METROCOG

West Metro Perimeter Highway Study

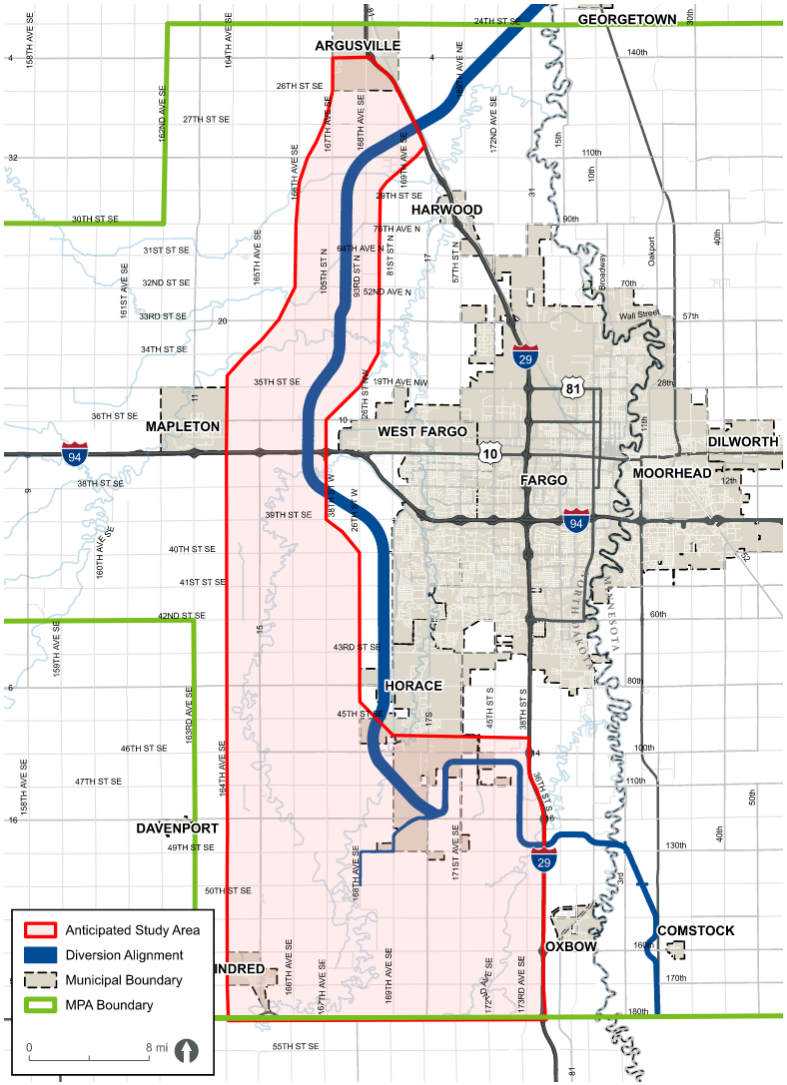
TRAFFIC FORECASTING MEMORANDUM

October 2024

Introduction

This memo summarizes the Travel Demand Modeling efforts for the future year conditions for the West Perimeter Highway study area, shown in **Figure 1.** These forecasts will guide the development of typical section recommendations, design considerations, and intersection / interchange options.

Figure 1. West Perimeter Highway Study Area



Coordination with 2050 MTP

The west perimeter highway study model runs were developed prior to the project selection phase of the 2050 Fargo-Moorhead Metropolitan Transportation Plan. To get a more accurate forecast for the perimeter road options, the study team decided to use a preliminary list of fiscally constrained projects as a baseline for the 2050 “No Perimeter Road” forecasts.

Land Use Considerations

Existing (2021)

Existing land use within the study area is generally rural with abutting up to communities on the outskirts of the metro area including: Argusville, Harwood, Mapleton, and Horace.

Metropolitan Transportation Plan (2050)

The MTP land use for the 2050 MTP provides future re-allocation of development patterns due to lands previously in the floodplain that will no longer be in the floodplain once the FM Diversion is complete and operational. The 2050 MTP land use will establish a baseline of future daily volumes on the potential perimeter road alignments.

Full Build Out

During the Interstate Operations Study (2023), MetroCOG developed a socioeconomic dataset that assumed a fully built out metro area where developable. MetroCOG developed this dataset for the entire metro area, but this project will focus on full build out potential on the North Dakota side (specifically development areas west of I-29).

Model Development

Model Baseline

The TDM was developed by staff at the Advanced Traffic Analysis Center (ATAC) for the 2050 Metropolitan Transportation Plan (MTP). The HDR team utilized the 2050 existing plus committed model (E+C) and added the preliminary 2050 MTP fiscally constrained projects in September 2024.

Models Developed for West Perimeter Road

A range of perimeter road alternatives were developed for the study. After some initial refinement due to floodplain concerns and stakeholder feedback, the alignments shown in Attachment 1 were modeled with both the 2050 land use and the full-build out land use. Two network sub-alternatives were run for Alternative 1.

Alternatives 1 through 3 were run with 65 mph as the design speed and 45 mph within one mile of I-94 and I-29. Alternative 1 was also tested with 50 mph vs 65 mph to gauge the sensitivity of travel speeds and the effectiveness of the perimeter road alignments. The following models were developed:

- 2050 Draft MTP Network (No West Perimeter Road – No Build)
  - MTP Network - 2050 SE Data
- Alternative 1
  - Base Alternative 1 Network - 2050 SE Data
  - Base Alternative 1 Network at 50 mph - 2050 SE Data
  - Base Alternative 1 Network with Harwood terminus instead of Argusville terminus - 2050 SE Data
  - Base Alternative 1 Network - Full Build Out SE Data)
- Alternative 2
  - Base Alternative 2 Network - 2050 SE Data
  - Base Alternative 2 Network - Full Build Out SE Data
- Alternative 3
  - Base Alternative 3 Network - 2050 SE Data
  - Base Alternative 3 Network - Full Build Out SE Data

Model Results

The study team reviewed vehicle miles traveled (VMT – defined below), vehicle hours traveled (VHT – defined below), and perimeter road daily traffic volume forecasts.

- **VMT**: This metric sums up all the travel distance for every user in the model.
- **VHT**: This metric sums up all the experienced travel times for every user in the model.

VMT and VHT are typically utilized to gauge how an alternative performs relative to a baseline network and can show the mobility benefits of the perimeter road compared to other projects.

Vehicle Miles Traveled & Vehicle Hours Traveled

Alternative 1 and sub-options were compared to the Draft MTP network for VMT and VHT model results for the 2050 Socioeconomic (SE) Data. These results are for the entire metro area model, so differences in VMT and VHT are area wide changes.

Table 1. 2050 VMT & VHT Results Summary

Scenario	VMT	VHT
Draft MTP	8,987,164	209,140
Alt 1	9,115,942	202,024
Alt 1 50 mph	9,071,494	204,496
Alt 1 Harwood	9,134,030	203,819

As expected, the perimeter road provides a higher-speed uncongested option for users on the west side of the metro area. This results in a lower VHT but increases VMT compared to the Draft MTP scenario, since users travel out of their way to reduce their overall travel time.

In general, Alternative 1 reduces the overall travel time in the model by 3.4% while increasing the total number of miles traveled by 1.4% in 2050. It is expected that Alternative 2 and 3 would perform similarly to the overall reduction in VHT and increase in VMT shown in **Table 1**.

Daily Traffic Volumes

Future 2050 daily traffic forecasts are shown in **Figure 2** through **Figure 6**. When reviewing Alternatives 1, 2, and 3, it was observed that the improvements made in one quadrant of the metro area didn't significant impact volumes on an adjacent quadrant (i.e. the location of the east-west connection for the southwest perimeter road doesn't change the volumes for the northwest perimeter road). Because of this, the traffic volumes shown in the following figures are for each quadrant.

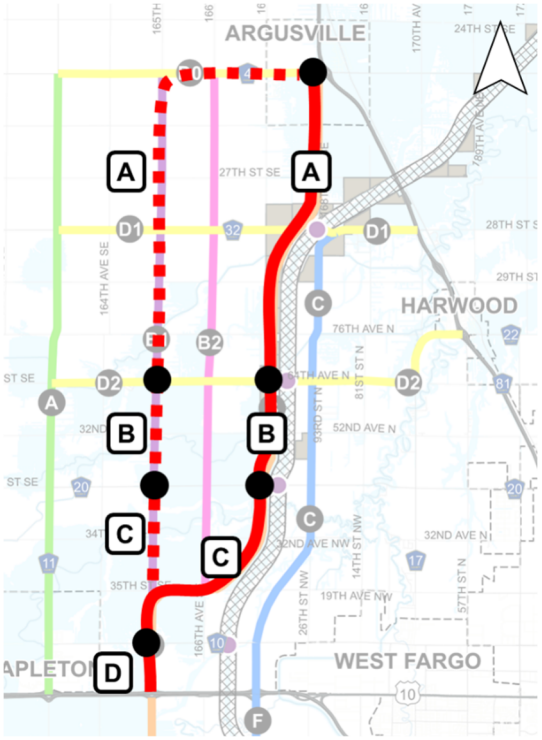
Northwest Perimeter Road – Base

Table 2. Northwest Perimeter Road Daily Forecasts

ID	2050 SE (veh/day)	Full Build SE (veh/day)
A	6,000-7,000	9,000-11,000
B	8,500-9,500	14,000-15,000
C	10,500-11,500	19,000-20,000
D	14,000-15,000	24,000-27,000

If the northwest perimeter road is reduced from 65 mph to 50 mph in rural areas, daily forecasts listed in **Table 2** drop by 25%.

Figure 2. Northwest Perimeter Road Forecast Key



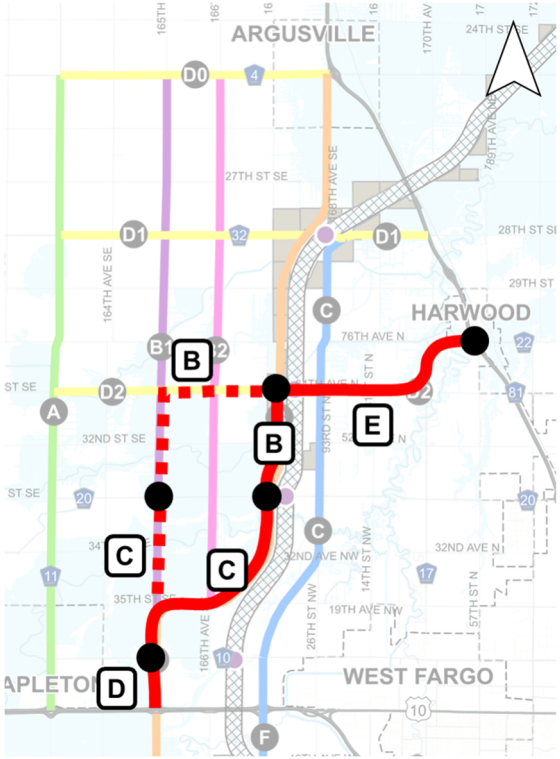
Note that the alignment of Alternative 1(solid line) vs Alternative 2 (dashed line) doesn't have a significant impact of the Travel Demand Model Forecasts. The forecasts shown in **Table 2** apply to either the solid red alignment or the dashed alignment for A, B, and C.

Northwest Perimeter Road – Harwood Connection

Table 3. Northwest Perimeter Road (Harwood Connection) Daily Forecasts

ID	2050 SE (veh/day)	Full Build SE (veh/day)
B	8,000-9,000	12,000-13,000
C	9,000-10,000	18,000-19,000
D	13,000-14,000	23,000-26,000
E	8,000-11,000	12,000-24,000

Figure 3. Northwest Perimeter Road (Harwood Connection) Forecast Key



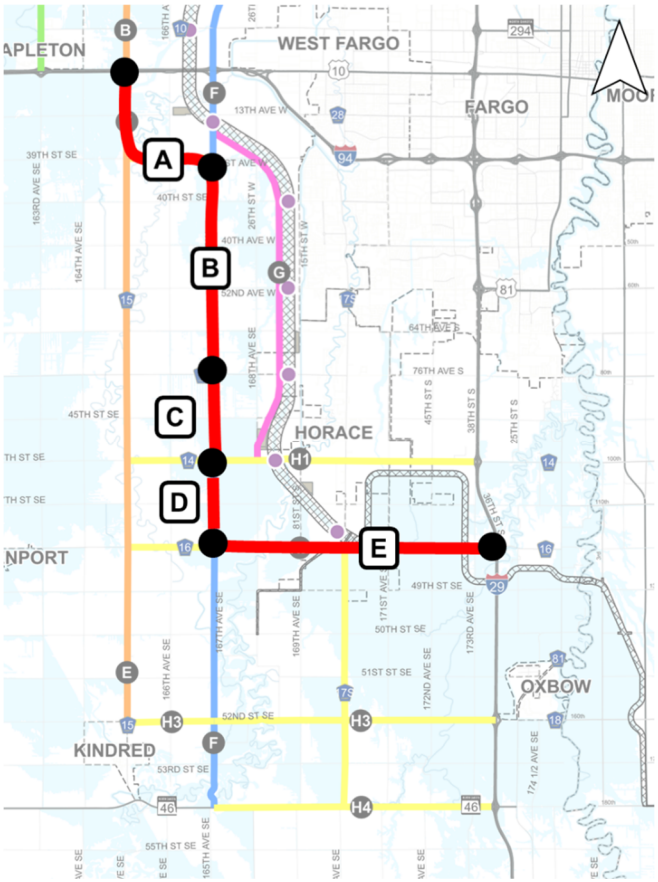
Note that the alignment of segment E may impact the model forecasts. The improvements made at I-29 and Harwood would likely impact the forecast on the rest of the northwest perimeter road. A more direct connection that avoids the current low-speed area through Harwood would likely result in forecasts closer to **Table 2**.

Southwest Perimeter Road – CR 16 Connection

Table 4. Southwest Perimeter Road (CR 16) Daily Forecasts

ID	2050 SE (veh/day)	Full Build SE (veh/day)
A	6,000-7,000	12,000-16,000
B	10,000-13,000	20,000-23,000
C	6,000-7,000	12,000-13,000
D	5,000-6,000	9,000-10,000
E	7,000-8,000	11,000-15,000

Figure 4. Southwest Perimeter Road (CR 16) Forecast Key

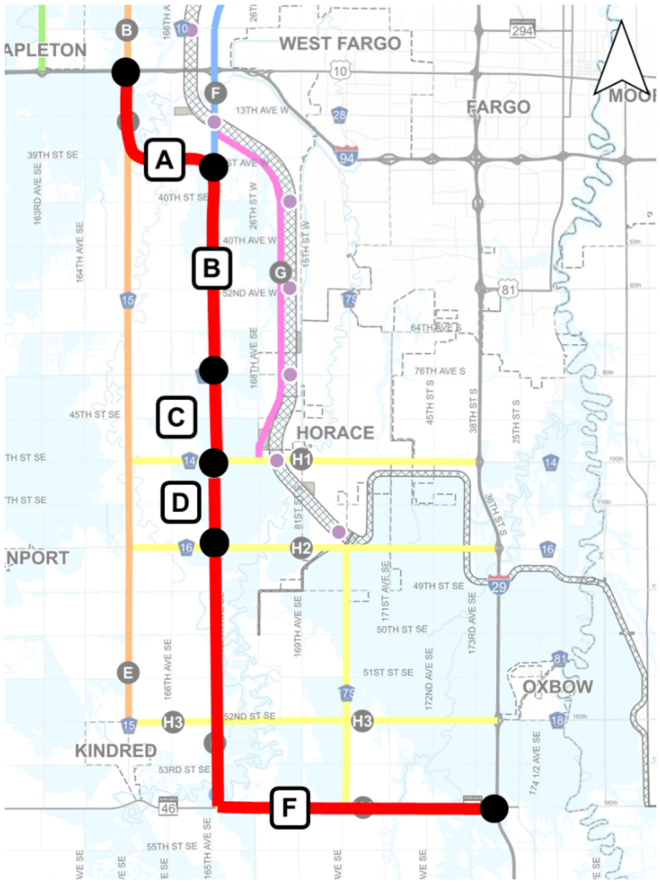


Southwest Perimeter Road – ND 46 Connection

Table 5. Southwest Perimeter Road (ND 46) Daily Forecasts

ID	2050 SE (veh/day)	Full Build SE (veh/day)
A	6,000-7,000	12,000-16,000
B	10,000-13,000	20,000-23,000
C	6,000-7,000	12,000-13,000
D	5,000-6,000	9,000-10,000
F	4,000-5,000	8,000-9,000

Figure 5. Southwest Perimeter Road (ND 46) Forecast Key

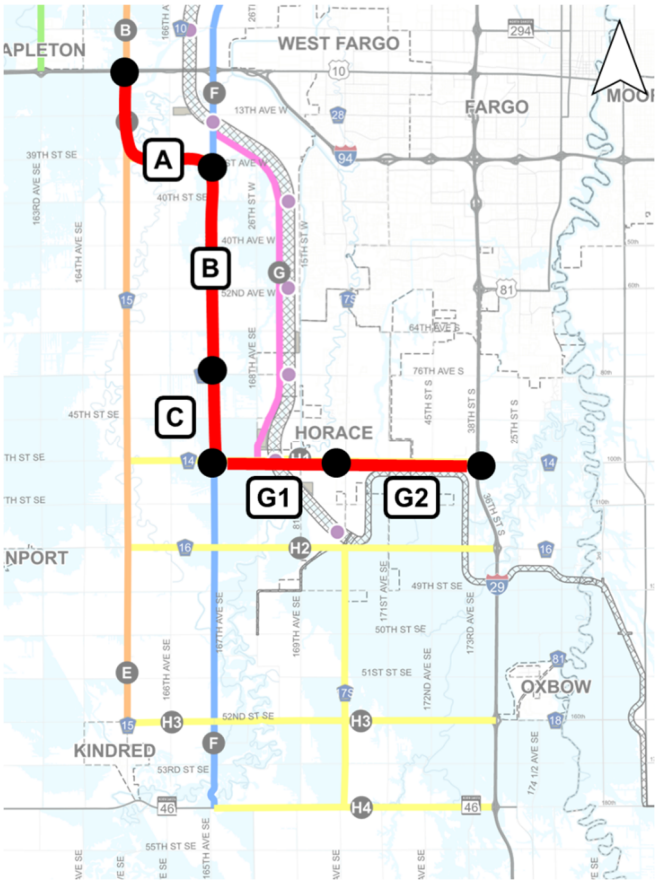


Southwest Perimeter Road – CR 14 Connection

Table 6. Southwest Perimeter Road (CR 14) Daily Forecasts

ID	2050 SE (veh/day)	Full Build SE (veh/day)
A	6,000-7,000	12,000-16,000
B	10,000-13,000	20,000-23,000
C	6,000-7,000	12,000-13,000
G1	7,000-8,000	12,000-14,000
G2	16,000-18,000	30,000-35,000

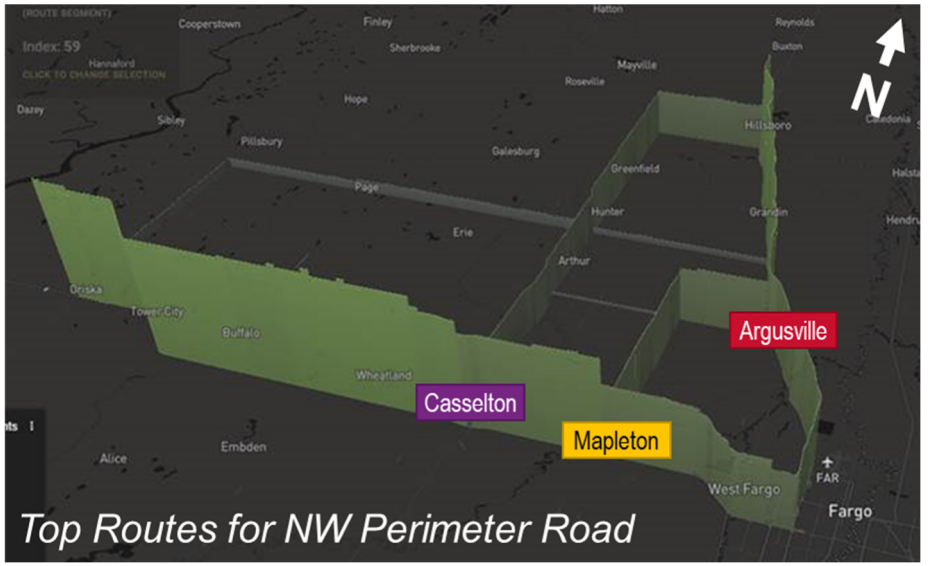
Figure 6. Southwest Perimeter Road (CR 14) Forecast Key



Other Data Sources

Daily origin and destination regional volumes were developed during the Interstate Operations Study for all vehicles and trucks utilizing I-94 and I-29. This analysis utilized Streetlight Data that provides estimates of existing travel patterns. Note that some county roads in the northwest quadrant of the metro area currently carry some regional traffic that wishes to "cut the corner" between I-94 and I-29, shown in **Figure 7**.

Figure 7. Streetlight Top Routes for NW Quadrant



Next Steps

As the perimeter road progresses into future stages of design and concepting, the travel demand model should continue to be refined to understand the forecasted improvements to the overall network. The study team recommends the following adjustments to the Travel Demand Model

- **Improve TAZ connectivity to a grid system in West Fargo**: This would provide a more realistic loading of TAZ volumes onto the network. The model currently loads most of the centroid connectors load directly onto 12th Avenue North. As West Fargo begins to plan for a future grid system east of the diversion, the model should be updated to reflect these changes.
- **Re-assess rural connectivity and speeds**: Additionally, there are areas within the model that are currently connect today that are not included as a connection within the model, specifically CR 10 to CR 4 from Mapleton to Argusville. Additionally, existing roadway networks should be reviewed for speed limit changes on the fringes of the metro area and rural connections outside city limits and how the model calculates the free flow speeds of these corridors
- **Diversion implications**: The diversion will change travel patterns into different parts of the metro area. Incorporating these changes in the existing plus committed model is recommended.

These adjustments will provide a more cohesive and refined set of model runs. Some of these adjustments may need to be incorporated in a new model update (or require a model recalibration) since adjusting speeds and route connectivity may impact calibration and validation efforts performed on the existing network.

Attachment #1: Alternative 1, 2, and 3 Alignments