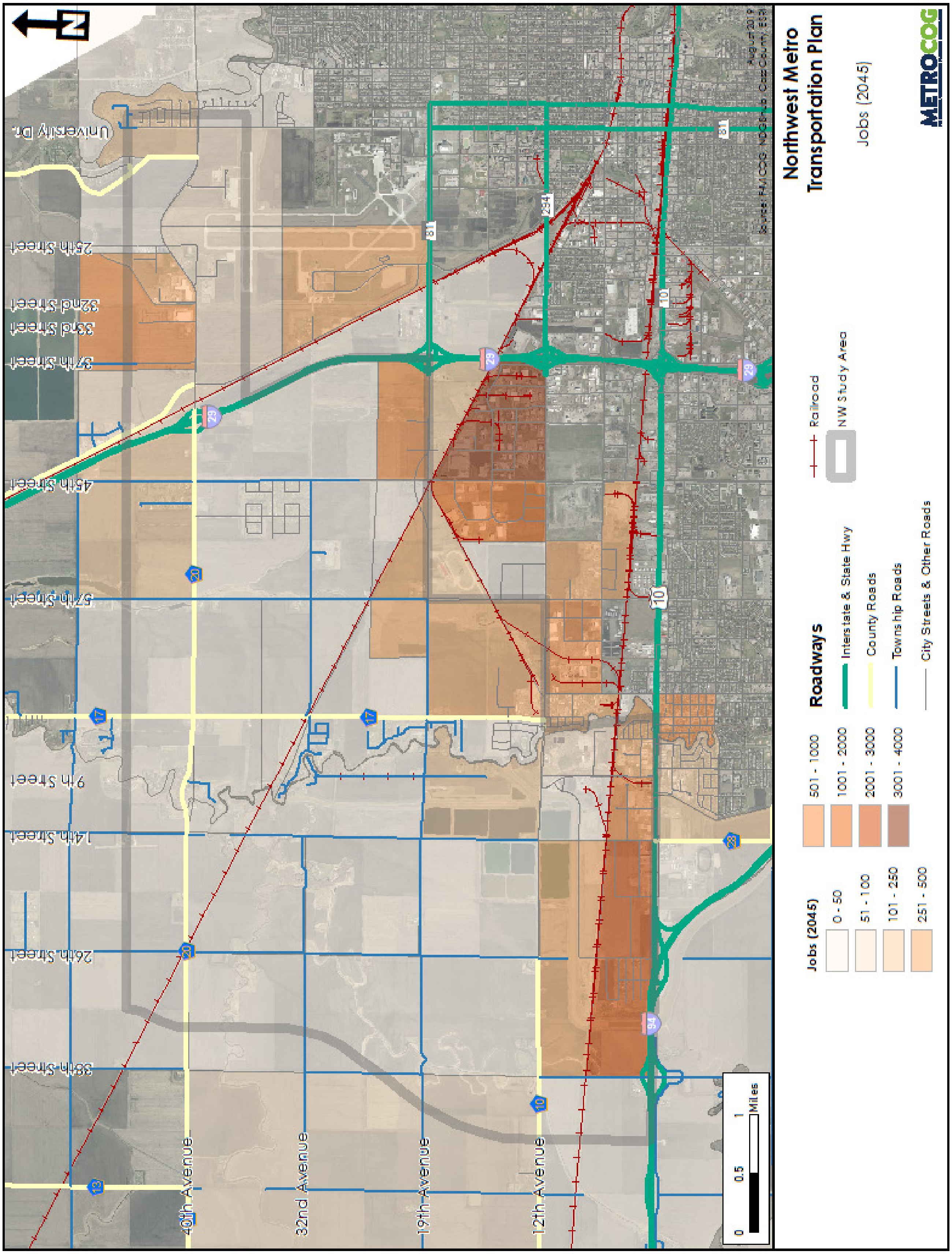


Figure 11 – 2045 Employment

ROADWAY CHARACTERISTICS

Excluding Interstate mileage, there are 83 centerline miles of roadway in the study area. The breakdown of roadways by roadway functional classification and by surface type can be seen in the tables below.

Of the unpaved roads, the overwhelming majority are local roads. Around two percent of gravel roads are collectors and three percent of gravel roads are minor arterials.

Within the study area, the majority of roads are owned by the cities (39 percent) or townships (34 percent). The remainder of the roadway mileage is maintained by Cass County or NDDOT.

Table 3 – Roadway Mileage by Functional Classification

Roadway Functional Classification	Percentage
Principal Arterial (Interstate)	11%
Principal Arterial (Non-Interstate)	1%
Minor Arterial	14%
Collector	14%
Local	60%

Table 4 – Roadway Mileage by Surface Type

Roadway Surface Type	Percentage
Paved	58%
Gravel	39%
Graded and Drained	2%
Trail	1%

Table 5 – Roadway Mileage by Jurisdiction

Mileage by Jurisdiction	Miles (Percent of Total)
Interstate	10 (12%)
State Highway	1 (1%)
County	12 (14%)
Township	28 (34%)
City	32 (39%)

Traffic Volumes

Given the generally undeveloped nature of most of the study area, traffic volumes are generally low. No study area roadways have daily traffic volumes exceeding 8,000 vehicles per day. The highest volumes in the area are seen on 12th Avenue North near Cass County Road 17 (5,000 to 7,500 vehicles per day), and on Cass County Road 20 east of Interstate 29 (5,500 to 8,000 vehicles per day).

Study area daily traffic data can be seen in **Figure 14 on page 22**.

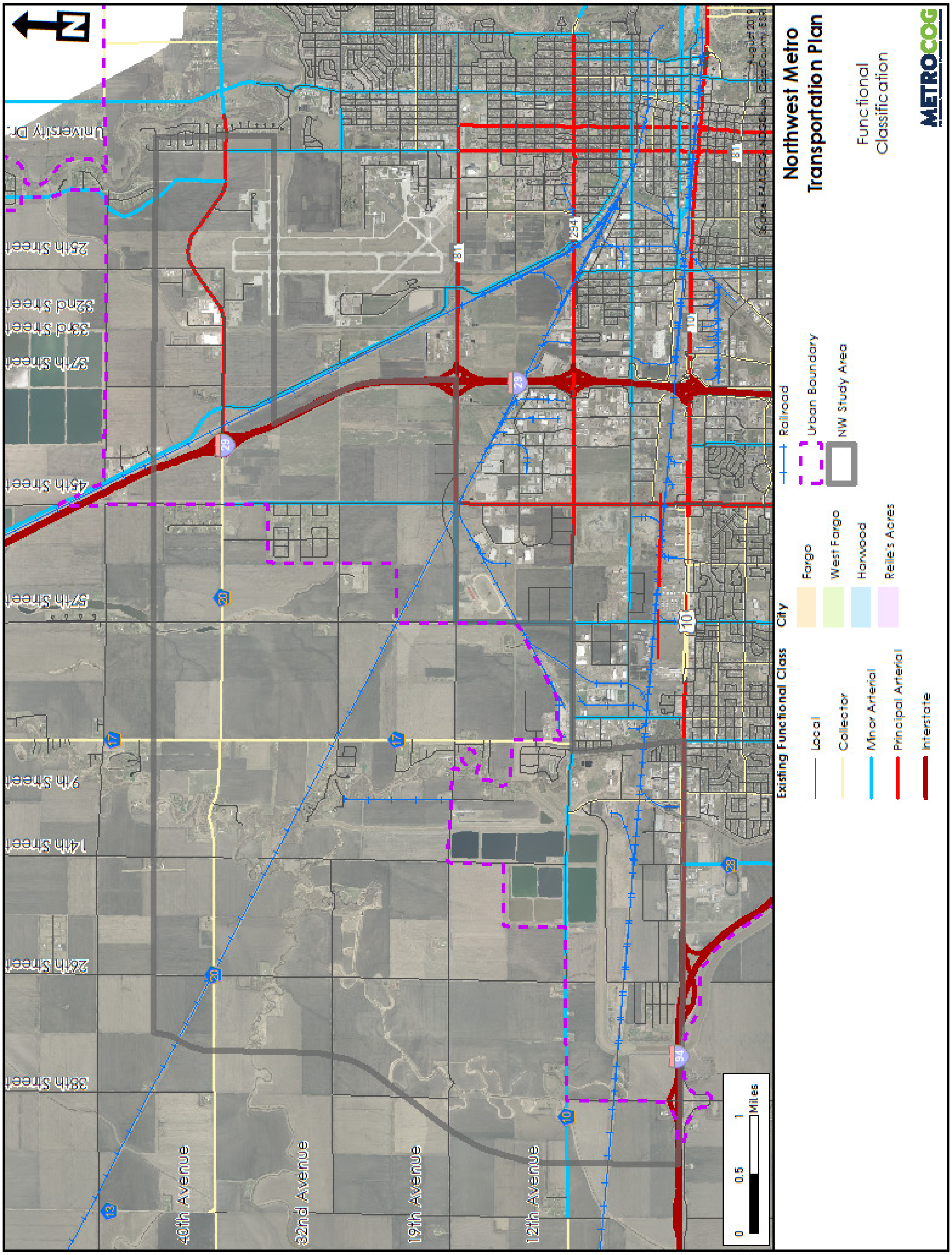


Figure 12 – Roadway Functional Classification

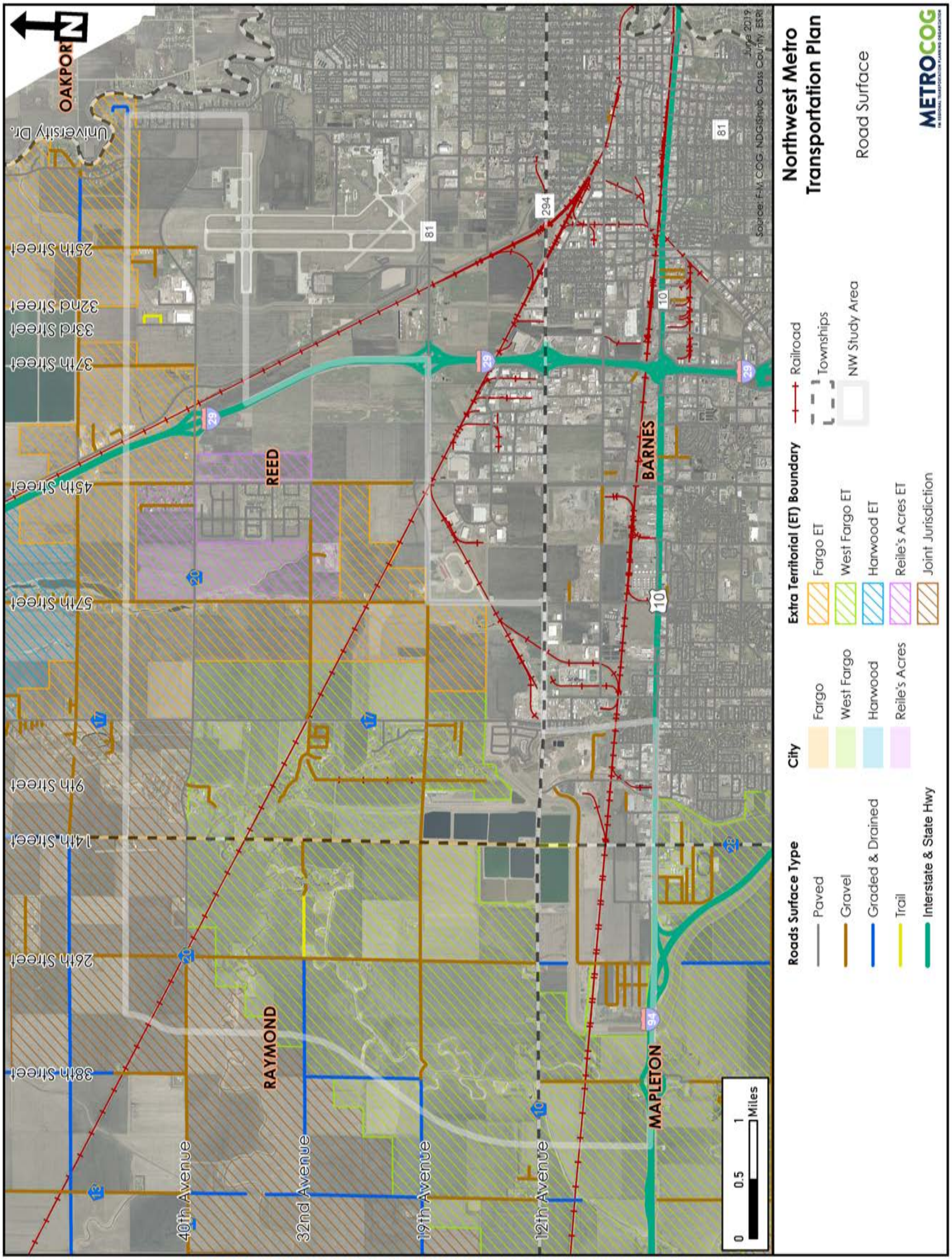


Figure 13 – Roadway Surface Type

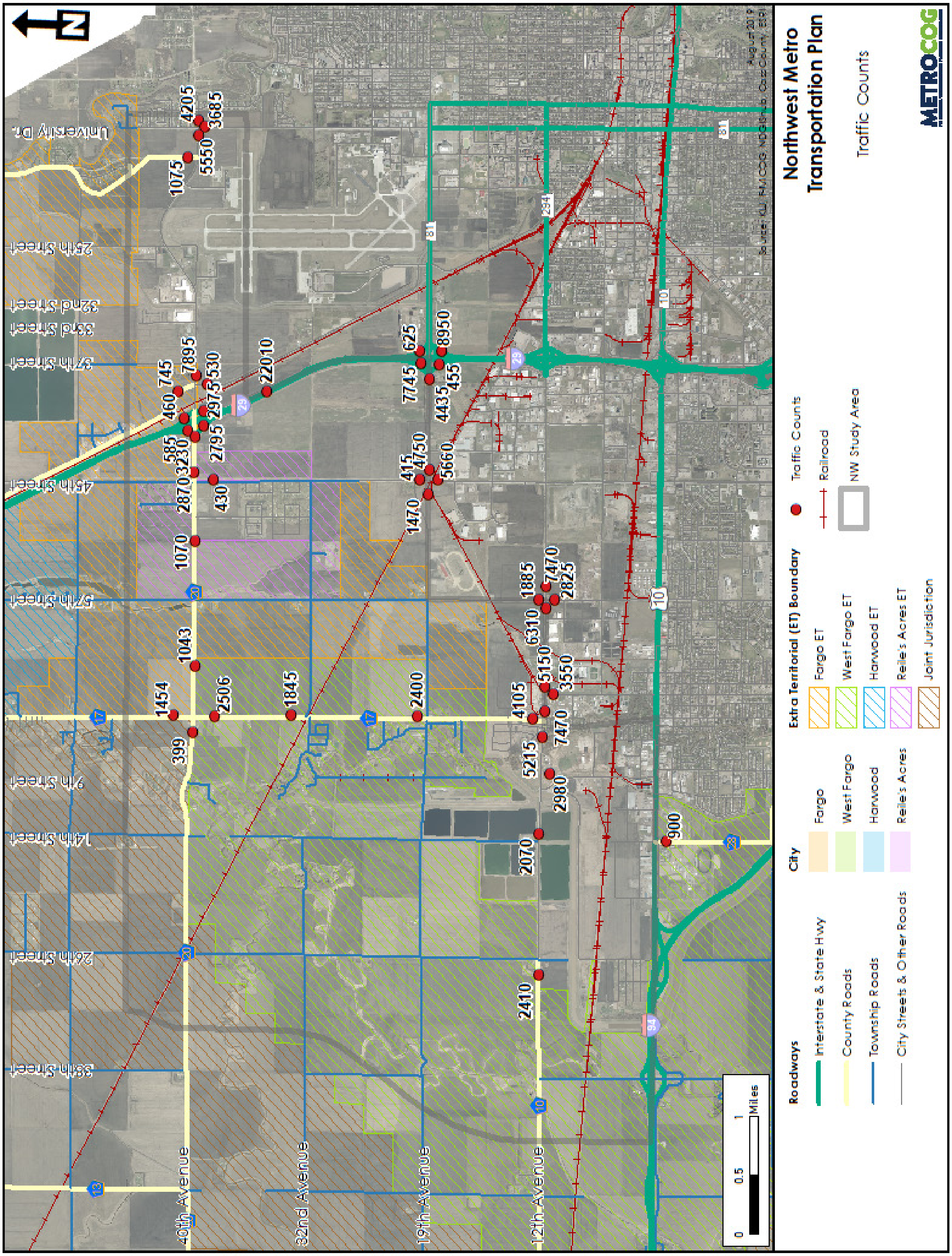


Figure 14 – Existing Average Daily Traffic Data

Corridor Level of Service

Travel demand model results from the 2045 Metropolitan Transportation Plan were evaluated to determine general level of service information throughout the study area based on currently available planning assumptions. Since demographic projections will be updated through the Northwest Metro Transportation Plan, analysis results under these revised assumptions will be presented throughout the study.

Note that travel demand model based level of service analysis is high-level in nature, and is generally best used to determine if there are an adequate number of travel lanes in each direction on a corridor-wide level. Such analysis is not intended to identify congestion at isolated intersections.

Under existing conditions, all corridors operate acceptably at LOS “C” or better, with the overwhelming majority of corridors operating at LOS “A”. Based on current demographic forecasts, this is expected to remain generally unchanged through 2045, with the only congestion occurring on County Road 20 between Interstate 29 and University Drive.

Corridor levels of service under the current planning assumptions for 2025 and 2045 can be seen in **Figure 15 – 2025 and 2045 Modeled Corridor Level of Service**.

Nonmotorized Facilities

Given the generally undeveloped nature of the study area, there are few multimodal facilities present today. Shoulders are wide enough to accommodate bicycles on portions of major routes like 12th Avenue North, County Road 17, and County Road 20. The only residential area with existing sidewalks is the residential development in the northwest quadrant of the intersection of County Road 17 and 12th Avenue NW. Both the Cass County Transportation Plan and Metro COG’s 2016 Bicycle and Pedestrian Plan identified future facilities in this study area, that will be refined later in this plan. Existing nonmotorized facilities can be seen in **Figure 16 on page 25**.

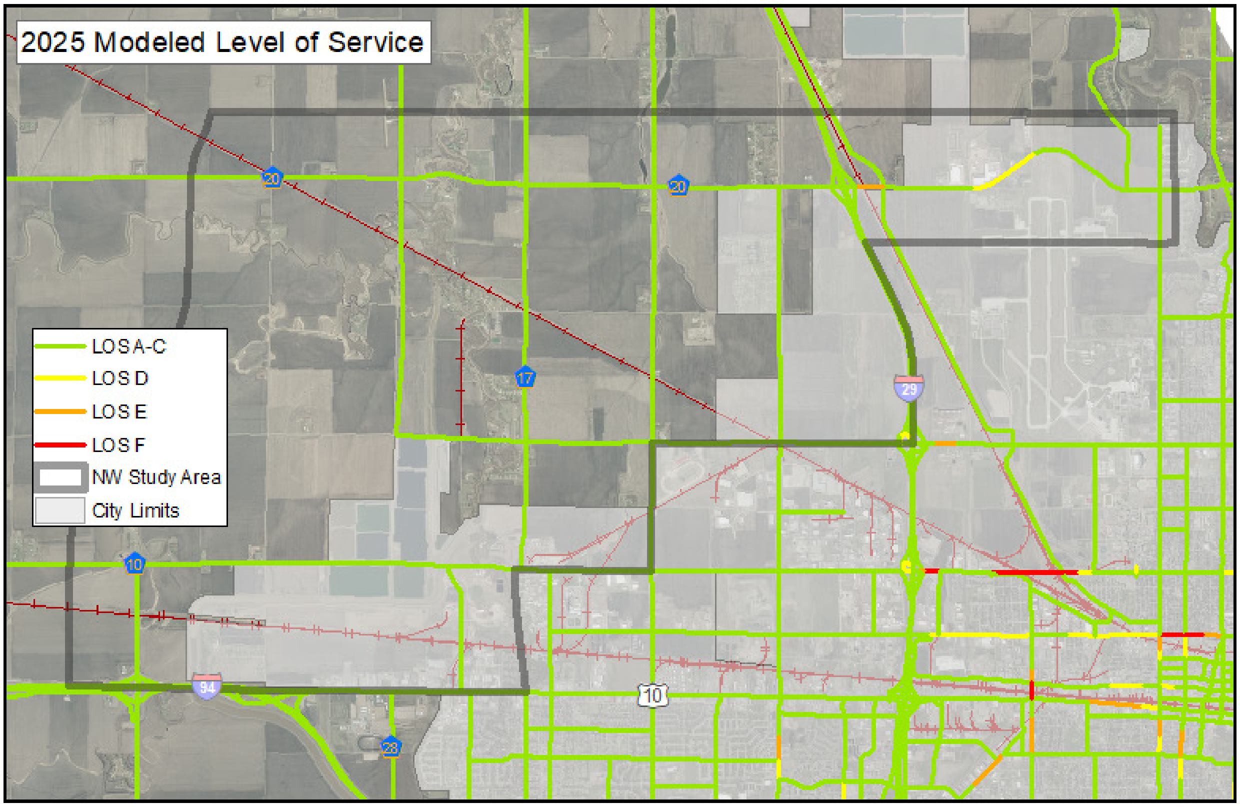
Railroads

Burlington Northern Santa Fe has three subdivisions that run through the study area: KO, Prosper, and Hillsboro, with multiple spur lines serving specific developments. Within the study area there are 12 at-grade highway-rail crossings and one grade separated highway-rail crossing (overpass/underpass), as shown in **Figure 17 on page 26.**

ENVIRONMENTAL CONSTRAINTS

The floodplain figures beginning on **page 27** demonstrate the existing surface water conditions in the study area, both with and without a proposed FM Diversion. **Figure 18** shows most of the study area to be impacted by the effective 100-year FEMA flood plain. These impacts will limit the ability of the study area to develop with out significant additional infrastructure considerations.

Figure 19 shows the 100-year FEMA flood plain with the proposed FM Diversion in place. This shows that nearly all the existing study area is out of the 100-year floodplain. However, this is contingent on the development of the FM Diversion which is still planned to be several years away.



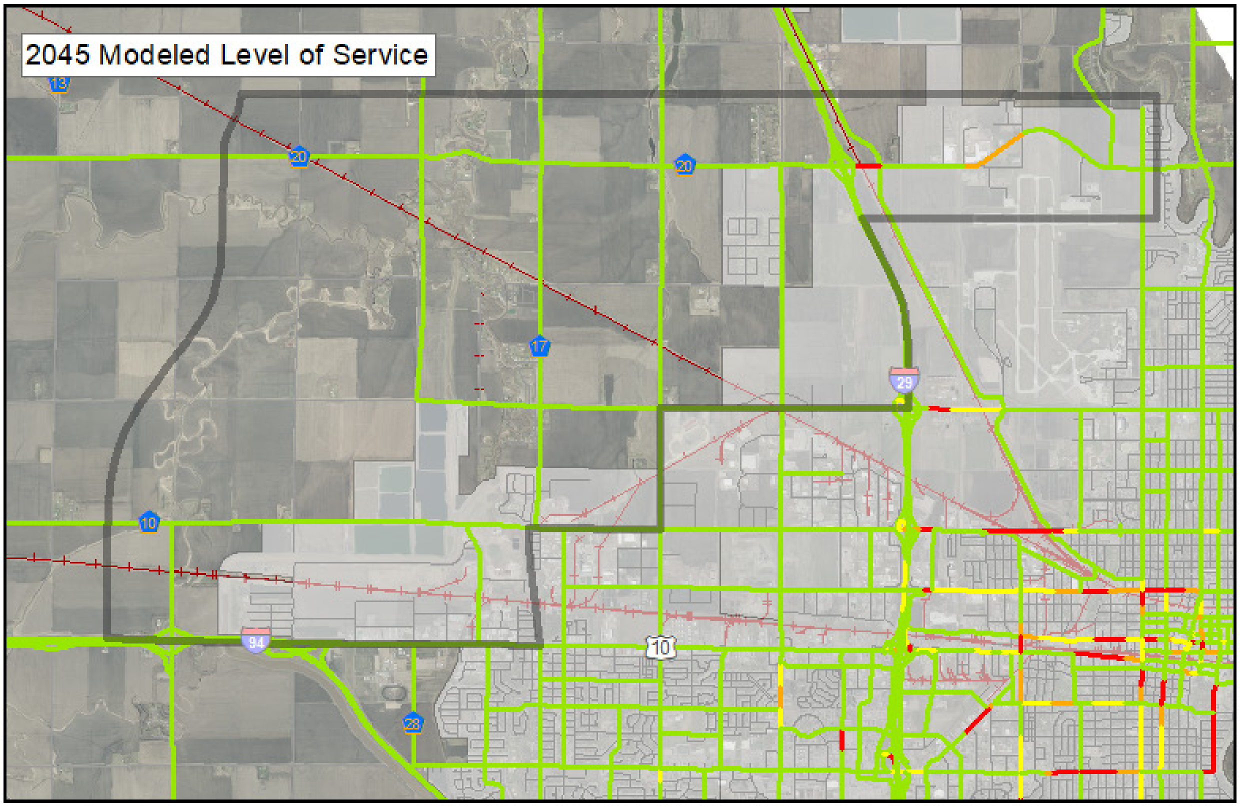


Figure 15 – 2025 and 2045 Modeled Corridor Level of Service

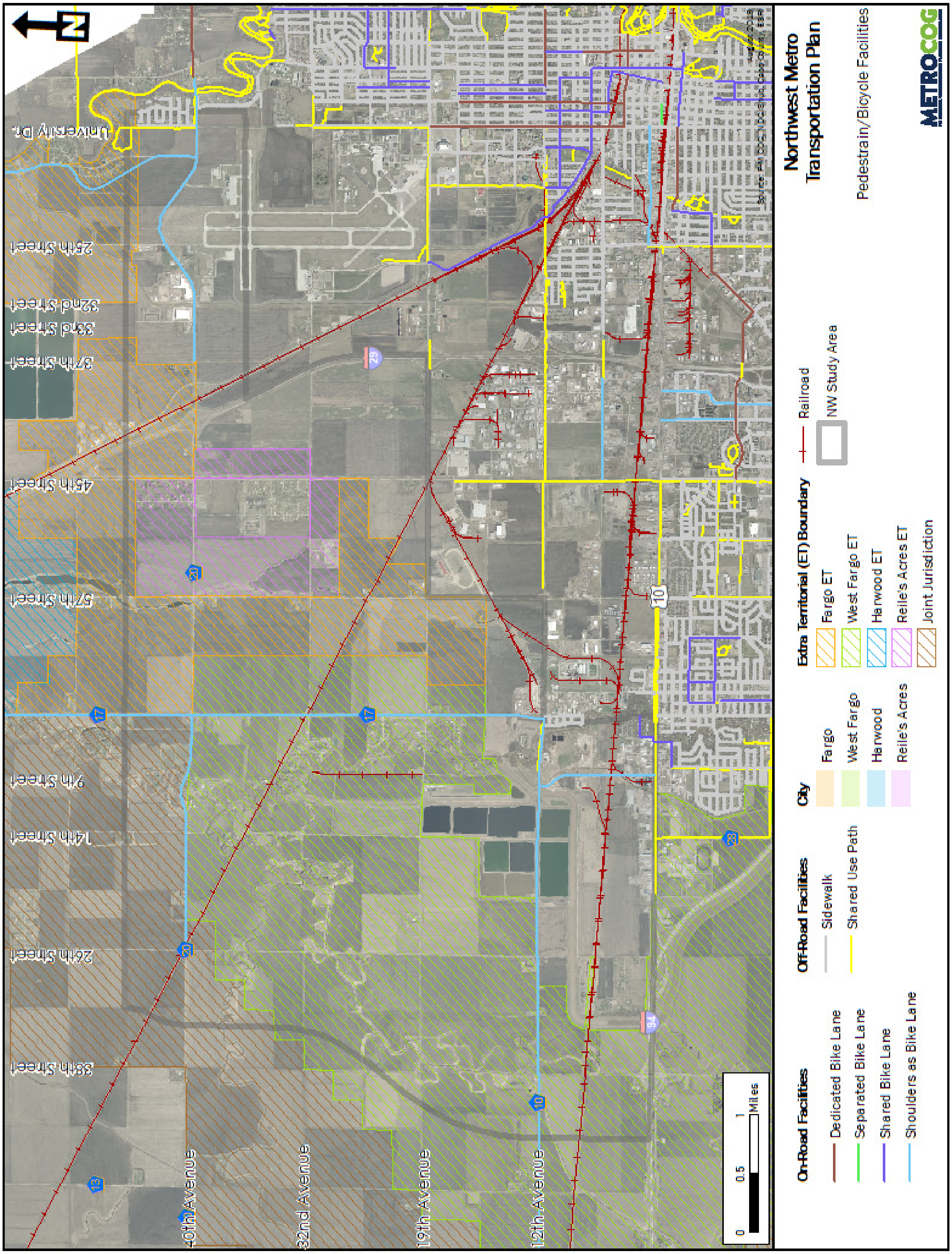


Figure 16 – Bicycle and Pedestrian Facilities

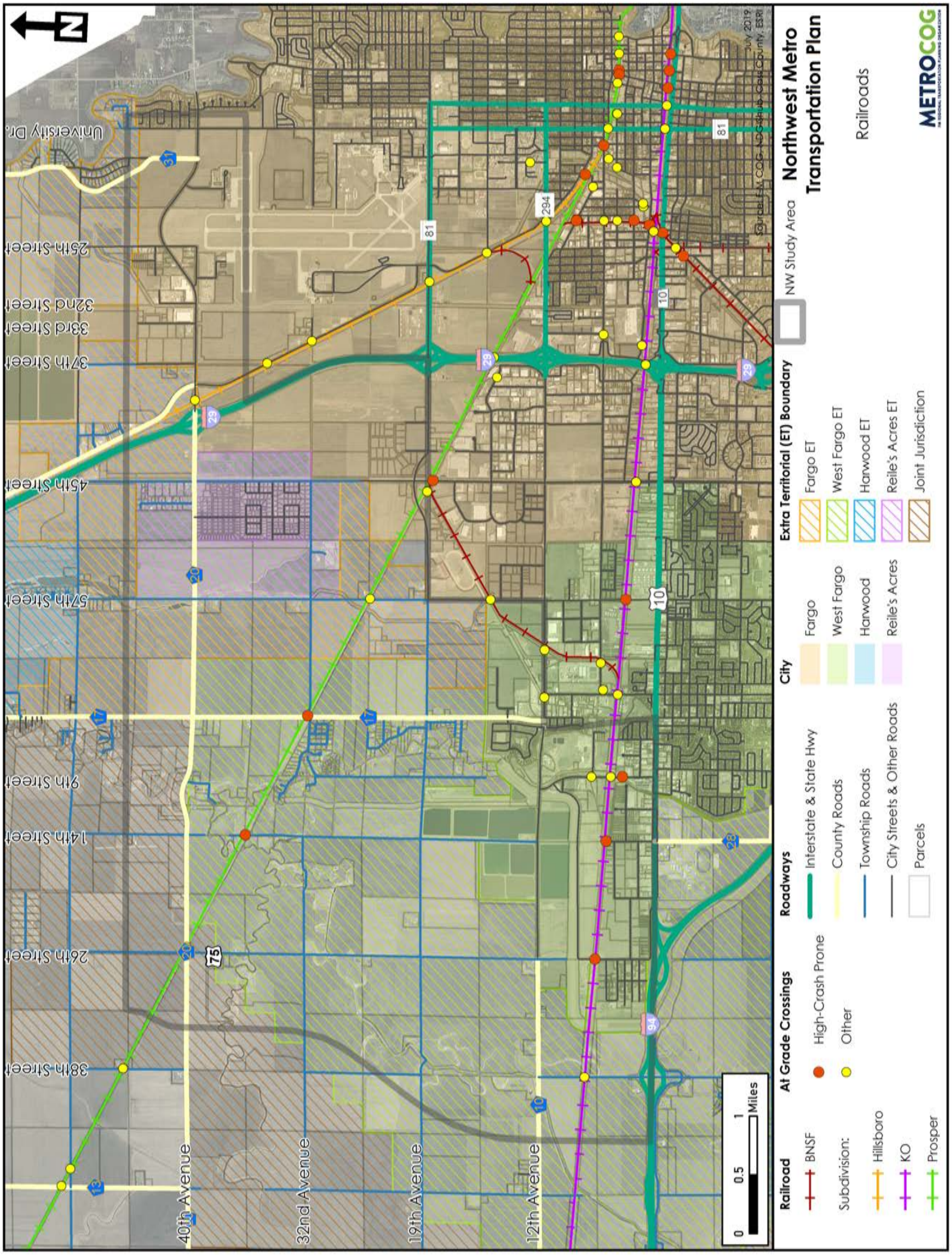


Figure 17 – Railroads

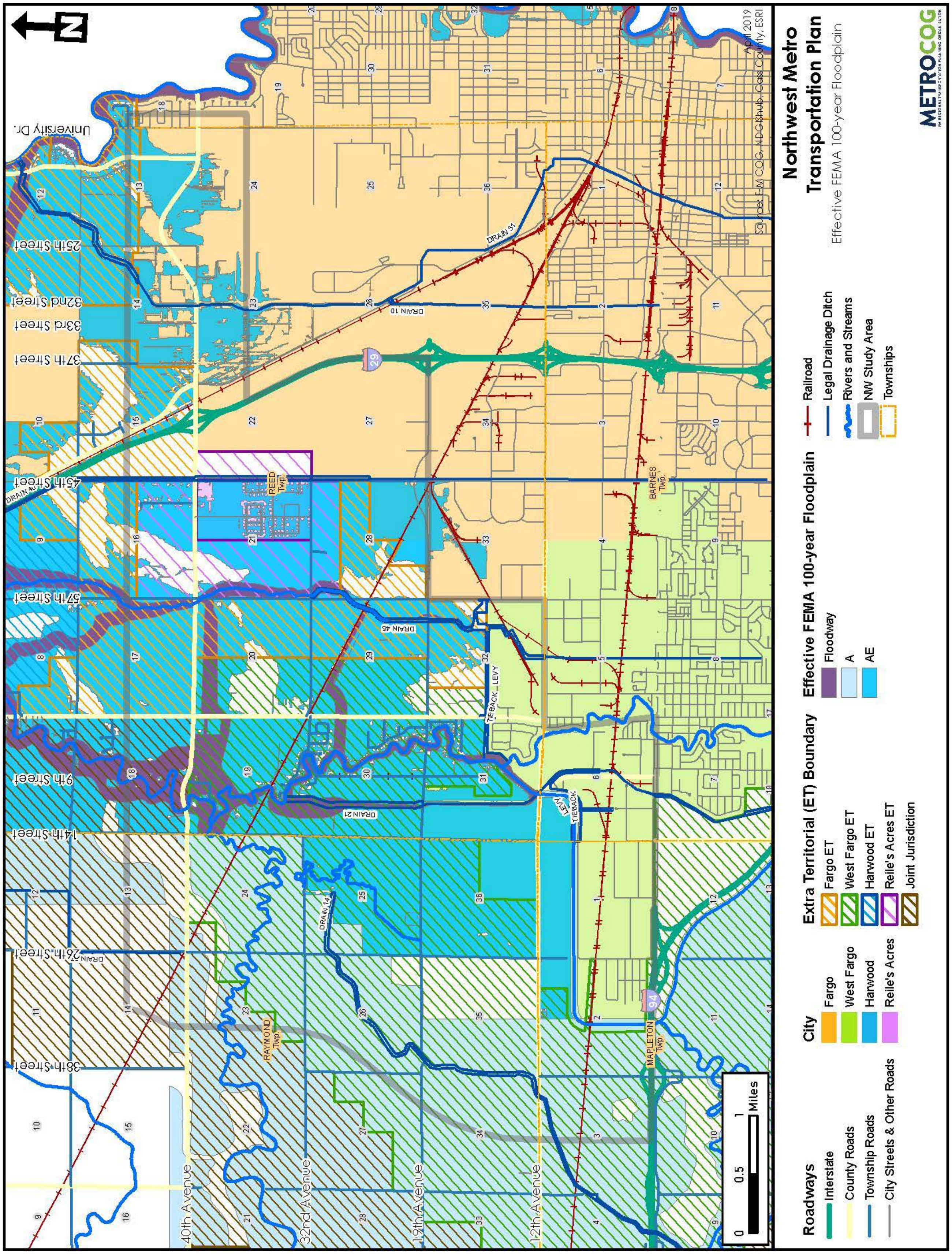


Figure 18 – 100 Year Floodplain Without Diversion

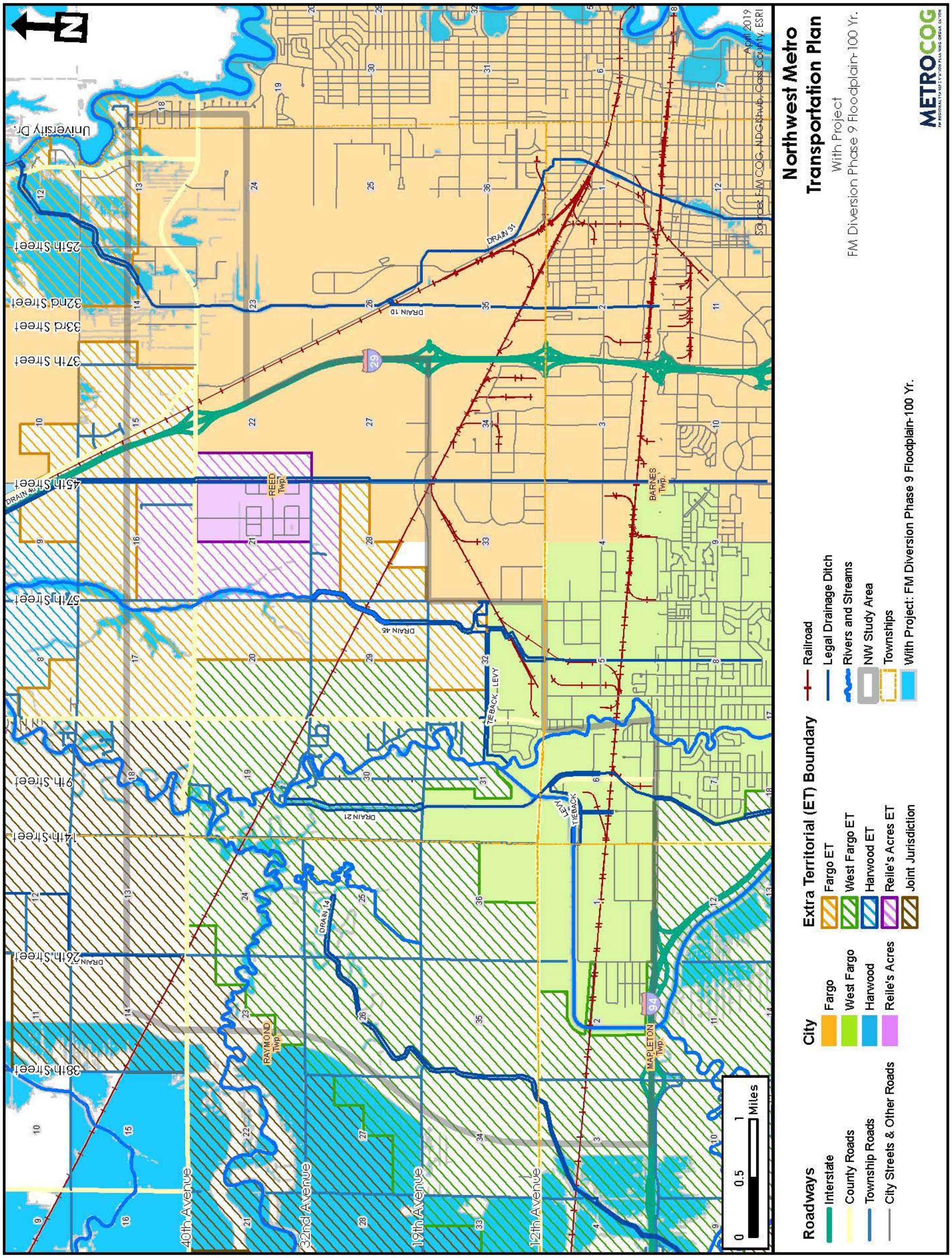


Figure 19 – 100 Year Floodplain With Diversion

TRANSPORTATION ISSUES

A series of working group meetings with key technical staff from the City of West Fargo, City of Fargo, and Cass County were conducted early in the study process. Additional outreach was conducted with key stakeholders in the study area including NDSU, Reed Township, Fargo Airport Authority, West Fargo Airport Authority, the Riverwood subdivision, and Reile's Acres. Through these meetings a series of key transportation issues were developed. **Figure 20 – Transportation Issues Map** demonstrates some of the areawide issue areas identified by technical and stakeholder's groups early in the study process.

Corridor Preservation

- ***Functional Class.*** Establish future proposed grid of principal arterial, collector, and local roadways. Support the development/refinement of Metro COG future functional class map.
- ***Cass County Connector Corridor.*** Continue to refine the concept of a Cass County led connector corridor generally connecting I-94 with I-29.

Jurisdictional Coordination

- ***Reile's Acres.*** Establish updated approach to ensuring coordinated roadway development on mile line corridors adjacent to and within Reile's Acres Extraterritorial Boundary. Refresh the range of options and relative long term need for an extension of 45th Street between 19th Avenue and CR 20/40th Avenue.
- ***Township Agreements***. Establish clear policy framework for conversion of township roads (with annexation) to city standards ahead of imminent development pressure. Focus on filling gaps in current paved mile line roadways.
- ***Corridor Phasing/Staging.*** Match up programming and investment plans between City of Fargo, West Fargo and Fargo regarding future investments in mile line corridors. Priority corridors including most notably 19th Avenue in the near term.

Catalyst Development

- Establish an understanding of development and infrastructure changes which may serve as key catalysts to jump start develop nodes.

Multimodal Systems

- ***Access to Freight Systems.*** Develop land use and transportation patterns to support significant rail infrastructure and easy access to I-29.
- ***Recreational Trails Development.*** Develop a rough framework of trails and greenway systems to integrate with future land use.
- ***Fargo Airport Master Plan.*** Integrate the Fargo Airport Master Plan to account for limitations and impacts on land use and transportation build out.

Roadway Development

- ***County Corridor Turnbacks.*** Establish long range phasing/staging plan for conversion of remaining County Roads in the study area to municipal roadways like CR 10, 17, 20.
- ***40th Avenue Corridor Strategy.*** Evaluate previous studies on 40th Avenue/CR 20 to establish an update corridor improvement plan; including needs at CR 20 and the I-29 Interchange.
- ***Urban Area Boundary.*** Establish guidance for Metro COG to "smooth" the 2020 Urbanized Area (UZA) to established next update of the Urban Area Boundary (UAB).

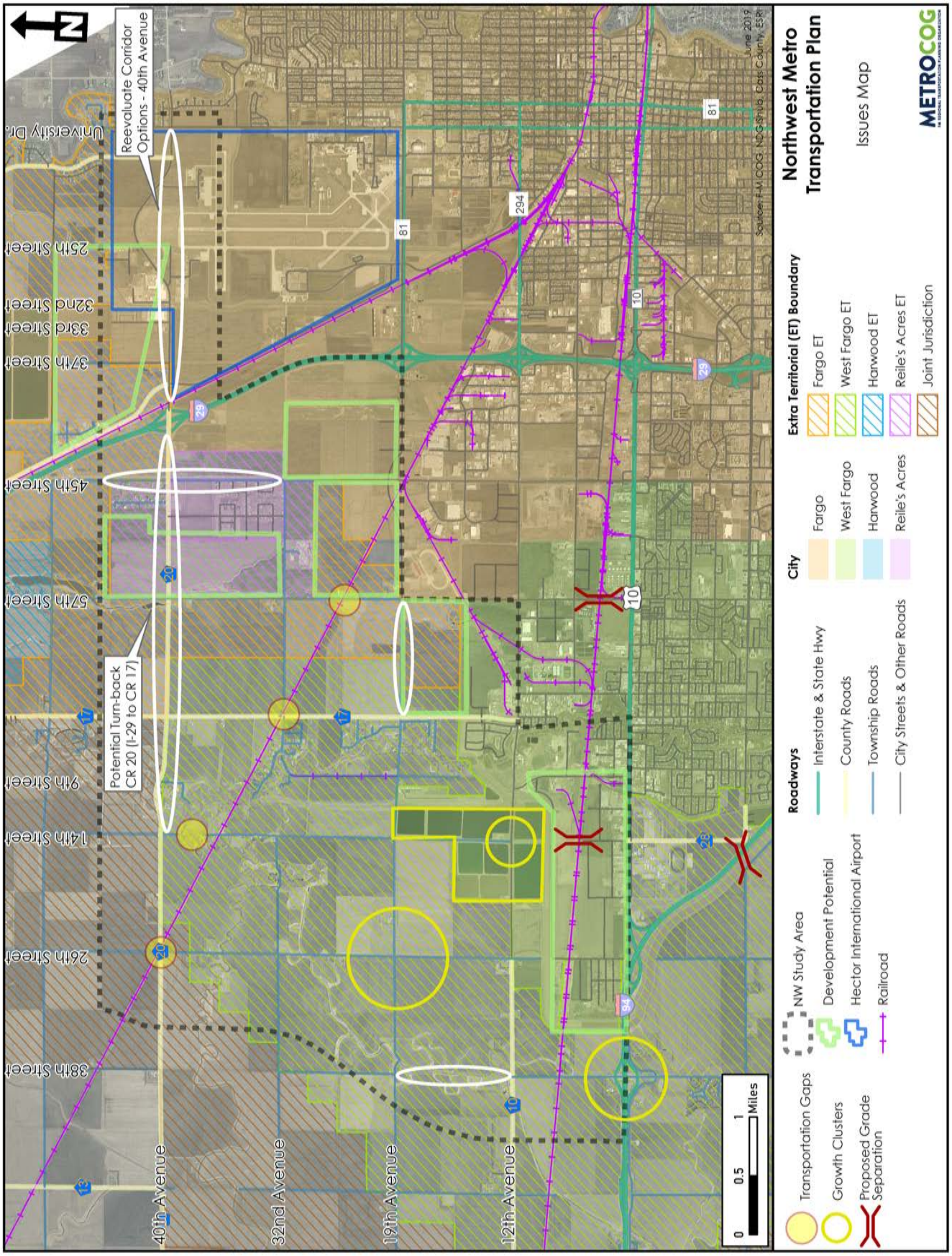
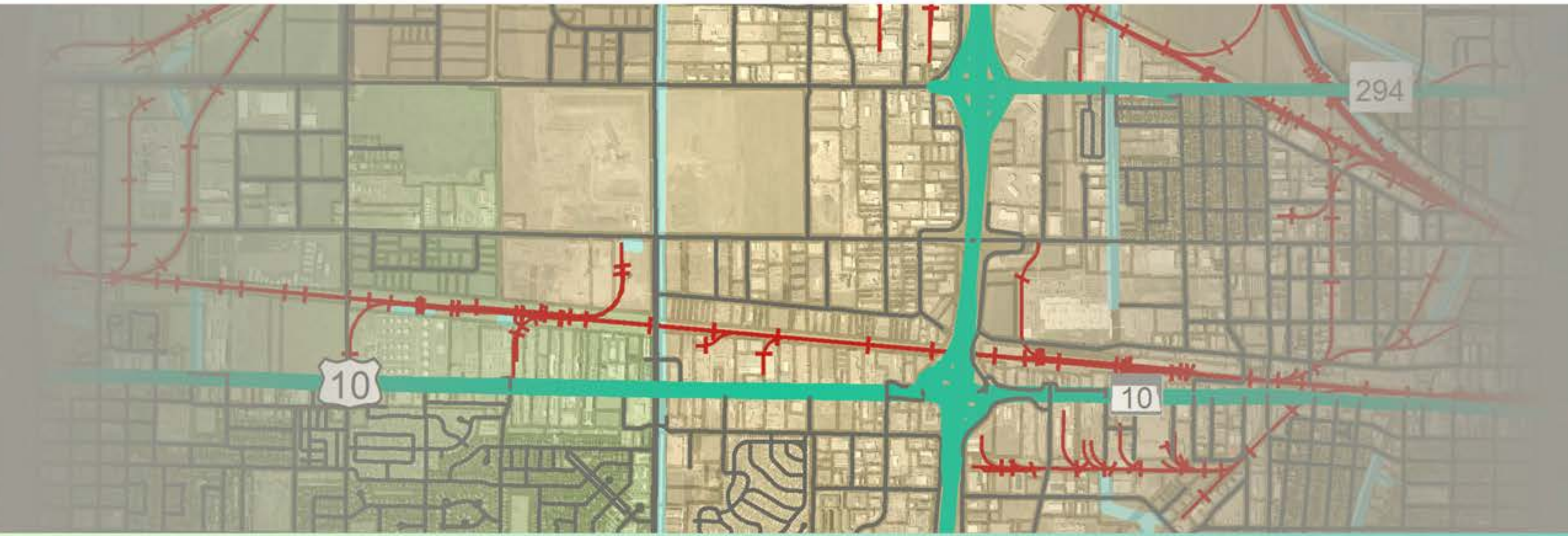


Figure 20 – Transportation Issues Map

Chapter 2
Land Use Plan



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LAND USE CONCEPTS

Introduction

The northwest vicinity of the metro area is mostly in the floodplain and primarily undevelopable. The construction of the diversion will result in the area not being in the floodplain and likely increase the market demand to build on land. While other areas in the metro are considered to experience more development in the near-term, this planning concept considers a proactive approach to ensuring a strong mobility system in the northwest for future employers, residents, and active living. Anticipated land uses are shown in **Figure 23.** While the land use concepts remain relatively consistent, the area's circulation is considered to understand possible warrants for future transportation enhancements. The mobility alternatives being considered are shown in **Figure 24.**

Land Use Typology Areas

Land Use Typology Areas ("LUTAs") are the framework that allows differentiation between areas of the region and the types, forms, and intensities of development allowed in each area. LUTAs are described in terms of their purpose, form, uses, intensity, and compatibility requirements. The descriptions of LUTAs are intended to provide a sequential framework of land use designations with increasing levels of intensity. It is appropriate to compare them to another when reading descriptions. If, for example, Medium Intensity is described as being more intense, it is understood that it is more intense than Low Intensity.

Table 6 shows the types of land uses that could be included in each of the LUTAs. **Figure 22** below explains the land use density. The intent of using LUTA land use approach is to establish a shared nomenclature for undeveloped areas on the fringe of Fargo, West Fargo, and in Cass County.

Figure 21 – Land Use Intensity

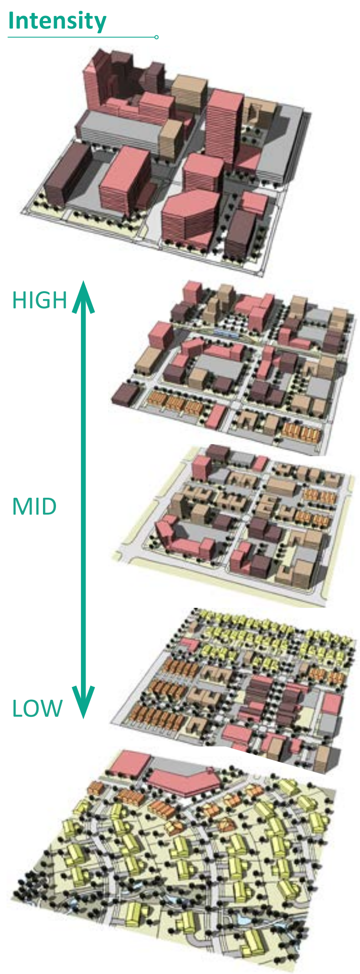
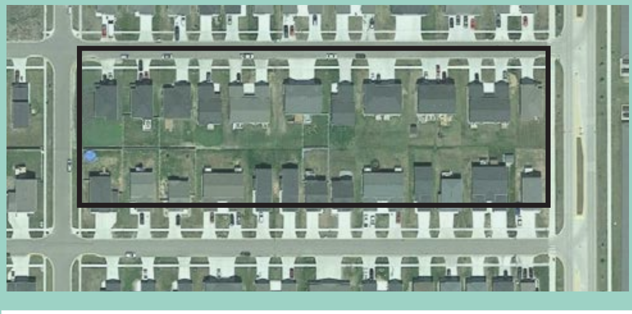


Figure 22 – Land Use Density

Density: What is Dwelling Units Per Acre, du/A?

Fargo example:

12 housing units are included on an acre of land. The density of this site, then, is 12 dwelling units per net acre (du/A).



West Fargo example:
32 housing units are included on 4 acres of land. The density of this site, then, is 8 dwelling units per net acre (du/A).

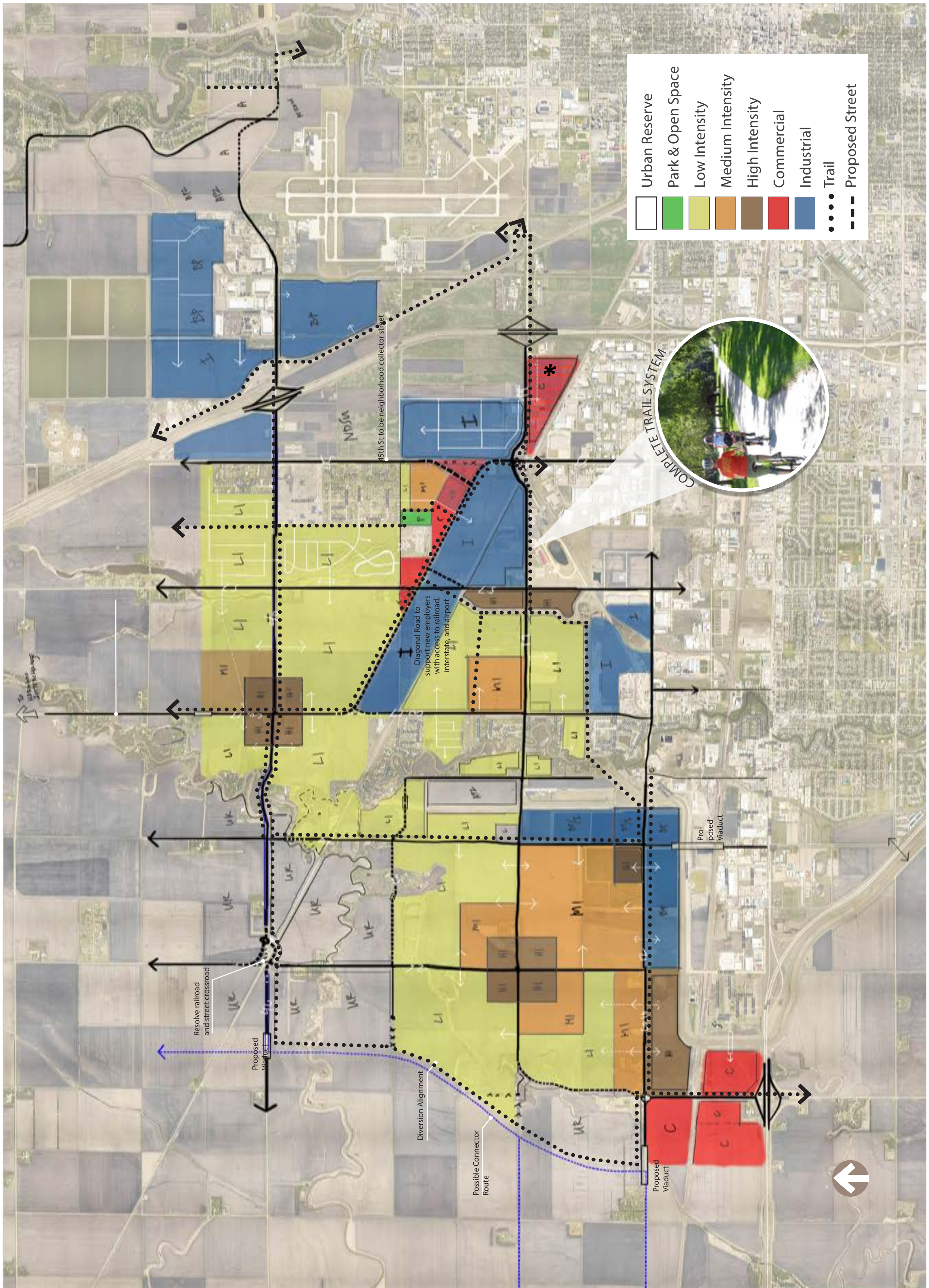


Figure 23 – Northwest Land Use Concept

* *Unlikely to be commercial land use.*

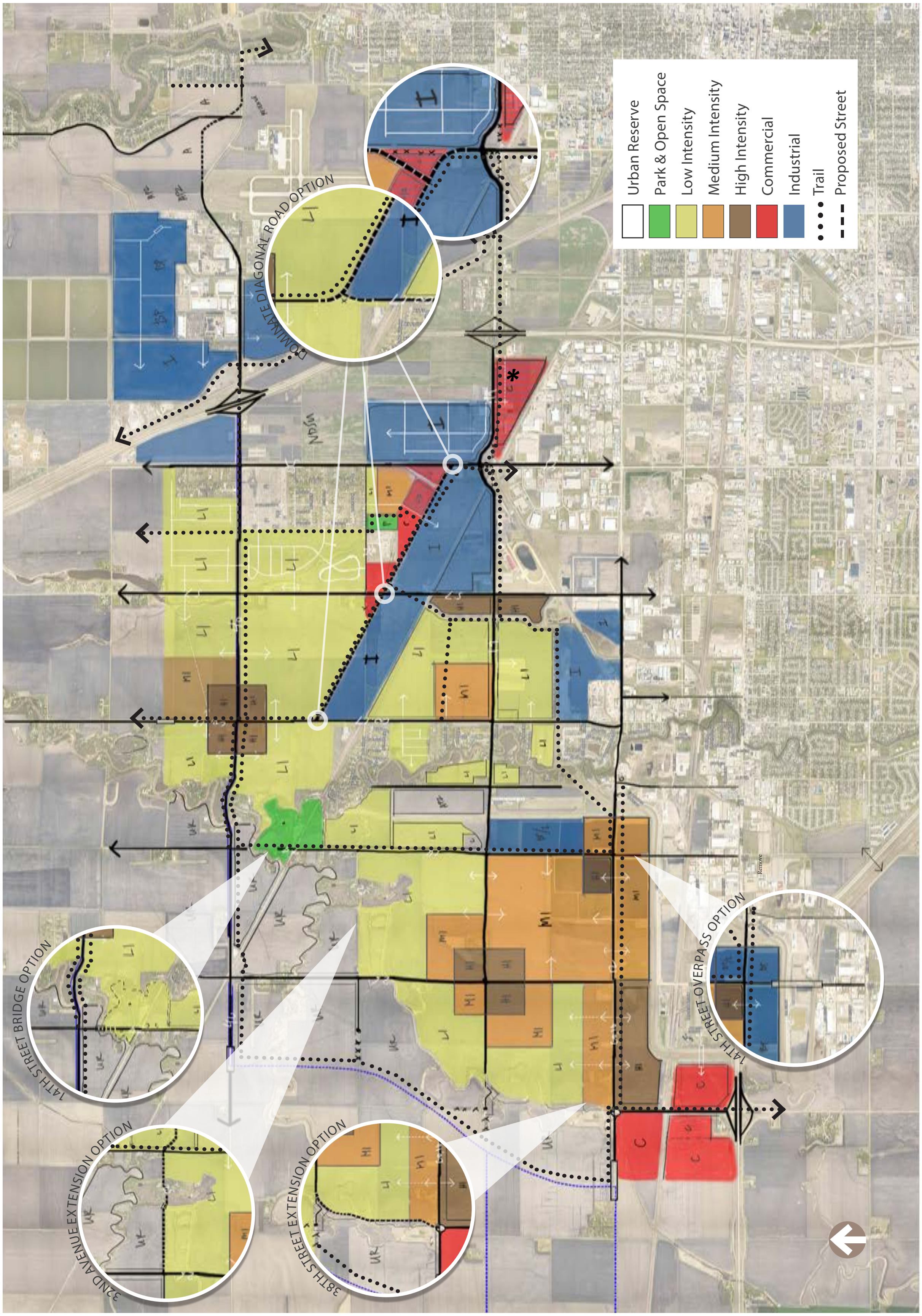


Figure 24 – Mobility Alternatives

Unlikely to be commercial land use.

Table 6 – Summary of Southwest Gateway Option Land Uses

Land Uses	AG Agriculture Preserve	UR Urban Reserve	LI Low Intensity	MI Medium Intensity	HI High Intensity	C Commercial	BP Business Park	I Industrial	P Park and Open Space
Agriculture	●	●							
Rural residential		●							
Low-density residential			●	◐					
Medium-density residential			●	●	◐				
High-density residential				●	●	◐			
Rural commercial		●							
Neighborhood commercial			◐	●	●	●			
Community commercial				◐	●	●			
Regional commercial					◐	●			
Low/medium intensity office			◐	◐	●	●	●		
High-intensity office				◐	●	◐	●		
Limited industrial		◐		◐	◐		◐	●	
General industrial				◐	◐		◐	●	
Intensive industrial					◐			●	
Parks and Civic Uses	●	●	●	●	●	◐			●
Major public/civic facilities									●
Residential density range (du/A)	>40 acres per unit	>40 acres per unit	2-12	8-14	14+	NA	NA	NA	NA
Non-residential intensity range (FAR)	NA	NA	0.25-0.50	0.30-1.0	0.80 and up	0.30-1.0	NA	NA	NA

● Normally permitted ◐ Requires location and compatibility standards

LAND USE DESCRIPTIONS

Low Intensity Uses (LI)

These land uses have an efficient, walkable pattern of low density development. As compared to denser areas, LI has more space and separation of uses, with farther distances between destinations and fewer shared amenities. Low intensity areas can include a horizontal mix of mostly residential and limited non-residential uses at compatible lower densities and scale.

Residential LI uses have an emphasis on single-family detached residential developments. Attached housing projects are located at transition areas between arterial streets, small scale commercial uses, and higher intensity districts. The forms and features include a density of two to seven units per acre, lot sizes comparable to surrounding neighborhoods, a framework of streets, trails, and open space that creates a sense of neighborhood and community.

Non-Residential LI uses are generally secluded to neighborhood retail, office, and horizontal mixed-use. Parks and civic uses can be incorporated into LI neighborhoods. The forms and features include an intensity of 0.25 to 0.5 floor area ratio (FAR), buildings at two stories or lower, larger retail/office clusters around arterial streets, smaller retail/office may cluster along collectors, and building orientation preferred to the street with parking in the side or rear yard. Generally, commercial retail and office uses are appropriate next to duplex and townhome developments.

Figure 25 – Low Intensity Land Use Examples


Single Family Detached

Neighborhood Office

Medium Intensity Uses (MI)

These land uses are vibrant areas that may draw customers and employees from outside the immediate area. Increased intensity (compared to LI) improves opportunities for economic activity and social interaction. Medium intensity areas include mostly a horizontal mix of residential and non-residential uses at compatible moderate densities and scale, although there may be opportunities for vertical mixed use.

Residential MI uses include a variety of housing on smaller lots. It may incorporate a mix of housing including single family detached homes, duplexes, and multi-family buildings to create integrated neighborhoods. The forms and features are seven to 12 dwelling units per acre, innovative design that has a larger number of public spaces than LI, development that maintains the identity of the individual housing units, and high connectivity with multiple access routes. As compared to LI, MI encourages closer proximity between transportation, housing, and commercial uses.

Non-Residential MI has neighborhood retail, office, and horizontal mixed-use options that are still primarily horizontal mixing with shared parking. Parks and civic uses should be incorporated throughout. The forms and features are an intensity of 0.3 to 1.0 FAR, buildings at four stories or lower, larger retail/office clusters around arterial streets and rail lines, and smaller retail/office are appropriate on any street that transitions between residential uses or higher intensity districts. Building orientation is preferred to the street with side or rear parking and pedestrian accommodations.

Figure 26 – Meduium Intensity Land Use Examples


Single Family


Neighborhood Retail

High Intensity Uses (HI)

These areas improve economic performance and opportunities for social interaction, by locating diverse and complementary uses in close proximity. High intensity areas include more urban services with a horizontal and vertical mix of high density residential and commercial uses.

Residential HI uses may focus more on non-residential buildings but still offer neighborhood dynamics with residential uses ranging from townhomes to apartments. Residential units are mixed with commercial uses on the same site when possible from a design and market feasibility stand point. The forms and features include 12 units per acre or higher at sites with direct access to major thoroughfare streets, and avoiding the creation of isolated multi-family developments. Edges of neighborhoods transition to lower intensity uses or buffer from industrial/commercial uses through design, landscaping, and buffering.

Non-Residential HI uses are more prevalent in the HI district that can include larger offices, medical buildings, commercial, limited industrial, and institutional uses such as churches, schools, or hospitals. The forms and features include an intensity of 0.8 FAR and higher, buildings up to eight stories, good access with multiple routes to highways and arterials, designed around pedestrians, and limited industrial uses allowed to mitigate anticipated negative impacts on adjacent land uses.

Figure 27 – High Intensity Land Use Examples


Apartments and Attached Housing

Commercial Retail/Services

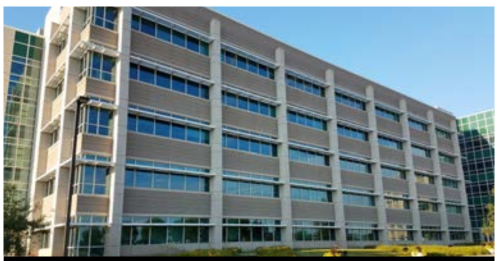
Industrial Areas

The characteristics of the northwest planning area are conducive for industrial development with adequate access to rail lines, interstate highways, employee housing, and the existing urban area. Several areas should allow for a broad range of industrial uses from small to large employers and include outdoor storage to large indoor manufacturing and warehousing facilities.

Business Park (BP) areas are preserved for larger business development, generally over 20 acres. Uses may focus on manufacturing, warehousing, distribution, office, office/industrial flex spaces. Commercial uses need to support the primary employment generators. The forms and features include higher standards for infrastructure and urban design (landscaping, connections, and storage screening), and buffering lower intensity uses. Special consideration is given to the image that travelers see for those areas along arterial roadways.

Light and Heavy Industrial areas are intended to house all types of industrial uses including manufacturing, warehousing, distribution, and office/industrial flex space. Uses in this area can be smaller in size than in the BP areas and aesthetic standards are less stringent. The forms and features include higher design/operational standards to ensure compatibility between employment uses inside and outside the area, operational standards that consider traffic, noise, lighting, and air quality, and strict control over signage, landscaping, and design necessary for locations nearer to low intensity uses.

Figure 28 – Industrial Land Use Examples


Large Scale Office/Corporate

LIght Industrial/Warehousing

Other Areas

Commerical areas include single-story to multistory retail, commercial, or office uses. FARs are greater than 0.3. The edges of these land uses should taper in form and intensity to achieve a compatible interface with the character of adjacent areas. Measures are taken so heavy traffic volumes do not impact adjacent areas.

Urban Reserve areas have minimal infrastructure (rural arterials; no transit, water, or sewer).Urban Reserve land should not be permitted to develop at urban or rural residential densities until such land is designated for residential development through a comprehensive plan amendment.

Public and Civic Uses are not individually identified on the land use plan. They have strong pedestrian connectivity for high traffic uses such as parks, schools, and public spaces.

Parks and Open Spaces are based around natural areas. Development is secondary through conservation subdivisions. They have specific policies for cluster development, minimal site disturbance, green infrastructure, and stormwater.

Figure 29 – Other Land Use Examples

Regional Commercial

Neighborhood and Community Parks

Conservation Development Areas

Some areas contain valuable environmental features like the Sheyenne River and greenways. With the significant amount of funds devoted to flood mitigation in the region, it is important to limit impacts of development on stormwater and habitat. Within the low, medium, and high intensity areas, development is allowed at localized higher densities to preserve natural areas. Individual projects are reviewed case-by-case

Community Agricultural areas are large planned developments with a mix of housing types built around a working food production for local use. They are designed much like a golf course community except the golf course is replaced with agriculture. The forms and features include areas for protected agricultural plots with clustered residential uses, community gathering space for farmers markets, community centers, prominent pedestrian pathways, and a mix of housing densities.

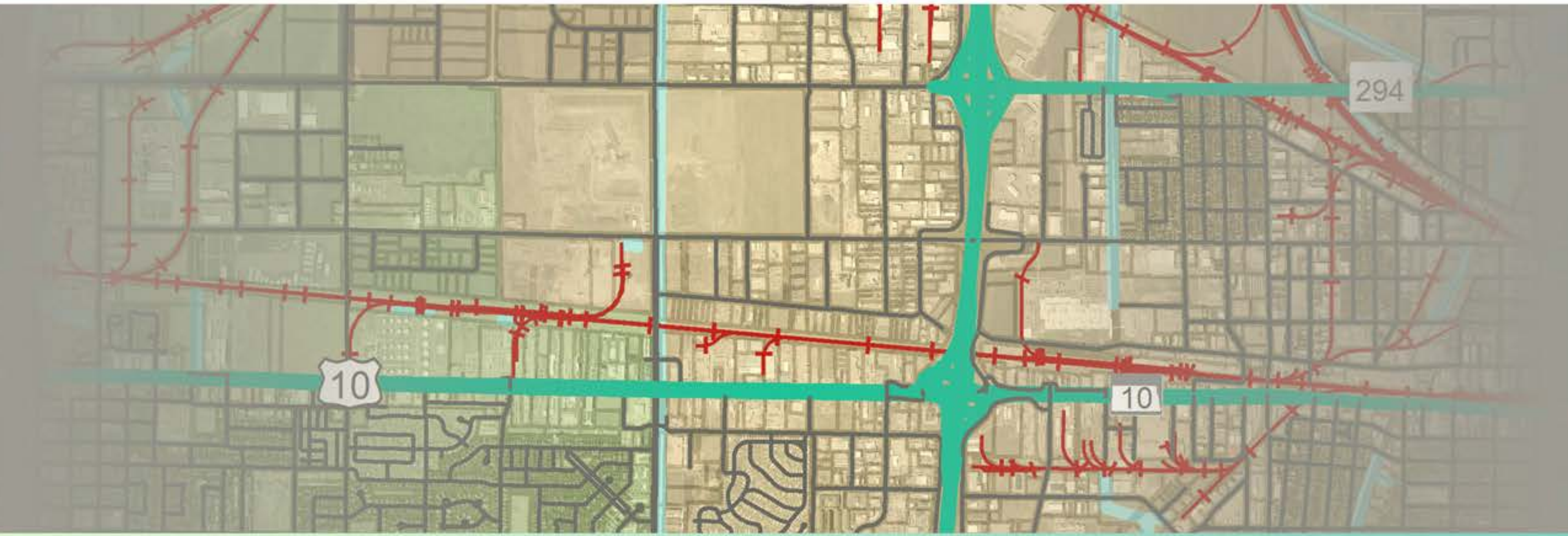
Conservation Subdivision areas agregate lower densities with localized higher densities to preserve environmental features and the character of the landscape.The forms and features include a varied density ranging from low to medium density residential, cul-de-sacs to preserve features, and housing on smaller lots to maximize utility and service connections.

Figure 30 – Conservation Development Land Use Examples

Conservation Subdivision

Community Agriculture

Chapter 3
Transportation Network Assessment



METROCOG
FM REGIONAL TRANSPORTATION PLANNING ORGANIZATION

Northwest Metro Transportation Plan

INTRODUCTION

The Northwest Metro Transportation Plan leveraged three unique modeling platforms, each with complimenting strengths to provide a detailed assessment of the study area's transportation needs. **Figure 31** is a graphical representation of how each model was used. The subsequent sections detail the strengths and weaknesses of each model, the process used to develop and analyze model inputs and outputs, and the findings. The analysis in this chapter focused on the base land use assumptions and roadway concepts. Deviations from this base configuration will be developed and assessed in the following chapter.

Figure 31 – Transportation Network Assessment Process

Travel Demand Model (TDM)

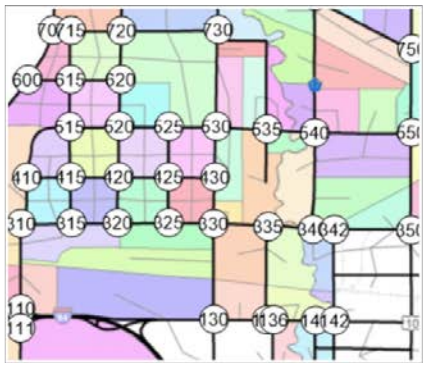
Tool: Cube Voyager

Use: Estimate regional traffic growth to calibrate TOM.

Use: Estimate regional attractions and develop origins and destination matrix.

Use: Evaluate major regional infrastructure changes (i.e. new bridges or roadways)

Traffic Operations Model (TOM)



Tool: PTV Vistro

Use: Translate daily traffic volumes from the TDM into peak hour traffic volumes.

Use: Model and determine capacity needs in terms of lanes and traffic control.

Use: Evaluate travel demand scenarios such as modal split, technology, and routing.

Roadway Infrastructure Model (RIM)

Tool: Bentley Concept Station

Use: Translate TOM capacity needs and alternative modes of travel plans into roadway concepts.

Use: Develop planning level cost estimates for roadway improvement decisions.

Use: Evaluate major infrastructure changes (i.e. new bridges or roadways)

TRAVEL DEMAND MODEL

The Fargo-Moorhead Metropolitan Council of Governments (Metro COG) maintains a regional travel demand model for transportation planning throughout the Fargo-Moorhead metro area. Travel demand models are tools that estimate traffic volumes as a function of spatially allocated demographic data, like the number of households and the number of jobs, for various time periods (i.e 2020, 2030, 2045). The current iteration of the Fargo-Moorhead regional travel demand model was developed for the 2045 Metropolitan Transportation Plan (MTP) update which was completed in 2019.

For the Northwest Metro Transportation Plan, a travel demand model analysis was used to estimate daily traffic patterns in the study area under multiple demographic scenarios. Results from the travel demand model can then be refined and converted to peak hour data for more detailed operations analysis. More information related to peak hour analysis is provided later in this report.

A summary of the travel demand model's strengths and weaknesses is provided in **Table 7.**

Table 7 – Cube Voyager Strengths and Weaknesses

Strengths	Weaknesses
• Estimates travel demand (i.e. traffic) and traffic patterns at a regional level. • Traffic is estimated as a function of expected demographic growth, not a function of time (i.e. annual growth rates). • Provides insights into trip origins and destinations. • Re-routes traffic based on the most efficient paths when roadway connections are added or removed.	• Volume shifts associated with capacity constraints are often difficult to model properly, meaning a roadway may show artificially higher modeled volume compared to reality, with real-world traffic diverting to less congested roadways. • The Fargo-Moorhead model does not include a mode choice component, limiting insights into non-motorized travel demand. • Model accuracy is dependent on sound demographic assumptions. The Fargo-Moorhead model only has demographic estimates through 2045, where full build-out in the study area is not likely to occur until after 2045.

Process

The modeling process that was used for the travel demand modeling component is shown in **Figure 32**.

Key Assumptions

Detailed discussion related to the planning and demographic assumptions is included in the appendix, with a summary of the key assumptions provided below. The full build future land use concept that was carried forward for the Northwest Metro Transportation Plan is shown in **Figure 33**. Each of the land use types and assumptions are discussed below.

RESIDENTIAL LAND USE DENSITY

Future residential land uses were sub-categorized into low, medium, and high intensity residential, with household densities per acre and the assumed composition of household sizes shown in **Table 8.** Household size is an important characteristic to identify because households with more people will generate more travel demand than smaller households.

Table 8 – Residential Land Use Density and Household Composition Assumptions

Category	Density	1 Person Households	2 Person Households	3 Person Households	4 Person Households
Low Intensity Residential	3.5 HH/acre	14%	31%	23%	32%
Medium Intensity Residential	8.1 HH/acre	44%	26%	19%	11%
High Intensity Residential	12.8 HH/acre	38%	31%	16%	15%

COMMERCIAL AND INDUSTRIAL LAND USE DENSITY

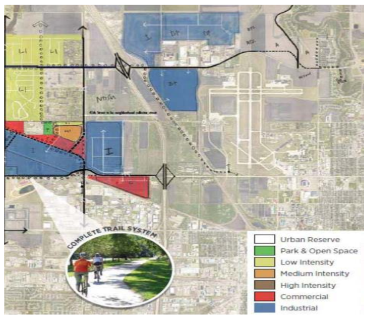
Assumed densities and the composition of employment types for future commercial and industrial land uses are shown in **Table 9**. Based on local and national development trends, it assumed that high intensity residential areas will have some mixed used commercial development as well.

Table 9 – Commercial and Industrial Land Use Density and Employment Composition Assumptions

Category	Density	Service	Retail	Construction	Manufacturing	Education	Wholesale	Agricultural
Commercial/ Business Park	13.1 jobs/acre	45.3%	53.1%	0.5%	0.2%	-	0.9%	-
Industrial Park	5.0 jobs/acre	9.0%	4.5%	9.4%	42.5%	-	34.5%	-
High Intensity Residential*	53.2 jobs/acre	65.3%	9.5%	2.3%	14.5%	3.5%	4.6%	0.3%

**Assumes mixed use development in High Density Residential areas*

Refine Area-Wide Land Use Assumptions

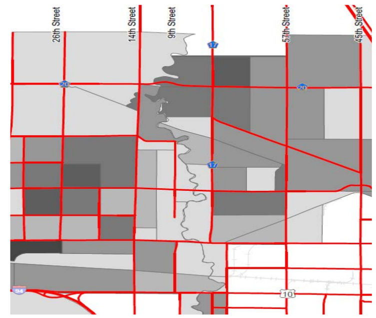


- The first step was establishing reasonable land use assumptions for the future, including locations, densities, and development trends.
- Land use growth was assigned to traffic analysis zones (TAZs). TAZs were split into smaller geographies where appropriate for a more precise allocation of future households and employment.

Establish Build Condition Demographic Scenarios

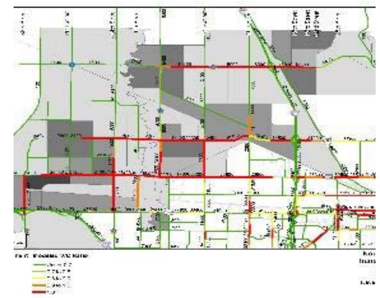
- Multiple development scenarios were developed based on the future land use plan to incorporate uncertainty in the land use development process.
- The three development scenarios assumed in travel demand modeling are:
  - Full-Build Scenario - anticipated to occur beyond 2045.
  - 50 Percent Build Scenario - approximately 50 percent of full-build that could likely be developed by 2045.
  - No diversion scenario - Expected development potential without a Red River Diversion, which correlated to about 25% build-out of the subarea.
  - More information related to demographic scenarios is provided in the Appendix.

Establish a Modeled Roadway Network



- A more refined future roadway network was modeled to reflect an urban transportation network. Note that this refined roadway network still does not include every roadway that would be present in the future, especially local, non-functionally classified roadways.
- The future roadway network was developed in parallel with demographic assumptions to best reflect reasonable access locations to future developments.

Run Updated Model and Evaluate Output Results



- Once the modeled roadway network and allocation of scenario-specific demographic data was established, the updated travel demand model was run for results.
- The output from this analysis is an area-wide estimate of daily traffic volumes for the three demographic scenarios (full-build, interim, no diversion).
- These results provide a high-level understanding of study area traffic patterns and were then used to guide the development of peak hour traffic for more detailed operations level analysis.
- Once a list of alternatives is developed, the travel demand model can be re-run with an updated network to understand area-wide impacts from infrastructure changes.

Figure 32 – Travel Demand Modeling Approach

TRAFFIC ANALYSIS ZONE (TAZ) DATA FOR TRAVEL DEMAND MODELING SCENARIOS

The assumed 2045 TAZ data (household and employment totals) for the three demographic scenarios (25 percent build, 50 percent build, and full build) under consideration are shown in **Figure 34**, **Figure 35**, and **Figure 36.**

Roadway Network

For the first iteration of travel demand modeling, all roadway links that do not exist today were modeled as a two-lane roadway, with existing roadways being modeled as they were in the 2045 MTP. Speed limits on future roadways were established using engineering judgment, and are shown in **Figure 37**.

Travel Demand Model Results

Daily modeled traffic volumes for the three scenarios under consideration are shown in **Figure 38**, **Figure 39**, and **Figure 40**.

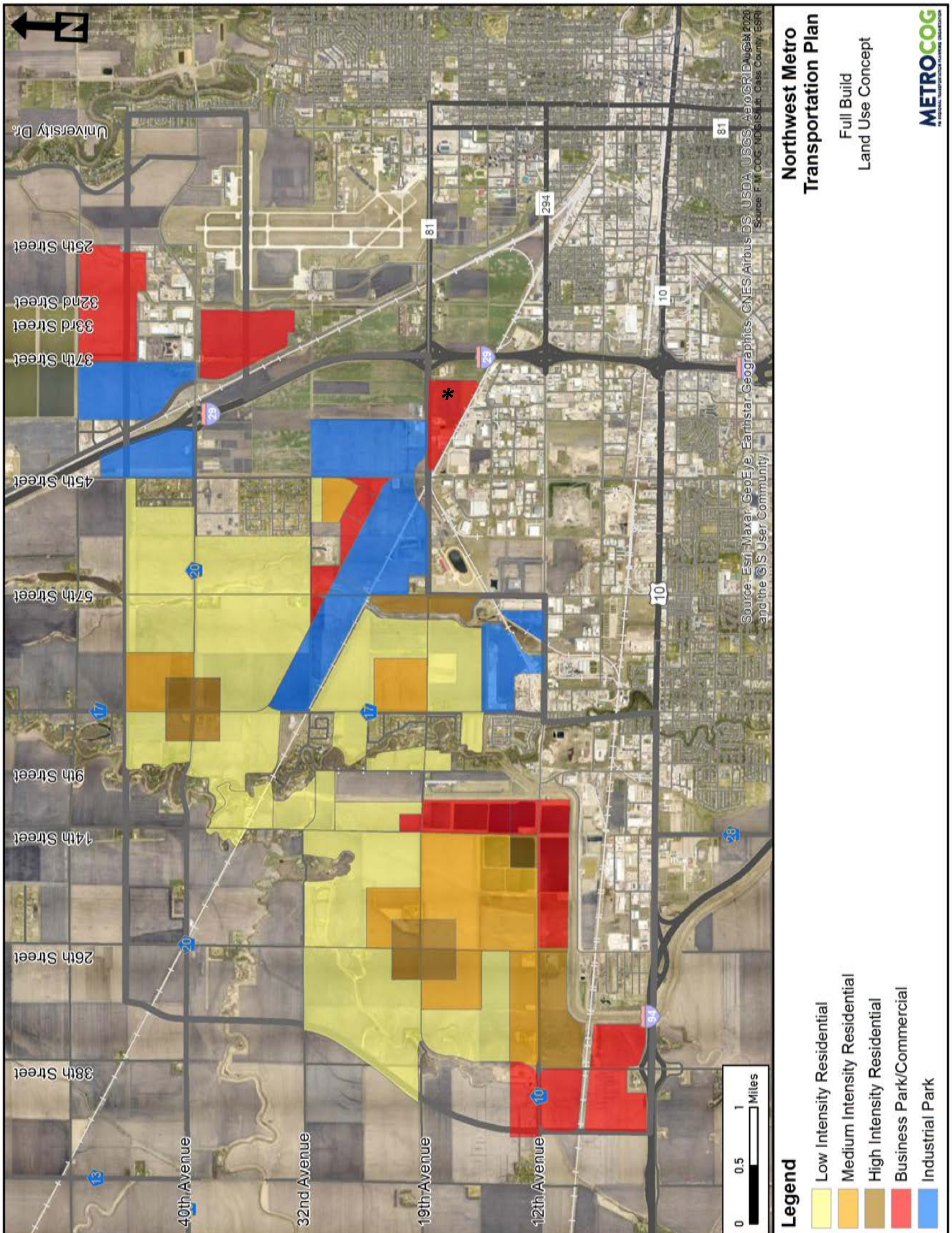
The full build scenario is anticipated to radically transform the study area, adding over 50,000 residents and 90,00 jobs. This great increase in development is expected to increase study area vehicle-miles traveled by nearly 725,000 vehicle-miles per day, and increase vehicle-hours traveled by over 25,000 vehicle-hours per day.

While less transformative than the full build scenario, the 50 percent and 25 percent development scenarios are also expected to introduce major changes to the study area. The 50 percent development scenario is expected to add around 37,000 residents and 57,000 jobs, and the 25 percent development scenario is expected to around 14,000 residents and 29,000 jobs.

A summary of demographic changes and area-wide traffic changes for each scenario is shown in **Table 10**.

Table 10 – Travel Demand Modeling Summary

Subarea Totals	2045 Base Model	25% NW Subarea Growth	50% NW Subarea Growth	100% NW Subarea Growth
Households	1,952	+6,606	+18,097	+27,772
		+238%	+827%	+1323%
Population	4,898	+13,664	+37,342	+56,816
		+179%	+662%	+1060%
Jobs	9,519	+28,658	+56,959	+90,015
		+201%	+498%	+846%
Miles with 10-20k ADT	1.75	+4.4	+11.6	+9.4
		+149%	+560%	+434%
Miles with 20-30k ADT	0	+2.8	+4.0	+11.8
		-	-	-
Miles with 30k+ ADT	0	+0.0	+0.0	+8.0
		-	-	-
VMT	73,419	+113,239	+393,435	+724,573
		+54%	+436%	+887%
VHT	781	+2,398	+7,883	+25,592
			+909%	+3176%



*Unlikely to be commercial land use.

Figure 33 – Full Build Land Use Concept

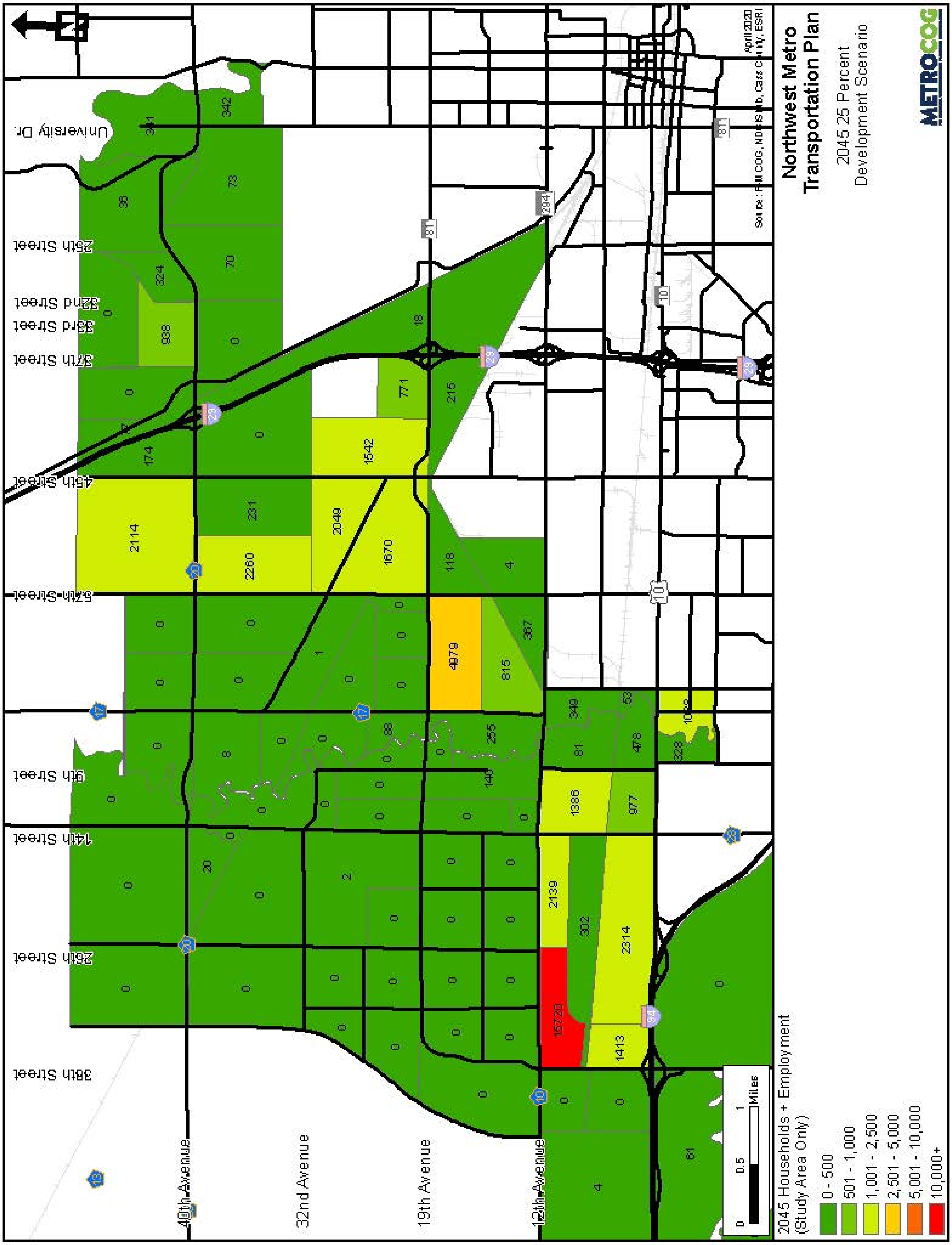


Figure 34 – 25 Percent Build TAZ Data

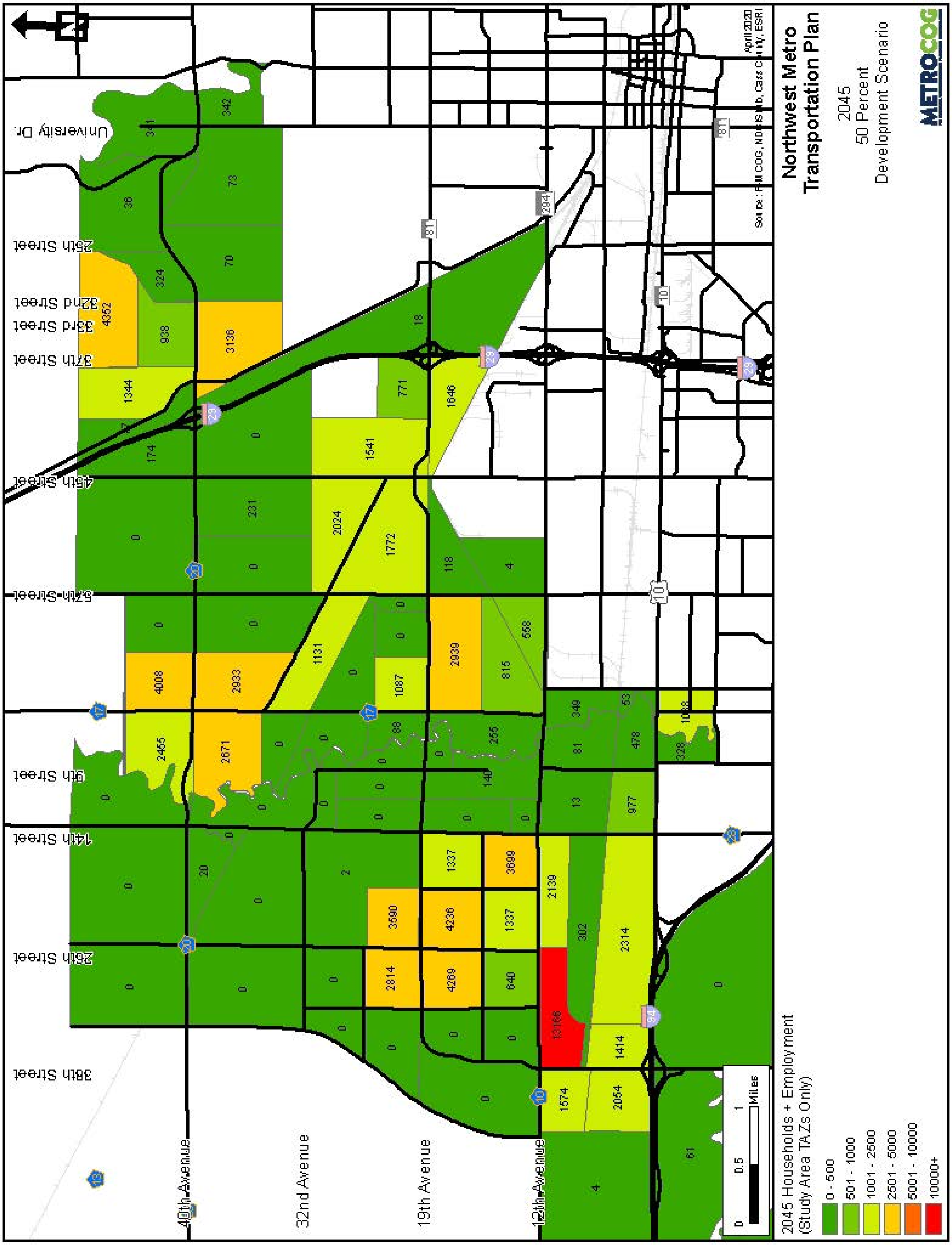


Figure 35 – 50 Percent Development Scenario TAZ Data

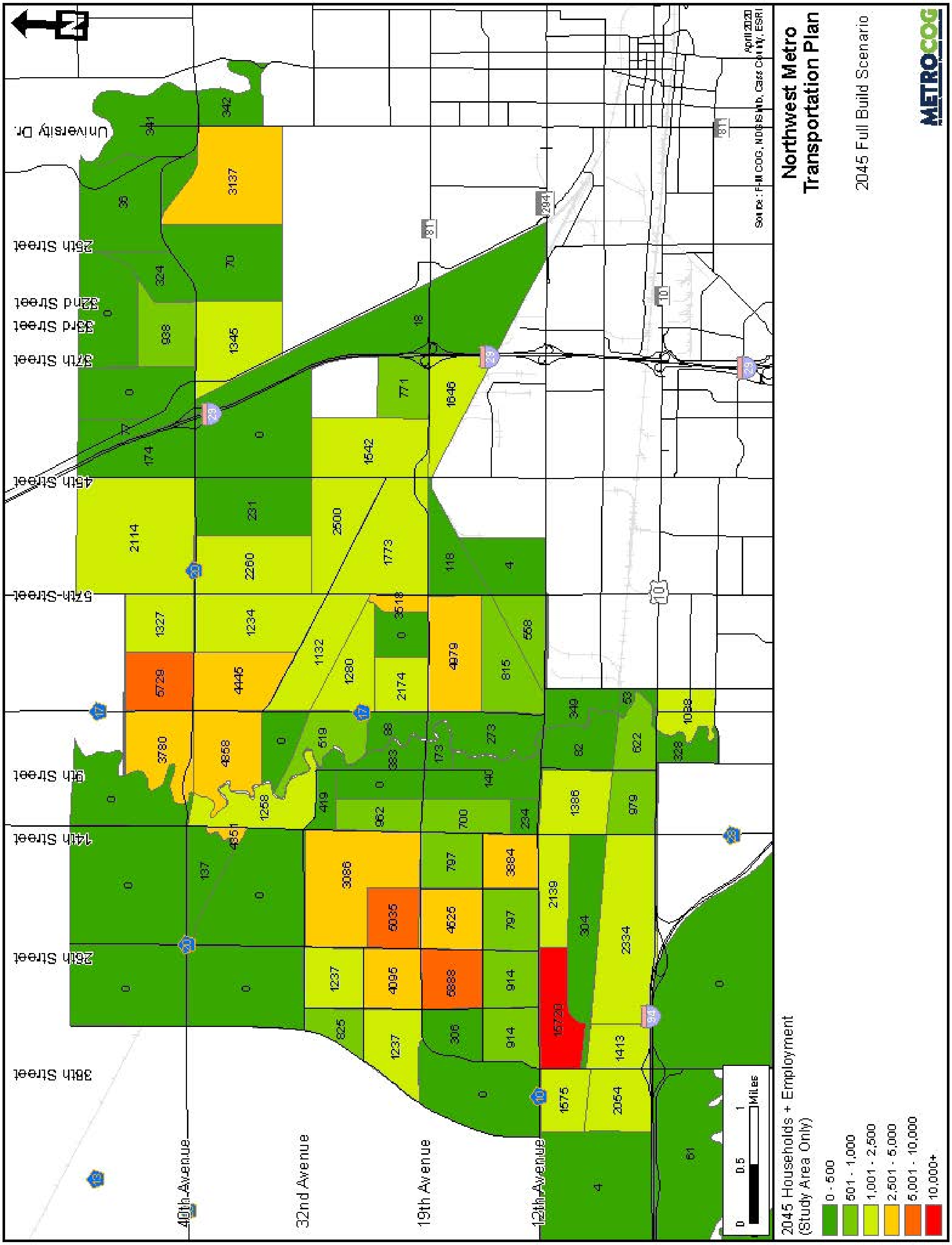


Figure 36 – Full Build Development Scenario TAZ Data

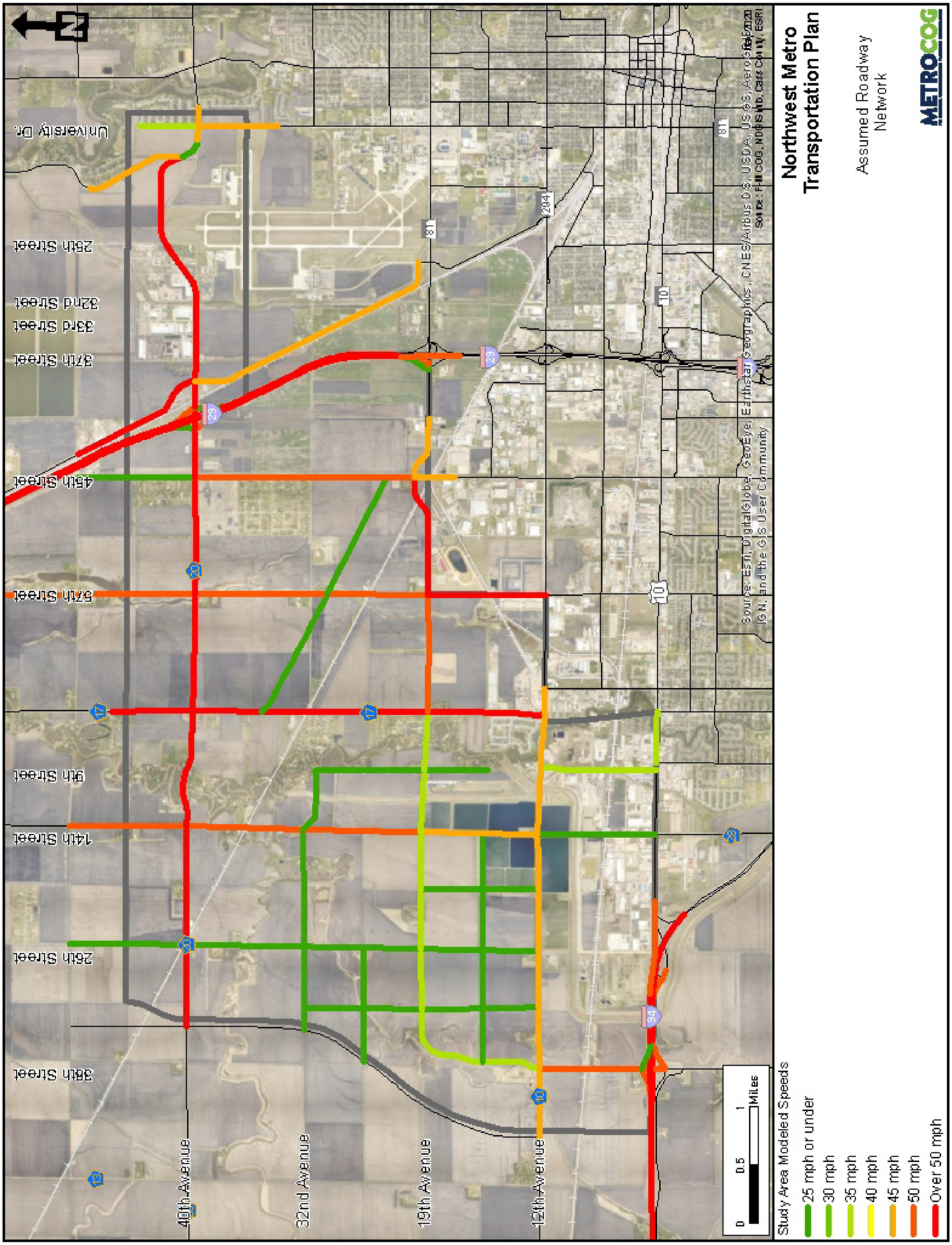


Figure 37 – Modeled Speed Limits on Study Area Roadways

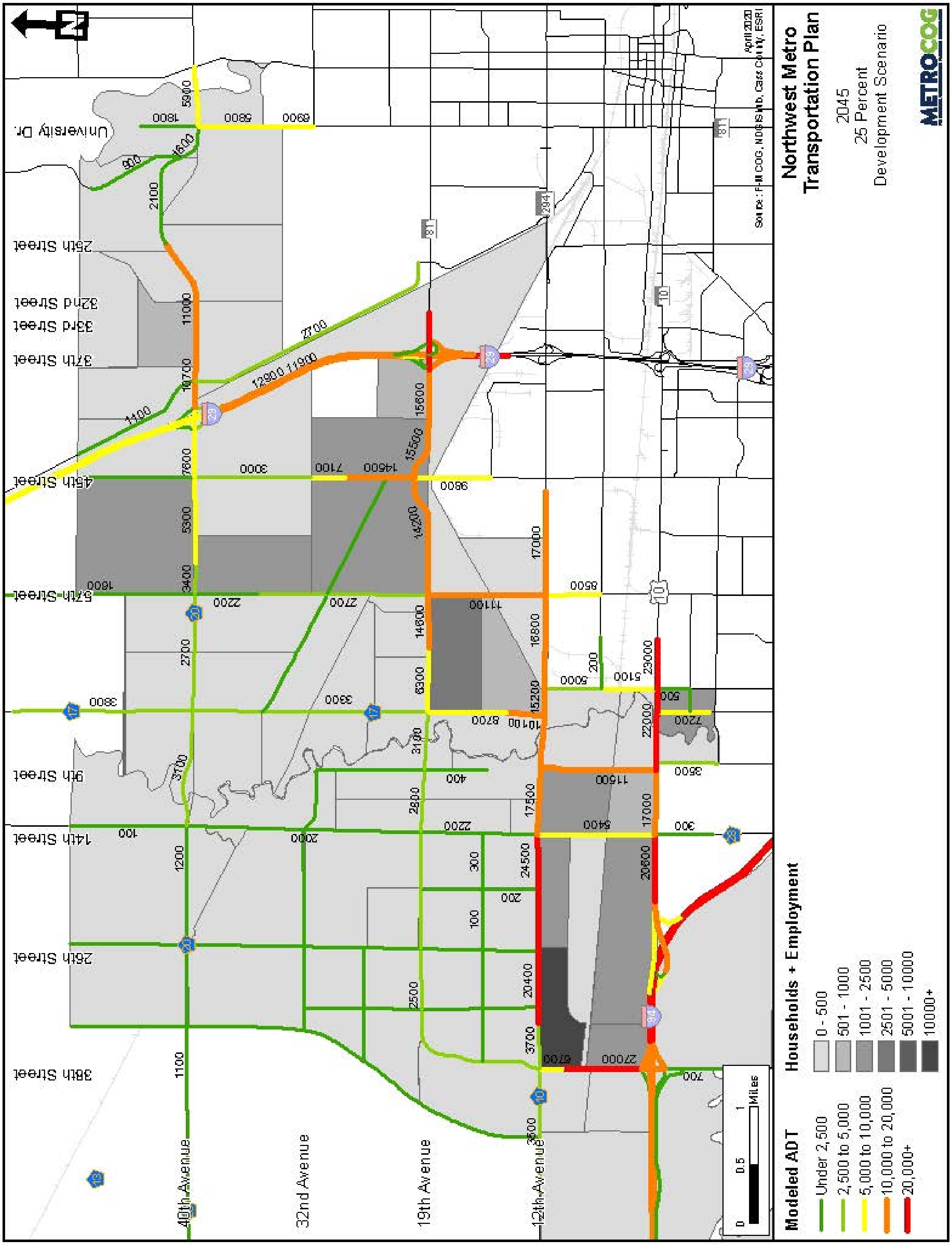


Figure 38 – 2045 Modeled ADT in 25 Percent Build Scenario

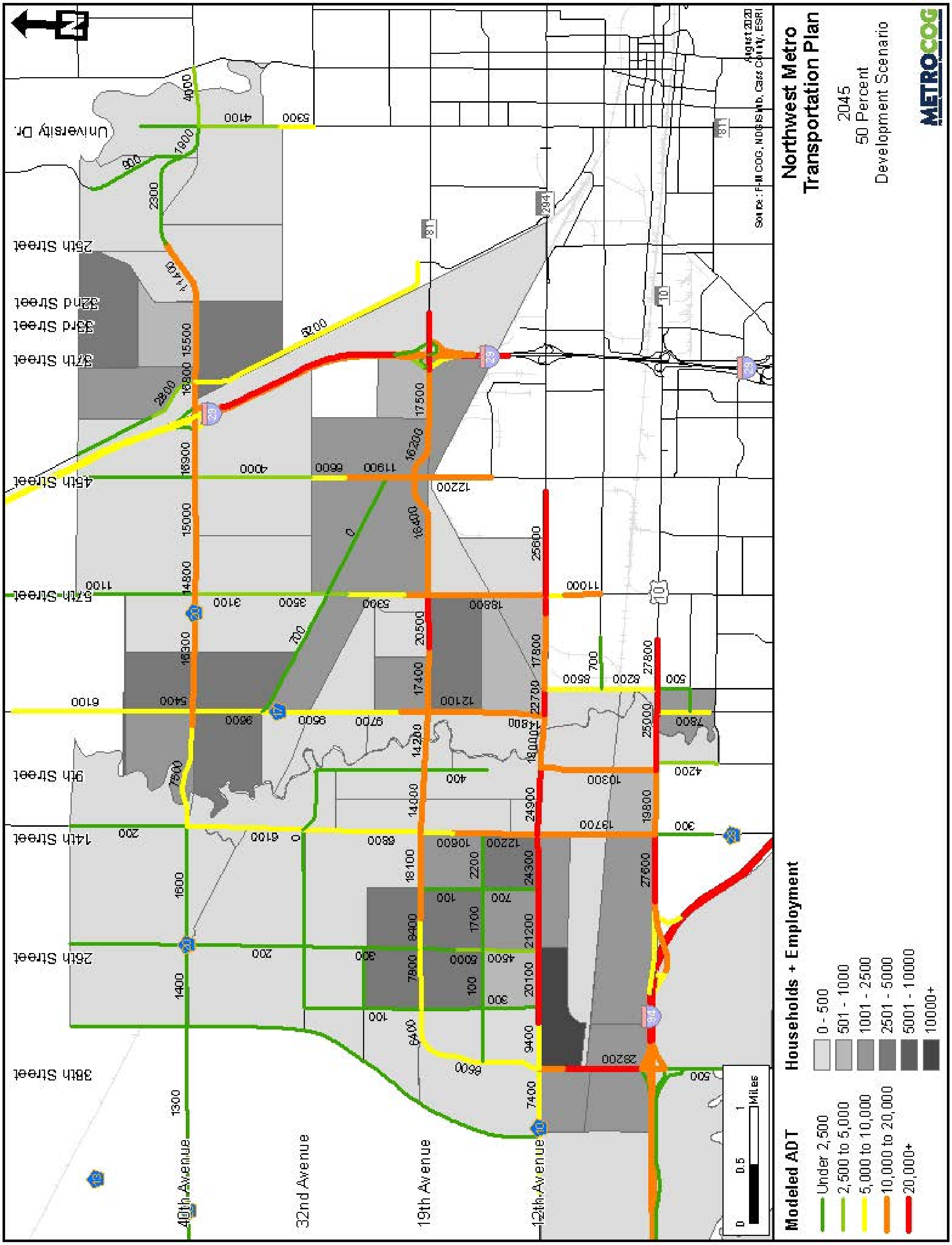


Figure 39 – 2045 Modeled ADT in 50 Percent Development Scenario

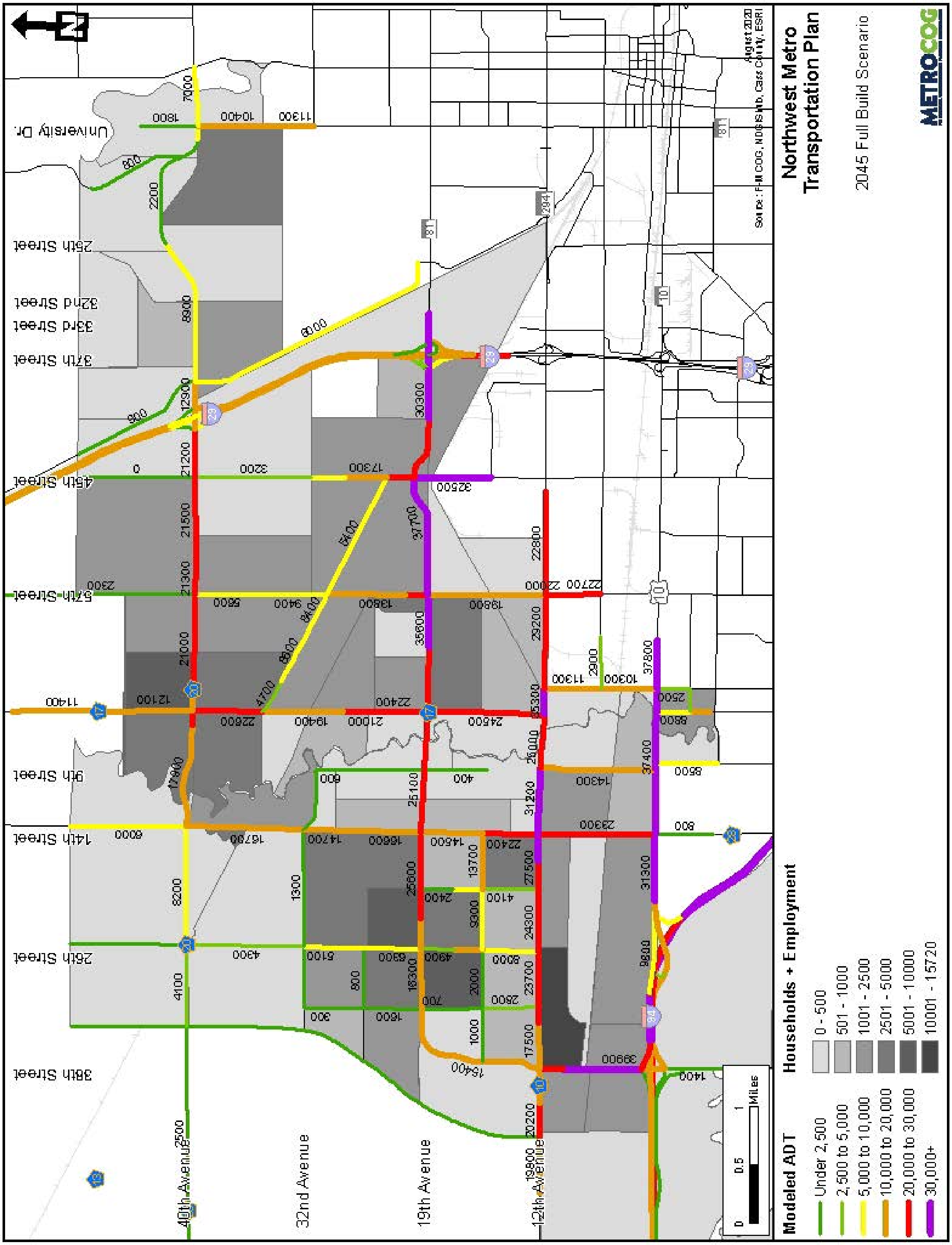


Figure 40 – 2045 Modeled ADT in Full Build Scenario

TRAFFIC OPERATIONS MODEL (TOM)

The traffic operations model (TOM) bridges the information gap between the travel demand model and project programming. The TOM can process high level trip generation data and turn it into a detailed analysis whose results can more accurately guide roadway cross section selection and optimum intersection control than the travel demand model. The TOM can be more easily modified to understand the impacts land use changes and trip making behavior have on transportation demand and potential thresholds for higher level transportation investments (intersection control, number of lanes, grade separations, etc.).

The software used for the TOM was PTV Vistro, which is a modeling tool that provides a Highway Capacity Model (HCM)-based capacity analysis. PTV Vistro offers the flexibility to analyze multiple peak hour development scenarios using the same base model to better understand development traffic flow throughout the roadway network. **Table 11** provides more information about the strengths and weaknesses of this software.

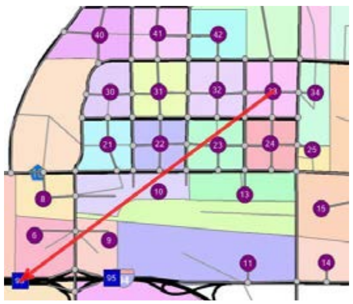
Table 11 – Vistro Strengths and Weaknesses

Strengths	Weaknesses
• Provides detailed peak-hour operational analysis capable of assessing capacity, control, and turn lane needs. • Creates a baseline for routing traffic so trip assignment does not have to be done manually which is good for large and complex study areas to aid in scenario analysis. • Allows for detailed traffic control analysis. • Allows for seamless analysis of various scenarios such as mode choice, routing decisions, and other more localized decisions that often require calibration. • Allows for optimization of signal timing and corridor progression.	• Time intensive to build traffic growth assumptions. • Requires regional model to estimate attraction between growth areas and external points. • Routing decisions prioritize shortest distance so manual adjustments are necessary.

PROCESS

Developing the TOM was a four-step process as described in **Figure 41**. The process begins by converting land use growth assumptions assigned to traffic analysis zones (TAZs) into total daily trips in that zone. These total daily trips were then assigned to the transportation network based on their destination and the functionally classified roadway system. The routing decisions determine the turning movements at each intersection and are converted to peak hour turning movements. Finally, a peak hour traffic operations analysis was completed for the 50 percent build scenario and the full build scenario. The 25 percent build scenario had traffic volumes low enough that detailed analysis at this scale was not necessary. Using the base scenario, 50 percent build scenario, and full build scenario allows for the extrapolation of needs to whatever growth condition may be desired.

Convert Land Use Growth Assumptions into Peak Hours

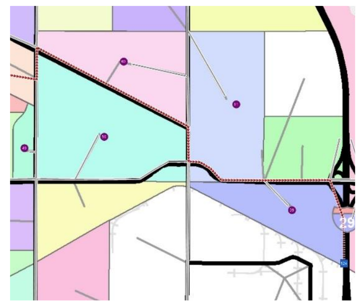


- TAZs with daily trips less than 200 vehicles or that experienced negative growth from 2015 to 2045 were excluded.
- Daily trips were established from centroid connector volumes sourced from the TDM. These centroid connectors represent unknown configurations of local roads that would service the TAZs.
- Once total daily trips were established, they were assigned to other zones within the study area or to external roadways leading out of the study area.
- Internal study area trips were assigned using the Origin-Destination Matrix output from the TDM and the remaining trips were assigned to external roadways based on exisitng and future ADTs.

Develop Routing Decisions

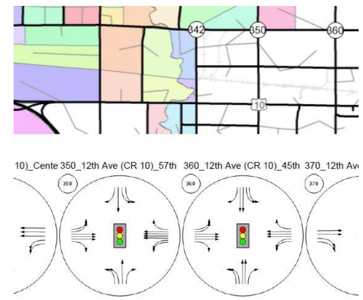
- To begin routing traffic, volumes needed to be fed onto the network from the TAZ. Since the configuration of these local roadways is unkown currently, a singular roadway with an undefined control type was used for volume delivery onto the network. These intersections were not analyzed or included in results reports.
- Once trip assignment was defined in Vistro, the software automatically created routes for each unique trip between locations.
- These routes were reviewed and manually adjusted based on local knowledge and future functional classification. Trips were calibrated and adjusted based on the TDM.
- Vistro automatically converts the routing to turning movements at all intersections.

Establish Peak Hour Capacity Needs



- To establish a baseline, a no-build future scenario with existing infrastructure and two lane undivided roadways was created. This initial analysis revealed large capacity deficiencies and became a starting point to build geometry for the traffic growth scenarios.
- Daily traffic from the TDM was consulted to confirm decisions about roadway cross section, turn lanes, and intersection control.

Evaluate Traffic Control Needs



- Initial control at future intersections was assumed to be two-way stop controlled before mitigation.
- Signals were considered where crossproducts of ADTs warranted.
- Once roadway capacity and control was generally established, the signals were optimized and coordinated to improve LOS. Turn lanes were also considered to alleviate delay.
- Different combinations of turn lanes and control were assesed until all intersections operated acceptably without being over-built.
- Certain corridors were tested for roundabouts after the initial mitigation.

Figure 41 – Traffic Operations Modeling Process

KEY ASSUMPTIONS

The following sections detail the critical assumptions necessary to translate daily forecasted traffic volumes into turning movement counts to be used for capacity and traffic control analysis. Detailed Vistro outputs can be found in the appendix.

TRIP ASSIGNMENT ASSUMPTIONS

A variety of assumptions were necessary to convert the travel demand model outputs of daily trips into peak hour trips necessary to complete traffic operations analysis, specifically K-factors and D-factors. K-factors are the proportion of daily traffic occurring in a specific hour, like an AM or PM peak hour. D-factors are the proportion of traffic moving in the higher volume direction. For example, a D-factor of 0.5 means half of traffic was entering a traffic zone and half was exiting the traffic zone. These assumptions include:

- Existing volumes were created from recent daily traffic volume counts. A K-factor of 6.7 percent was used for the AM peak hour and 8.2 percent for the PM peak hour based on the NDDOT Annual Traffic Report. A D-factor of 0.6 was used for AM outbound traffic heading southeast and PM inbound traffic heading northwest. A D-factor of 0.4 was used for AM inbound traffic heading northwest and PM outbound traffic heading southeast. The D-factor was determined based on local knowledge and engineering judgment.
- Similar to existing traffic, daily future traffic used a K-factor of 6.7 percent for the AM peak and 8.2 percent for the PM peak. However, information from the Institute of Traffic Engineers Trip Generation Manual was used to assign inbound and outbound percentages to TAZ volumes. The methodology for this is shown in **Table 12.**
- Trips that do not begin and end in the northwest study area were distributed to the external roadway leaving the study area based on existing and future daily traffic volumes. **Table 13** and **Figure 42** provides the detailed external trip assignment.

Table 12 – In and Out Percentages for TAZ Generated Traffic

TAZ General Classification	Criteria	ITE Trip-Generation Code	AM Peak Hour		PM Peak Hour	
			IN%	OUT%	IN%	OUT%
Primarily Residential	More than 70 percent of the TAZ trips originate from household productions	LUC 210-Single-Family Detached Housing	25%	75%	63%	37%
Mixed Use	Trips from this TAZ do not originate more than 70% from either job attractions or household productions	LUC 270-Residential Planned Unit Development	22%	78%	65%	35%
Primarily Commercial	More than 70% of the TAZ trips originate from job attractions	LUC 820-Shopping Center	62%	38%	48%	52%

Table 13 – TAZ External Trip Assignment

Roadway Leaving Study Area	Existing ADT	Full Build ADT	External Traffic Share
I-94 to/from the west	17,420	40,200	10%
I-94 to/from the southeast	22,480	68,470	10%
45th Street to/from the south	16,945	32,502	10%
I-29 to/from the south	62,220	86,200	25%
12th Avenue to/from the east	20,410	22,800	7.5%
I-29 to/from the north	21,695	21,200	7.5%
19th Avenue to/from the east	20,460	41,300	10%
Main Avenue to/from the east	15,770	47,600	10%
9th Street to/from the south	15,990	13,700	5%
Sheyenne Street to/from the south	11,775	8,800	5%

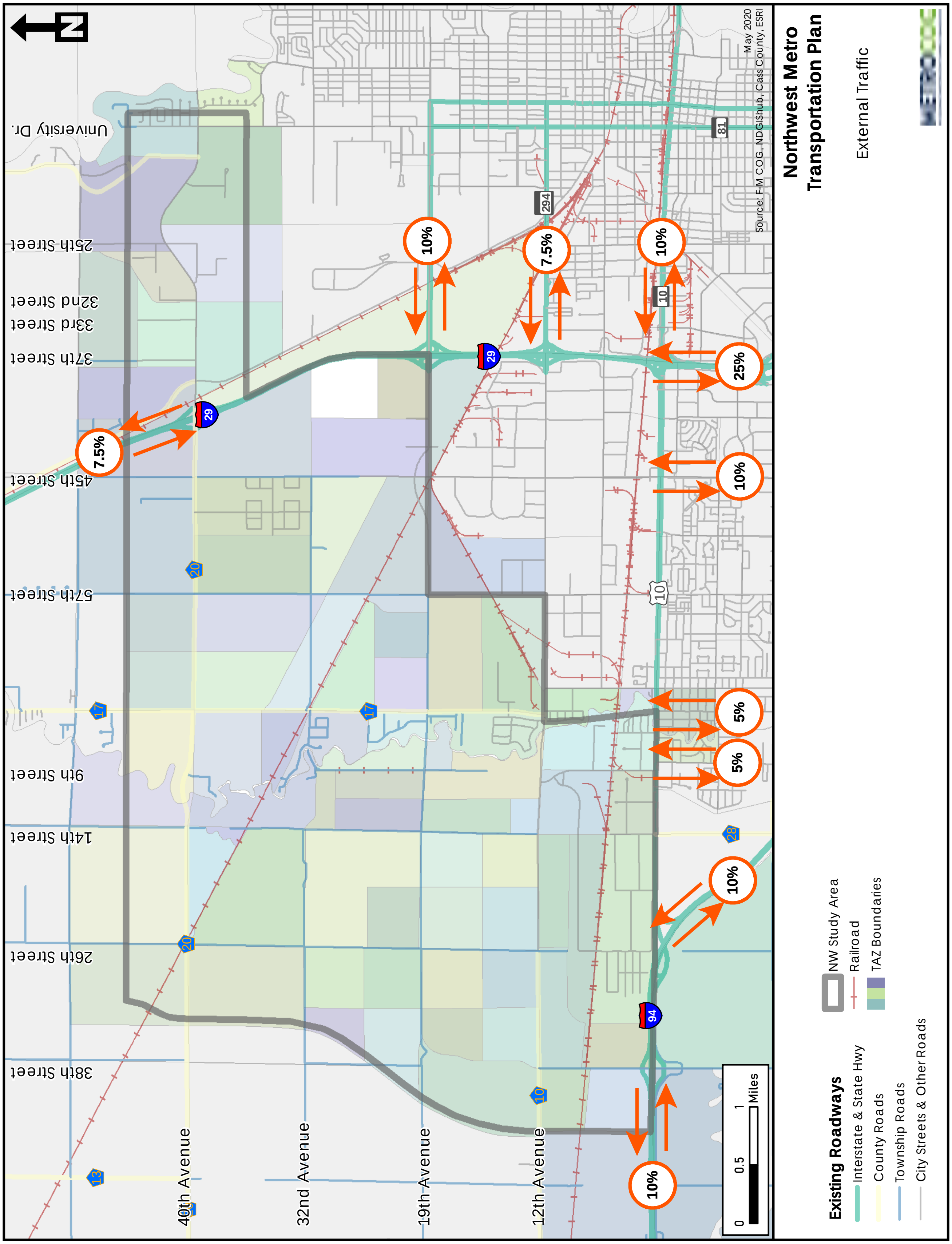


Figure 42 – TAZ External Trip Assignment

CAPACITY AND CONTROL ASSUMPTIONS

In addition to the trip assignment assumptions, additional assumptions were necessary to establish the roadway capacity and intersection control analysis.

- Additional access points and driveways and their impacts to capacity were not considered because the information is not reasonably available. Adding more access points reduces the roadways capacity but can also help distribute traffic demand across multiple roadways. Overbuilding a roadway in anticipation of these reductions results in higher costs. As development occurs, more refined traffic analysis will be completed that can better address these needs. If the two Cities follow their existing access management standards and direction layed out in Metro COG's Fargo/West Fargo Parking and Access Study (2018) the proposed access will be effective.
- Signals were not attempted for mitigation if the cross product of the ADTs for the roadways was not greater than 20,000,000. For example, an intersection with one roadway carrying 5,000 vehicles each day and the other roadway carrying 3,000 vehicles each day has a cross product of 15,000,000, thus making it unqualified for traffic signal control mitigation. This threshold is found in the NDDOT Traffic Operations Manual. This produced some deficient intersection under future scenarios. This condition is not uncommon at low-volume two-way stop controlled roadways trying to access major thoroughfares.
- Roundabouts were considered at intersections that met the following criteria:
    - There are no multi-lane roundabouts in North Dakota, so intersections with a six-lane roadway were excluded from roundabout consideration.
    - Additionally, multi-lane roundabouts have inconclusive safety benefits, but generally reduce crash severity.
    - To avoid progression challenges related to switching traffic control between signals and roundabouts, at least two roundabout intersections in a row was required.
    - Single lane roundabouts were recommended if the intersection LOS was equal to a traffic signal due to the clear safety benefits provided by single lane roundabouts.
    - At skewed intersections, roundabouts were considered to mitigate the adverse effects of misaligned intersections. Where operations permitted, roundabouts were evaluated on skewed roadways.
- Dual left turn lanes were considered for turning movement volumes greater than 300 in either the AM or PM peak hour. They would operate as protected only phases
- Left turn lanes at signalized intersections that crossed more than three lanes of traffic were operated as protected only.

FINDINGS

The TOM was completed for two scenarios, the 50 percent build scenario and the full build scenario. **Table 14** provides the best fit improvements for the two scenarios.

Generally, under the 50 percent build scenario, most traffic needs can be accommodated with a two or three lane cross section. However, there are some corridors that will require a four/five lane section, specifically 12th Avenue and 14th Street, which already provides access, mobility, and connectivity to the industrial park, I-29, and North Dakota State University as well as multiple commercial, institutional, and residential uses. Currently, 12th Avenue east of 45th Street is a five-lane section. Many of the intersections will require improved traffic control to provide acceptable levels of service. There are four intersections that operate deficiently, although these are at two-way stop control intersections that see very low side street traffic volumes and high mainline traffic volumes. For the purposes of this study, this is considered acceptable, but will need to be monitored as development occurs.

Under the full-build scenario, traffic demand increases significantly and requires roadway expansion on major corridors. While more than half of the roadways still operate effectively as a two/three lane section, 20 percent of roadways would require a six/

seven lane section. More than half of intersections operate in the LOS C or D, which is still acceptable, but will require regular monitoring to ensure safe and effective operations. Nearly every intersection on 12th Avenue will require dual left turn lanes in every direction. This will create large intersections that become challenging for pedestrian and bicycle movements.

Table 14 – Traffic Operations Modeling Summary

Criteria	Existing Conditions	50% NW Subarea Growth Best Fit Improvements	100% NW Subarea Growth Best Fit Improvements
2/3 Lane Roadways in Subarea	40.4 Miles (100%)	39.8 Miles (73%)	29.6 Miles (55%)
4/5 Lane Roadways in Subarea	0 Miles (0%)	14.4 Miles (27%)	13.2 Miles (24%)
6/7 Lane Roadways in Subarea	0 Miles (0%)	0 Miles (0%)	11.4 Miles (21%)
% of Intersections in LOS A-B	39 (100%)	29 (51%)	25 (44%)
% of Intersections in LOS C-D	0 (0%)	24 (42%)	29 (51%)
% of Intersections in LOS E-F	0 (0%)	4 (7%)	3 (5%)

**Includes modeled roadways only.*

One important consideration in these results is that the model can only consider the modeled roadways. This means that if developments increase connectivity and provide a more traditional grid network, roadway capacity needs on major corridors may be able to be mitigated. The impacts of a traditional grid network will be limited on the southern edge of the study area where the grid has already been limited by existing development and on corridors with interstate interchanges.

ADDITIONAL CONSIDERATIONS

Three areas were identified for further analysis in later sections of the report:

- CR 20 from CR 17 to University Drive. This corridor is the most likely to experience short-term growth and functions at a similar level with traffic signals and roundabouts. A more detailed analysis will be completed to compare advantages and disadvantages of each traffic control.
- East-West Corridor Configuration. Given the lack of supplemental east-west arterials, these corridors became very wide and still had poor operations in full-build scenarios. Locally, it is very uncommon to have arterials spaced two full miles apart. This design also does not align with current parallel routing visions set forth by both Fargo and West Fargo. In later chapters, concepts to adjust the east-west traffic flow will be assessed.
- South Gateway Access. Access to the west side of the study area can be challenging from the south given the lack of access from I-94, the Sheyenne Diversion, and railroad tracks. To unlock the potential of the west portion of the study area, alternative access configurations will be considered. The configuration of the Raymond Interchange (38th Street) will also be studied in greater detail.

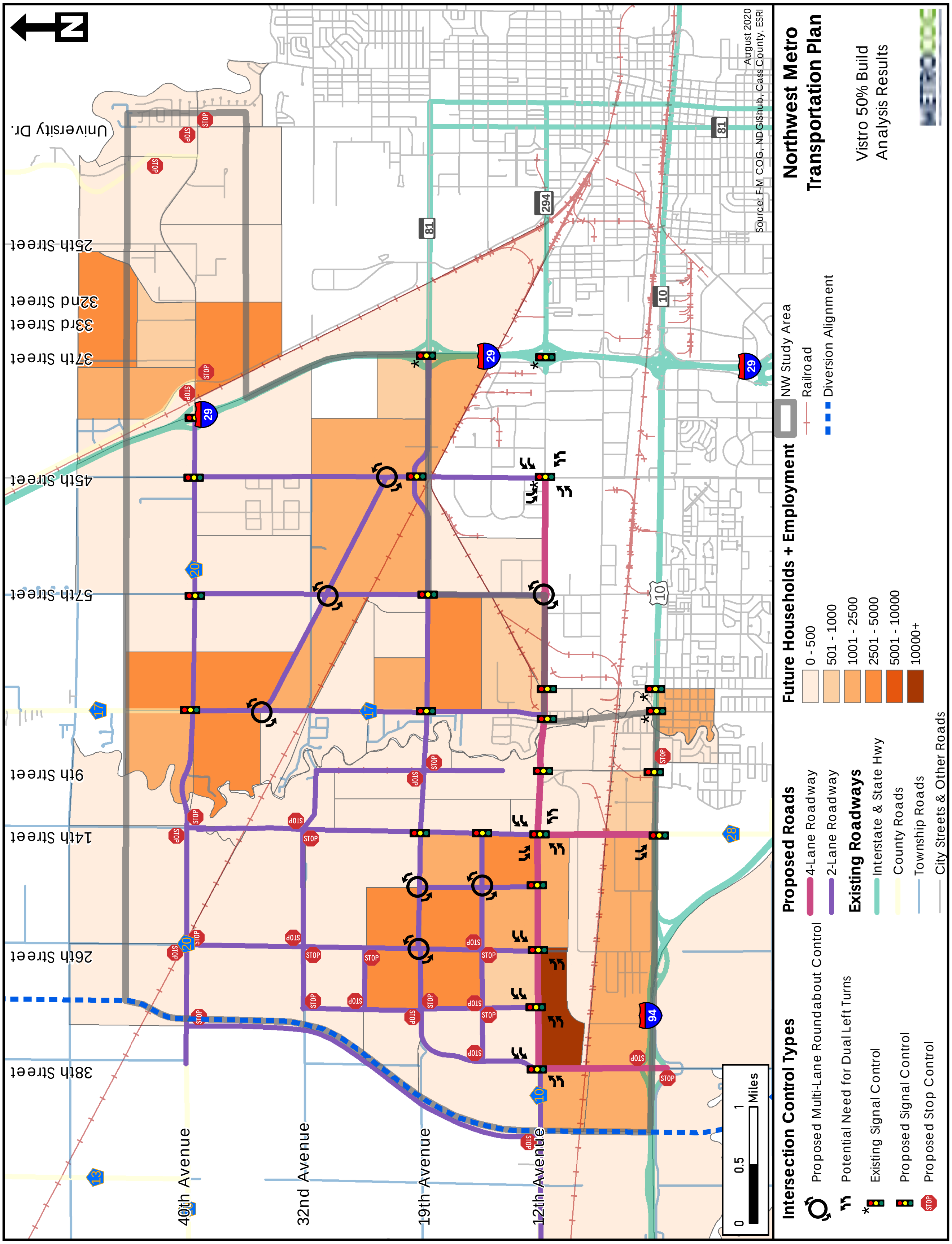


Figure 43 – Capacity and Traffic Control Needs for 50 Percent Build Scenario

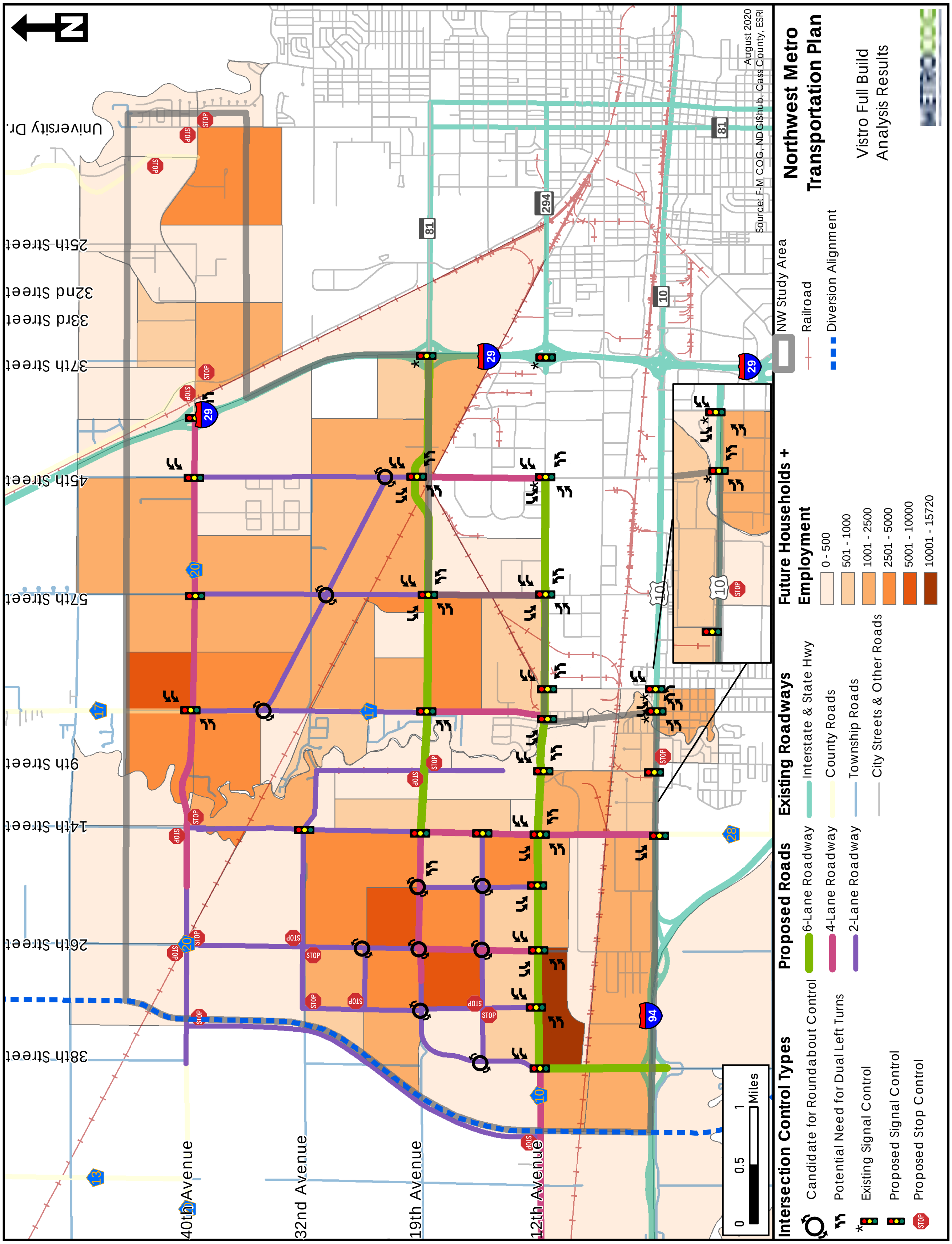


Figure 44 – Capacity and Traffic Control Needs for Full Build Scenario

ROADWAY INFRASTRUCTURE MODEL (RIM)

The Roadway Infrastructure Model (RIM) provides guidance to policy makers on costs associated with implementing the planned development in the northwest study area. Typically, planning level cost estimates are generic costs per mile of roadway constructed by cross section type. The RIM includes more context specific estimates that consider local terrain, unique cross sections, and local specifications for roadway construction. The RIM works cohesively with the TOM by adjusting roadway cross section types based on capacity demand to understand the associated costs. The goal of the RIM is to assist with planning decisions, by adding future costs as another data point for alternative comparison and to help with future programming and budgeting.

The RIM was developed using Bentley's OpenRoads ConceptStation which is a conceptual road network design software. The software models road alignments, horizontal and vertical geometry, cross sections, bridges, and drainage structures. The program then calculates basic construction quantities, such as earthwork, road sub-base, asphalt, and concrete. A cost estimate is then calculated based on factors that can be adjusted in the program. Once a roadway alignment is created, the cross section type can easily be changed to address multiple design scenarios. **Table 15** briefly describes some of the strengths and weaknesses of ConceptStation.

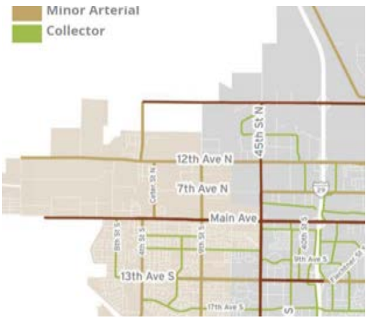
Table 15 – ConceptStation Strengths and Weaknesses

Strengths	Weaknesses
• Provides reliable and efficient planning level cost estimates. • Allows for integrated four-dimensional concept modeling (x, y, z and cost). • Provides substantially more detailed cost estimates than per-mile estimates which are common on subarea studies of this magnitude. • Utilizes AASHTO standards for design. • Can be integrated into design platforms for final design. • Highly customizable for various unique cross section types and potential terrain restrictions.	• Labor intensive to create each roadway section type. • Not as refined as traditional concept layouts, specifically in relation to specific roadbed and striping design. • No specific costs for demolition of current roads to expand. All roadway costs are based on a brand-new build so will tend to overestimate costs.

PROCESS

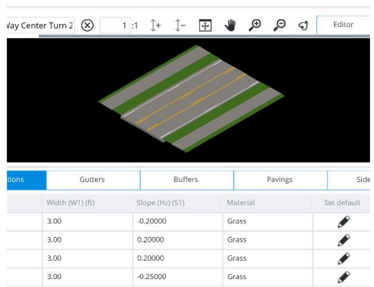
Developing the RIM was a four-step process as shown in **Figure 45**. The process begins with developing a functional classification system for the study area. Then, typical sections were created based on the functional classifications, local standards, and NACTO design guidelines for complete streets. Next, cost assumptions were developed for items included in each model based on recent local projects. Finally, roads were modeled using classification specific typical sections and cost reports were exported. Additional costs were added in for items not included in ConceptStation including water, storm sewer, and sanitary sewer.

Establish Functional Classification Network



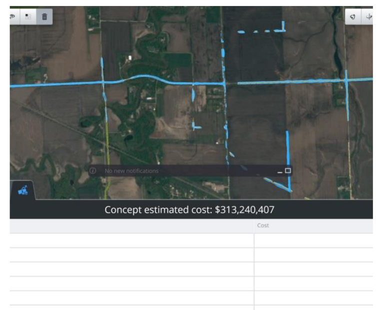
- Reviewed best practices for roadway development, based on intended use and planned developments in the area.
- Reviewed the Fargo-Moorhead-West Fargo Access Study to determine appropriate functional classifications in the study area.
- Local examples of each functional classification were identified.

Develop Cross-Sections



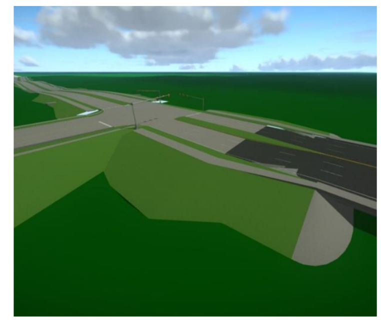
- After reviewing local examples, the City of Fargo Standard Specifications for Concrete and Asphalt were reviewed to develop cross sections.
- NACTO guidelines for complete streets were applied to each cross section type to ensure the RIM would incorporate full development of the area for all users.
- Cross sections were created in ConceptStation.

Establish Cost Estimation Assumptions



- Recent local projects were reviewed for costs.
- Estimates per mile of roadway, by roadway type were developed for storm sewer, water, and sanitary sewer.
- Average bid amounts were used wherever possible for other factors in Conceptstation like roadway excavation, sub-base, concrete, etc.

Model Roadway Network



- Roadway alignments and intersections for proposed roadways were created.
- Drainage structures and bridges were added where necessary.
- Vertical geometry adjusted for continuity between roadways and appropriate cover for drainage structures.
- Models were constructed for the 50 percent build scenario and full build scenario.
- Costs were exported from ConceptStation and additional utility costs were added.

Figure 45 – Roadway Infrastructure Modeling Process

KEY ASSUMPTIONS

Multiple assumptions were made when developing the RIM. Creating a final design for an area of this magnitude would take many months, if not years to complete. Models accounted for anticipated needs of bridges and drainage structures as much as possible, however environmental and hydraulic studies will need to be completed as part of project development. Detailed cost estimate assumptions can be found in the appendix.

MODEL ASSUMPTIONS

- The focus of the model was to develop costs for capacity decisions, significant investments such as structures, and the impact of terrain. Minor details like an extra turn lane was not considered in the overall design but was factored using cost contingencies.
- No hydraulic analysis was completed for box culverts. Sizing was based on existing drainage structures in similar applications.
- Eighteen inches of base material was used for all cross sections to match similar roadways and cross section requirements throughout the metro area.
- Concrete roadways were assumed for commercial arterials, mixed use arterials, and mixed-use collectors. Asphalt roadways were assumed for residential collectors. Intersections were assumed to be constructed of concrete when at least one of the intersecting roadways was concrete
- Bicycle and pedestrian facilities were incorporated for all typical sections and followed the NACTO design guidance based on traffic volumes, speed, and context. More details on the bicycle and pedestrian facilities can be found later in this report.

COST ASSUMPTIONS

- Per mile utility costs for each cross section type was incorporated based on recently completed local projects and engineering judgment, as shown in **Table 16**.
- Cost allowances for individual items was based on the lowest bidder average for two recently completed local projects. Where data was not available, ConceptStation default values were used. Detailed values can be found in the appendix.

Table 16 – Cost Assumptions

Roadway Type	Sanitary Sewer	Storm Sewer	Water Lines	Total Utility Cost per mile
Commercial Arterial 6 Lane	$461,000	$72,800	$686,900	$2,221,500
Commercial Arterial 4 Lane	$461,000	$50,960	$686,900	$2,199,660
Commercial Arterial 2 Lane	$461,000	$32,760	$686,900	$2,181,460
Mixed Use Arterial 5 Lane	$461,000	$45,500	$686,900	$2,194,200
Mixed Use Arterial 3 Lane	$461,000	$36,400	$686,900	$2,185,100
Mixed Use Collector (3 lanes with bikes and parking	$461,000	$65,520	$686,900	$2,214,220
Residential Collector (2 lanes, bikes and parking)	$461,000	$54,600	$686,900	$2,203,300

FINDINGS

In total, the RIM incorporated two different scenarios, the fifty percent build scenario and full build scenario. Total project costs for each model are shown in **Table 17** and **Table 18**, respectively. **Figure 46** shows the functional classification and corresponding cross sections for each of the roadways modeled in each scenario. **Figure 47** and **Figure 48** show the capacity for each roadway along with the costs for construction.

Table 17 – Total Cost for 50 Percent Build Scenario

Road Type	Miles	Model Cost	Utility Cost Per Mile	Cost Per Mile	Total Cost
Commercial Arterial 6 Lane	0.0	$-	$2,221,500.00	-	-
Commercial Arterial 4 Lane	5.1	$28,033,113.00	$2,199,660.00	$7,646,630.65	$39,353,775.67
Commercial Arterial 2 Lane	16.0	$47,387,987.78	$2,181,460.00	$5,149,273.09	$82,220,033.04
Mixed Use Arterial 5 Lane	0.0	$-	$2,194,200.00	-	-
Mixed Use Arterial 3 Lane	10.4	$34,849,154.57	$2,185,100.00	$5,543,785.50	$57,521,383.85
Rural Arterial Asphalt	6.2	$16,524,160.65	-	$2,667,397.81	$16,524,160.65
Mixed Use Collector	9.4	$47,552,910.93	$2,214,220.00	$7,254,737.56	$68,442,155.97
Residential Collector	13.4	$50,302,612.07	$2,203,300.00	$5,967,588.28	$79,745,560.34
Total Miles	**60.5**			**50% Build Cost**	**$343,807,070**

Table 18 – Total Cost for Full Build Scenario

Road Type	Miles	Model Cost	Utility Cost Per Mile	Cost Per Mile	Total Cost
Commercial Arterial 6 Lane	10.1	$71,398,925.93	$2,221,500.00	$9,308,387.24	$93,780,079.83
Commercial Arterial 4 Lane	4.5	$13,443,360.66	$2,199,660.00	$5,215,696.63	$23,247,891.02
Commercial Arterial 2 Lane	6.6	$15,514,434.79	$2,181,460.00	$4,538,641.79	$29,872,308.73
Mixed Use Arterial 5 Lane	2.5	$10,412,605.80	$2,194,200.00	$6,294,868.04	$15,984,219.84
Mixed Use Arterial 3 Lane	7.8	$28,052,876.49	$2,185,100.00	$5,764,832.20	$45,176,598.87
Rural Arterial Asphalt	6.2	$16,880,215.08	-	$2,724,873.58	$16,880,215.08
Mixed Use Collector	9.4	$49,728,854.22	$2,214,220.00	$7,485,383.39	$70,618,099.25
Residential Collector	13.4	$50,802,122.02	$2,203,300.00	$6,004,968.04	$80,245,070.30
Total Miles	**60.5**			**Full Build Cost**	**$375,804,483**

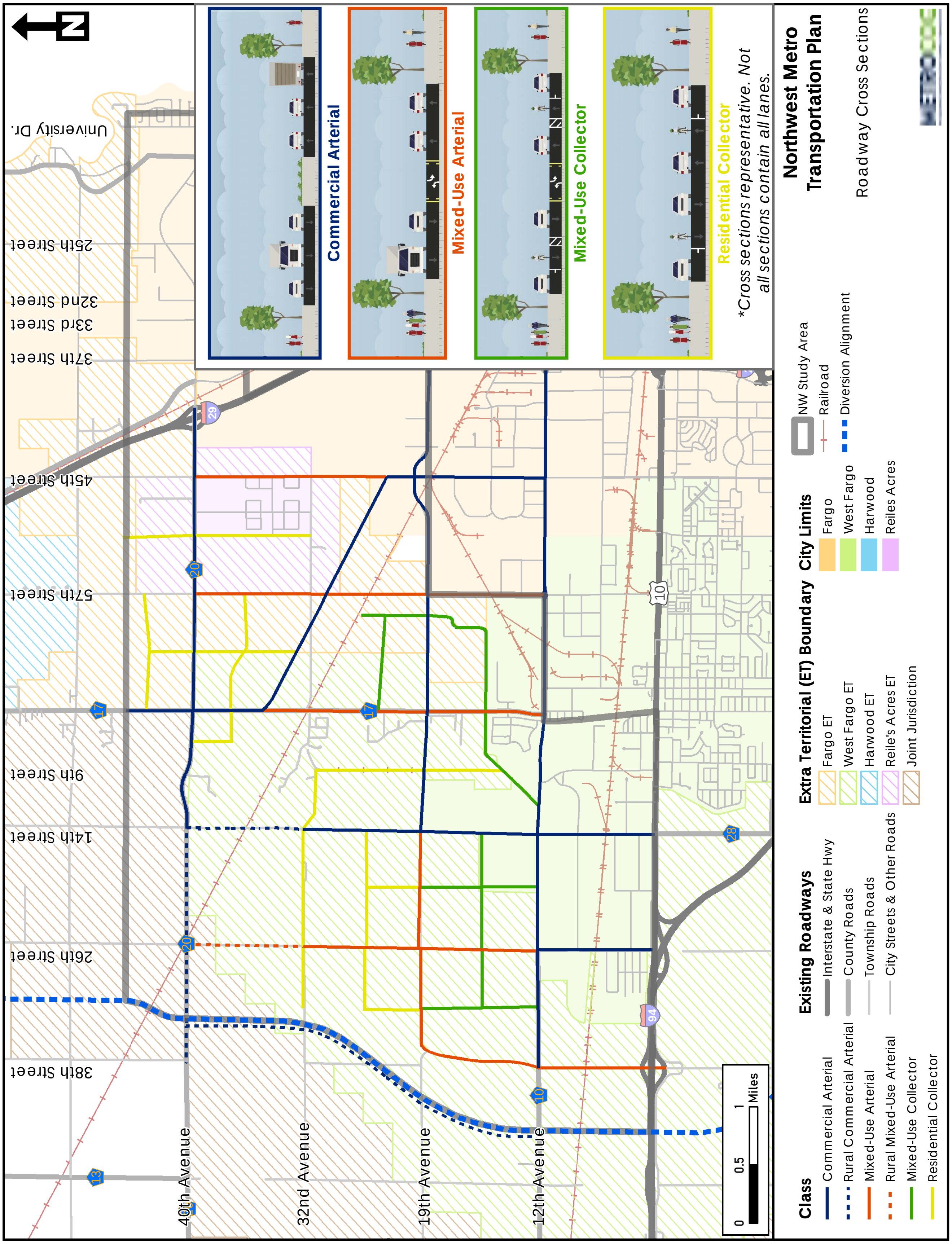


Figure 46 – Functional Classification in the Study Area

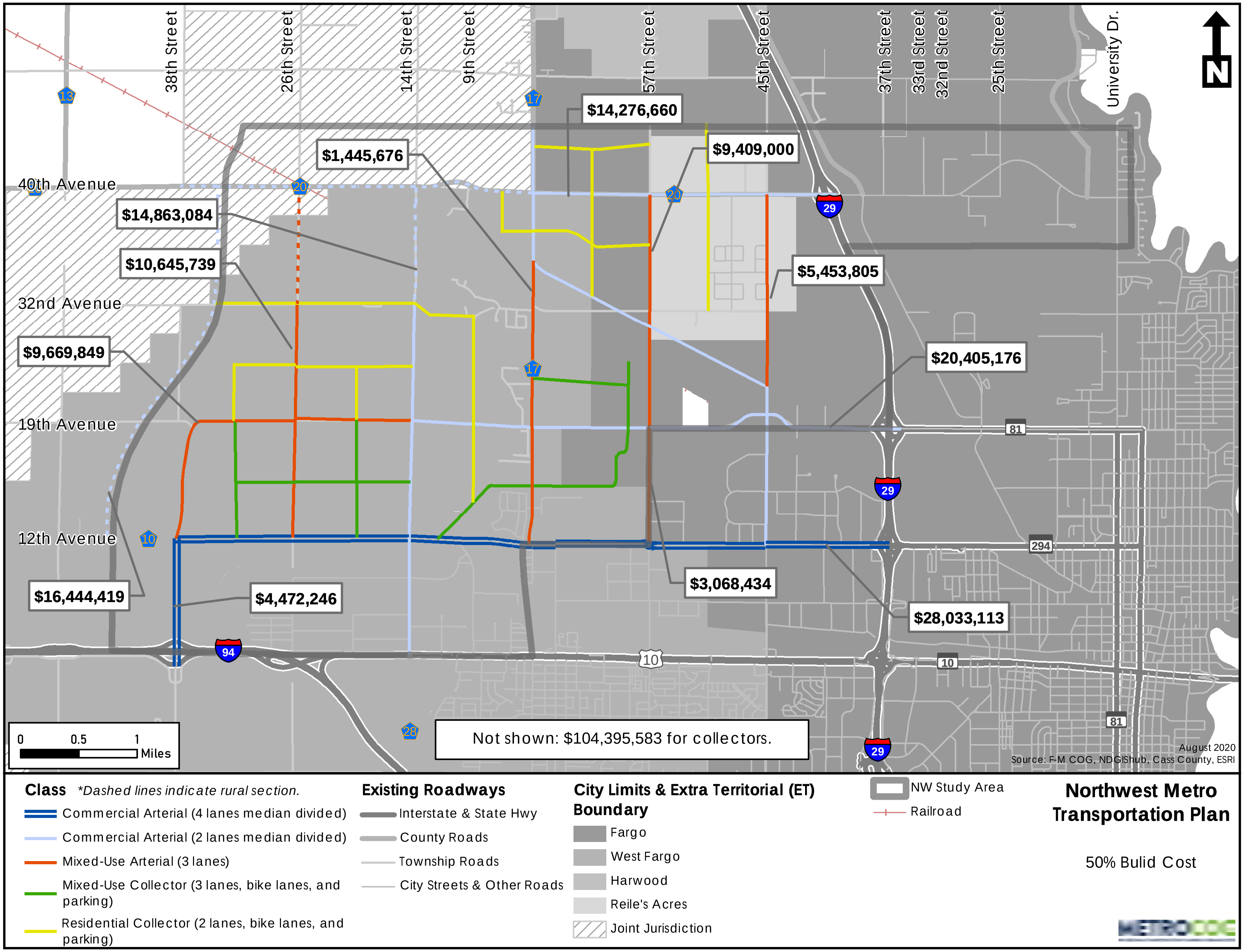


Figure 47 – 50 Percent Build Roadway Investment Needs

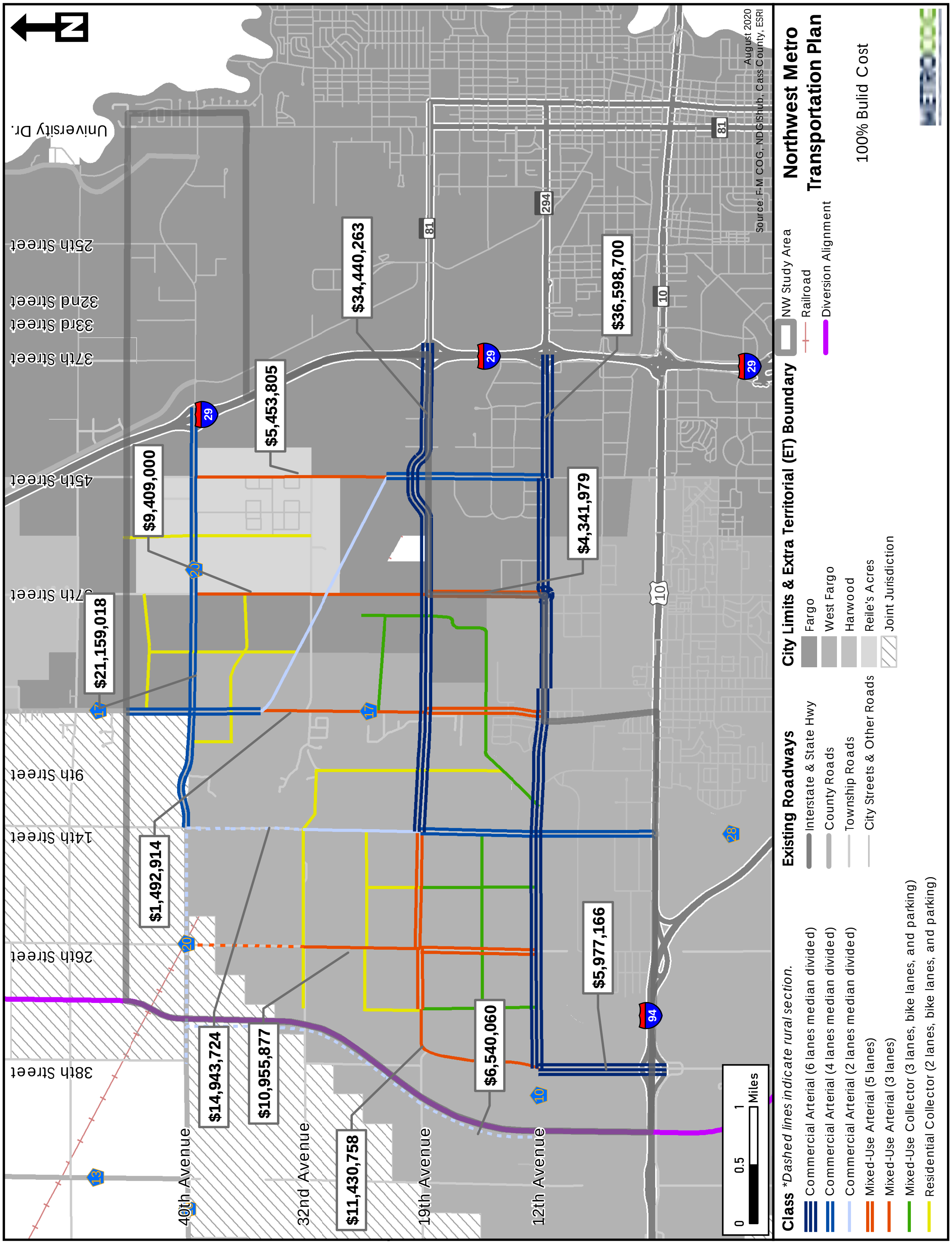


Figure 48 – Full Build Roadway Investment Needs

MULTIMODAL OPPORTUNITIES

In urban areas, walking and biking are important components of the transportation system. Enhancing the ability of travelers to walk or bike involves providing adequate infrastructure and linking urban design, streetscapes, and land use to encourage walking and biking. Designing roadways to accommodate all types of users is commonly termed “complete streets”. For many reasons, the Northwest Metro Transportation Plan provides an opportunity to proactively address bicycle and pedestrian mobility and provide high bicycle and pedestrian levels of service:

- The relative housing and employment density identified for the study area will create neighborhoods and developments that naturally support more biking and walking trips. For example, according to American Community Survey (ACS) data, 22.5 percent of people who live in downtown Fargo walk or bike to work, compared to 4.2 percent for the City of Fargo as a whole and 0.6 percent for the City of West Fargo as a whole. The density, design, and mix of land uses, combined with safe and comfortable bicycle and pedestrian facilities, in downtown create a place that is convenient and comfortable to walk and bike. Many of these elements have been brought forward into the land use and transportation plan for the Northwest Metro Transportation Plan.
- Preserving enough right-of-way can ensure adequate space for high-quality and dedicated facilities. Often bicycle and pedestrian facilities are constrained or limited by lack of right-of-way or costly redesign of an existing roadway. Establishing a plan before there is development pressure can provide clarity and consistency for developers and ensure the vision of the northwest subarea study can be achieved.

Complete Streets Planning

DEFINITION AND BENEFITS

Complete streets is the process of planning, design, building, and operating streets so they routinely and safely accommodate all modes of travel. This approach to transportation planning does not mean all modes must be incorporated on all roads, but that the transportation network as a whole serves all modes of transportation for all ages and abilities. A complete streets planning approach provides multiple benefits:

- Streets designed with sidewalks, raised medians, traffic-calming measures and treatments for travelers with disabilities improves pedestrian safety. Research has shown that sidewalks alone reduce vehicle-pedestrian crashes by 88 percent.
- Multiple studies have found a direct correlation between the availability of walking and biking options and obesity rates. The Centers for Disease Control and Prevention recently named adoption of complete streets policies as a recommended strategy to prevent obesity.
- Complete streets offer inexpensive transportation alternatives to roadways. A recent study found that most families spend far more on transportation than food.
- Research has found that people who live in walkable communities are more likely to be socially engaged and trusting than residents living in less walkable communities.

COMMUNITY SUPPORT AND PLANNING

Over the last decade, Metro COG, West Fargo, and Fargo have completed multiple planning efforts that provide guidance and support for improving multimodal mobility.

- In 2010, Metro COG adopted a complete streets policy to improve multimodal mobility on roadway projects.
- In 2012, Fargo completed their comprehensive plan, Go 2030, that established the community’s vision and guiding principles. The most relevant principles include “transform its transportation system to encourage walking, biking, and transit” under transportation, and “support neighborhoods where residents can age in place, children can walk to school, and essential services are only a short walk away” under neighborhoods. Bicycle and pedestrian infrastructure was the fourth highest rated initiative in the entire Go 2030 plan.

- In 2018, West Fargo completed their comprehensive plan, West Fargo 2.0, with a specific goal to promote transportation choice and mobility and set livability measures to ensure arterials have sidewalks and bikeways on at least one side. Additional recommendations to come out of West Fargo 2.0 are to develop a more robust grid network and adopt a citywide complete streets policy.
- Metro COG's Metropolitan Transportation Plan, Metro Grow, adopted in 2019, sets the regional transportation policy for all of Metro COG's planning area. The plan embraces a multimodal policy direction including robust walking, bicycling, and transit policies forwarding complete streets and mobility objectives.

In addition to these planning efforts, the Fargo-West Fargo Parking and Access Requirement Study provided a roadway typology to guide the development of new and reconstructed roadways and the 2016 Bicycle and Pedestrian Plan, the 2020 Fargo-Moorhead Metro Bikeways Gap Analysis Study, and the FM Greenway Recreation Master Plan identified regional bicycle connections. Each of these documents' relevant parts are summarized below.

Fargo-West Fargo Parking and Access Requirement Study

The Parking and Access Requirement Study developed access and roadway guidelines that complement land use form in addition to the roadways purpose and functional classification to create a comprehensive transportation network. Each of the street typologies are designed to align with existing and future land uses. The seven different typologies include:

- Regional arterial: secondary alternative and direct connection to the Interstate system, serving large traffic volumes with highly controlled access points.
- Commercial arterial: act as gateways, connecting people from the wider region to the area's major destinations.
- Mixed-use arterial: cross-town links and business corridors where people live, shop, dine, and work.
- Mixed-use collector: connects neighborhoods to commercial nodes and corridors.
- Residential collector: connects neighborhoods with important facilities like libraries, schools, and parks.
- Mixed-use neighborhood: prioritize pedestrian safety over the mobility of cars.
- Residential neighborhood: connects neighborhoods and serve as shared space for neighbors to socialize and play.

These typologies each include guidance on speed limits, lane configuration, traffic control, and access spacing. The typologies were used as a starting point to guide the development of the multimodal element of the Northwest Metro Transportation Plan.

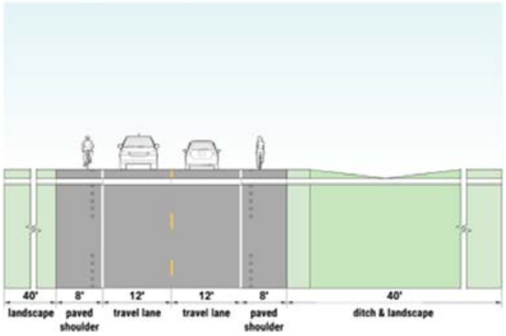
Bicycle and Pedestrian Plan

The 2016 Bicycle and Pedestrian Plan is part of the Metropolitan Transportation Plan which is updated every five years to plan and prioritize bicycle and pedestrian facilities as part of the transportation network. This plan identified and prioritized bicycle facilities on functionally classified roadways, including 12th Avenue, 19th Avenue, and CR 81.

Fargo-Moorhead Metro Bikeways Gap Analysis Study

The Metro Bikeways Gap Analysis Study developed alternatives for closing 16 gaps in the existing bikeway network in the metro, including the connection on CR 81 from 12th Avenue North to CR 22, which would connect North Dakota State University, Pepsi Soccer Complex, Hector International Airport, and the North Softball Complex. The recommended concept was to widen the paved shoulders to eight feet, as shown in **Figure 49**.

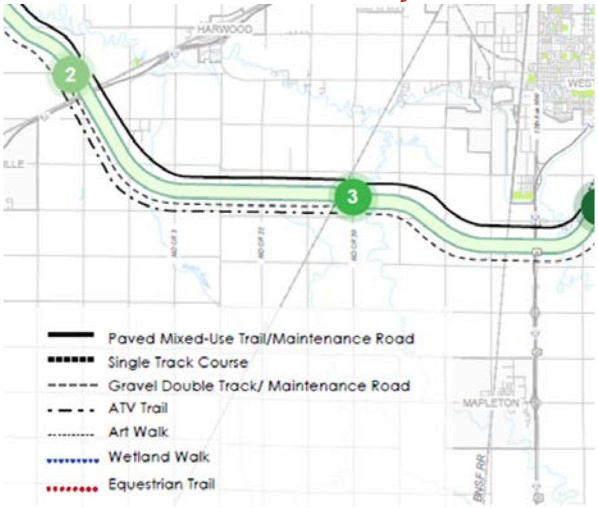
Figure 49 – US 81 Bike Gap Concept



FM Greenway Recreation Master Plan

The FM Diversion presents a significant multimodal opportunity in the FM Greenway, which would create a 30-mile greenway for year-round recreation. The FM Greenway Recreation Master Plan, currently in process, has established priorities and guidance for three different segments. In relation to this study, the rural segment of the greenway would extend from the outfall of the diversion channel into the Red River south to Interstate-94. Within this segment, there may be multiple cultural resources, including a Hudson Bay Trading Post at the confluence of the Buffalo and Red rivers.

Figure 50 – FM Greenway Connections in the Study Area



The greenway would include paved mixed-use trail on the east side, with connections at CR 20 to the west side, where they have proposed a gravel double track and ATV trail. At CR 20, the master plan has proposed a medium intensity node. The node is recommended to be a regional park due to its location on the Maple River and the planned Maple River aqueduct structure. Potential opportunities at this node are a visitor center, prairie landscape, cultural and diversion interpretation sites, picnic shelters, and alternate site for a potential state park or campground.

Network Recommendations

To create a transportation network that works for all ages and abilities, the bicycle and pedestrian plan for the Northwest Metro Transportation Plan was developed to identify low stress bicycle and pedestrian facilities and routes through the entire study area.

ASSUMPTIONS

A variety of assumptions were made to identify the appropriate facilities on the appropriate corridors.

- Land use type and density was assumed to follow the land use plan identified in this study.
- Traffic demand on each corridor was based on the full build-out of the study area.
- Adequate right-of-way for the appropriate facilities was assumed. Modifications due to design constraints may be necessary during project development.
- The roadway typology and recommended bicycle facility follow the National Association of City Transportation Officials (NACTO) guidance for all ages and abilities facilities. The speed, traffic volumes, and roadway typology recommended for each facility type are shown in **Table 19**.

NETWORK RECOMMENDATIONS BY FUNCTIONAL CLASSIFICATION

The proposed bicycle and pedestrian network is shown in **Figure 51**. Each of the different roadway typologies and recommended bicycle and pedestrian facilities are discussed in more detail below.

Table 19 – NACTO Contextual Guidance for Selecting All Ages and Abilities Bicycle Facilities

Facility Type		Target Vehicle Speed	Daily Traffic	Roadway Type	Key Considerations
Shared Lanes		<20 MPH	<2,000	Residential Neighborhood	Bicycles share the roadway. Or <50 motor vehicles per hour in peak direction at peak hour.
Conventional Bicycle Lanes		<25 MPH	<3,000	Mixed Use Neighborhood, Residential Collector	Low curbside activity.
Buffered Bicycle Lanes		<25 MPH	<6,000	Residential Collector, Mixed Use Collector	Low curbside activity.
Protected Bicycle Lanes/ Cycle Tracks		>25 MPH	>6,000	Mixed Use Arterial, Commercial Arterial	Low curbside activity.
Shared-Use Path		Any	Any	Any	None.

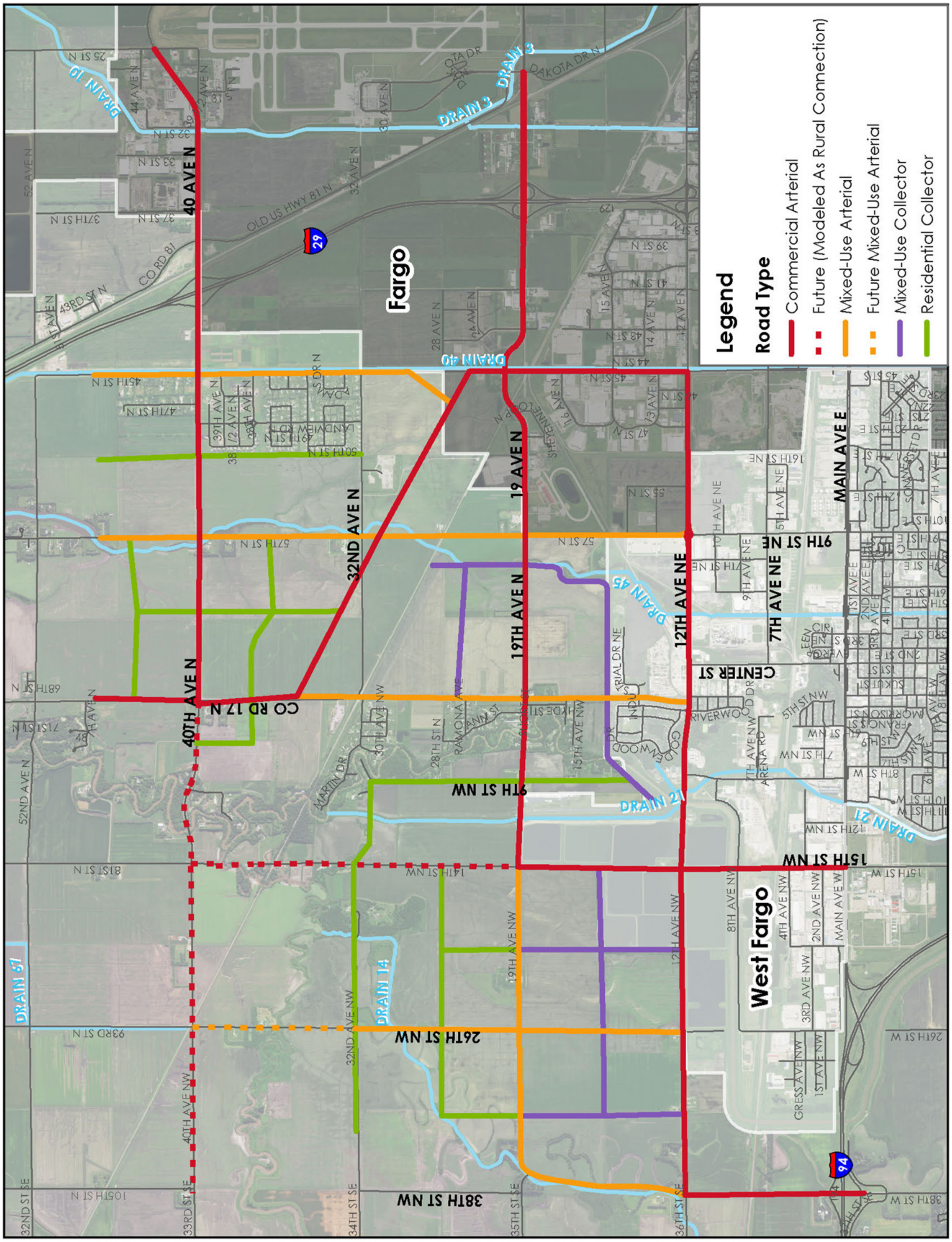


Figure 51 – Bicycle and Pedestrian Network

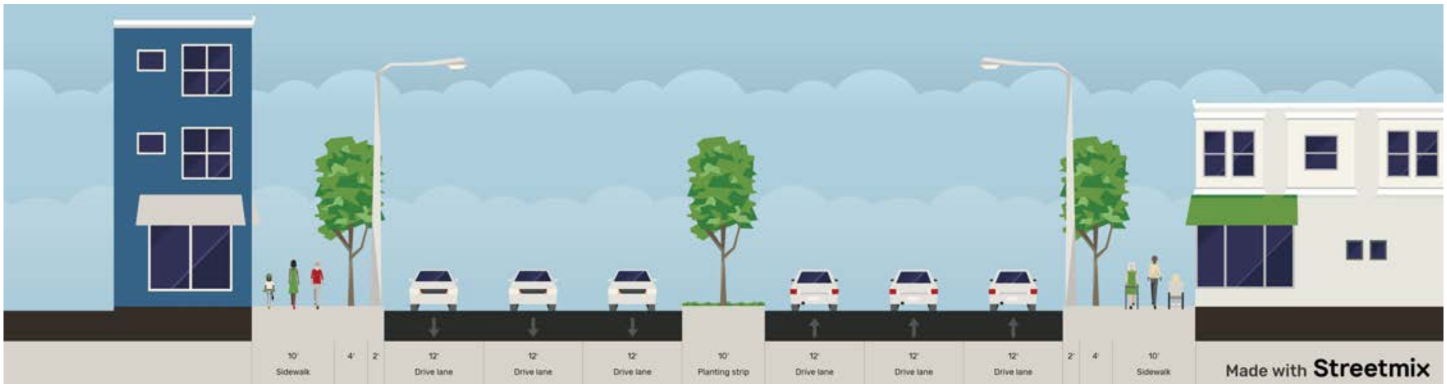
Commercial Arterials

Commercial arterials act as gateways and provide a high level of mobility for vehicles. Typically, they would include four to six travel lanes with raised medians and speeds up to 40 miles per hour. Examples of Commercial Arterials within Fargo and West Fargo include 13th Avenue, Main Avenue, and 45th Street.

The appropriate bicycle facilities for commercial arterials are shared-use path(s) on both sides of the roadway. An example four-lane cross section is shown in **Figure 52** and six-lane cross section is shown in **Figure 53.** These cross sections include 10-foot shared use paths on both sides of the roadway, a six-foot boulevard, four or six travel lanes (12 feet travel lanes), and ten-foot median. The entire cross section for four travel lanes would require 90 feet of right-of-way and six travel lanes would require 114 feet of right-of-way. Where space is constrained, the travel lanes, boulevards, or median could be narrowed or shared-use path reduced to a sidewalk on one side.

Figure 52 – Bicycle and Pedestrian Facilities on Four-Lane Commercial Arterials

Figure 53 – Bicycle and Pedestrian Facilities on Six-Lane Commercial Arterials



Mixed-Use Arterials

Mixed-use arterials provide connections across town and to major destination corridors. Typically, they would include two to four travel lanes with a center turn lane or landscaped median and speeds of 30 miles per hour. On-street parking may be present. Examples of Mixed-Use arterials within Fargo and West Fargo include 9th Street north of I-94, 25th Street, and 40th Avenue.

The appropriate bicycle facilities for mixed-use arterials may vary depending on the traffic volumes. On higher volume roadways, shared-use paths may be most appropriate, however, on lower volume roadways protected bike lanes could also be appropriate. Two example cross sections are shown below.

- For lower volume mixed-use arterials (two travel lanes) or interim roadway builds, buffered and/or protected bike lanes should be used, as shown in **Figure 54**. It would include one travel lane in each direction with a two-way left turn lane, eight-foot bike lanes with buffer, a six-foot boulevard on both sides, and a six-foot sidewalk for a total required width of 76 feet. Adding parking on both sides would add 16 additional feet (eight feet per side). However, elements could be narrowed (boulevard, drive lane, turn lanes) if space is constrained. For higher volume mixed-use arterials (four travel lanes), a shared-use path configuration should be used, as shown in **Figure 55**. It would include two travel lanes in each direction with flush median or center left-turn lane, a six-foot boulevard on both sides, and a 10-foot shared use path on both sides for a total required width of 90 feet. The median, boulevard, and shared use paths could be narrowed, or the shared use path converted to a sidewalk on one sides.

Figure 54 – Bicycle and Pedestrian Facilities on Three-Mixed-Use Arterials

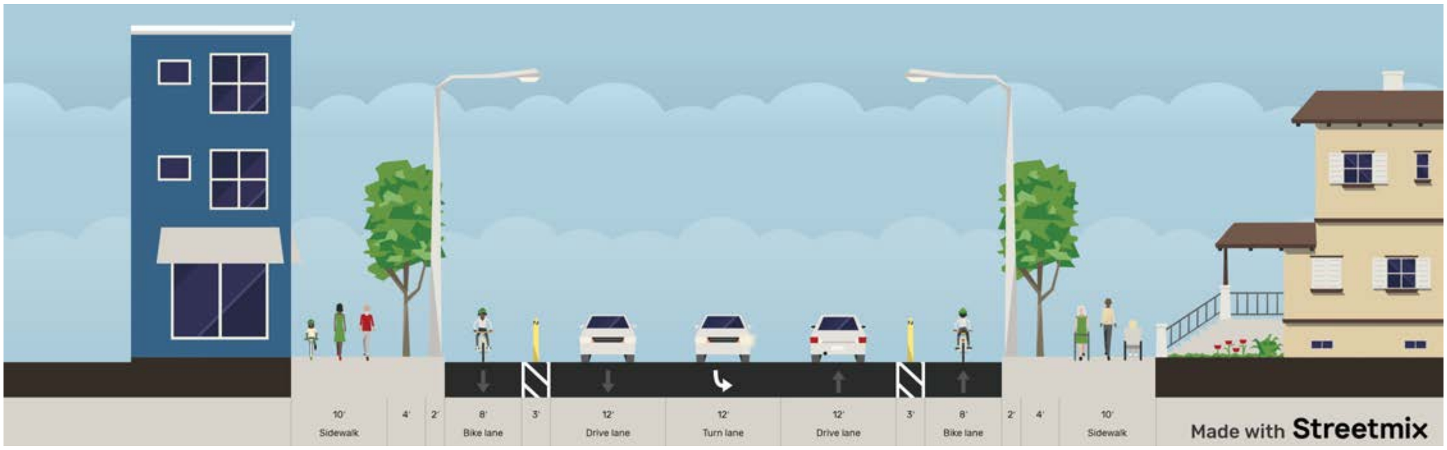
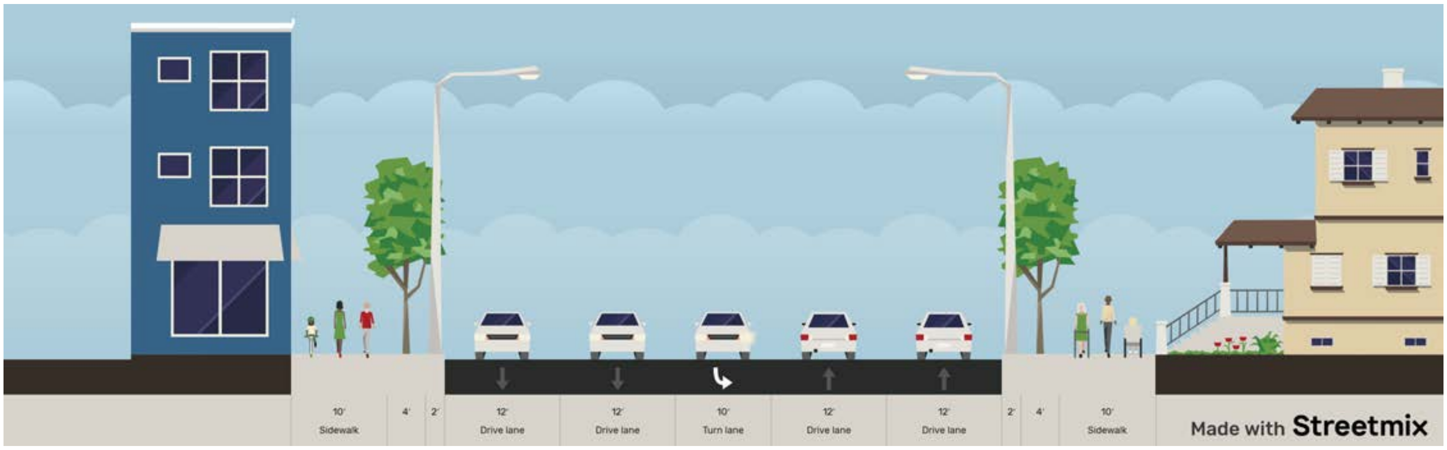


Figure 55 – Bicycle and Pedestrian Facilities on Five-Lane Mixed-Use Arterials



Mixed-Use Collector

Mixed-use collectors connect neighborhoods to commercial destinations. Typically, they would include two travel lanes with a center turn lane with speeds up to 30 miles per hour. On-street parking may be present. Examples of mixed-use collectors within Fargo and West Fargo include 17th Avenue, 23rd Avenue west of 42nd Street, and 7th Avenue N.

The appropriate facilities for mixed-use collectors include buffered or protected bike lanes with sidewalks. An example cross section that includes parking is shown in **Figure 56** with three 12-foot drive lanes, protected and buffered bike lanes, parking lanes, boulevard and sidewalk. The entire cross section for three lanes would require 90-feet of right-of-way. For mixed-use collectors without parking, an example cross section is shown in **Figure 57.** This section would require 74 feet of right-of-way.

Where space is constrained, the travel lanes, boulevard, and buffer could be narrowed. Narrowing the bike lanes or buffer could create safety challenges by reducing the amount of space a cyclist has to avoid people entering and exiting parking spaces.

Figure 56 – Bicycle and Pedestrian Facilities on Mixed-Use Collectors

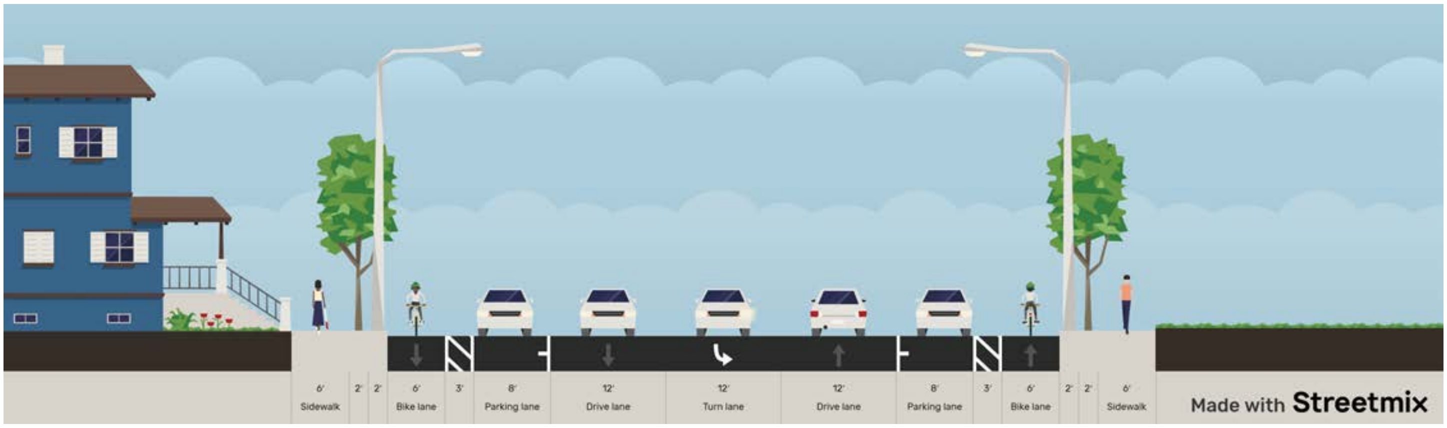
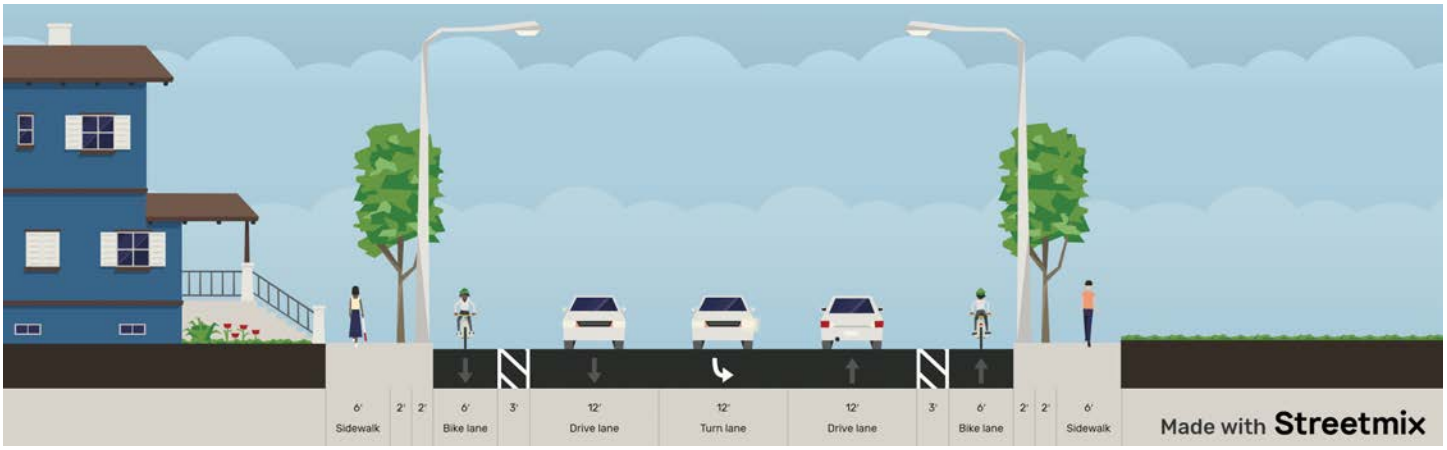


Figure 57 – Bicycle and Pedestrian Facilities on Mixed-Use Collectors without Parking



Residential Collector

Residential collectors connect neighborhoods with institutional and recreational facilities. Typically, they would include two travel lanes with speeds of 25 miles per hour. On-street parking may be present. Examples of residential collectors within Fargo and West Fargo include 17th Avenue between 45th Street and 9th Street and 12th Avenue east of University Drive.

The appropriate facilities for residential collectors will generally be bike lanes, with or without a buffer. A cross section requiring 68 feet of right of way as shown in **Figure 58** would include two travel lanes, two parking lanes, two seven-foot bike lanes, a four-foot boulevard on both sides, and six-foot sidewalk.

For very low volume residential collectors shared lanes may be appropriate, as shown in **Figure 59**. A cross section requiring 68 feet of right of way would include two shared travel lanes, two parking lanes, a four-foot boulevard, and six-foot sidewalks on both sides. Wider sidewalks (eight feet or more) would provide shared use paths and improving bicycle facilities for the least confident and youngest riders. All elements in this cross section could be narrowed in locations that require it but none of the elements should be eliminated.

Figure 58 – Dedicated Bicycle and Pedestrian Facilities on Residential Collectors

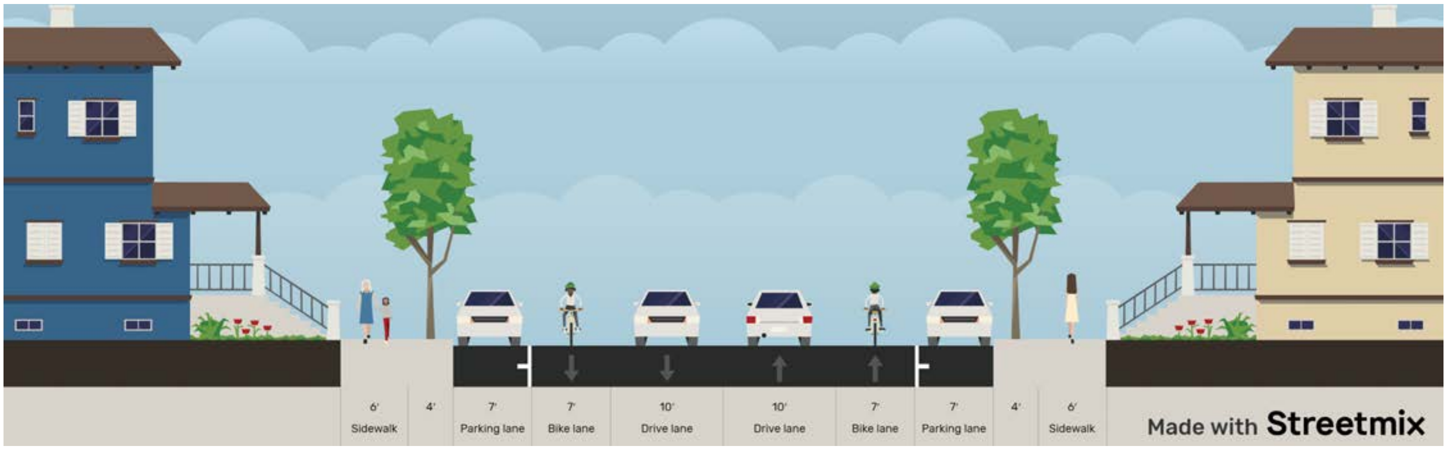
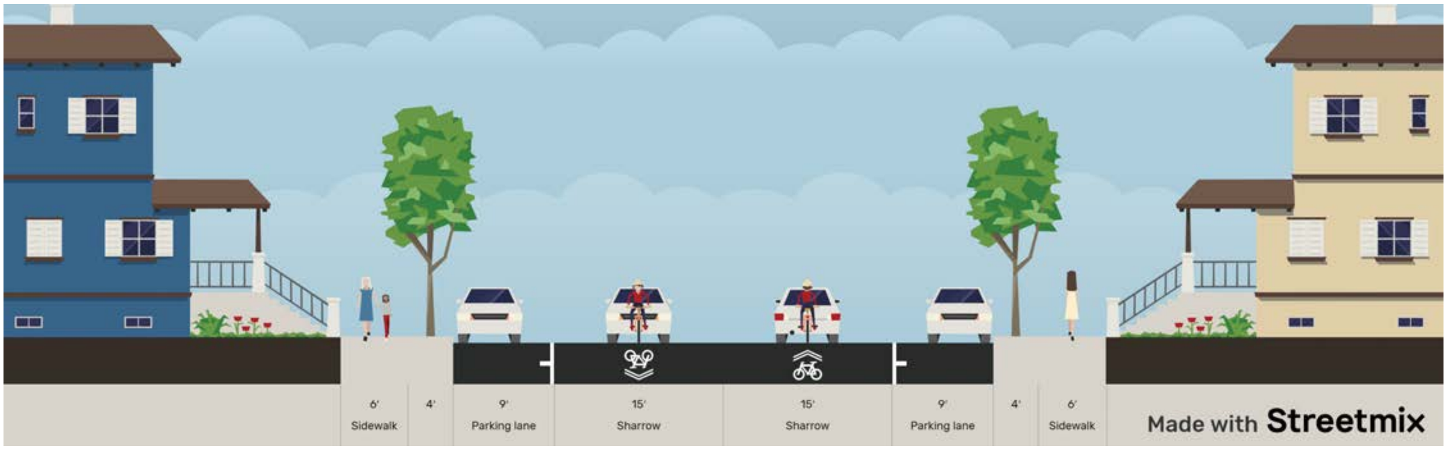


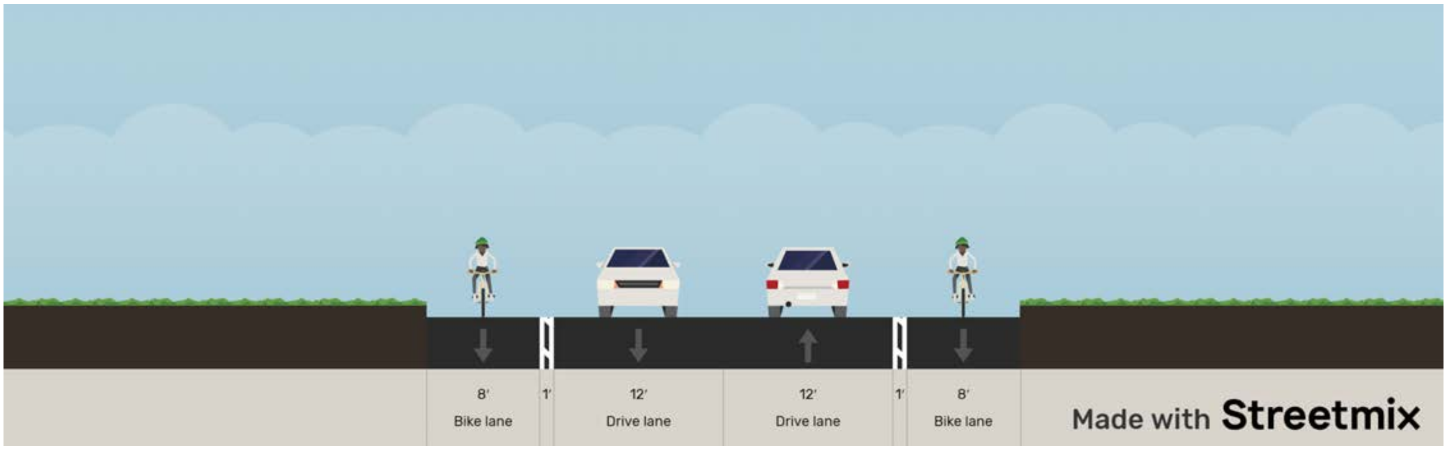
Figure 59 – Shared Bicycle and Pedestrian Facilities on Residential Collectors



Rural Arterials

Rural arterials, like county highways and township roads, will likely remain in the northwest study area for a very long time, until development reaches full build out. As these corridors see maintenance and improvement projects programmed, opportunities to enhance the roadway for multimodal users do exist. Following similar guidance from ND Moves, the Cass County Comprehensive Plan, and the Metro Bikeways Gap Analysis Study, these roadways should see wide shoulders, at least eight feet, separated with rumble strips, as shown in **Figure 60**. This may require grading a wider footprint but provides a safer walking and biking experience.

Figure 60 – Bicycle and Pedestrian Facilities on Rural Arterials



SUMMARY

The bicycle and pedestrian plan has developed a network of bicycle and pedestrian facilities that will support multimodal movements for all ages and abilities. This plan provides miles of sidewalk and shared use paths, bike lanes, and separated and buffered bike lanes to provide a safe and comfortable network.

RECREATIONAL TRAILS

As noted earlier, the FM Greenway as part of the FM Diversion will provide a major recreational opportunity along the western edge of the northwest study area. Given the robust network of bicycle and pedestrian facilities included in the roadway network, combined with the grade and terrain challenges and existing development no additional specific recreational trails were identified. However, efforts outside of this planning effort could identify future recreational trails along abandoned rail spurs, lowered river channels, and drains. The member jurisdictions should proactively identify these opportunities and develop plans to convert them into amenities within the study area. Any new recreational trail should be connected to the overall bicycle and pedestrian network to ensure people can access the trails without a vehicle.

Transit

The expected development patterns and density planned for in the northwest study area will likely support a relatively high level of transit service, especially once full build- out has occurred. As this growth and development occurs, the City of Fargo and West Fargo should be in close coordination with MATBUS, the transit provider for the two cities, and Metro COG, to ensure future developments consider transit service and needs.

The potential to add 90,000 jobs and 50,000 people to the northwest study area provides a tremendous opportunity to provide transit service to improve access to jobs within the study area and the greater Fargo-Moorhead region. However, this growth will occur over time and does not provide immediate or urgent needs. Instead, the growth in the subarea will require a series of transit investments as development occurs.

Short Range Needs

In the short range, transit service needs may include:

- Incorporating policies and guidance into the appropriate zoning codes to consider transit service needs like right-of-way or easements for stops and shelters, potential turning radius needs, improved roadway connectivity, etc.
- Working with MATBUS to plan for and establish demand response service like TapRide at major employment and high-density residential developments. TapRide service uses a mobile application that allows people to request a ride and connect into the main MATBUS system at designated transfer points. For example, the TapRide service for the industrial park (around 12th Avenue N and I-29) operates from 6:15 AM to 11:15 PM and connects six routes at the Whale of a Wash and West Acres Hub to the industrial park.

Mid- Range Needs

As development increases in the northwest study area, additional transit needs are likely to arise. The vision within the study area is a significant amount of mixed-use and dense development that will support transit use by providing nearly all daily needs within the area. This approach to development would likely support improved transit service. In the mid-range, transit service needs may include:

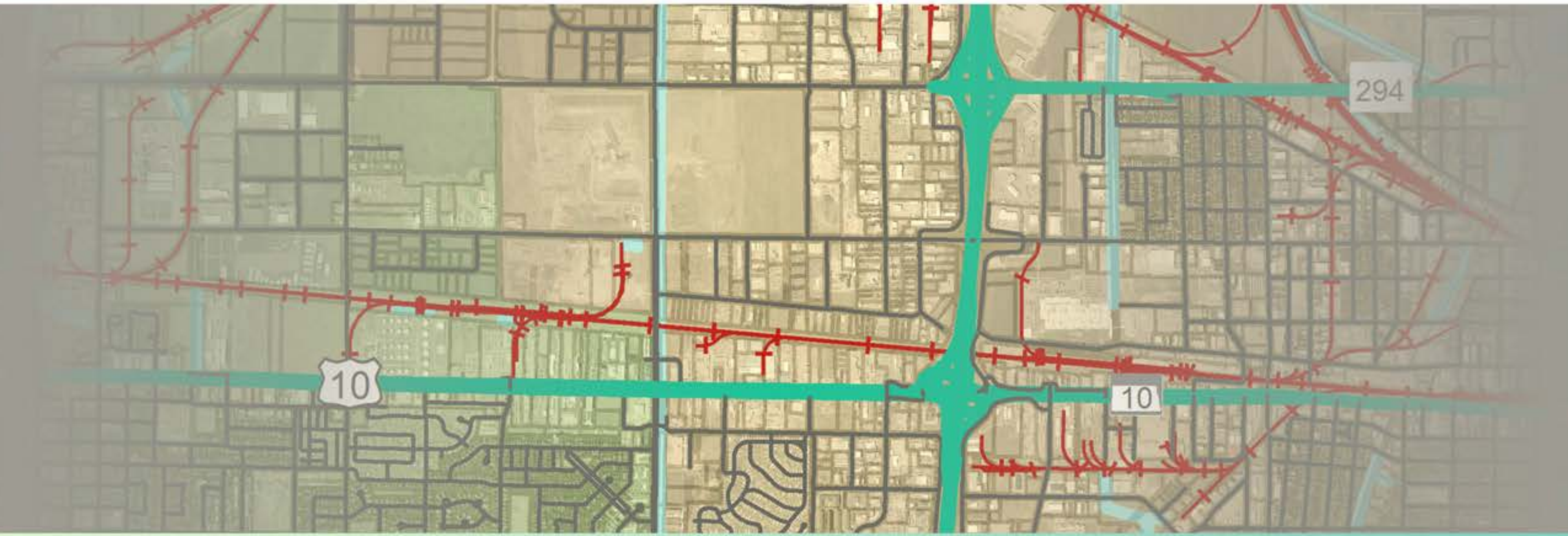
- Working with Metro COG and their Transit Development Plan (TDP) update process to ensure service needs are proactively identified and incorporated into the TDP.
- Maintaining the TapRide service to connect to the primary fixed route network. If demand requires it the TapRide service may need to move to a commuter service with fixed routes operated at limited times of the day, typically during the AM and PM peak commuting hours. TapRide service may still be necessary to support shift workers.

- Establishing a circulator route through the study area connecting residential developments to employment and community destinations.

Long Range Needs

As the northwest study area reaches full build out, fixed route service could be supported. The two cities along with MATBUS will need to consider appropriate routing and scheduling to meet the needs in the northwest study area and how they relate and connect to the overall system. It is likely a circulator route would remain appropriate with on-demand TAP ride service provided in the late evenings.

Chapter 4
Transportation Improvements Assessment



METROCOG
FM REGIONAL TRANSPORTATION PLANNING ORGANIZATION

Northwest Metro Transportation Plan

INTRODUCTION

After establishing the baseline transportation network for the Northwest Metro, a series of scenario analyses were completed to understand the potential impacts to roadway needs. For this study, the scenarios fell into one of the following categories.

- Traffic Scenario – An assessment of how different traffic patterns, land uses and growth assumptions can affect the travel demand and overall needs of an area or study area. An example of a traffic scenario includes changes to mode split or increasing development intensity.
- Infrastructure Scenario – An assessment of a specific piece of infrastructure that is or is not included in the network. An example of an infrastructure scenario is a new bridge across a river or diversion channel.
- Focus Area Scenario – An assessment of a focus area in greater detail to assess various improvement scenarios that could be viable in the area. An example of a focus area scenario includes a corridor evaluating cross-sections and traffic control.

Different modeling tools (travel demand model, roadway investment model, and the traffic operations model) were used for different scenarios. This allows the analysis to use the best tools that will most comprehensively assess the changes in each scenario.

Scenario Identification

Based on the Transportation Network Assessment, the Study Review Committee identified and prioritized the scenarios to be considered. In total, 14 separate alternatives were reviewed, assessed, and prioritized. The alternatives that were determined to be the most critical to the success of the subarea were studied further. They are summarized below:

- Southwest Gateway – This scenario evaluated potential solutions to improve connectivity to the southwest portion of the subarea to support growth and improve transportation efficiency. The lack of convenient connectivity to I-94 from the southern half of the subarea shifts traffic to the Raymond Interchange, County Road 15, and I-29 which overburdens existing east-west corridors.
- East-West Connection – The proposed transportation network presented in previous chapters resulted in a two-mile gap in east-west connectivity between 19th Avenue and County Road 20, which created major capacity needs on 19th Avenue. There is nowhere in the metro area with this same connectivity gap. This scenario is designed to provide better east-west mobility by improving 32nd Avenue and creating access to I-29.
- Modal Split – Currently the travel demand model does not account for trip generation other than vehicles. In the metro area, nine percent of traffic currently does not commute using single occupancy vehicle, with substantially greater percentages in more densely populated parts of the community such as downtown. The subarea is projected to be densely populated. Additionally, traffic patterns are currently evolving to emphasize pedestrian and bicycle trips and work from home arrangements. As such, this scenario looks at traffic patterns with modal split incorporated.
- County Road 20 Focus Area – County Road 20 was identified as a corridor of importance in the subarea because of its short-term growth potential and regional connectivity. This scenario included more detailed analysis on this corridor to facilitate short and mid-term investments.

There were a variety of other alternatives that were not prioritized in this analysis. Of those discarded, the following were identified as a lesser priority, but should be considered as part of other more relevant efforts.

- Northwest Connectivity – A northwest reliever route that connects I-29 to I-94 around the northwest study area was determined to be a high priority to several key stakeholders. The alignment of this concept and benefits of this concept (i.e., Interstate) are primarily outside the study area and should be studied further as part of the planned Interstate Operations Report scheduled for 2021.

- Connected and Automated Vehicles – Connected and autonomous vehicles (CAV) have the potential to completely change regular driving patterns, corridor efficiency, and safety characteristics of the transportation system by interconnecting vehicles and infrastructure and making travel more productive. The majority of key stakeholders agreed that CAVs are expected to be at least 25 percent of the vehicle fleet by 2045. At this level, the overall impacts of CAV will be tempered by an inability of CAVs to connect and communicate with traditional vehicles. This concept should be studied at a regional level as part of an independent study or as part of the next Metropolitan Transportation Plan.
- Routing Balancing – Within the context of this study, routing balancing is the idea that local governments can manage growth to the level in which it is possible to shape traffic patterns. For example, in the 50 percent build scenario, 9th Street warrants additional capacity. However, 45th Street to the east and County Road 17 to the west have excess capacity. Meaning, if properly planned, these three parallel corridors could share the traffic burden and each operate effectively with three lanes of traffic. While this scenario has intriguing outcomes, the level of analysis required more detailed land use assumptions than what were currently available. Conditions should be continually monitored as utility expansion continues into the subarea and development requests occur.
- Raymond Interchange (CR 15) Analysis – The Raymond Interchange is projected to carry some of the highest traffic volumes in the region under the full build scenario, with nearly 40,000 vehicle trips per day. By comparison, this exceeds most traffic volumes in the metro area, excluding the interstate. While a more detailed analysis will be valuable at this location, there are many variables that should be resolved before analysis is completed. Specifically, the concepts in the southwest gateway concept, which will have significant impacts to the traffic volumes at this interchange, and the unknown growth potential south of the Raymond Interchange. As these variables are resolved, additional analysis should be completed, potentially as part of the upcoming Interstate Operations Study.

SOUTHWEST GATEWAY CONCEPT

The western portion of the study area is the most challenging area to develop due to several transportation barriers including a railroad line, the Sheyenne River Diversion, I-94, and heavy industrial development that historically required minimal connectivity to the north. The southwest portion of the study area also includes some of the most aggressive growth assumptions because it is not encumbered by existing industrial land uses and a railroad line. For this area to meet growth expectations, a number of existing barriers must be mitigated, which will require a sizable investment. This concept considered two variations to improving the transportation network in this portion of the study area.

- Option 1 – Convert the existing 26th Street alignment to a north-south corridor that crosses the Sheyenne Diversion and railroad tracks and provides access to I-94. This would revise the configuration of the existing I-94 and Main Avenue interchange to include access to 26th Street and a viaduct to be constructed on 26th Street to create a grade-separated diversion and railroad crossing. This option is shown in **Figure 61**.
- Option 2 – Includes all components of Option 1, with the addition of a second viaduct on the 14th Street alignment. This option is shown in **Figure 62.**

This concept was studied using the travel demand model to estimate regional traffic pattern changes and the roadway infrastructure model to estimate costs.

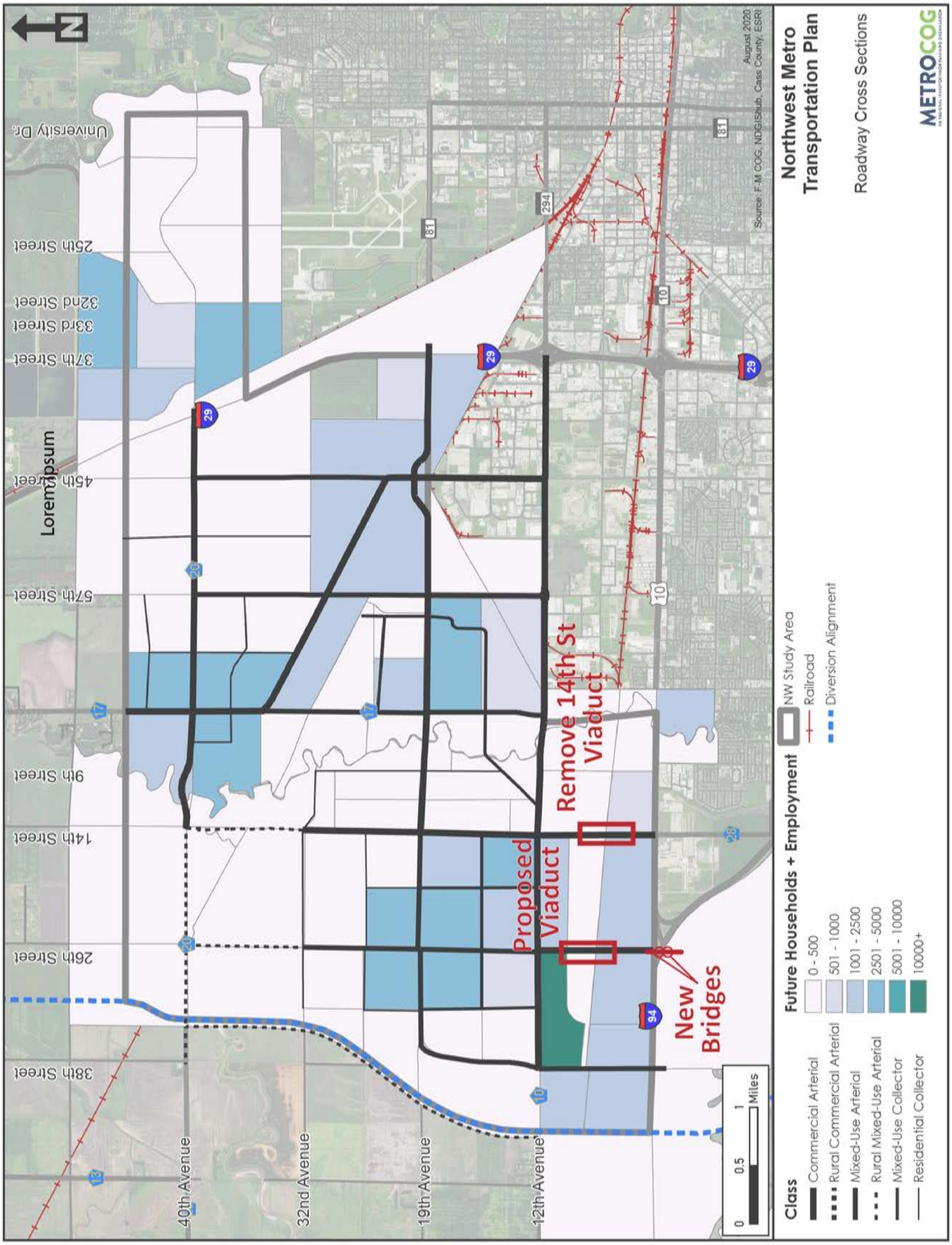


Figure 61 – Southwest Gateway Concept Option 1 Network Revisions

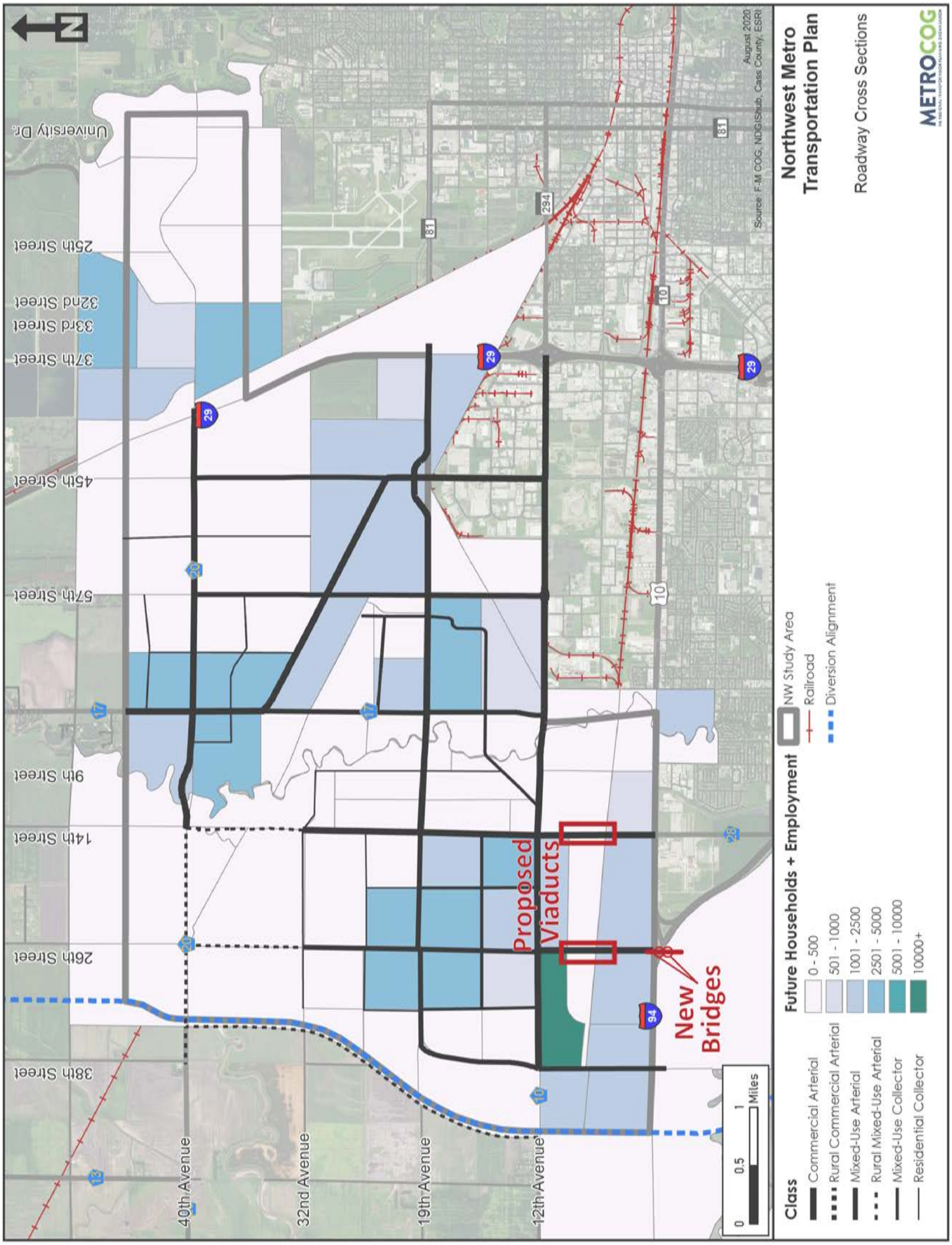


Figure 62 – Southwest Gateway Concept Option 2 Network Revisions

Southwest Gateway Option 1 Model Results

At full build, the new interchange configuration at I-94/Main Avenue/26th Street, shown in **Figure 63** is expected to have a major impact, drawing over 50,000 vehicles per day to 26th Street, just north of I-94. The traffic would then disperse throughout the study area using 12th Avenue. This new interchange would draw around 10,000 vehicles off Cass County Road 15 (CR 15) and between 7,000 to 15,000 vehicles off 19th Avenue, depending on the location. Projected volumes on CR 15 and 19th Avenue in this scenario could be handled with a four-lane section. Both corridors had previously been forecasted as six-lane sections.

At 50 percent build, the new interchange configuration at I-94/Main Avenue/26th Street is expected to draw over 40,000 vehicles per day to 26th Street, just north of I-94. This new interchange would draw around 5,000 vehicles off CR 15 and around 2,000 vehicles from CR 20/40th Avenue. Volume differences on 19th Avenue North near I-29 are expected to be modest.

Southwest Gateway Option 2 Model Results

At full build, the provision of a parallel north-south roadway along 14th Street, shown in **Figure 64,** would alleviate a small amount of traffic from 26th Street, however maximum daily modeled volumes on 26th Street would still approach 50,000. This option also would draw around 10,000 vehicles off CR 15 and around 7,000 to 15,000 vehicles off 19th Avenue. As such, impacts to other major interchanges are expected to be similar to the original Southwest Gateway concept.

At 50 percent build, the new interchange configuration would still be expected to draw 40,000 vehicles per day, with reductions of 5,000 vehicles on CR 15 and 2,000 vehicles on CR 20/40th Avenue. Like the original Southwest Gateway concept in the 50 percent development scenario, impacts to 19th Avenue North traffic are expected to be modest.

Figure 64 – Viaduct Concept at 14th Street

Figure 63 – Southwest Gateway Concept Interstate Access

Summary of Southwest Gateway Options

Both of the Southwest Gateway options provide major network wide benefits under both the full build and 50 percent build demographic conditions as shown in **Table 20**. Not surprisingly, Option 2 with both the 26th Street and 14th Street connections, had the best results but the highest costs. With more direct routes to destinations, the infrastructure included in the southwest gateway scenarios reduce vehicle miles traveled and vehicle hours traveled. However, the more direct routes are highly desirable and create new roadways carrying more than 40,000 vehicles each day. Traffic demand at these levels will require wide cross-sections that are costly and may become a barrier to bicycle and pedestrian movements. However, the wide cross-section on 26th Street would merely relocate wide cross-sections on CR 15, 19th Street, and 14th Street.

Both concepts successfully mitigated congestion and pressure on the east-west corridors in the study area. While 12th Avenue continued to require six lanes of capacity, 19th Avenue was able to be reduced to four lanes. It is clear that the interchange reconfiguration at 26th Street would provide major benefits. When comparing Options 1 and 2 at full build, a 30 percent increase in costs yields only a 15 percent reduction in vehicle miles traveled and seven percent reduction in vehicle hours of delay. From a benefits standpoint, the 14th Street viaduct would provide good connectivity for the more than 15,000 vehicles per day projected to use the corridor. However, it appears that the 14th Street viaduct should be a lesser priority moving forward, as the transportation system still functions at similar levels of service without this investment.

Table 20 – Summary of Southwest Gateway Options

2045 Scenario	Full Build Baseline	Option 1	Option 2	50% Build Baseline	Option 1	Option 2
VMT	9,188,304	9,011,098	8,984,505	8,269,435	8,134,150	8,129,250
VHT	266,817	229,221	226,502	197,279	191,567	190,274
VMT Change	-	-177,206	-203,799	-	-135,285	-140,185
VHT Change	-	-37,596	-40,315	-	-5,712	-6,555
Daily Benefit*		$812.8 K	$875.5 K	-	$153.8 K	$172.3 K
Miles over 10K ADT	44	42	42	34	32	32
Miles over 20K ADT	23	21	20	13	9	12
Miles over 30K ADT	8	4	5	1	2	2
Miles over 40K ADT	0.1	0.8	0.9	0.0	0.7	0.3
Capacity Reduction	-	CR 15 from I-94 to 12th Avenue (6 to 4 Lanes) 19th Avenue from I-29 to 14th Street (6 to 4 Lanes)			None.	
Estimated Cost (2020)	-	$69.5 M	$101.1 M		$69.5M	$101.1 M

**MnDOT values published in the Cost-Effectiveness & Benefit-Cost Analysis for Transportation Projects for vehicle miles and vehicle hours were used to calculate daily benefit.*

Conclusion

The study review committee agreed that the 26th Street interchange was the optimal access configuration to unlock the growth potential for the southwest growth area. This concept provided clear benefits in terms of barrier mitigation, connectivity and mobility as illustrated by the superior daily benefits provided by the concept. This concept also achieved the goal of mitigating congestion on both 38th Street and 19th Avenue. The 14th Street connection also provided regional benefits but not until the full build scenario. As such, this concept should be considered a long-term improvement given the heavy financial cost of crossing both the Sheyenne Diversion and the Railroad tracks.

Figure 65 – Southwest Gateway Option 1 Modeled Traffic Volume Changes for Full Build

Figure 66 – Southwest Gateway Option 1 Modeled Traffic Volume Changes for 50 Percent Build

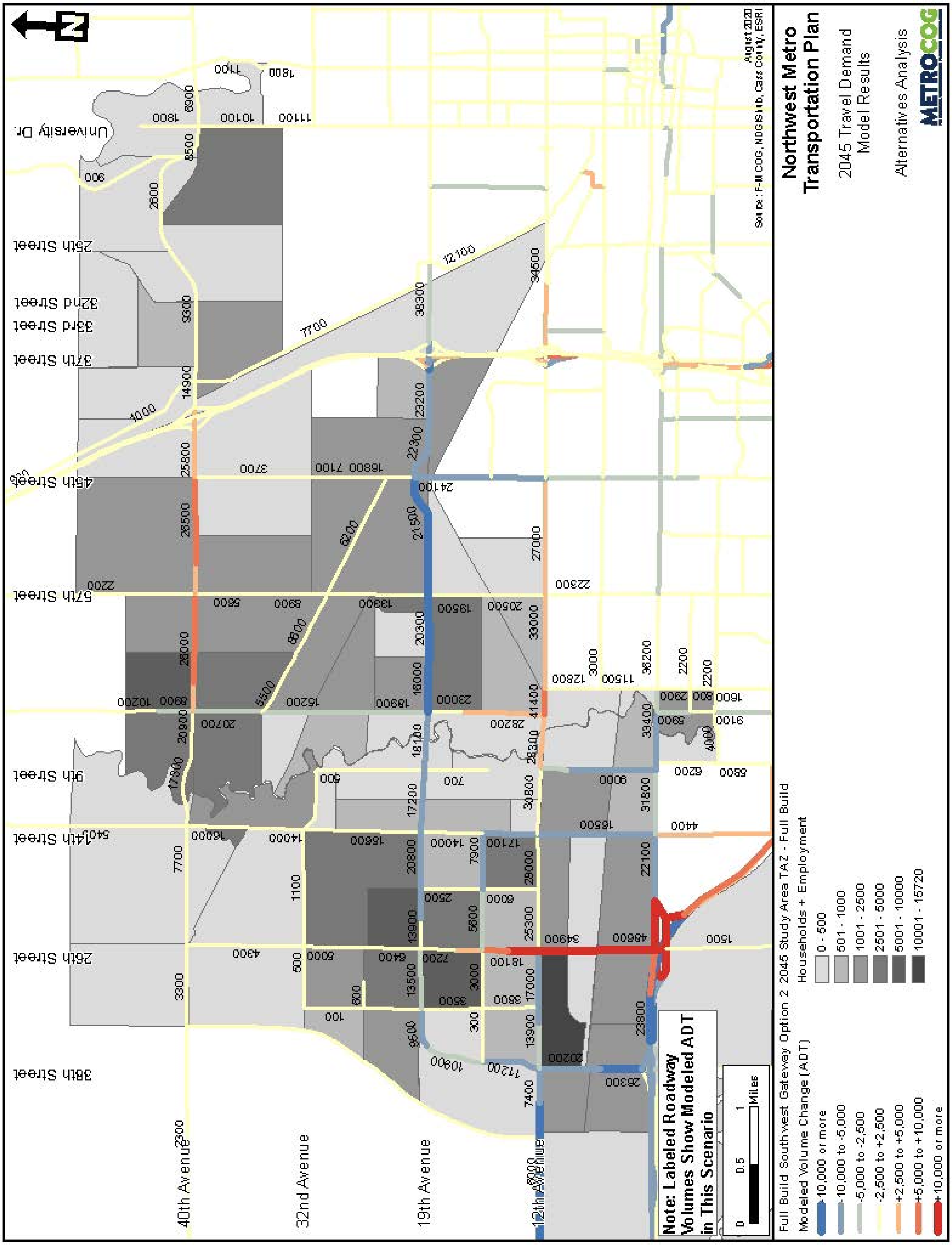


Figure 67 – Southwest Gateway Option 2 Modeled Traffic Volume Changes for Full Build

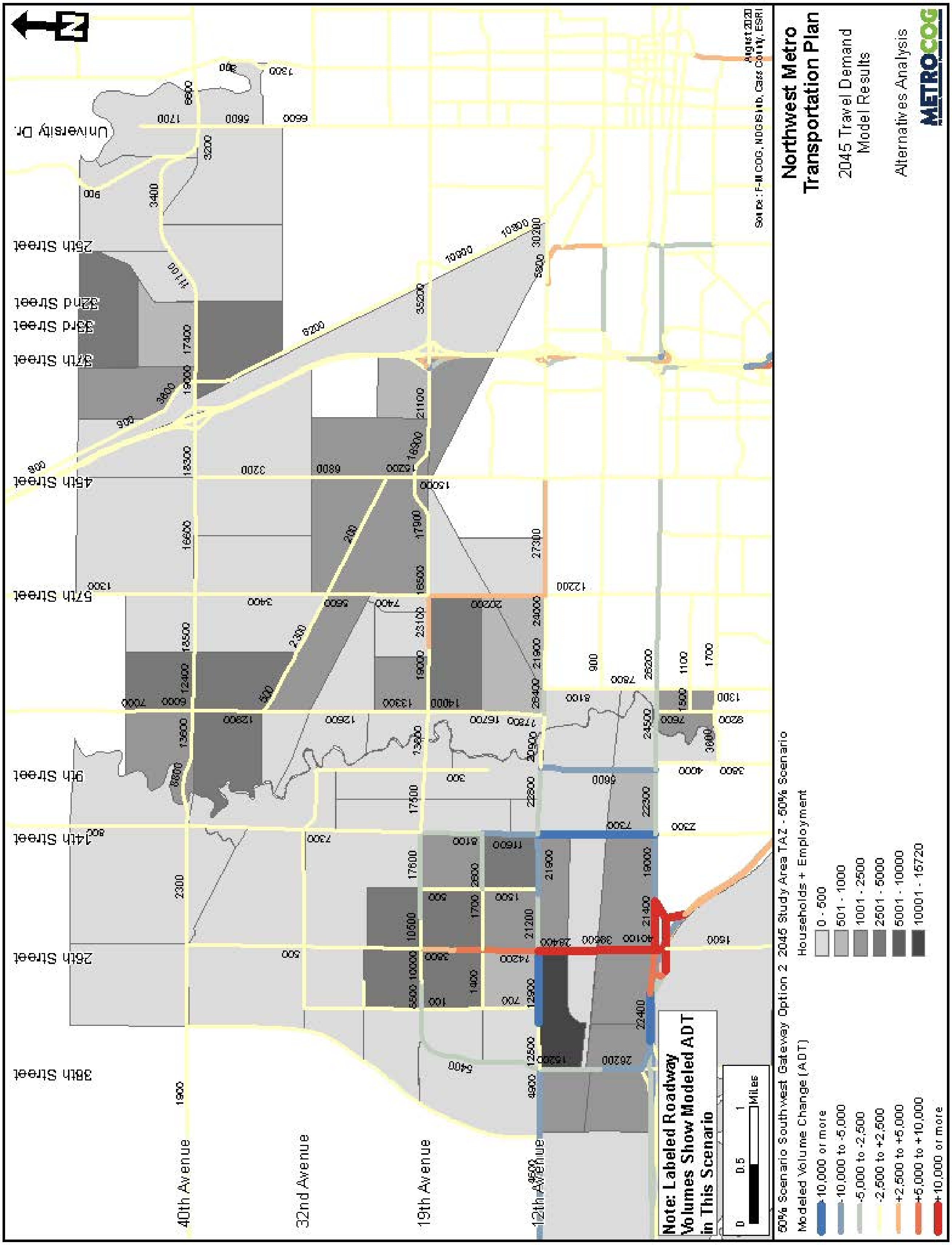


Figure 68 – Southwest Gateway Option 2 Modeled Traffic Volume Changes for 50 Percent Build

EAST-WEST CONNECTIVITY CONCEPT

The baseline future roadway network is supported by few east-west corridors. Under the proposed transportation network, there would only be three existing east-west corridors to support planned growth: 12th Avenue North, 19th Avenue North and County Road 20, creating a two-mile gap between 19th Avenue and CR 20. Comparatively, there is a north-south arterial every mile with collectors nearly every half-mile. Because access to study area via I-94 is so far west, 12th Avenue and 19th Avenue are expected to carry high volumes due to the lack of a corridor at 32nd Avenue.

To alleviate expected congestion and associated capacity/roadway cross-section needs on east-west study area arterials, the East-West Connectivity concept would create a new east-west arterial on the alignment of 32nd Avenue north, also adding a new interchange at I-29. This concept is shown in **Figure 71,** with more detailed concept graphics shown in **Figure 69** and **Figure 70.**

Key considerations for an improved arterial on the 32nd Avenue alignment include multiple difficult terrain challenges for design. This includes the Sheyenne River, Maple River, and the railroad. There are also neighborhoods on both sides of the Sheyenne River at 32nd Avenue. Significant improvements along this corridor could be potentially prohibitive from a cost and/ or impacts perspective.

This concept was studied using the travel demand model to estimate regional traffic pattern changes and the roadway infrastructure model to estimate costs.

East-West Connectivity Model Results

At full build, the new 32nd Avenue corridor is expected to carry between 11,000 and 17,000 vehicles each day by 2045. These volumes are approaching volumes that justify a four-lane typical section, but could likely be accommodated with a three-lane section with proper access spacing. For cost estimation purposes, a four-lane section was assumed, given the likelihood that an investment of this magnitude would be designed with ample room for unpredicted growth, which often occurs when significant connections are made. The east-west corridor is expected to have modest traffic impacts to CR 20, likely still requiring a four-lane section. The new I-29 interchange also creates new travel patterns as drivers have a new, likely faster route to their destinations. Traffic is reduced by nearly 10,000 vehicles per day on some sections of 19th Avenue. Maximum volumes on both 12th Avenue and 19th Avenue are around 36,000 vehicles per day, which is unlikely to be accommodated by a four-lane section even with stringent access spacing and appropriate traffic control.

Figure 69 – I-29 Interstate Access at 32nd Avenue

Figure 70 – East-West Connection on 32nd Avenue

At 50 percent build, the new 32nd Avenue corridor is expected to carry between 5,000 and 10,000 vehicles each day by 2045. These volumes could be accommodated with a two-lane or three-lane roadway section. Under the 50 percent build conditions, there are limited changes to daily traffic volumes on CR 20, 19th Avenue, and 12th Avenue.

Summary of East-West Connectivity Concept

The east-west connectivity concept produced mixed results, as shown in **Table 21**. The concept carried as much as 17,000 vehicles per day by full build, which created major reductions to vehicle miles traveled and large, but less significant, reductions to vehicle hours traveled. The value of these benefits on a single day equate to $165.2 thousand and can be easily extrapolated over the 50 year lifespan of the bridges to reach a positive benefit-cost ratio. Despite these values, this concept is estimated to cost $56 million, has substantial environmental constraints, fails to reduce capacity needs along adjacent east-west corridors, and provides minimal value under the 50 percent build scenario.

Table 21 – Summary of East-West Connectivity Concept

2045 Scenario	Full Build Baseline	E-W Connectivity	50% Build Baseline	E-W Connectivity
VMT	9,188,304	9,025,425	8,269,435	8,178,225
VHT	266,817	260,926	197,279	193,858
VMT Change	-	-162,879	-	-91,210
VHT Change	-	-5,891	-	-3,421
Daily Benefit*		$165.2 K	-	$95.0 K
Miles over 10K ADT	44	44	34	32
Miles over 20K ADT	23	25	13	11
Miles over 30K ADT	8	7	1	1
Miles over 40K ADT	0.1	0.0	0.0	0.0
Capacity Reduction	-	None		None.
Estimated Cost (2020)	-	$61.8 M		$61.8M

**MnDOT values published in the Cost-Effectiveness & Benefit-Cost Analysis for Transportation Projects for vehicle miles and vehicle hours were used to calculate daily benefit.*

Conclusion

The Study Review Committee agreed that the East-West Connectivity Concept should not be advanced further. The overall benefits through 50 percent build illustrate minimal benefits, with full build benefits paling in comparison to other major concepts. The design challenges surrounding crossing the Sheyenne River, Prosper Railroad, Drain 21, and the rural neighborhood in this same vicinity make the feasibility of this crossing challenging and contribute to high costs. By contrast, the diagonal roadway concept provides better accommodation to existing land uses and barriers and accommodates the desire to maintain quiet traffic conditions on 45th Street, north of 19th Avenue.

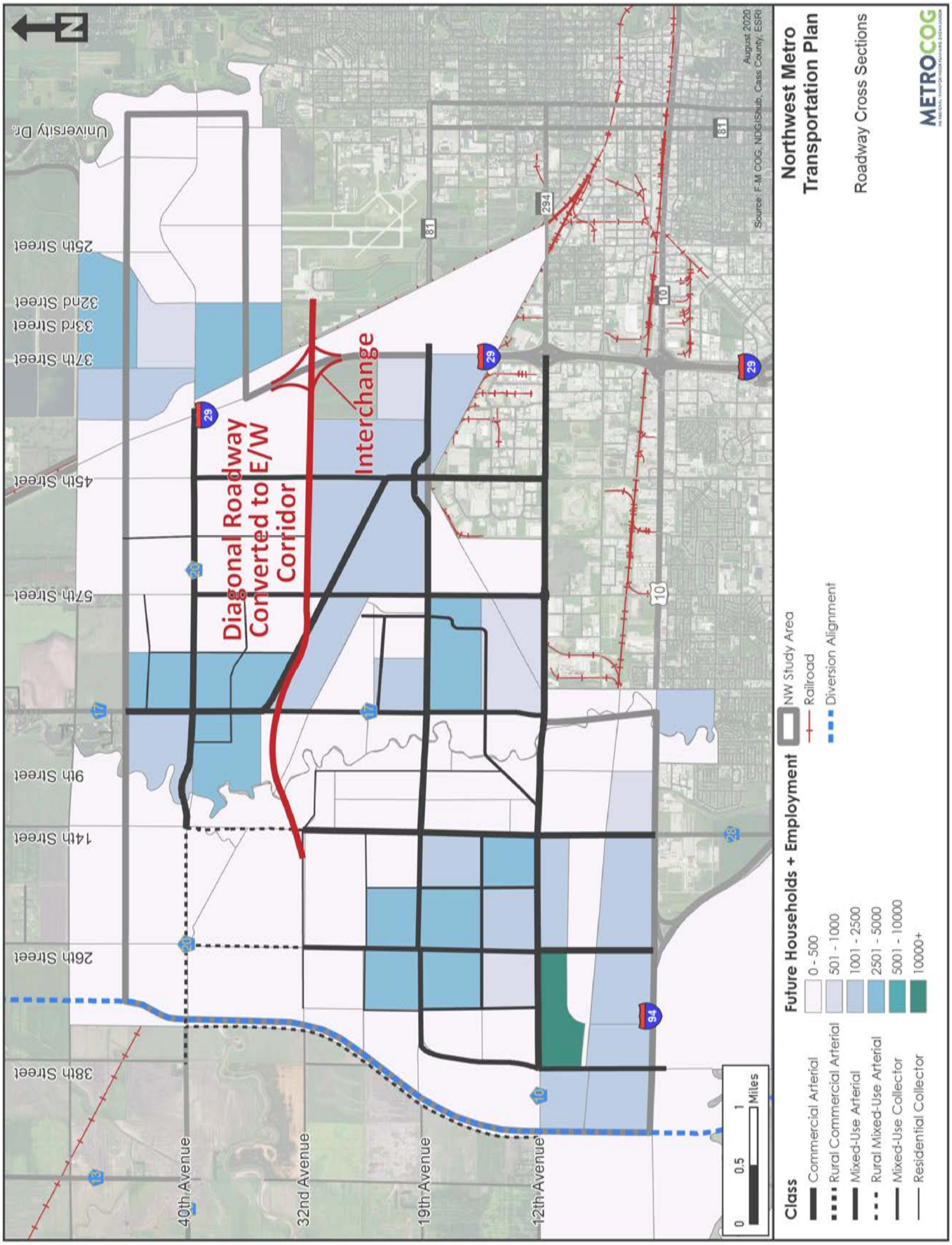


Figure 71 – East-West Connectivity Concept Network Revisions

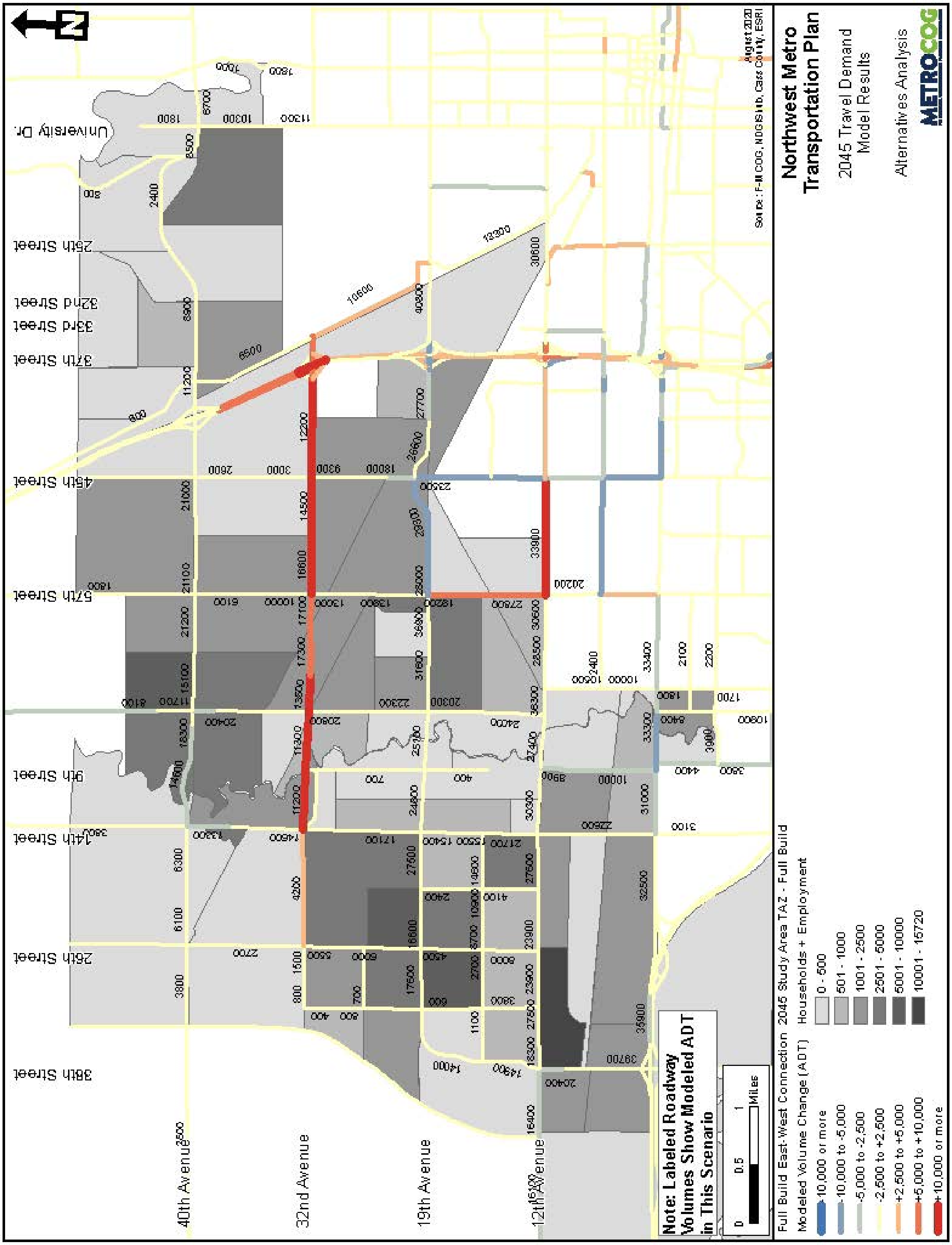


Figure 72 – East-West Connectivity Concept Modeled Traffic Volume Changes for Full Build

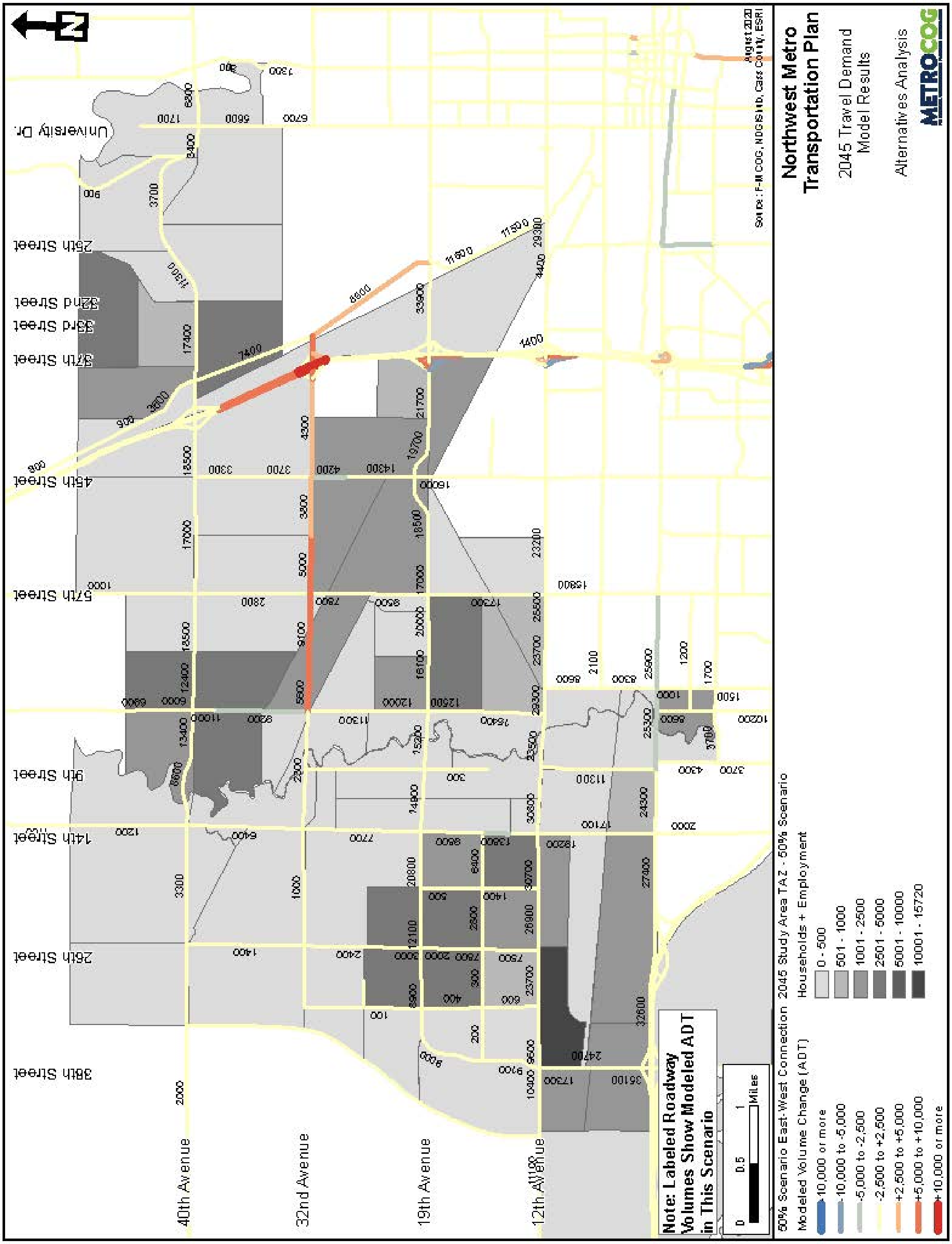
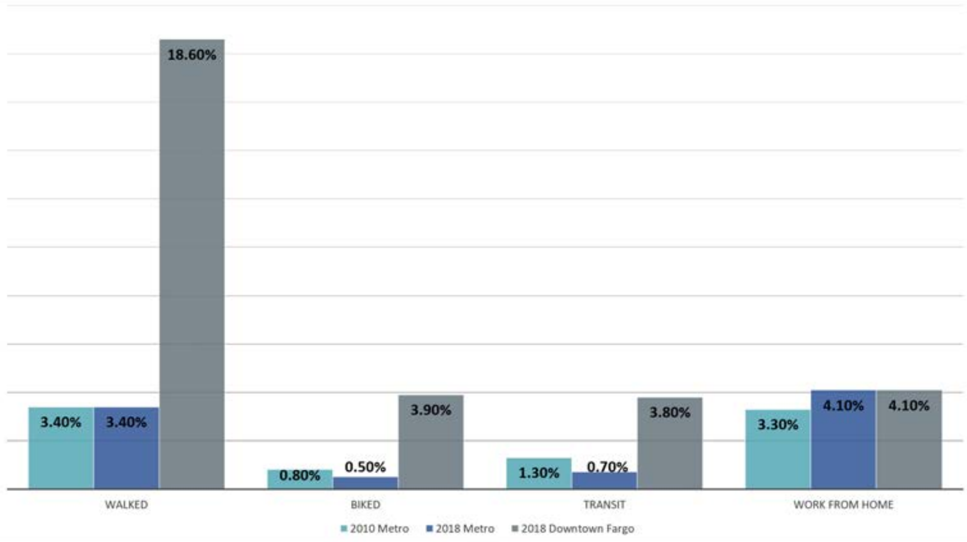


Figure 73 – East-West Connectivity Concept Modeled Traffic Volume Changes for 50 Percent Build

MODAL SPLIT CONCEPT

Figure 74 – Metro and Downtown Bike, Walk, and Transit Commute Trends



Currently, the travel demand model only considers vehicular trip generation and does not account for trips that would be made by walking, biking and transit. However, many jurisdictions locally, across the state, and across the country have begun to incorporate complete streets into their planning documents and visions. Additionally, as new technologies, opportunities, and facilities arise, single occupant vehicle trips are expected to decline. These mode choice changes are beneficial for public health, roadway congestion and safety, and transportation equity.

In the metro area, less than five percent of commuting trips are bike, walk, or transit trips but in densely populated parts of the community, like downtown Fargo, bike, walk, and transit trips make up a much larger percent of commuting trips, around 25 percent in 2018. **Figure 74** shows the metro and downtown bike, walk, and transit commute trends. Many areas within the Northwest Metro study area are expected to grow as densely as downtown Fargo, making incorporating modal split into traffic forecast an important consideration in understanding future investment needs. More information on density and land use expected in this area can be seen in the Land Use chapter of this report.

In addition to bike, walk, and transit trips, work from home "commutes" remove peak hour trips from the transportation network. In 2018, around four percent of people in the metro work from home. COVID-19 has substantially increased working from home, with county-wide estimates showing up to a 36 percent decline in traffic from the average at the peak of the shutdowns. While traffic has mostly rebounded locally, work from home trends may continue, at least some of the time. A recent study by Gallup found that 59 percent of adults would prefer to work remotely as much as possible and 55 percent of employers said they will change their remote work policy after COVID-19 restrictions are lifted. A shift of even five to ten percent away from peak hours has the potential to completely change the peak hour congestion profile in the metro area.

This modal split concept looks at traffic patterns with modal split incorporated to factor in a shift toward alternative modes of travel and mode choice. The traffic operations model was used to evaluate this alternative.

Approach

Input from the Study Review Committee indicated a desire to further explore this alternative with a modal split at the existing levels of nine percent or greater (walk, bike, transit, and work from home). An increase of 50 percent to the modal split, including work from home, was agreed upon to arrive at a long-term future modal split value of 13 percent. While walking/biking would be limited by length of trip, working from home could eliminate trips of a greater length from the roadway network. With such a large study area and the possibility for trips to be reduced for any length, traffic was reduced equally from all zones within the Vistro model. Trip distribution and routing decisions remained consistent with what was used for the transportation network assessment. After volumes were adjusted, the same mitigation process used for transportation network assessment was applied to the full build year model with modal split volumes.

Modal Split Concept Summary

Increasing bike, walk, and transit trips and work from home to 13 percent has significant impacts to the roadway network. **Table 22** summarizes the results for the full build scenario, with and without a modal split component. The modal split concept provides a similar level of service as the full build best fit improvements without the modal split while reducing the number of miles of 4/5 lane and 6/7 lane roadways.

Table 22 – Modal Split Concept Summary

	Existing Conditions	Full Build Best Fit Improvements	Full Build Best Fit Improvements with Modal Split
2/3 Lane Roadways in Subarea	40.4 Miles (100%)	29.6 Miles (55%)	32.6 Miles (60%)
4/5 Lane Roadways in Subarea	0 Miles (0%)	13.2 Miles (24%)	15.4 Miles (28%)
6/7 Lane Roadways in Subarea	0 Miles (0%)	11.4 Miles (21%)	6.2 Miles (12%)
% of Intersections in LOS A-B	39 (100%)	25 (44%)	30 (53%)
% of Intersections in LOS C-D	0 (0%)	29 (51%)	24 (42%)
% of Intersections in LOS E-F	0 (0%)	3 (5%)	3 (5%)

Figure 75 shows the anticipated roadway and traffic control needed in the full build without modal split and **Figure 76** and shows the anticipated roadway and traffic control needed if the modal split goal is reached. There are five roadways that would have a significant reduction in needed capacity with a modal split in the full build scenario. These segments when re-mitigated were able to accommodate the reduced traffic volumes with a smaller cross section. Overall 5.2 miles of 6-lane roadway were reduced to a 4-lane cross section and 3.0 miles of 4-lane roadways were reduced to a 2-lane cross section. Intersection control and the need for turn lanes remained consistent with the original analysis. Those roadways were:

- 19th Avenue from 14th Street to I-29 ramps (4.2 miles) – reduced from 6-lane section to 4-lane section
- 38th Street from 12th Avenue to I-94 ramps (1 mile)– reduced from 6-lane section to 4-lane section
- 26th Street from 19th Avenue to 12th Avenue (1 mile)– reduced from 4-lane section to 2-lane section
- 14th Street from 19th Avenue to 12th Avenue (1 mile)– reduced from 4-lane section to 2-lane section
- CR 17 from 19th Avenue to 12th Avenue (1 mile)– reduced from 4-lane section to 2-lane section

At first glance, the results may not seem so different, however a more detailed breakdown highlights how transformative a reduction of 13 percent of peak hour vehicles could be:

- Governmental Expenses – Conversion of five miles of roadway from 6-lane to 4-lane and another three (3) miles from 4-lane to 2-lanes can produce major cost savings, likely around $20 million. Increasing bike, walk, and transit trips can help save jurisdictions money, while maintaining an acceptable level of service with fewer lane miles.
- Commuter Cost Savings – A 13 percent reduction in vehicle miles traveled and vehicle hours of delay, when translated into travel time costs and vehicle operating costs saves commuters $203,000 each day under the full build scenario.
- Health and Equity – By reducing capacity and travel speeds and promoting alternative modes, a safer, healthier, and more equitable transportation system can be created.

Promoting alternative modes of transportation, while still facilitating vehicular movements, can provide a more fiscally responsible, sustainable, healthy and equitable transportation system. The analysis presented here helps quantify and support ongoing practices in both Fargo and West Fargo that promote livable and active roadways. Both Fargo and West Fargo should continue to prioritize alternative modes of transportation in future.

Conclusion

The Study Review Committee agreed that planning for increased modal diversity was a critical factor in planning for the Northwest Subarea. The Subarea itself is expected to see land use density akin to some of the densest areas in the metropolitan area. These areas already experience modal splits higher than 30 percent, which may only increase due to work from home trends initiated by COVD-19 precautions. The modal split scenario highlights the potential of actively promoted density and modal split in the development approval process and will be an asset for each community for years to come to support existing livability initiatives. This analysis also provides a springboard for future planning work in the metropolitan area to provide a more modal diversity in traffic forecasting.

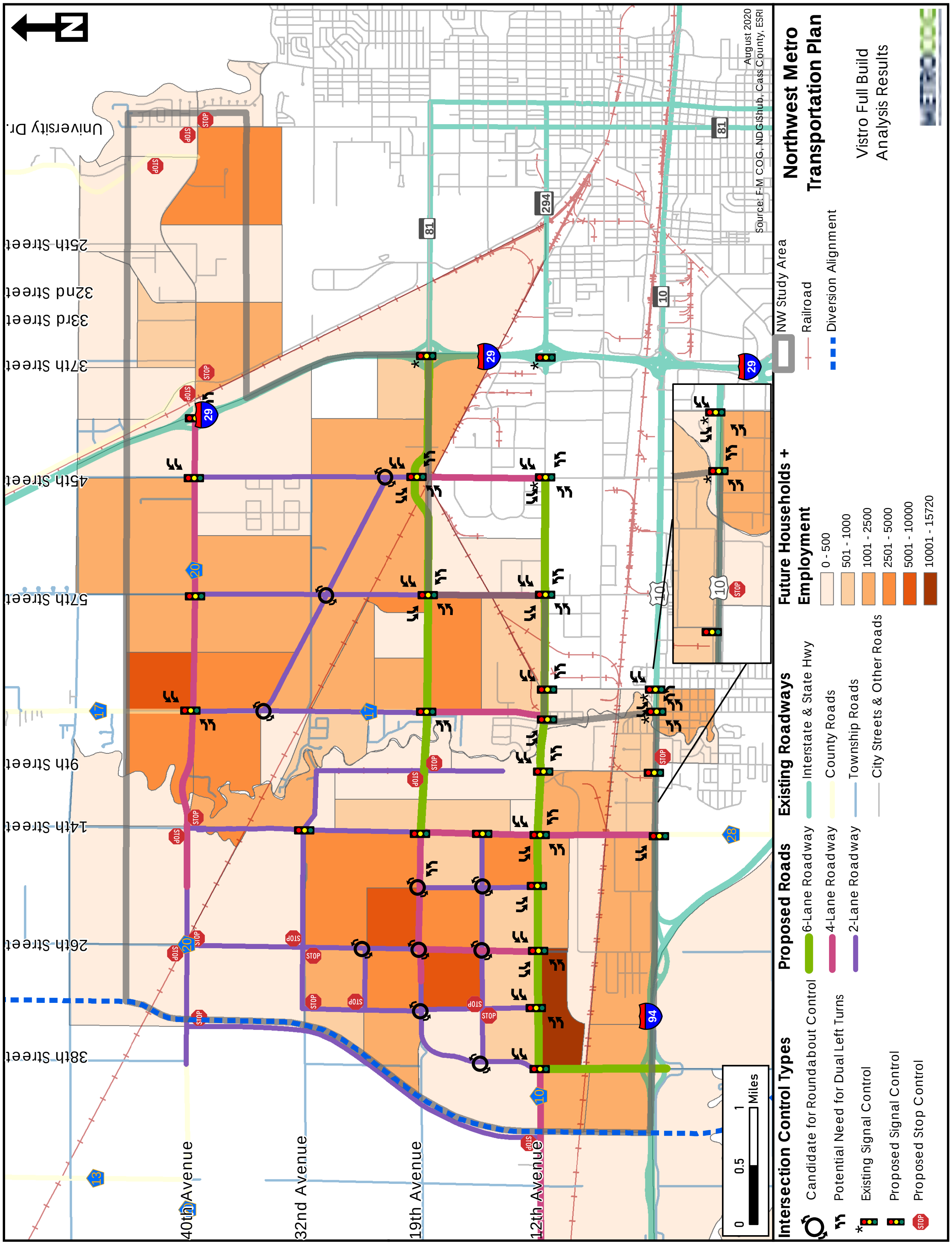


Figure 75 – Roadway and Control Needs for Full Build (No Mode Split)

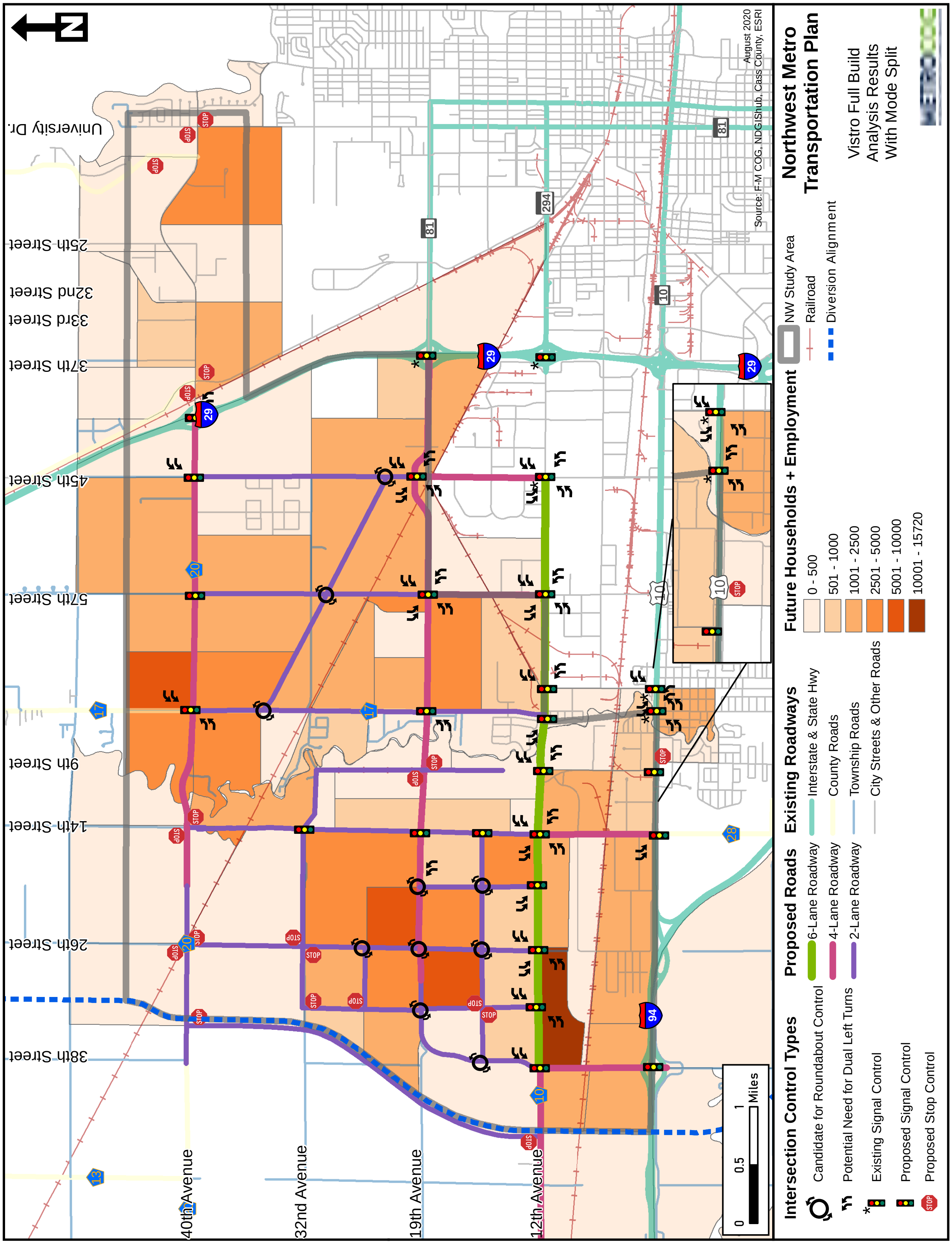


Figure 76 – Roadway and Control Needs for Mode Split Concept Under Full Build

COUNTY ROAD 20 FOCUS AREA CONCEPT

County Road 20 was identified as a corridor of importance because of its expected short-term growth, especially when compared to other portions of the subarea, and its connectivity, which is vital to the entire region. More detailed analysis was conducted on this corridor to facilitate short and mid-term programming. The traffic operations model was used to evaluate this concept.

Approach

The CR 20 corridor currently carries around 3,200 vehicles each day. With the 50 percent build, CR 20 is expected to carry nearly 17,000 vehicles each day, and by full build, more than 21,000 vehicles each day. By the 50 percent build condition, congestion begins to build at the major intersections and will likely require higher level traffic control. By the full build condition, additional congestion occurs and the corridor will likely need to be expanded to four-lanes. Traffic signal and multi-lane roundabout concepts were studied in the areas of operations, safety, and cost.

Figure 77 through **Figure 80** summarize level of service results for the CR 20 corridor from 26th Street to CR 81 in the 50 percent build and full build scenarios, respectively.

County Road 20 Focus Area Concept Summary

Under the 50 percent build conditions, the roundabout alternative has a clear advantage over signalized intersections because of the safety associated with single lane roundabouts. Under this build condition, the roundabouts and traffic signals provide roughly the same operations and result in approximately the same cost, given the need for turn lanes along CR 20 under the traffic signal concept. Under the full build conditions, the comparison provides less obvious results. The two alternatives perform similarly in terms of operations with the traffic signal experiencing near capacity performance at two intersections. The roundabout alternatives comes with a higher cost. The multi-lane roundabouts may reduce serious crashes, but increase overall crashes, when compared to traffic signals.

All things considered, the roundabout corridor appears to provide significant safety benefits, likely for decades, when compared to the traffic signal corridor with similar operations and cost impacts. Ultimately, both concepts have merit and should be pursued further by the County and the City. **Table 23** shows the summary for CR 20.

Table 23 – County Road 20 Focus Area Concept Summary

	Operations	Safety	Cost
Full Build Conditions			
Traffic Signals	Three intersections are at LOS D, with all others being LOS C or better.	Warranted traffic signals can reduce crashes by 44 percent compared to two-way stop controlled intersections.	$250,000 to $500,000 to construct with annual maintenance around $5,000. Due to the larger cross sections under full build, higher costs are anticipated.
Multi-Lane Roundabouts	Two intersections are at LOS D, with all others being LOS C or better.	Research on multi-lane roundabout safety is inconclusive. A MnDOT study found multi-lane roundabouts increases all crashes by 44 percent. However, all studies found a significant reduction in fatal and serious injury crashes.	$2 million to construct with minimum maintenance costs.
50% Build Conditions			
Traffic Signals	All locations operated at LOS A or B during both peak hours.	Warranted traffic signals can reduce crashes by 44 percent compared to two-way stop controlled intersections.	$250,000 to $500,000 to construct with annual maintenance around $5,000.
Single Lane Roundabouts	All locations operated at LOS A or B during both peak hours.	A single lane roundabout reduces all crash types by 72 percent and fatal and injury crashes by 88 percent.	$750,000 to construct with minimal maintenance costs.

Conclusion

The Study Review Committee felt that Roundabouts were the logical choice for CR 20 given the clear safety benefits through the 50 percent build scenario and ability to construct roundabouts without having to rebuild the entire corridor to an urban context immediately. By the time widening is needed, it is expected that existing roundabouts may be nearing the end of their useful lives and reconstruction to an alternative traffic control, if so desired, would be reasonable. The effectiveness and support of roundabouts at that time would help determine whether multi-lane roundabouts would be built in the future.

CR 20 is mired with a variety of design challenges to implement roundabouts or widened intersections necessary to support traffic signals. Each intersection required additional design consideration to understand the cost and feasibility. Specifics are detailed below:

- **County Road 81 and East I-29 Ramp.** This location has challenging grades related to the railroad overpass and the narrow overpass itself . Considerations should also be given to the Hector International Airport's glide path and related height restrictions once project development begins.
- **45th Street.** This intersection is in close proximity to Drain 40 and a private driveway to the east.
- **57th Street North.** This intersection is in close proximity to Drain 45 and has overhead powerlines to the east.

In terms of timing, the need for roundabouts is heavily dependent upon actual development occurring as the 25 percent, 50 percent, and 100 percent growth scenarios do not directly correspond with years, but rather likely growth patterns. Below is a cursory summary of when each intersection should consider a roundabout. It may be reasonable to connect the 25 percent growth scenario to a mid-term project (five to 10 years) and a 50 percent growth scenario (10 to 20 years). The full build growth scenario should not be considered in any near-term programming at this time.

- 25 Percent Growth Scenario
  - I-29 East Ramp
  - I-29 West Ramp
  - 45th Street
- 50 Percent Growth Scenario
  - County Road 81
  - 57th Street
  - County Road 17
- Full Build Scenario
  - 14th Street

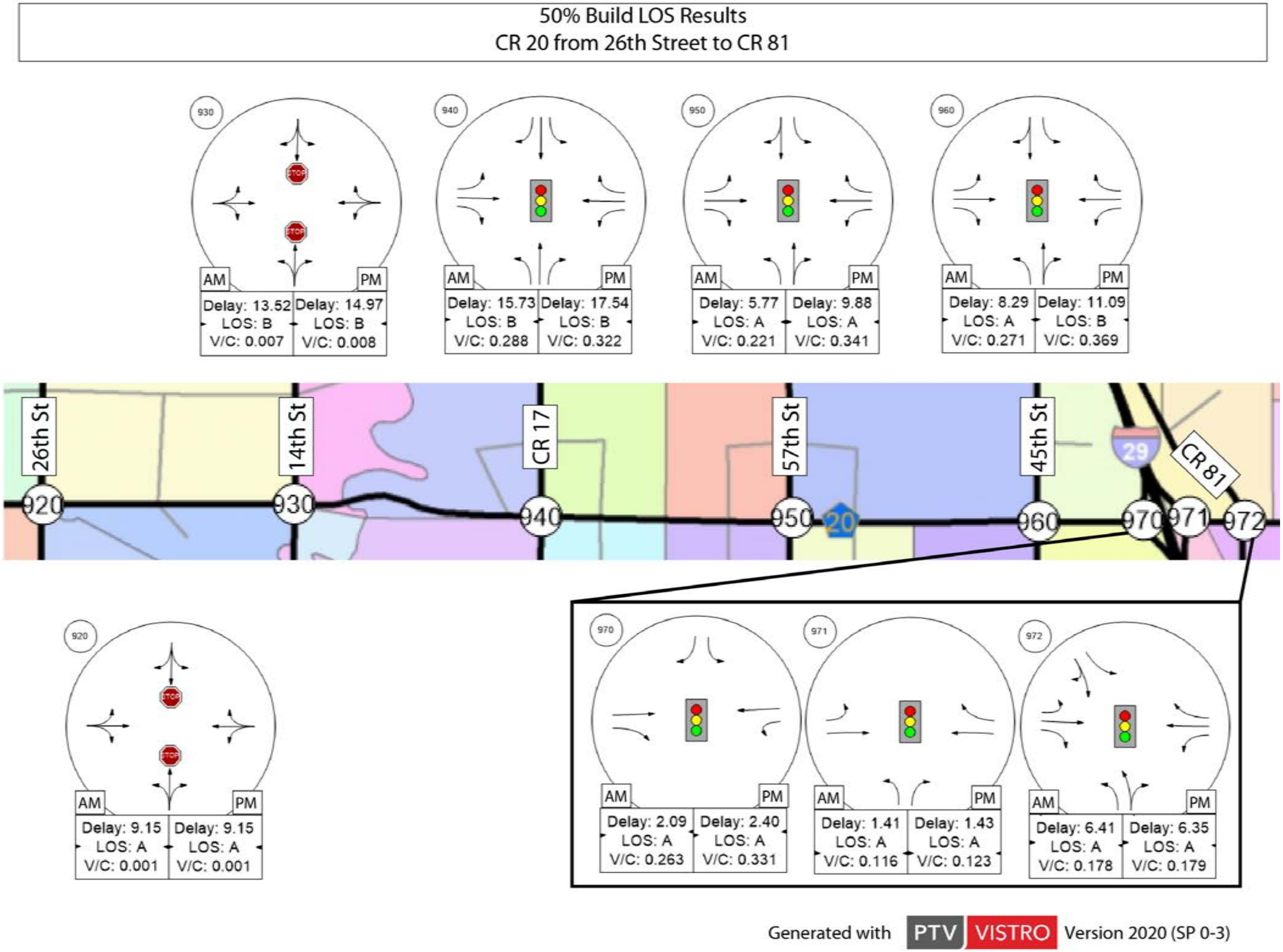


Figure 77 – Intersection Details for CR 20 Concept Under 50 Percent Build

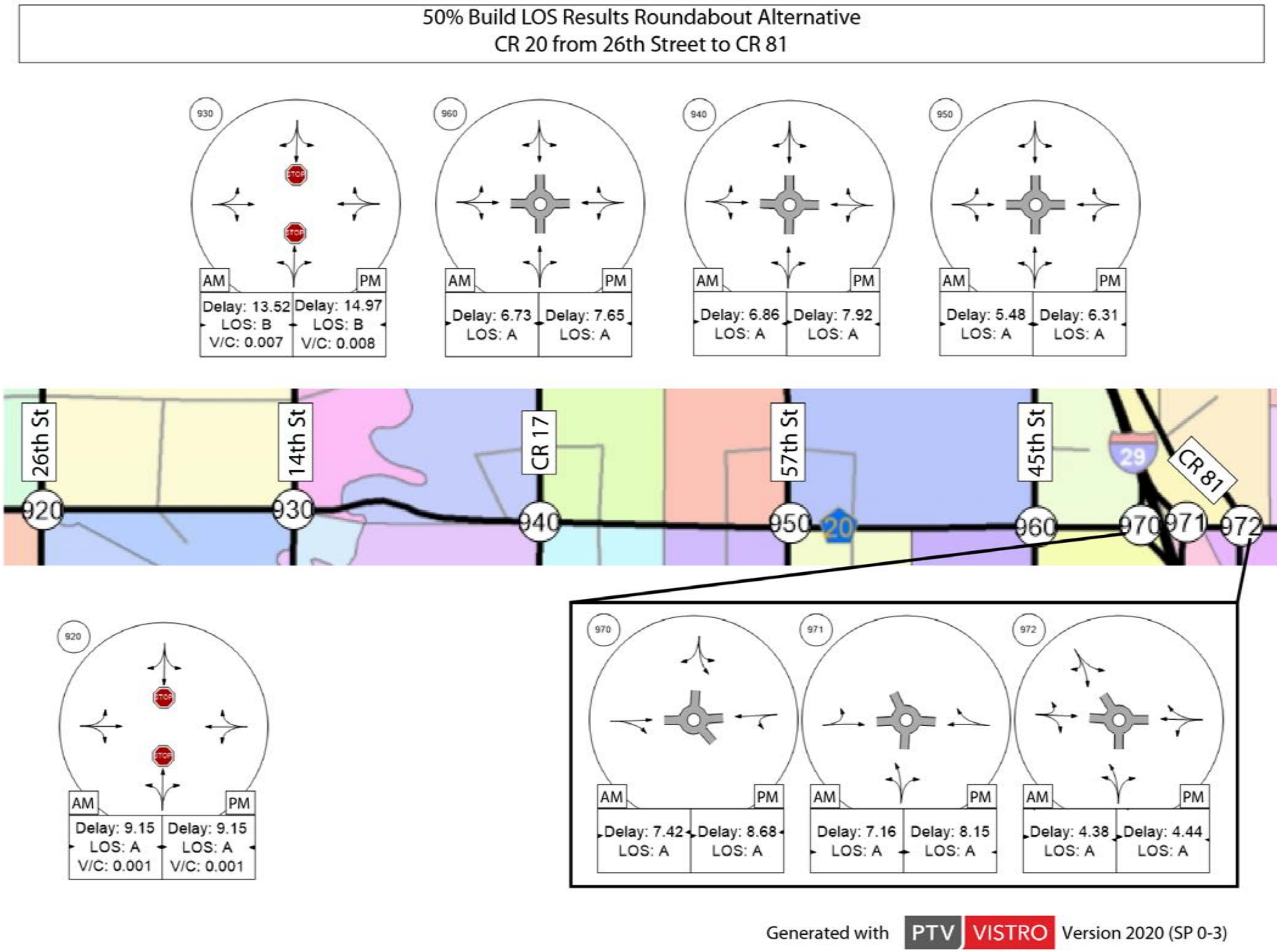


Figure 78 – Intersection Details for CR 20 Concept Under 50 Percent Build Roundabout Alternative

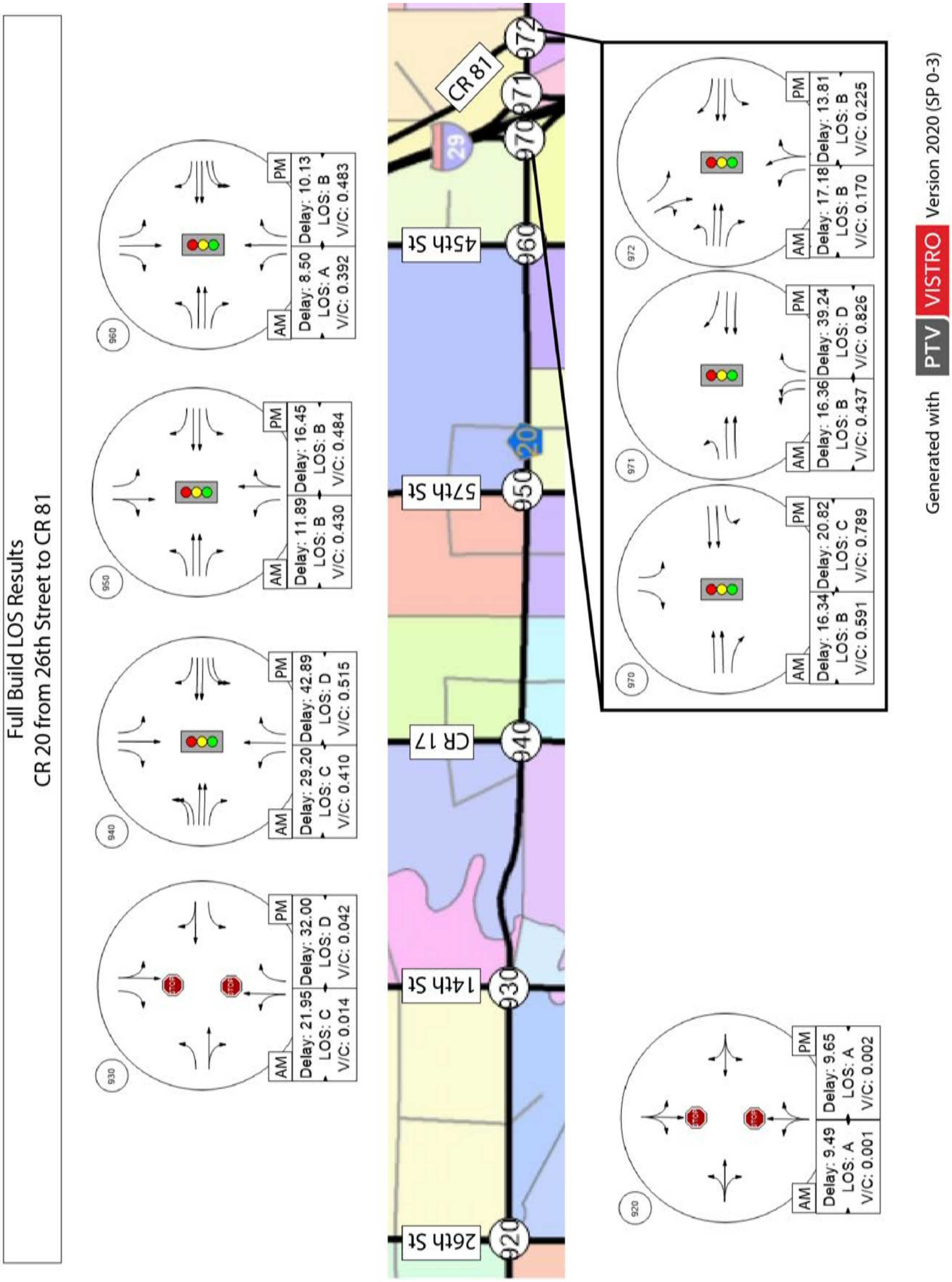


Figure 79 – Intersection Details for CR 20 Concept Under Full Build

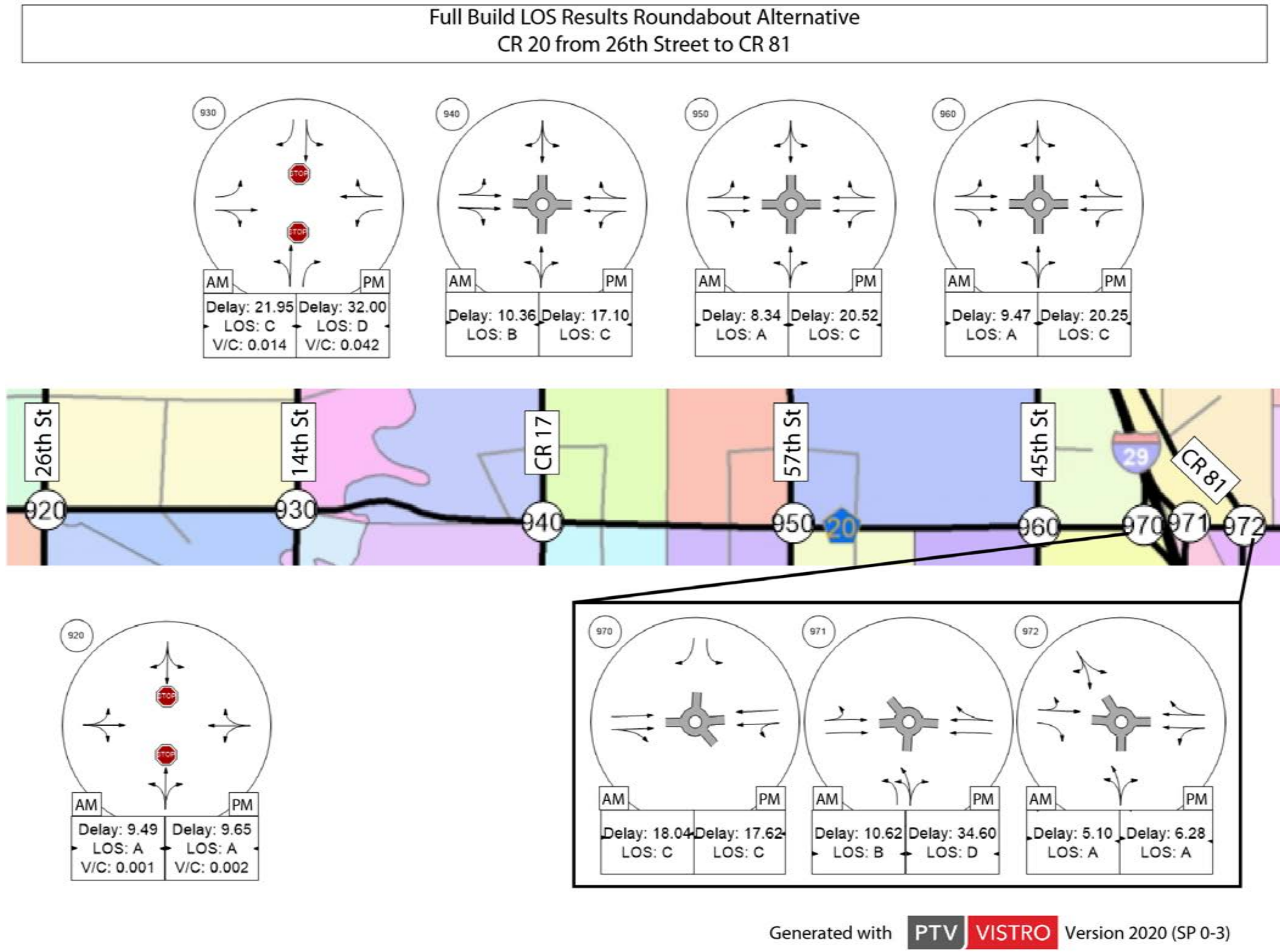


Figure 80 – Intersection Details for CR 20 Concept Under Full Build Roundabout Alternative

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