Appendix I
Documentation of Travel Demand Model Input Assumptions

Overview

GBNRTC's travel demand model is a state-of-the-art suite of analytics that is designed for applications such as simulating the effects of prospective transportation system investments and policies. The model provides a range of outputs including the number of trips by each of the different modes of transportation in the Buffalo-Niagara region, the amount of vehicle-miles of travel (VMT) and person-hours of travel (PHT), the amount of pollutant emissions from the transportation sector, and patterns of congestion on the road network.

In order to support the development of GBNRTC's Metropolitan Transportation Plan, the strategy to employ the travel demand model was as follows:

> First, a Year 2020 Baseline model was developed, which uses the highway and transit networks as they existed in 2020, along with population, households, and employment in the Buffalo-Niagara region updated using the currently available data released from Census 2020 (readers are referred to Appendix I for further information on the use of newly released Census 2020 data). Due to the disruption of the covid-19 pandemic beginning in March 2020, the year 2020 run should be interpreted as representing early 2020, prior to the pandemic's impacts.
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> Second, a Year 2050 "No-Build" model was developed, using the same year-2020 highway and transit networks, but with demographic and employment patterns in the region forecasted to year 2050 levels (forecasting approach described in Appendix I), and the region's vehicle fleet also projected to year 2050 (including additional rollout of electric vehicles). This model run simulates the transportation network's operations in the horizon year of this MTP (2050), without the system enhancement projects that are listed in the MTP's Fiscally Constrained Project Listing.
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> Third a Year 2050 "Build" model was developed – containing the highway and transit networks that include the system enhancement projects listed in this MTP's Fiscally Constrained Project Listing.

The objective of these model runs is to quantify how the transportation network's key performance metrics would be impacted by the investments in system enhancement that are set out in this MTP.

Modeling Approach for System Enhancement Projects

The projects in the Fiscally Constrained Project Listing were reviewed to identify which were amenable to testing using the Buffalo-Niagara region's travel demand model. The following specific modifications were made to the highway and transit networks.

- **Project IR1: Region Central Infrastructure Re-Envisioning:** The highway network was modified in the vicinity of the Region Central area to reflect the preferred alternative recently developed

for the Scajaquada Corridor as part of this project. Additionally, changes in bus routes relating to the Region Central project were coded into the transit network.

- **Project RHS2: Next Generation Freeway Technology and Safety Upgrades:** Roadway capacities on the region's freeways were adjusted upwards by 20% to reflect improved traffic flow from the MTP's investments to enhance management and operations on the region's freeway network. This 20% factor was developed by iteratively testing a range of capacity values within the model until a reduction in vehicle-hours of travel (VHT)of ~4.3% was achieved. The value of 4.3% reduction is sourced from the traffic microsimulation analysis of the Buffalo-Niagara Integrated Corridor Management, Final Report. Figure 1 shows the freeway links where the adjustments were applied.
- **Project RHS4: I-290/Main Street Interchange Improvements:** Ramps at this interchange were reconfigured to reflect the scope of this project.
- **Project RHS5: Exit 50 ramps/interchange Improvements:** Ramps at this interchange were reconfigured to reflect the scope of this project.
- **Project RTSE1: Regional Traffic Signal Enhancement:** Intersection approach capacities in the model were adjusted upwards by 10% to reflect reduced delay from optimization and enhanced management of the region's traffic lights. The adjustment factor was based on professional judgement and review of published literature on the impacts of traffic signal optimization, and results in a 1.3% reduction in VHT at signalized intersections, which translates to a 0.7% reduction in regional VHT. Figure 1 shows the location of signalized intersections in the GBNRTC region.
- **Project NMT1: Metro Transit Expansion:** The extensions of Metro LRT to Amherst as well as the DL&W were included in the transit network.
- **Project NMT3: Bailey Avenue High Capacity Transit Enhancements:** The upgrade of bus services on Bailey Avenue to reflect Bus Rapid Transit (BRT) service improvements was coded into the transit network. Service modifications included higher bus frequencies in the off-peak and higher average travel speeds (due to traffic signal preemption by buses).
- **Project NMT6: Mobility Hubs:** Shared-fleet e-bike and e-scooter services were introduced into the travel demand model at sites reasonably anticipated as possible Mobility Hub locations throughout the region, as shown in Figure 2. Walking and bicycling speeds were increased (from 2.5 mph to 3.0 mph for walking and 7.5 mph to 10.0 mph for cycling), to reflect the priority to be placed on non-motorized travel in the vicinity of Mobility Hubs projects (the same locations identified in Figure 2).

All other projects were deemed to not be developed enough at the time of publication to be reliably simulated with the travel demand model (or otherwise not suitable for travel demand modeling, e.g. maintenance activities). The improvements in system performance metrics presented in Chapter 6 of this MTP should therefore be interpreted as conservative estimates, as the benefits from all other projects not in the listing above would be additional.

Figure 1 – Roadways and Signals with Operational Improvements

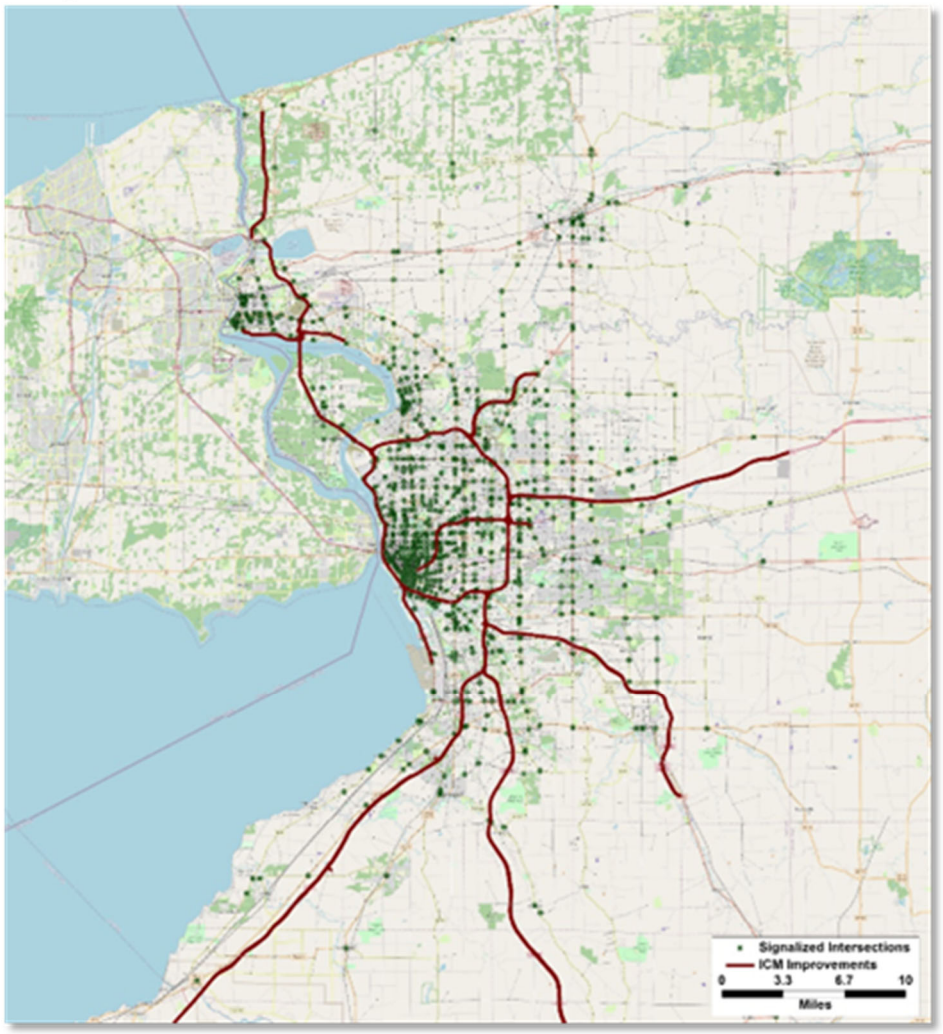

Figure 2 – Traffic Analysis Zones with E-Micromobility Services Available