Appendix E: Perimeter Road Memos

Appendix E includes two memos detailing the review and analysis of potential perimeter roads in the Fargo-Moorhead metro area.

- Peer Road Peer Community Review
- Perimeter Road Future Forecasts and Cost Summary
  - Including Full Build-Out Analysis

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Perimeter Road Peer Community Review

Interstate Operations Study & Plan for Future Improvements

November 30, 2022

Introduction

One of the tasks of the *Interstate Operations Analysis and Plan for Future Improvements* is to determine the pros and cons of potential perimeter routes to make a recommendation for a preferred alignment. Cities can benefit from lessons learned by peer communities that have faced similar transportation needs, so part of this task is to evaluate perimeter routes located in peer communities.

This memo presents research related to peer communities that have similar perimeter route infrastructure. The evaluation criteria include:

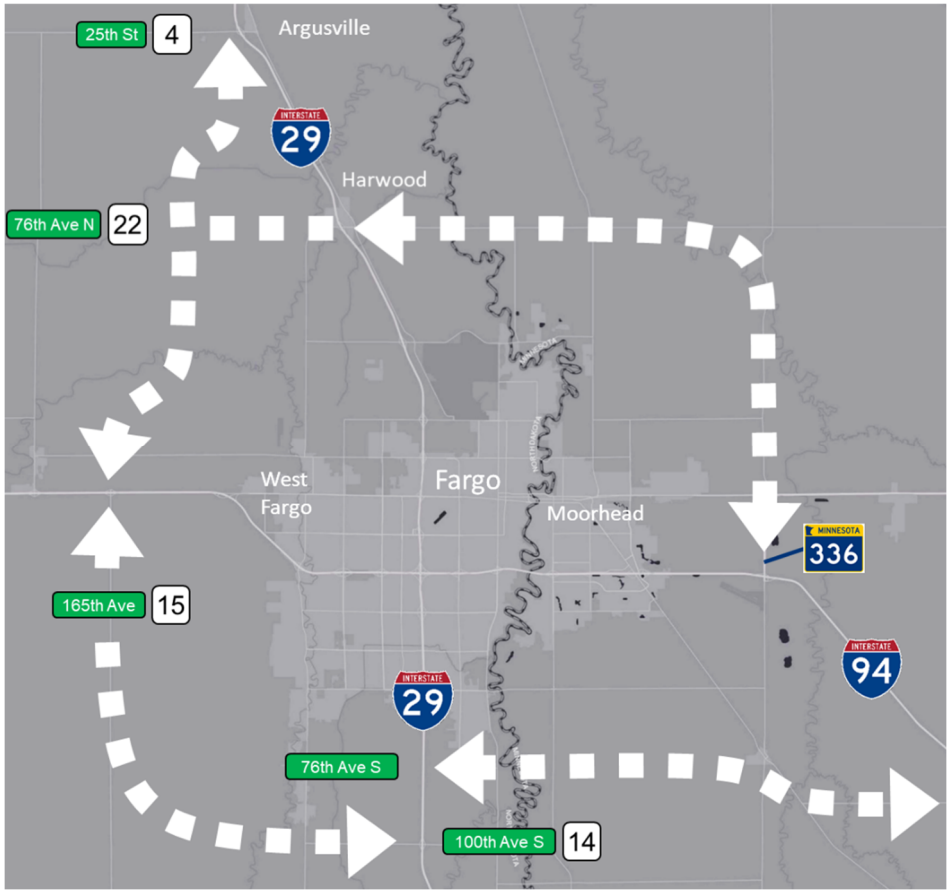
- Route type (type of facility)
- Length
- Adjacent land use / proximity to urban development
- Daily traffic volumes
- Speeds
- Bicycle and pedestrian elements
- Planning and implementation process
- Purpose and need of facilities
- Cost / funding
- Partners and review agencies

This memo also provides a summary of past research related to the impacts of perimeter highways on towns.

Potential Perimeter Route Locations

The metro area is divided by I-29 running north/south through the region and by I-94 running east/west through the region. Previous planning efforts have identified a variety of perimeter route locations in the four quadrants of the metro area, shown in **Figure 1**. The study team will assess the potential impacts of various connection points at I-29 and I-94 including the potential benefit the perimeter routes could provide to the Interstate reliability.

Figure 1. Potential Perimeter Route Locations



Background

Over the past 25-30 years, Metro COG and local partners have carried out planning for routes with potential to serve as "bypasses" or "beltways" that allow traffic to move at higher rates of speed through the growing metropolitan area.

In the 1990s, a beltway system was envisioned that included MN 336/CSAH 11, 52nd Avenue S (60th in MN), County Road 17, and County Road 20 (Wall Street in MN). The only segment of this system that continues to support higher speed vehicular travel is MN 336/CSAH 11. While 60th Avenue S in Clay County remains a rural highway, portions of 52nd Avenue S in Fargo have access spacing that is not conducive to free-flowing traffic due to the need for signalization.

Sheyenne Street is similar due to driveways that serve individual parcels and subdivisions along the corridor, although access management has been somewhat of a priority. On the north side of the metro area, County Road 20 still functions at a high level, but on the Minnesota side, Wall Street is somewhat limited by residential development and environmental factors such as flooding.

As a result of the limitations of these corridors, and opportunities presented by the FM Diversion Alignment, this study analyzes the relationship between the interstate and a future alternative route that would allow regional traffic to traverse the metro area on a mostly free-flowing roadway network that remains outside the urbanized area for the foreseeable future.

Peer Communities

Community Selection

The project team initially used population and geography to identify peer communities. A population range of 100,000 to 200,000 for the central city (with metropolitan populations over 200,000 like Fargo-Moorhead) was applied in the search, which captured 32 peer cities within the Midwest. Of those, six communities had perimeter routes or perimeter highways that might be similar to Fargo-Moorhead including:

- Sioux Falls, South Dakota
- Rockford, Illinois
- Cedar Rapids, Iowa
- Rochester, Minnesota
- Springfield, Illinois
- Green Bay, Wisconsin

The proposed alternative route for Fargo-Moorhead is different from many of the peer communities since most are seeking to improve travel times for through traffic by avoiding a highway through route that functions as an arterial street and includes their downtown area. The study team added the following peer communities that fall outside the initial set of parameters but had study data that was readily available.

- Fremont, Nebraska
- Fuquay-Varina, North Carolina
- Springdale, Arkansas
- Omaha, Nebraska

Metro COG requested that Winnipeg, MB and Amarillo, TX also be reviewed as peer communities. Winnipeg is like Fargo-Moorhead in that it has a perimeter route along with a stormwater diversion, but different from Fargo-Moorhead in that Winnipeg does not have an Interstate that runs through the heart of the city. Amarillo is like Fargo-Moorhead in that it has interstates running north/south and east/west through the city, along with a perimeter route option. It is also similar in size to the FM metro and it is distant from other large cities. The project team reached out to both communities to schedule a discussion regarding their transportation systems and impact alternative routes have on them. The City of Winnipeg participated in a discussion with the project team while the City of Amarillo was unable to schedule a time for discussion.

Reasons For Building an Alternative Route

The peer review showed that communities had similar reasons for building their alternative routes:

- To alleviate existing congestion on existing transportation network
- To meet anticipated transportation demand
- To improve safety on existing highways/transportation network
- To improve connectivity thought the region
- To minimize through traffic in the city

Tables comparing each of these communities is in **Appendix A.**

Peer Community Interview - Winnipeg

To further understand impacts on communities, the project team contacted the city of Winnipeg to gain their first-hand insight on their transportation system. David Patman, Winnipeg Public Works Manger of Transportation, and Alex Regiec, project lead for the *Winnipeg Transportation Master Plan 2025*, provided the following information:

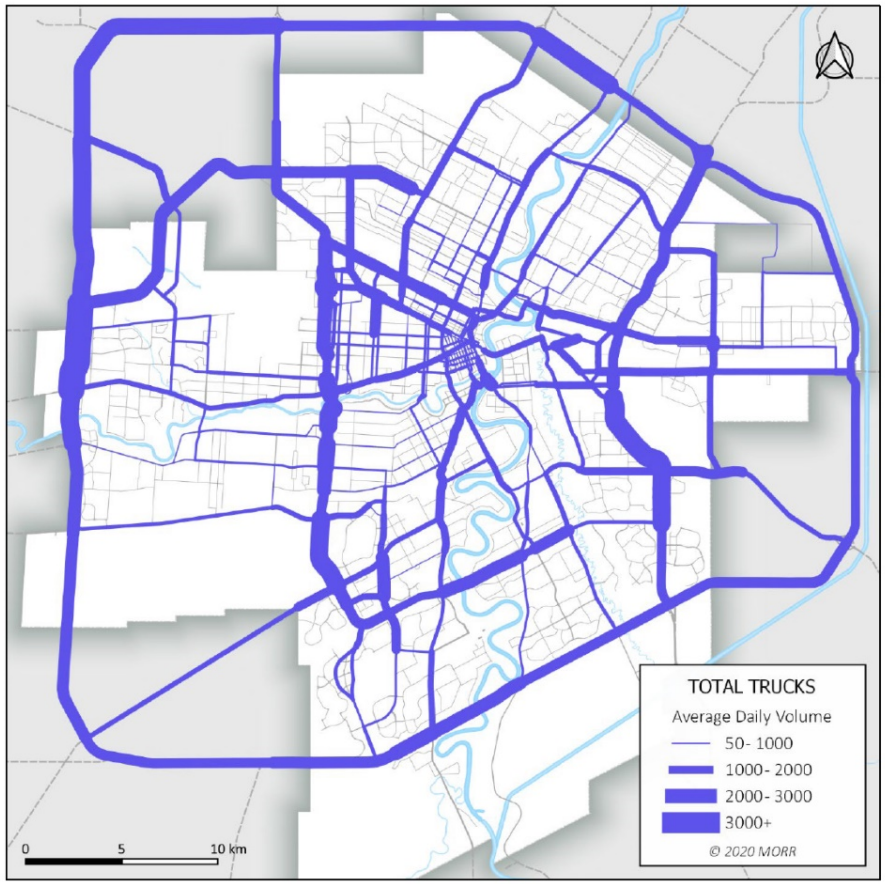
Provincial Trunk Highway #100 & #101 is the outer ring road (or Perimeter Highway) and is a free-flow, limited access, four-lane divided expressway (high speed 100 km/h or 62 mph) facility that has access/egress points at controlled intersections (either by at-grade traffic signal control or with full bridge interchange). The Province of Manitoba recently improved the facility by closing access/egress from several secondary road connections and directing traffic to the controlled intersections/interchanges. The Province also protects the right-of-way from any encroachments.

Development Pressure Near Perimeter Road: The portion of the Perimeter Highway that parallels the floodway is largely located on lands outside of the city boundaries. A large city residential neighborhood called Transcona is built-up to the highway's ROW; however, it is physically separated by a berm built parallel to the highway ROW for sound attenuation. The neighborhood has been built over the last twenty years according to City of Winnipeg land use development standards and regulations. In addition, a newer industrial area (built over the last ten years) is located immediately north of Transcona, in the adjacent rural municipality of Springfield. It was likely situated to be near the Perimeter Highway for trucking access/egress. All traffic from these areas is controlled and directed to main arterial roads that intersect at specific points with the Perimeter Highway.

Perimeter Road Benefits: As the outer perimeter road that loops the entire City of Winnipeg, the perimeter route plays an important role in supporting the region's transportation network. The facility accommodates many home-to-work commuting trips between regional towns and the city and provides good access-egress for freight to specific points inside the city. It also serves as a by-pass express route for those vehicles and trucks travelling to points beyond the City of Winnipeg.

Truck/Freight Routes: Average daily truck volumes are shown in **Figure 2**. Depending on terminal points or load origin-destinations, there's a split on the volume of trucks using city routes or the Perimeter Highway.

Figure 2. Winnipeg Truck Volumes



Source: Winnipeg Area Transportation Master Plan

Related Research

Development of bypass highway routes is often a controversial subject, particularly for communities that rely on pass-through visitors to support their in-town businesses. Because of this controversy, several studies have taken place to determine the impact of bypasses on cities, with an emphasis on economic impacts. Many of these studies revealed inconclusive results, such that impacts were specific to each city and could not be applied generally as impacts of bypasses. Further, this research does not directly apply to Fargo-Moorhead since the proposed perimeter route is not likely to create a bypass of traffic previously running though the city streets or a downtown area. Instead, the perimeter route provides an alternative route for interstate traffic traveling through the urban area. This difference in the transportation network should be factored in when applying the studies below to the Fargo-Moorhead area.

"California Bypass Study - The Economic Impact of Bypasses," Systems Metrics Group, Inc., et al., California Department of Transportation - Transportation Economics. May 2006. This study found that towns that serve regional markets by providing services, such as big box retail, automobile dealers, department stores, or hospitals, may experience little or no economic impacts. Gas stations and quick service or fast-food restaurants cater the most to pass-through traffic, and these businesses are most likely to be impacted by the diversion of traffic to bypass routes. Annexation and land use controls were identified as strategies available to local jurisdictions to prevent development that would compete with downtown areas from occurring along perimeter highways.

"The Economic Impacts of Highway Bypasses on Communities," Wisconsin Department of Transportation. January 1998. This study observed very little retail flight occurring in bypassed communities, meaning that few businesses have relocated or developed new operations in areas adjacent to the bypass route. Over the long term, average travel levels on the "old routes" in medium and large bypassed communities are close to or higher than pre-bypass counts. Communities view their bypasses as beneficial overall, but they understand that the bypasses presented changes that must be addressed proactively.

"The Impact of a New Bypass Route on the Local Economy and Quality of Life," University of Kentucky College of Engineering. Kentucky Transportation Center. June 2001. This study showed retail loss in downtown and retail development of new businesses along bypass. Most of the business along the bypasses were new and had not relocated from downtown (in the study of 8 communities, only 7.6% of bypass-area businesses were relocated from downtown). While the study did not find a statistically significant relationship between the presence of a bypass and total employment growth, it was found that the construction of a bypass would be more likely to encourage total employment growth if designed with partial access control, and is located closer to the community's central business district.

"Managing Decisions Regarding Rural Expressway Routes and Associated Highway Bypasses," Institute for Transportation, Iowa State University. October 2009. In this study, researchers found that the use of trade area analysis does not conclusively demonstrate that bypasses can positively or negatively impact the economy of a rural community. How proactive a community is in adapting to the bypass will determine the kinds of effects felt in the community.

"The Regional Economic Impacts of Bypasses: A Longitudinal Study Incorporating Spatial Panel Econometrics and Multilevel Modeling," NEXTRANS Center, Purdue University. September 2011. In this assessment of bypassed communities, it was determined that the policies implemented by public officials following the opening of a bypass were found to play a key role in the type and magnitude of long-term impacts. Retail activity in all four bypassed communities profiled declined, due both to retail consolidation and more convenient access to the bypass.

A bypass's primary purpose may be to divert through traffic from city streets unable to handle large volumes of traffic, but the combination of enhanced mobility (which lowers transportation costs, a key selling point for attracting basic industry) and newly accessible land provides an opportunity for economic growth. Local officials may choose to implement land use controls and public investments that favor development along the bypass. With limited access to/from the bypass, mobility is maintained, satisfying state DOT interests, while the new facility can generate new employment and more tax dollars, which satisfies local interests.

While not explicitly stated in the study, local officials may also decide to pursue policies and strategies to limit development along perimeter highways through measures such as land use controls or not extending city services like sewer and water to these locations.

Other issues should be considered for communities with proposed bypasses. Local officials should be consulted to determine the status of the city or county Comprehensive Plan and the plans for downtown and outlying areas once the bypass is constructed. Local land use and zoning policies should ensure that development does not impede mobility. The views of local businesses and residents should also be considered.

"Summary of Highway Bypass Studies," Economic Development Research Group. Minnesota Department of Transportation and Wisconsin Department of Transportation. December 2000. This summary found that the wide range of highway bypass studies carried out around the country provide a generally consistent story. They indicate that highway bypasses are seldom either devastating or the savior of a community business district. Communities and business districts that have a strong identity as a destination for visitors or for local shoppers are the ones that are most likely to be strengthened due to the reduction in traffic delays through their centers.

Appendix A

Peer Community Analysis

PEER COMMUNITIES - EVALUATION OF PERIMETER ROUTES				
Category	**Sioux Falls, South Dakota**	**Springdale, Arkansas**	**Fuquay-Varina, North Carolina**	**Fremont, Nebraska**
Project Name	South Veterans Parkway	Springdale Northern Bypass / Hwy 612 future name is U.S. Route 412	U.S. 401 Corridor	Fremont Southeast Beltway
Project Website	South Veterans Parkway	Springdale Northern Bypass (Highway 412) - Arkansas Department of Transportation (ardot.gov) No. 5 - Springdale Northern Bypass (Future Highway 412) | Roads & Bridges (roadsbridges.com)	U.S. 401 Corridor Study (arcgis.com)	Fremont Southeast Beltway - Nebraska Department of Transportation
Population	192,517 (2020)	84,161 (2020)	29,200 (2018)	26,509 (2018)
Route Type (Types of Facilities)	• Limited access • 6 lanes • Raised median • Two overpasses • 9 signalized intersections, approx. every mile	• Fully controlled • 4 lanes • Variable width median • Interchanges	• Anticipated to be 4 lanes • Design details to be determined	• 4 lanes • Raised median • Roundabouts at 4 intersections
Bicycle and Pedestrian Elements	• Shared use path along south and east sides • Grade-separated crossing every mile	• None	• Anticipated to have a shared use path on one or both sides	• None
Length	• 8.5 miles	• 4.5 miles constructed • 20 total miles planned	• 7 miles (future) • 19 miles (existing)	• 3.2 miles
Land Use / Proximity Urban Development	• Fringe of urban development, developed on north side, rural on south side. Anticipated to experience suburban development in near Future.	• Primarily rural • Fringe north of Springdale	• Rural agricultural • Rural residential	• Urban fringe / rural • Industrial
Daily Traffic Volumes	Planned Facility. LRTP traffic forecasts of 15,000 to 30,000 ADT (2045)	10,000 ADT (2021)	Planned Facility	Planned Facility. Local traffic forecasts are for 7,000 to 10,000 ADT (2045).
Speeds	• Planned to range 45 mph to 55 mph • Design speed 60 mph	• Posted 65 mph • Design speed 70 mph	• To be determined	• Likely 45 to 55 mph.

PEER COMMUNITIES - EVALUATION OF PERIMETER ROUTES				
Category	**Sioux Falls, South Dakota**	**Springdale, Arkansas**	**Fuquay-Varina, North Carolina**	**Fremont, Nebraska**
Planning Process	• 2003 – Environmental Assessment • 2012 – Environmental Assessment (changes to the 2003 alignment) • 2021 – Design and permitting • 2022 – Design and right-of-way acquisition • 2023 – Construction of first segment • 2024-2026 – Construction of 3 additional segments	• 1970-1990 – Northwest Arkansas Regional Transportation Study – planned a future E/W arterial • 1996 – Major Investment Study • 1998 -2002 – Environmental Impact Study • 2002 – Location Public Hearing regarding Draft Environmental Impact Statement • 2004 – Location Public Hearings regarding Supplemental Draft Environmental Impact Statement 1 • 2005 – Final Environmental Impact Statement • 2006 – Selected Alignment Alternative • 2008 – Design Public hearings • 2015 - 2018 – Construction of first 4.5 miles segment • 2022 – Public input on extending another mile • Future segments as funding becomes available, likely within the next 5 years	• 1997 – Future U.S. 401 alignment adopted • 1999 – Revised U.S. 401 alignment approved • 2002 – included in MTP (LRTP) • 2017 – 2035 Fuquay-Varina Community Transportation Plan • 2017 – CAMPO 2045 MTP • 2019 – CAMPO Southwest Area Study Update • 2021 – Existing conditions analysis • 2021 – Develop Solutions • 2021-2022 – Developed preferred alternative • 2022 – Adopt project • Future – Programming and Funding • Environmental Clearances • Design • Property Acquisition • 2034-2035 – Anticipated Construction	• 2018 – Public engagement • 2020 – Right-of-way acquisition • 2020-2023 – Construction
Purpose And Need of Facilities	• To meet transportation needs anticipated in 2050 • To avoid capacity and continuity issues on the existing street network if it were not built	• Alleviate congestion on Hwy 412 • Improved safety on Hwy 412 • Improve connectivity/access throughout the region • Minimize through traffic in the cities	• To meet projected population and job growth • Reduce congestion and increase transportation capacity and safety • Encourage economic development • Accommodate appropriate modes of travel (transit, bicycle, pedestrian, freight)	• To improve traffic flow and safety on U.S. Hwy 77 • To improve safety and reduce congestion in residential and downtown Fremont • Facilitate economic growth • Address challenges associated with truck traffic
Cost / Funding	$210 Million • South Dakota DOT - $176M • City of Sioux Falls - $32.9M	$104.3 Million • Arkansas DOT	• To be determined	$62 Million • Nebraska DOT • City of Fremont
Partners and Review Agencies	• Sioux Falls Metropolitan Planning Organization • FHWA	• Metropolitan Planning Organization • FHWA • U.S. Fish and Wildlife Service • U.S. Army Corps of Engineers Little Rock District	• N.C. Capital Area Metropolitan Planning Organization • N.C. DOT • FTA • FHWA	• Nebraska DOT • City of Fremont • FHWA

PEER COMMUNITIES - EVALUATION OF PERIMETER ROUTES			
Category	**Winnipeg, Manitoba**	**Amarillo, Texas**	**Sarpy County, Nebraska**
Project Name	Perimeter Highway: Provincial Trunk Highways 100 and 101	The Amarillo Loop State Loop (SL) 335	Platteview Road
Project Website	South Perimeter Highway Projects | Infrastructure | Province of Manitoba (gov.mb.ca) Perimeter Highway (Winnipeg) - Wikipedia	SL 335 (txdot.gov) State Loop 335 - AARoads - Texas Highways Texas State Highway Loop 335 - Wikipedia	Platteview Road Expressway — Connect Sarpy
Population	749,607 (2021) 834,678 metro area	199,924 (2018)	967,604 (2020) Omaha Metropolitan Area
Route Type (Types of Facilities)	• Fully controlled interchanges (cloverleaf) and some signalized at-grade • 4 lanes • Signalized intersections will be updated to interchanges • Entire highway will be updated to 6-lane freeway	• Varies 2 to 7 lanes • At-grade and separated • Upgrading the entire loop to a controlled-access freeway type facility • Ramps • Three-level interchanges (I-40 East, I-40 West, I-27 and US 87)	• Widening from 2 lane to 4 lane • Grade separated crossings
Bicycle and Pedestrian Elements	• None along the highway • There is a trail between the diversion floodway and the highway	• Sidepath trails/sidewalks • Future: one-way frontage roads with bicycle and pedestrian accommodations	• Trail option is being evaluated
Length	• 56 miles	• 40 miles	• 8 miles
Land Use / Proximity Urban Development	• Originally, the route was entirely outside Winnipeg and within other jurisdictions. Now 1/4 is within city limits following the "municipal amalgamation of Winnipeg" in 1972.	• Mostly rural, about 1/4th developed	• Rural
Daily Traffic Volumes	• More than 30,000 ADT	• Varies 7,300 – 32,300 ADT	• Current = 3,000 to 5,000 ADT • Forecast = 20,000 to 35,000+ ADT (2050)
Speeds	• 62 mph	• 40 mph in urbanized area • 55 mph • 75 mph	• 55 mph (potentially higher in future build)

PEER COMMUNITIES - EVALUATION OF PERIMETER ROUTES			
Category	**Winnipeg, Manitoba**	**Amarillo, Texas**	**Sarpy County, Nebraska**
Planning Process	• 1955 – original construction • Recent and planned upgrades to the South Perimeter Highway	• 1960 – first segment • 1965, 1977 – additional development • 1984 – loop completed • 2018 – a segment was rerouted • October 2014 – SL 335 Corridor Development Study	• 2015 – Platteview Road Public Planning Workshop • 2020 – Public meeting to introduce project • 2020 – Began design for widening 2-lane to 4-lane expressway • 2020-2021 – Field work completed (survey, wetland delineation, archeological survey, hazardous materials investigations) • 2021 – Preliminary design options narrowed to recommended option • 2021 – Additional public meeting on preferred option • 2022 – Design continues on preferred option
Purpose And Need of Facilities	• To bypass rush hour traffic.	• Regional mobility	• A road that meets current design standards • Increased capacity for current and anticipated future traffic volumes • Improved east-west connectivity and efficient traffic movement • Enhanced mobility for people and goods • Potential south bypass for Omaha metro
Cost / Funding	• $800 million for 4 new interchanges (2015)	• $870 million for upgrades • $65 million from TxDOT to City in 2017	• Sarpy County • Additional funding unknown
Partners and Review Agencies	• Province of Manitoba	• Texas Department of Transportation • Amarillo MPO	• Cities Wastewater Agency (a force main is being constructed parallel to the Expressway)

Appendix B

FM COG Independent Review

FM COG developed comparison maps of primary corridors for the eight metro areas listed in **Table B.1**. Comparison maps are shown on the following page.

Table B.1. Metro Area Comparisons

	URBAN POP (2010)	URBAN AREA (SQ MI)	URBAN DENSITY (POP/SQ MI)	MSA GROWTH (2010-2019)	URBAN POP (2019 EST.)	MEAN COMMUTE
RAPID CITY, SD	81,251	42.3	1,923	12.44%	91,359	16.4 mins
SIOUX FALLS, SD	156,777	64.2	2,443.10	17.51%	184,229	16.9 mins
FARGO-MOORHEAD, ND/MN	176,676	70.3	2,514.30	17.90%	208,301	15.3 mins
QUAD CITIES, IA/IL	280,051	138.2	2,026	-0.14%	279,659	17.9 mins
MADISON, WI	401,661	151	2660	9.82%	441,104	19.6 mins
DES MOINES, IA	450,070	200.6	2,243.70	15.30%	518,931	18.9 mins
OMAHA-COUNCIL BLUFFS, NE/IA	725,008	271.2	2673.3	9.72%	795,479	19.2 mins
MINNEAPOLIS-ST PAUL, MN	2,650,890	1,021.80	2,594.30	9.20%	2,894,772	23.2 mins

Figure B.1. Primary Corridor Maps

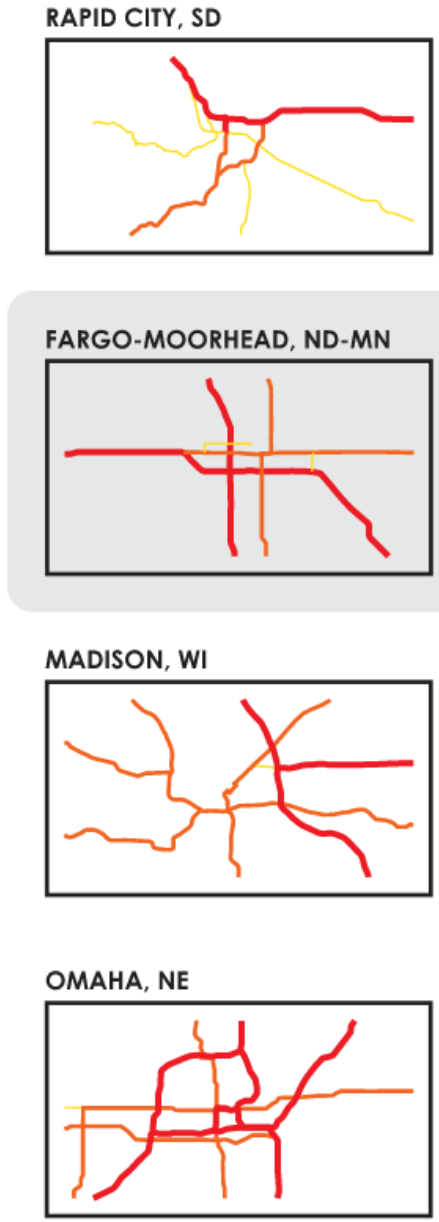
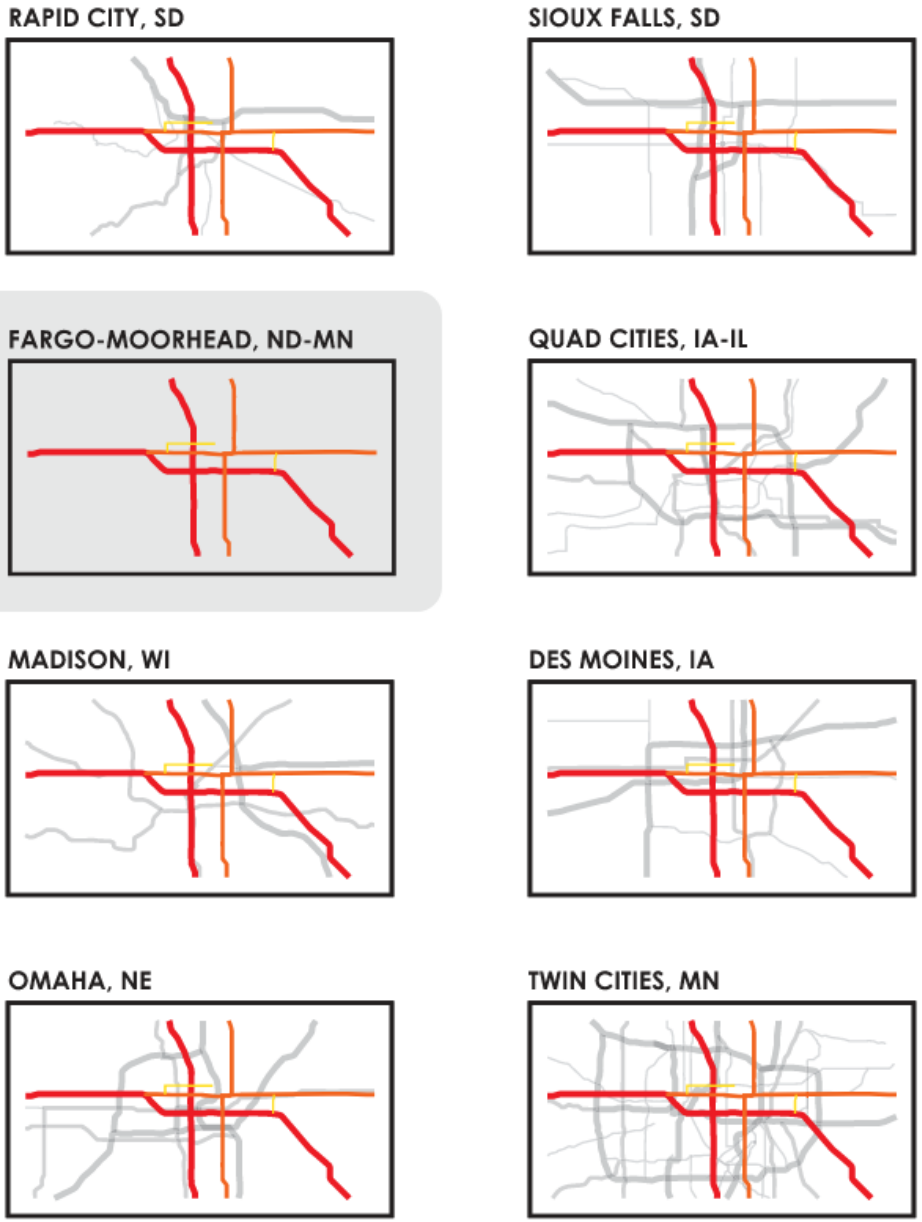


Figure B.2. Fargo-Moorhead Overlay on Peer Communitites



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Perimeter Road Future Forecasts & Cost Summary

Interstate Operations Study &
Plan for Future Improvements

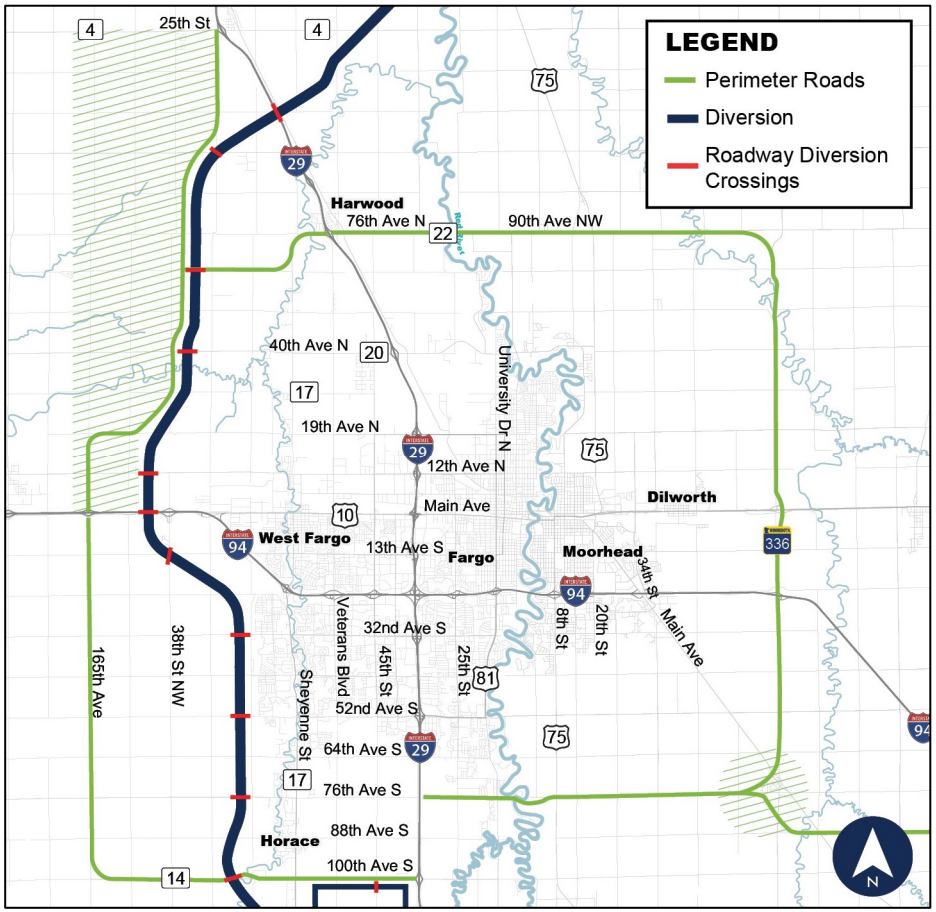
June 29, 2023

Introduction

This memo details the detailed investigation of potential perimeter highways as part of the Interstate Operations Study (IOS). MetroCOG and Cass County will be advancing the NW and SW perimeter roads through a follow-on West Metro Perimeter Highway Study. The following sections are covered in this memo.

- Alignment Considerations
- Planning Level Cost Estimates
- Travel Demand Modeling Forecasts
  - 2045 Base Year
  - Full Build Out

Figure 1. Perimeter Road Alignments



Alignment Considerations

General Overview

During the IOS, the study team developed a variety of alignment connection points with I-29 and I-94. The following general alignments were determined through modeling efforts discussed later in the memo and through discussions with the core study team, Study Review Committee, and Focus Groups.

Planning-level alignments are shown in **Figure 1**. The green lines represent the general location of the proposed alignments. Follow on studies will be needed to help determine the most viable alignment alternative. Hatched areas represent locations where the perimeter roads may need to purchase right-of-way, utilize existing roadway alignments, or a combination of both. Additional details for each quadrant are shown in **Figure 3** through **Figure 6**.

Design Features

For purposes of this study, the following design features are assumed to aid in planning level cost estimates and for modeling results.

- **Posted Speed**: 25 - 65 mph
  - Rural sections range from 55 - 65 mph
  - Urban sections range form 25 - 40 mph
- **Bridge Needs**
  - SE perimeter road requires a Red River bridge crossing at 76th Ave S
  - Existing bridges over waterways along perimeter roads were assumed to be utilized as-is.
  - Viaducts were considered for railroad crossings for the following perimeter road alignments:
    - NW: 2 railroad viaducts assumed
    - NE: No viaducts assumed at existing at-grade crossings
    - SE: 3 railroad viaducts assumed
    - SW: No viaducts assumed

    In future project phases, each rail crossing will need to be assessed to determine the need for grade separation.
- **Access Control**: The study team recommends limiting access in the rural areas to one mile spacing while allowing ¼ mile access spacing in urban areas. There may be some exceptions to this recommendation in areas of the metro area that are already established.

- **Intersection Configuration**: The study team did not develop specific intersection layouts as part of this study but recommends intersection configurations that limit disruptions to through traffic while providing safe and efficient operations. This could include Restricted Crossing U-Turns (which exist on 52nd Ave S between 45th Street & Sheyenne Street), Continuous Green T intersections, or grade separated intersections if necessary. In urban areas, signalization may be required.
- **Roadway Width**: A 56' roadway width was assumed for cost estimating purposes (similar to the Dickinson bypass section shown in **Figure 2**) including: 1 travel lane in each direction (12' each), center striped median (16'), and paved shoulders (8' each). Note that some locations may need to widen out to 4 lanes near I-29 and I-94.

Figure 2. Dickinson Bypass Typical Section

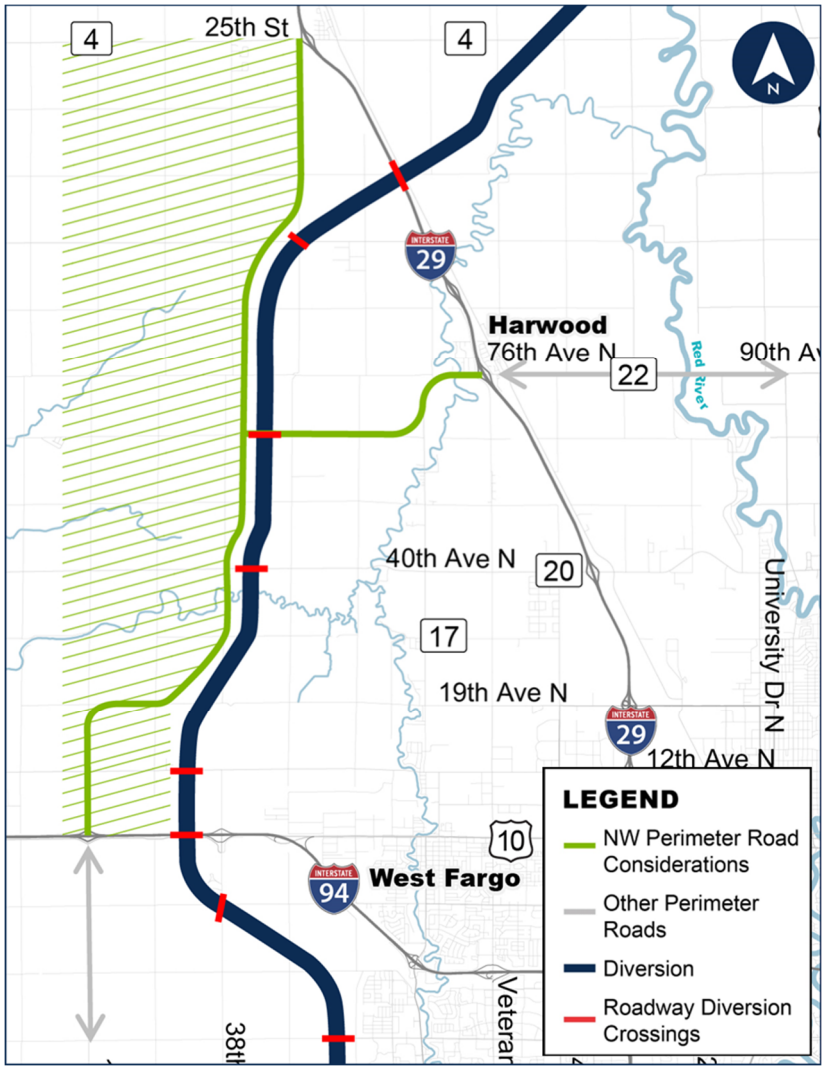
Note that the study team did not recommend freeway-level access control due to the forecasted volumes along the perimeter highways. Freeway level access should continue to be assessed and discussed in future studies as the perimeter road projects evolve.

Perimeter Road Alignments

Northwest (NW) Perimeter Road

The NW perimeter road is shown in **Figure 3**. This project would either utilize existing county road alignments, ROW purchased for the Diversion, or a combination of both in the NW quadrant of the metro area.

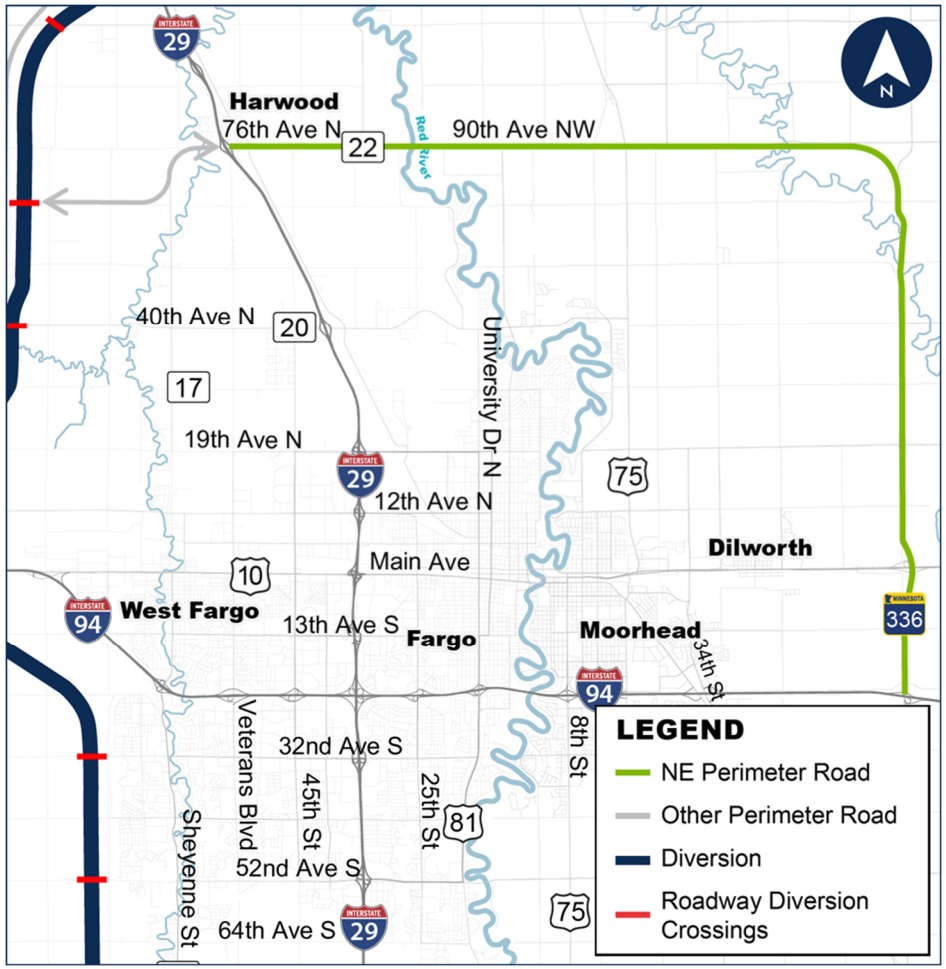
Figure 3. NW Perimeter Road



Northeast (NE) Perimeter Road

The NE perimeter road is shown in **Figure 4**. This project would extend north from MN 336 then utilize 90th Avenue NW / CR 26 in Minnesota and 76th Avenue N / CR 22 in North Dakota. This project would utilize the existing CR 26 / CR 22 Red River bridge. Through Harwood, the perimeter road alignment will intersect an at-grade crossing, pass by an elementary school, and cross multiple closely spaced intersections. These locations need to be considered from an operational and safety standpoint as the perimeter road advances to further development phases.

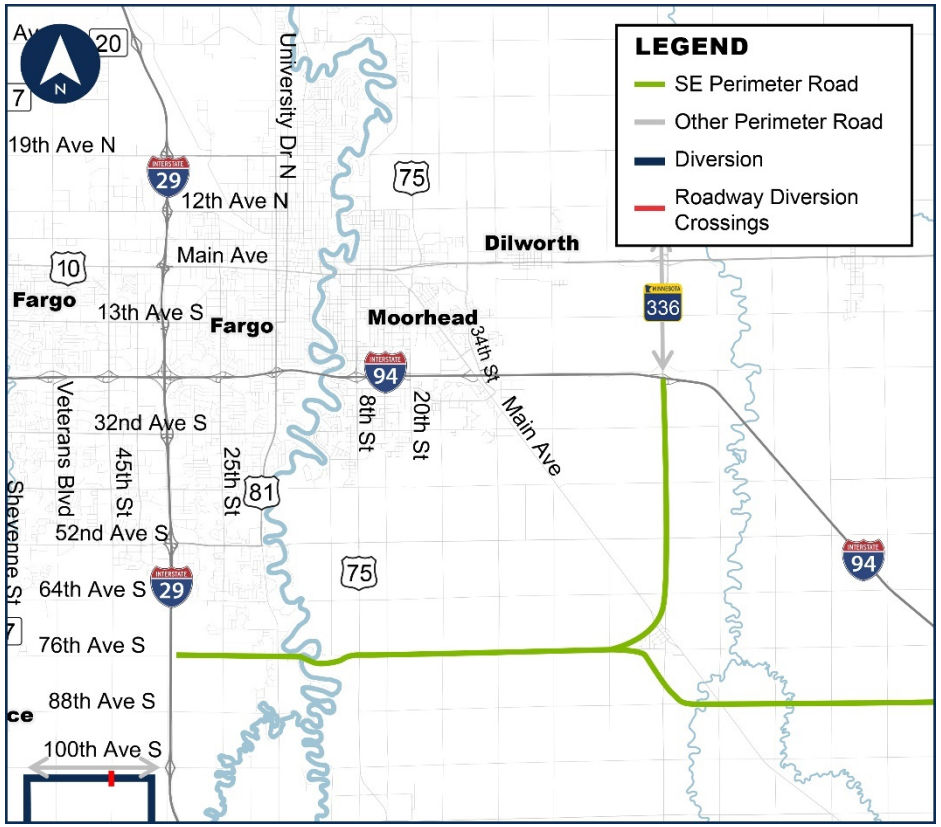
Figure 4. NE Perimeter Road



Southeast (SE) Perimeter Road

The SE perimeter road is shown in **Figure 5**. This project would extend east from a new interchange at 76th Avenue S, cross the Red River at a new river crossing, and connect to I-94 via County 10 (Exit 15) and MN 336.

Figure 5. SE Perimeter Road



Southwest (SW) Perimeter Road

The SW Perimeter Road is shown in **Figure 6**. This project would extend south from the NW perimeter road & I-94 connection at 165th Avenue (Kindred Exit), then east via 100th Ave S / CR 14 to I-29.

Figure 6. SW Perimeter Road

Planning Level Costs

The study team developed a range of costs for the perimeter road utilizing the following parameters:

Lower Cost Range

- Utilize existing alignments (where possible)
- Keep existing rural cross section
- No railroad viaducts
- Limited intersection / interchange improvements

Higher Cost Range

- Utilize new alignments (e.g., near Diversion for NW route)
- Improve cross section to 56' roadway width (discussed previously)
- Railroad viaducts on NW and SE quadrants
- Intersection improvements at major intersections / interchanges

The study team applied the following planning-level approach to develop the lower and higher cost ranges. Note that a freeway-level cost range was not developed and would cost significantly higher than the cost ranges shown in **Table 1**.

- A per-mile cost was developed for 36' and 56' cross sections.
- A per square foot cost was used to estimate bridge costs.
- A contingency was applied to the scenarios to include planning, design, permitting, ROW purchases, and other costs associated with construction.
- The estimate was factored +/- 10% to account for uncertainty in planning-level cost development.

Table 1. Perimeter Road Cost Range

Location	Cost Range (in $ Millions)	
	Lower	Higher
NW	$25 - $31	$113 - $139
NE	$10 - $12	$76 - $93
SE	$53 - $65	$126 - $154
SW	$19 - $23	$77 - $94

General assumptions for lower and higher cost ranges for each quadrant are listed in **Table 2**.

Table 2. General Cost Assumptions

Location	General Cost Assumptions	
	Lower	Higher
NW	• Utilize existing paved facilities (CR 11 & CR 4) with minor improvements • Pave 5 miles of gravel roads on CR 22 to connect to Harwood	• New alignment (56' cross section) west of Diversion that is within Diversion ROW • Bridges at Rail Crossings • Intersection improvements at 6 locations
NE	• Utilize existing paved facilities with minor improvements	• Expand to 56' cross section on existing alignments • Intersection improvements at 4 locations
SE	• Utilize existing paved facilities with minor improvements • New Red River Bridge* • Pave 5 miles of gravel roads (from Red River to Sabin) • New alignments around Sabin	• Expand to 56' cross section on existing alignments • New Red River Bridge* • Bridges at Rail Crossings • Intersection improvements at 8 locations • New alignments around Sabin
SW	• Utilize existing paved facilities (CR 14 & CR 15) with minor improvements • Pave 4 miles of gravel roads (from Sheyenne River to CR 15)	• Expand to 56' cross section on existing alignments • Intersection improvements at 6 locations

* 80' bridge width assumed for both Lower & Higher cost assumptions

Travel Demand Modeling Forecasts

Methodology

The study team worked with the Advanced Traffic Analysis Center (ATAC) to acquire the most recent version of the 2045 Travel Demand Model (TDM). The Metropolitan Transportation Plan (MTP) network was utilized as the base network and the following perimeter road scenarios were analyzed.

- NW Perimeter Road Only
- NE Perimeter Road Only
- SE Perimeter Road Only
- SW Perimeter Road Only
- All Perimeter Roads
- All Perimeter Roads – With Aligned Connections at I-29 & I-94
- West Perimeter Road

The forecasts shown on the following pages are from the "All Perimeter Roads" TDM network which represents the alignments and design features on page 1.

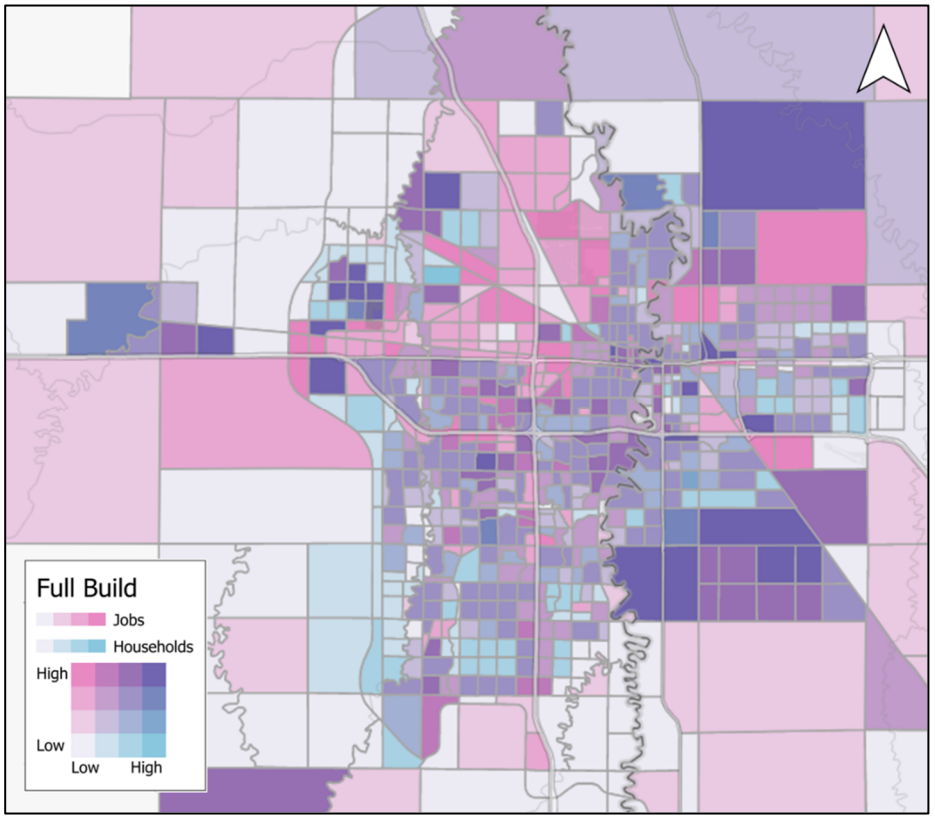
Full Build Out Socioeconomic Data

Future land use and growth assumptions in the metro area are anticipated to change significantly over the coming years once the Diversion is completed. Because of this, MetroCOG developed a socioeconomic dataset that assumed a fully built out metro area in areas that are developable. A comparison between the previous 2045 Metropolitan Transportation Plan (MTP) forecasts of job and household metro area totals to the Full Build Out totals is shown in **Table 3** and graphically in **Figure 7**. Areas of dark purple show significant increases in total households and jobs in the full build out compared to the 2045 MTP socioeconomic data.

Table 3. Household & Employment TDM Comparison

Type	2045 MTP	Full Build Out
Households	128,769	257,023
Employment	183,606	328,256

Figure 7. Full Build Out Comparison



Future Model Updates

ATAC is currently updating the TDM to a new base (2021) and future (2050) models for MetroCOG's upcoming MTP. These models include updates to the Traffic Analysis Zone (TAZ) structure which will provide more granular detail in on the fringes of the model. During the next phase, more detailed adjustments will be added to the model to test various scenarios of the impact of land use assumptions, adjacent expansion projects, and the updated TAZ structure.

Forecasts

The following forecasts for the 2045 MTP land use and Full Build Out land use data are provided in the following sections.

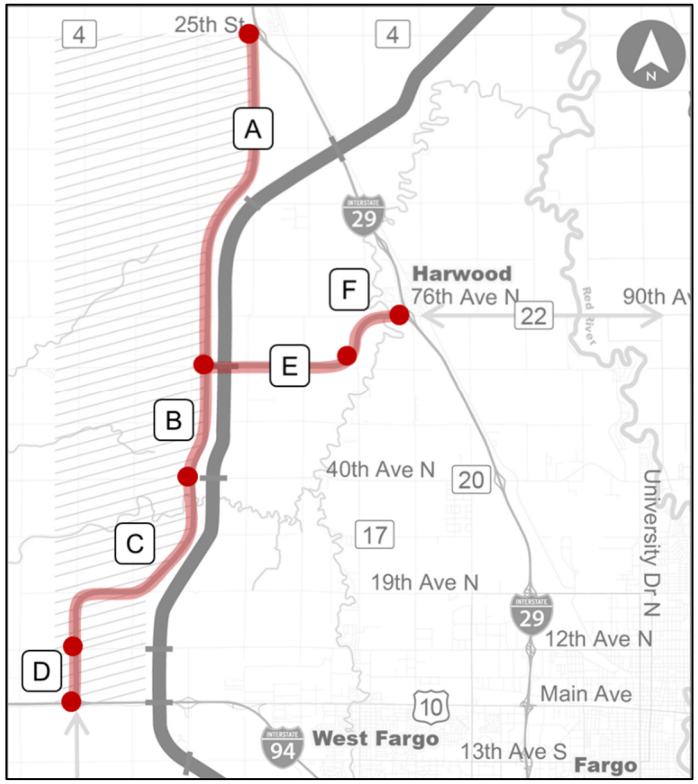
NW Perimeter Road

NW Perimeter Road forecasts are shown in **Table 4**. IDs in the left-most column correspond to IDs shown in **Figure 8**.

Table 4. NW Perimeter Road Future Forecasts

ID	2045 MTP Land Use	Full Build Out Land Use
	Daily Traffic Forecasts	
A	2,000 - 3,000	5,000 - 7,000
B	2,500 - 3,500	8,000 - 10,000
C	4,500 - 5,500	13,000 - 15,000
D	5,000 - 6,000	28,000 - 30,000
E	500 - 1,500	5,500 - 6,500
F	2,000 - 3,000	14,500 - 16,500

Figure 8. NW Perimeter Road Forecast IDs



NE Perimeter Road

NE Perimeter Road forecasts are shown in **Table 5**. IDs in the left-most column correspond to IDs shown in **Figure 9**.

Table 5. NE Perimeter Road Future Forecasts

ID	2045 MTP Land Use	Full Build Out Land Use
	Daily Traffic Forecasts	
A	5,000 - 7,000	10,500 - 13,500
B	2,000 - 3,000	4,000 - 5,000
C	3,000 - 4,000	4,500 - 5,500
D	5,000 - 6,000	12,000 - 13,000
E	6,000 - 8,000	16,000 - 19,000
F	22,000 - 25,000	38,000 - 42,000

Figure 9. NE Perimeter Road Forecast IDs

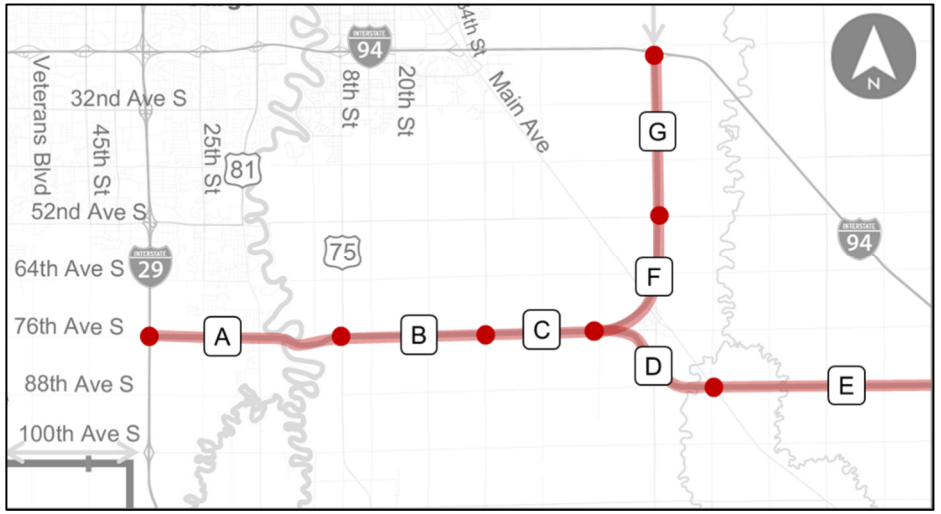
SE Perimeter Road

SE Perimeter Road forecasts are shown in **Table 6**. IDs in the left-most column correspond to IDs shown in **Figure 10**.

Table 6. SE Perimeter Road Future Forecasts

ID	2045 MTP Land Use	Full Build Out Land Use
	Daily Traffic Forecasts	
A	14,000 - 17,000	15,000 - 20,000
B	10,000 - 11,000	15,000 - 17,000
C	7,000 - 8,000	13,000 - 15,000
D	5,000 - 6,000	8,000 - 9,000
E	6,000 - 8,000	7,000 - 10,000
F	2,000 - 3,000	5,000 - 6,000
G	6,000 - 8,000	13,000 - 16,000

Figure 10. SE Perimeter Road Forecast IDs



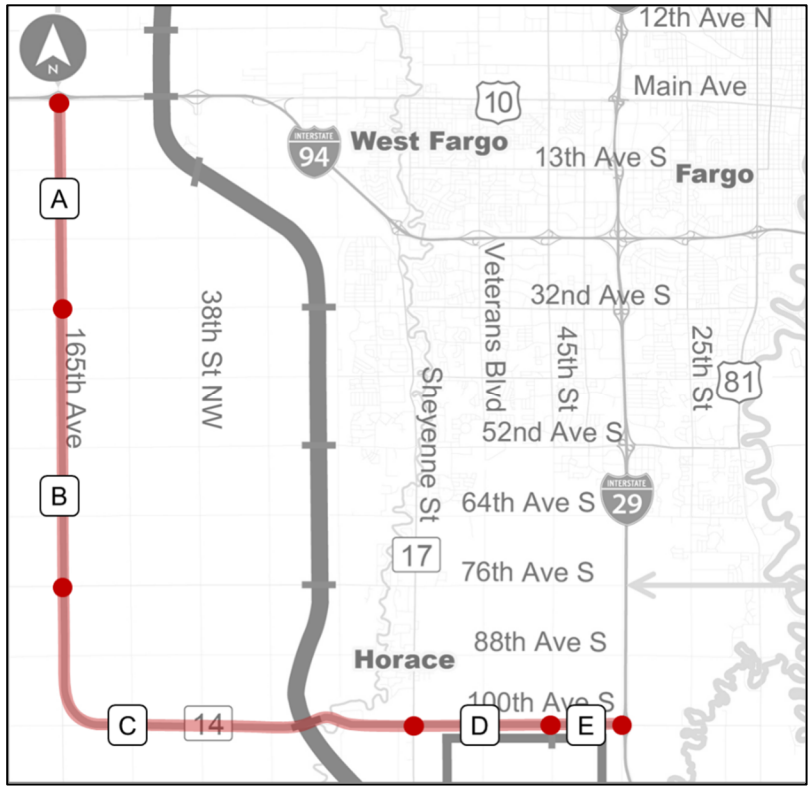
SW Perimeter Road

SW Perimeter Road forecasts are shown in **Table 7**. IDs in the left-most column correspond to IDs shown in **Figure 11**.

Table 7. SW Perimeter Road Future Forecasts

ID	2045 MTP Land Use	Full Build Out Land Use
	Daily Traffic Forecasts	
A	5,000 - 7,000	10,500 - 13,500
B	2,000 - 3,000	4,000 - 5,000
C	3,000 - 4,000	4,500 - 5,500
D	5,000 - 6,000	12,000 - 13,000
E	6,000 - 8,000	16,000 - 19,000

Figure 11. SW Perimeter Road Forecast IDs



Forecast Summary

As shown in **Table 4** through **Table 7**, the full build out land use scenario yields future forecasts in excess of 15,000 on various perimeter road segments. During future planning phases, it is important to refine the MTP and full build out forecasts to identify appropriate ROW needs for perimeter road areas that may need 4 lanes of capacity.