APPENDIX F
Transportation Technical Report

Metro Rail Expansion
Transportation Technical Report

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DRAFT

Prepared by

Table of Contents

List of Figures

List of Tables

1.0 Executive Summary

The Niagara Frontier Transportation Authority (NFTA) Metro Rail Expansion Project consists of approximately 7 miles of a new double track light-rail transit (LRT) line running from University Station at the University at Buffalo (UB) South Campus, through the UB North Campus, to the area near Audubon Pkwy and I-990. This alignment will traverse through the municipalities of Amherst, Buffalo, and Tonawanda in Erie County, New York. The Transit Options Amherst-Buffalo Alternatives Analysis (AA) was initiated by NFTA in the fall of 2012 along with study partner, the Greater Buffalo Niagara Regional Transportation Council (GBNRTC). The overall goal of the AA project was to evaluate a range of high quality transit service alternatives to improve transit access between key activity centers in Amherst and Buffalo, and provide enough information to support the recommendations of a Locally Preferred Alternative (LPA). In January 2017, the NFTA Board of Commissioners accepted the Niagara Falls Boulevard LRT alterative alignment as the recommended LPA. The NFTA Board later refined this LPA to exit University Station and transition to Niagara Falls Boulevard sooner, resulting in an alignment that no longer runs along Bailey Avenue and turns westerly under Kenmore Avenue to get to Niagara Falls Boulevard.

The purpose of this Transportation Technical Report is to document the detailed analyses of transportation conditions analyzed for existing and future years for the study corridor with and without the proposed Metro Rail extension. The Transportation Technical Report is prepared as an appendix of the Metro Rail Expansion DEIS. The transportation elements analyzed included non-motorized (pedestrian and bicycle) users, existing and proposed transit services, and existing and proposed vehicular operations, as well as the integration of the proposed Metro Rail Expansion.

1.1 Overview

The proposed Metro Rail Expansion would connect the existing Metro Rail section within the City of Buffalo to destinations in the Town of Tonawanda and Amherst with termination near John James Audubon Pkwy and I-990. The proposed extension is approximately 7.17 miles in length. It is proposed that the Metro Rail Expansion would replace the existing UB Stampede bus service between the South Campus and North Campus. Additionally, the Metro Rail Expansion woud alternate from median-running to shoulder running throughout the 7.17-mile extension. The area of interest contains a few local and university-level institutional locations, as well as residential and commercial zones within Amherst, Buffalo, and Tonawanda, New York.

The LRT trains would have separate tracks for northbound and southbound trains which would run concurrently with peak 10-minute headways and 30-second station dwells during operating hours. The median-running Metro Rail alignment would act similar to a median in that movements across the tracks would only be permitted at signalized intersections. At unsignalized intersections or driveways, only right-turns would be permitted for vehicular traffic. This prevents an unsafe left-turn or through movement in conflict with the train. At

signalized intersection locations, all permissive left turn phases were modified to run as protected-only. This operational adjustment serves the same purpose; to inhibit motorists from interacting with the LRT in an unsafe manner.

Furthermore, pre-emption techniques are also proposed for the LRT to enhance progression through traffic signals at various signalized locations within the Metro Rail Expansion corridor. The purpose of the pre-emption is to ensure that the LRT does not stop at signalized intersections, thus reducing the required travel time. Additionally, the pre-emption prevents conflicting traffic from interacting with the LRT as only non-conflicting movements can progress through the intersection when the LRT is approaching.

1.2 Existing Conditions

This section summarizes the existing (2018) transportation conditions within the study corridors, including non-motorized facilities, transit operations, and vehicular traffic conditions.

1.2.1 Non-Motorized

A network of sidewalks is available within most of the Proposed Action alignment, except for the following two segments:

- John James Audubon Pkwy between Rensch Road and Core Road/Lee Road
- John James Audubon Pkwy between Lee Road and Dodge Road

Along all other roadways within the study network there is either parallel running sidewalk on both sides of the roadway or sidewalk along at least one side of the roadway for pedestrian use. The availability of pedestrian signal heads also varies along the corridor as well.

There are two designated bicycle facilities within the study corridor: one along Sweet Home Road, which accommodates cyclists traveling in both directions with two 5 foot lanes on either side of the roadway. The other is on Kenmore Avenue, which accommodates cyclists traveling in both directions with two 5 foot lanes on either side of the roadway. There are shared lane markings (i.e. sharrows) painted on Rensch Road that indicate a mixed-use facility near the UB North Campus.

Several trails exist throughout the Audubon community and the Ellicott Creek Trail traverses the corridor near the proposed Ellicott station.

1.2.2 Transit

The NFTA Metro is the public transportation service provider for both Erie and Niagara counties. In 2018, the Metro fleet traversed 10 million miles and completed 25 million passenger trips. As mentioned previously, it is expected that the NFTA Metro Bus service will continue throughout the Metro Rail Expansion corridor and compliment access to stations. Because of this, there are not anticipated to be any significant negative impacts on existing or future Metro

Bus service, although the UB Stampede bus service for students to travel between the South Campus and North Campus is expected to be terminated in favor of the Metro Rail Expansion for student use.

1.2.3 Traffic Operations

VISSIM 10.0 software was used for the traffic evaluation. VISSIM is a microsimulation modelling tool, meaning that traffic movements are explicitly modeled based on geometric parameters, traffic volumes, vehicle types, intersection control, and driver behavior. VISSIM assesses the roadway network in a dynamic fashion, instead of analyzing each intersection or each roadway segment in isolation. Unlike macroscopic analysis, which can be calculated manually, simulation models function only as a computer analysis tool. Average performance statistics, such as vehicle delay, volume served, flow density, and travel time, are measured during the simulation. Furthermore, as a stochastic model, a random number seed guides the assignment of vehicle headways. By varying the random number seed, the model results can also vary with identical inputs. This allows the user to test several iterations with the same input values to determine average performance.

Existing traffic conditions were established using a combination of previously collected traffic volume data and intersection turning-movement counts at project area intersections. Tri-State Traffic Data collected the intersection traffic counts for the entire project area. The AM period data was collected on April 24, 2018 (Tuesday), the MD period data was collected on April 28, 2018 (Saturday), and the PM period data was collected on April 26, 2018 (Thursday).

1.3 Future Conditions

1.3.1 Forecasted Growth

As part of the analysis, future conditions were also analyzed. This process involved growing the existing traffic demand to the estimated volumes of the target future year (2040). The growth rates were applied on a corridor level to the network and were based on estimated travel demand from a TransCAD model provided by GBNRTC. Any negative growth rates identified were assumed to be 0% growth to be conservative.

1.3.2 No Action Condition

To prepare an alternative to the implementation of the Metro Rail Expansion in the target future year, a No Action condition VISSIM model was constructed. This model used an identical network to the existing conditions VISSIM model, but had adjusted growth rates to simulate the expected demand in the target future year without a Metro Rail Expansion project.

1.3.3 Proposed Action

A future year alternative, which included the Metro Rail Expansion, was also modeled in VISSIM. The purpose of this modeling was to determine the operational impacts of a LRT system within the current roadway network.

2.0 Project Background

The NFTA Metro Rail Expansion project consists of approximately 7 miles of a new double LRT line running from University Station at the UB South Campus, through the UB North Campus, to the area near Audubon Pkwy and I-990. This alignment will traverse through the municipalities of Amherst, Buffalo, and Tonawanda in Erie County, New York. The Transit Options Amherst-Buffalo AA was initiated by NFTA in the fall of 2012 along with study partner GBNTRC. The overall goal of the AA was to evaluate a range of high quality transit service alternatives to improve transit access between key activity centers in Amherst and Buffalo, and provide enough information to support the recommendations of a LPA. In January 2017, the NFTA Board of Commissioners accepted the Niagara Falls Boulevard LRT alterative alignment as the recommended LPA. The NFTA Board later refined this LPA to exit University Station and transition to Niagara Falls Boulevard sooner, resulting in an alignment that no longer runs along Bailey Avenue and turns westerly under Kenmore Avenue to get to Niagara Falls Boulevard.

The purpose of this Transportation Technical Report is to document the detailed analyses of transportation conditions analyzed for existing and future years for the study corridor with and without the proposed Metro Rail Expansion. The Transportation Technical Report is prepared as an appendix to the Metro Rail Expansion Project Draft Environmental Impact Statement (DEIS). The transportation elements analyzed included non-motorized (pedestrian and bicycle) users, existing and proposed transit services, and existing and proposed vehicular operations, as well as the integration of the proposed Metro Rail Expansion.

2.1 Light-Rail Transit Extension Alignment Overview

The Metro Rail Expansion will begin at University Station at the UB South Campus and utilize the existing tunnel to reach a portal near the intersection of Niagara Falls Boulevard and Kenmore Avenue. Once at the surface, the Metro Rail Expansion will traverse the Niagara Falls Boulevard corridor median-running until the Boulevard Mall entrance just before the intersection of Niagara Falls Boulevard and Brighton Road/Maple Road. At this intersection, the Metro Rail Expansion alignment will shift to shoulder-running and travel along the mall property until the intersection of Maple Road and Alberta Drive, where the train will once again shift in the intersection from shoulder-running to median-running. This alignment continues in the median of Maple Road until the intersection of Maple Road and Sweet Home Road, where the train will be grade-separated to run under the intersection, until it resurfaces and once again shifts to shoulder-running along Sweet Home Road. This alignment is maintained until the Metro Rail Expansion travels through the UB North Campus. Through campus, the train will utilize surface lanes running parallel to Putnam Way on the south side of the campus and run parallel to Lee Road. Upon exiting the campus along Lee Road, the Metro Rail Expansion is planned to solely occupy the northbound lanes of John James Audubon Pkwy, as all traffic will be shifted permanently to utilize the existing southbound lane infrastructure due to an

unrelated upcoming project. The Metro Rail Expansion will continue north and terminate within the property just to the north of I-990 ("Muir Woods").

In total, there are ten proposed at-grade stations to accommodate this extension. The proposed Metro Rail Expansion is approximately 7.17 miles in length. It is proposed that the Metro Rail Expansion will be complimented by existing NFTA Metro Bus service, while the UB Stampede bus service to transport students from the South Campus to the North Campus will be terminated in favor of the Metro Rail for student use. The area of interest contains a few local and university-level institutional locations, as well as residential and commercial zones within Amherst, Buffalo, and Tonawanda, New York.

The Metro Rail trains will have separate tracks for northbound and southbound trains, which will run concurrently with peak 10-minute headways and 30-second station dwells during operating hours. The median-running Metro Rail alignment will act similar to a median in that movements across the tracks will only be permitted at signalized intersections. This prevents an unsafe left-turn or through movement in conflict with the LRT. At signalized intersection locations, all permissive left turn phases were modified to run as protected-only. This operational adjustment serves the same purpose; to inhibit motorists from interacting with the LRT in an unsafe manner.

Furthermore, pre-emption techniques are also proposed for the trains to enhance progression through traffic signals at various signalized locations within the Metro Rail Expansion corridor. The purpose of the pre-emption is to ensure that the LRT does not stop at signalized intersections, thus reducing the required travel time. Additionally, the pre-emption prevents conflicting traffic from interacting with the LRT as only non-conflicting movements can progress through the intersection when the LRT is approaching.

2.2 Description of the Study Corridor

The study network for this analysis includes portions of the following five roadway corridors: Niagara Falls Boulevard, Maple Road, Sweet Home Road, Rensch Road, and John James Audubon Pkwy. Figure 1 contains an image of the study network in relation to the surrounding area. Note that in Figure 1 Niagara Falls Boulevard is displayed in green, Brighton Road/Maple Road is shown in blue, Sweet Home Road is displayed in yellow, Rensch Road is depicted in purple, and John James Audubon Pkwy is shown in red.

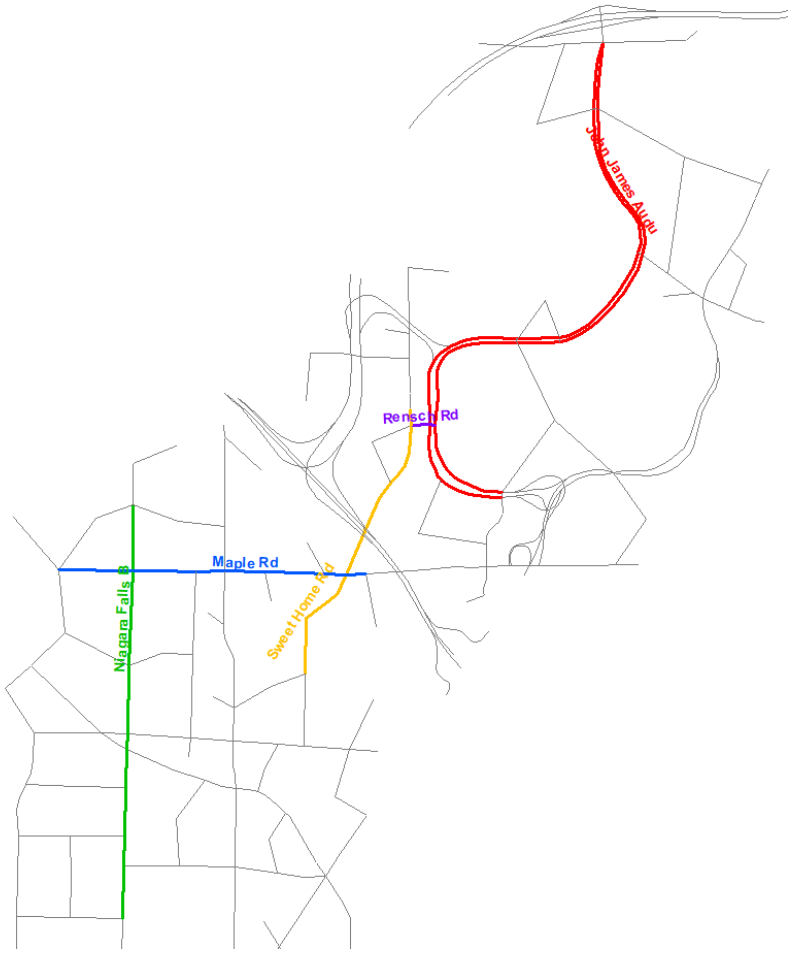

Figure 1. Study Network

The following 19 study intersections within the identified corridors were included in the analysis:

1. Niagara Falls Boulevard and Longmeadow Road
2. Niagara Falls Boulevard and Highland Ave/Ruth Drive
3. Eggert Road and Alberta Drive
4. Niagara Falls Boulevard and Eggert Road
5. Eggert Road and Sheridan Drive
6. Niagara Falls Boulevard and Sheridan Drive
7. Niagara Falls Boulevard and Rochelle Place/Franklin Avenue
8. Niagara Falls Boulevard and Treadwell Road
9. Niagara Falls Boulevard and Boulevard Mall Entrance

10. Niagara Falls Boulevard and Brighton Road/Maple Road
11. Maple Road and Alberta Drive
12. Maple Road and N. Bailey Avenue
13. Maple Road and Hillcrest Drive
14. Maple Road and Sweet Home Road
15. Sweet Home Road and Rensch Road
16. Rensch Road and John James Audubon Pkwy
17. John James Audubon Pkwy and Core Road/Lee Road
18. John James Audubon Pkwy and N. Forest Road
19. John James Audubon Pkwy and Gordon R. Yaeger Drive

3.0 VISSIM Methodology

VISSIM 10.0 software was used for the traffic evaluation. VISSIM is a microsimulation modelling tool, meaning that traffic movements are explicitly modeled based on geometric parameters, traffic volumes, vehicle types, intersection control, and driver behavior. VISSIM assesses the roadway network in a dynamic fashion, instead of analyzing each intersection or each roadway segment in isolation. Unlike macroscopic analysis, which can be calculated manually, simulation models function only as a computer analysis tool. Average performance statistics, such as vehicle delay, volume served, flow density, and travel time, are measured during the simulation. Furthermore, as a stochastic model, a random number seed guides the assignment of vehicle headways. By varying the random number seed, the model results can also vary with identical inputs. This allows the user to test several iterations with the same input values to determine average performance.

VISSIM provides several measures of effectiveness (MOEs) such as vehicle delay, travel time, queuing, and fuel consumption on a network-wide basis, so that the effects of improvements at a single location may be measured throughout the network. This ability makes VISSIM an ideal tool for testing and comparing alternatives to determine the most effective combination of elements in facilitating mobility for all transportation modes. In addition, the sensitivity of the VISSIM model allows the user to test more subtle changes to the roadway system, such as adjustments in traffic signalization, addition or removal of driveways and access points, changes in bus operations, and others.

The simulation component of VISSIM is a powerful feature, as it provides a graphical, intuitive representation of traffic flow throughout the corridor that is simple to visualize and interpret, making it an ideal tool for presentation to non-technical parties. The following describes the elements involved in coding the conditions in VISSIM, as well as a summary of the calibration/validation of the models and the traffic operations analysis within the project area.

3.1 Roadway Network and Laneage

The roadway network was modeled over a scaled aerial photograph provided by Bing Maps. A field review was conducted of the entire project area to inventory signal equipment, pedestrian facilities, and current traffic operations (to assist in identifying deficiencies and calibration of the simulation models). The traffic signal controllers were modeled in VISSIM to match the signal operations provided by Erie County and the Town of Amherst .

The study corridor has many distinct cross-sections among the five major corridors between Longmeadow Road and Gordon R. Yaeger Drive. These different cross-sections are defined in the following list, starting at the southernmost point of the project area:

- *Niagara Falls Boulevard from Longmeadow Road to Eggert Road:* Niagara Falls Boulevard is a 5-lane roadway with no shoulders and a two-way left turn lane (TWLTL) in this area. A sidewalk is available on both sides of the roadway for pedestrian use. Just before Eggert Road, this section of Niagara Falls Boulevard transitions into a 5-lane boulevard with three lanes for northbound traffic and two lanes for southbound traffic. The posted speed limit in this section is 35 mph.
- *Niagara Falls Boulevard from Eggert Road to Sheridan Drive:* Niagara Falls Boulevard is a 5-lane boulevard with no shoulders in this area. There are three lanes for northbound traffic and two lanes for southbound traffic. A sidewalk is available on both sides of the roadway for pedestrian use. The posted speed limit in this section is 40 mph.
- *Niagara Falls Boulevard from Sheridan Drive to Brighton Road/Maple Road:* Niagara Falls Boulevard is a 6-lane boulevard with no shoulders in this section. A sidewalk is available on at least one side of the roadway for most the corridor. The posted speed limit in this area is 40 mph.
- *Maple Road from Niagara Falls Boulevard to Bowmart Pkwy:* Maple Road is a 6-lane roadway with no shoulders and a TWLTL, which repeatedly changes to a left turn bay at various intersections. There are two lanes for eastbound traffic and 3 lanes for westbound traffic. A sidewalk is available on both sides of the roadway for pedestrian use. The posted speed limit in this section is 45 mph.
- *Maple Road from Bowmart Pkwy to Sweet Home Road:* Maple Road is a 5-lane roadway with no shoulders and a TWLTL in this area. A sidewalk is available on both sides of the roadway for pedestrian use. The posted speed limit in this corridor is 45 mph, with a school zone speed limit of 35 mph near Sweet Home Middle School.
- *Sweet Home Road from Maple Road to Rensch Road:* Sweet Home Road is a 5-lane roadway with no shoulders and a TWLTL in this section. A sidewalk is available on both sides of the roadway for pedestrian use, while a bike lane is also present in either direction for cyclists. Just before Rensch Road this section of Sweet Home Road transitions into a 4-lane boulevard. The posted speed limit in this section is 45 mph.
- *Rensch Road from Sweet Home Road to John James Audubon Pkwy:* Rensch Road is a 4-lane boulevard with no shoulders in this area. A sidewalk is only available on the north side of the roadway. Both outer lanes of the boulevard are marked with shared lane markings (i.e. sharrows) for cyclist use. The posted speed limit in this corridor is 30 mph.
- *John James Audubon Pkwy from Rensch Road to Hamilton Road:* John James Audubon Pkwy is a 6-lane boulevard with shoulders and a wide grassy median in this section. There are multiple crossovers along the segment to facilitate left-turning traffic. No sidewalk is available on either side of the roadway, and the posted speed limit in this area is 40 mph.

- *John James Audubon Pkwy from Hamilton Road to Gordon R. Yaeger Drive:* John James Audubon Pkwy is a 4-lane boulevard with shoulders and a wide grassy median in this area. There are multiple crossovers along the segment, and a single-lane roundabout is located at the intersection of John James Audubon Pkwy and Core Road/Lee Road. At this location, each approach narrows from two lanes to one lane and returns to two lanes north of the recently reconstructed bridge. There is limited sidewalk available on one side of the roadway in this section, and the posted speed limit is 45 mph.

3.2 Traffic Volumes

Existing traffic conditions were established using a combination of previously collected traffic volume data and intersection turning-movement counts at project area intersections. Tri-State Traffic Data collected the intersection traffic counts for the entire project area. The AM period data was collected on April 24, 2018 (Tuesday), the Midday period data was collected on April 28, 2018 (Saturday), and the PM period data was collected on April 26, 2018 (Thursday). The traffic volumes were entered as static routes within the VISSIM models for all time periods.

VISSIM requires that all traffic balance within the model between intersections/driveways. The general volume balancing methodology used by WSP was as follows:

- Where minor volume imbalances occurred between intersections, the through volumes were adjusted to always favor the higher volume intersection. In other words, the volumes were always adjusted up, not down, to provide a conservative approach.

- Where larger imbalances occurred (approximately 100 or more vehicles), artificial (dummy) driveways were placed to represent a major traffic generator that would account for this imbalance (e.g., cross streets not currently modeled as part of project area, commercial driveways, parking deck entrances/exits, etc.).

3.3 Transit Service Integration

Existing route information for the Metro system was obtained from the NFTA. This included the routing information and all stop locations for the Metro Bus service. The headway information for each route of interest was obtained from the NFTA Metro website [2]. The following Metro Bus routes were incorporated into the existing and future condition VISSIM models:

- Route 34
- Route 35
- Route 44

Note that each of these routes utilized roadways which were within the constraints of the Metro Rail Expansion and within the study corridor. As mentioned previously, these routes and stops were not changed with the implementation of the Metro Rail Expansion as it was assumed that each would be running concurrently. Therefore, the transit service is modeled in all the existing condition and future VISSIM models.

3.4 Vehicle Composition

The vehicle composition (the percentage of cars versus heavy vehicles) was based on the percentages identified in the disaggregate traffic counts collected by Tri-State Traffic Data. The compositions vary by intersection based on the vehicle type information recorded during the data collection process.

3.5 Driver Behavior

The default VISSIM driver behavior parameters were adjusted in the models to more accurately represent the types of drivers utilizing the network roadways. The Wiedemann 74 car following model was utilized which is specifically oriented towards urban surface-street driver behavior parameters. Minor adjustments from the default VISSIM parameters for lane change distances were necessary to accurately represent driving behavior.

3.6 Seed Interval

A seed interval is the amount of time the VISSIM model is ran in advance of summarizing the MOEs. An 1,800-second (30-minute) seed interval was used for all time periods in this analysis. This ensures that the appropriate level of traffic is on the roadway network at the time the MOEs begin recording in the model.

3.7 Model Calibration/Validation

VISSIM model results must be validated by comparing them to real-world measures of operational performance, such as volume served, travel time, queuing, and delay, until a certain level of accuracy is reached. For this study, model results were validated based on a combination of volume served and travel time information available through Google Maps. While volume served is a useful comparison measure for use in model validation, it does not always reflect actual demand. For instance, in real-world conditions, when the demand on a segment of roadway exceeds its capacity, the unserved demand results in queuing, while a volume count on the segment may remain constant or potentially decrease as congestion builds.

The existing condition models were considered validated when the volumes served as reported by the model were within the greater of +/-10% or +/-20 vehicles of the actual recorded volumes. These thresholds were achieved when validating the existing VISSIM models for all three time

periods. This finding means that the existing condition models accurately represent the real-world traffic conditions of the Proposed Action corridor.

The network (end-to-end) travel times were also compared to Google Maps estimated travel times at the same time and date as the traffic counts were completed. These thresholds were achieved in all three time periods for the existing condition VISSIM models.

3.8 Level of Service Definitions

The performance of the intersections within the project area was evaluated as part of the VISSIM modeling effort. Table 1 and Table 2 display the level of service (LOS) criteria for signalized and unsignalized intersections, respectively. The LOS criteria utilized for the analysis are contained within the most recent edition of the Highway Capacity Manual[1].

Table 1. Level of Service Definitions for Signalized Intersections

Level-of-Service	Description	Average Control Delay Per Vehicle (seconds)
A	Operations with very low control delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B	Operations with low control delay occurring with good progression and/or short cycle lengths.	> 10.0 and ≤ 20.0
C	Operations with average control delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 and ≤ 35.0
D	Operations with longer control delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 and ≤ 55.0
E	Operations with high control delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered the limit of acceptable delay.	> 55.0 and ≤ 80.0
F	Operation with control delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	> 80.0

[1] Transportation Research Board. (2016). Highway Capacity Manual: A Guide for Multimodal Mobility Analysis (6th ed.). Washington, D.C.: The National Academies of Sciences, Engineering, and Medicine.

Table 2. Level of Service Definitions for Unsignalized Intersections

Level-of-Service	Description	Average Control Delay Per Vehicle (seconds)
A	Operations with very low control delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B	Operations with low control delay occurring with good progression and/or short cycle lengths.	> 10.0 and ≤ 15.0
C	Operations with average control delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 15.0 and ≤ 25.0
D	Operations with longer control delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 25.0 and ≤ 35.0
E	Operations with high control delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered the limit of acceptable delay.	> 35.0 and ≤ 50.0
F	Operation with control delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	> 50.0

4.0 Existing Conditions

This section summarizes the existing (2018) transportation conditions within the study corridors, including non-motorized facilities, transit operations, and vehicular traffic conditions.

4.1 Non-Motorized

A network of sidewalks is available within most of the Proposed Action alignment, except for the following two segments:

- John James Audubon Pkwy between Rensch Road and Core Road/Lee Road
- John James Audubon Pkwy between Lee Road and Dodge Road.

Along all other roadway corridors within the study network, there is either parallel running sidewalk on both sides of the roadway or sidewalk along at least one side of the roadway for pedestrian use. The availability of pedestrian signal heads also varies along the corridor as well.

There are two designated bicycle facilities within the study corridor: one along Sweet Home Road, which accommodates cyclists traveling in both directions with two 5 foot lanes on either side of the roadway. The other is one Kenmore Avenue, which accommodates cyclists traveling in both directions with two 5 foot lanes on either side of the roadway. There are shared lane markings (i.e. sharrows) painted on Rensch Road that indicate a mixed-use facility near the UB North Campus.

Several trails exist throughout the Audubon community and the Ellicott Creek Trail traverses the corridor near the proposed alignment.

4.2 Transit

The NFTA Metro is the public transportation service provider for both Erie and Niagara counties. In 2018, the Metro fleet traversed 10 million miles and completed 25 million passenger trips. As mentioned previously, it is expected that the NFTA Metro Bus service will continue throughout the Metro Rail Expansion corridor and compliment access to stations. Because of this, there are not anticipated to be any significant negative impacts on existing or future Metro Bus services, although the UB Stampede bus service for students to travel between the South Campus and North Campus is expected to be terminated in favor of the Metro Rail Expansion for student use.

4.3 Traffic Operations

Table 3, Table 4, and Table 5 illustrate the AM, Midday, and PM peak hour operational results from the existing condition VISSIM models, respectively. The results are the average of five runs using different random number seeds.

Table 3. Existing Weekday: AM Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	B	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	B	C	A	B	B	B	A	A	NA
Eggert Rd	Alberta Dr	A	A	A	A	A	A	A	A	D	D	C	D	D	C	D	C	C
Niagara Falls Blvd	Eggert Rd	E	A	A	B	D	A	A	A	NA	D	B	D	E	D	C	D	C
Eggert Rd	Sheridan Dr	D	D	C	D	D	D	A	D	C	C	A	B	NA	B	B	B	C
Niagara Falls Blvd	Sheridan Dr	NA	C	B	B	E	C	A	C	D	D	A	D	D	D	A	D	C
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	A	NA	NA	NA	A	A	A	NA	A	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	C	B	A	B	D	A	A	A	D	D	B	C	E	D	A	D	B
Niagara Falls Blvd	Boulevard Mall	C	A	A	A	C	A	A	A	A	A	A	NA	F	A	A	B	A
Niagara Falls Blvd	Brighton Rd/Maple Rd	E	C	B	C	D	C	C	C	C	D	C	D	D	D	A	C	C
Maple Rd	Alberta Dr	B	B	A	B	B	C	A	B	A	A	A	A	A	A	A	A	A
Maple Rd	N Bailey Ave	B	C	A	C	B	B	A	B	B	C	A	B	B	B	A	B	B
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	B	NA	A	B	A	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	B	NA	A	A	C	C	B	C	NA	A	A	A	B	A	NA	A	A
Maple Rd	Sweet Home Rd	D	D	B	C	C	C	A	C	C	C	A	C	C	C	A	C	C
Sweet Home Rd	Rensch Rd	D	C	A	C	C	B	B	B	D	D	C	D	D	D	A	C	C
John James Audubon Pkwy	Rensch Rd	C	C	A	C	C	C	A	C	C	B	A	B	C	B	A	B	B
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
John James Audubon Pkwy	Forest Rd	B	B	A	B	B	B	A	B	A	A	A	A	B	B	B	B	B
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	B	NA	A	A	A

* = Unsignalized Intersection

Table 4. Existing Weekend: Midday Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	C	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	B	B	A	B	B	B	A	A	NA
Eggert Rd	Alberta Dr	A	A	A	A	A	A	A	A	D	C	C	C	D	C	C	C	C
Niagara Falls Blvd	Eggert Rd	E	B	A	B	D	B	A	B	NA	D	A	C	E	D	D	D	C
Eggert Rd	Sheridan Dr	D	D	B	D	D	D	B	D	D	C	A	C	NA	C	C	C	C
Niagara Falls Blvd	Sheridan Dr	NA	C	B	C	F	C	B	C	F	D	A	E	D	D	A	D	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	B	NA	NA	NA	A	A	A	NA	C	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	E	C	B	C	D	B	B	B	D	D	C	D	D	E	B	C	C
Niagara Falls Blvd	Boulevard Mall	E	C	B	C	D	B	B	B	D	D	B	D	D	D	B	C	B
Niagara Falls Blvd	Brighton Rd/Maple Rd	E	D	C	D	E	D	C	D	E	F	F	F	E	E	E	E	E
Maple Rd	Alberta Dr	C	C	B	B	C	C	B	C	B	C	A	C	C	B	B	B	B
Maple Rd	N Bailey Ave	D	D	C	D	E	D	B	D	C	C	A	C	C	C	C	C	C
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	C	NA	A	C	A	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	C	NA	A	B	A	A	A	NA	NA	A	A	A	A	A	NA	A	A
Maple Rd	Sweet Home Rd	D	D	B	D	C	D	B	C	C	C	A	C	C	D	A	C	C
Sweet Home Rd	Rensch Rd	D	C	A	B	B	B	B	B	D	D	B	C	C	C	A	B	B
John James Audubon Pkwy	Rensch Rd	C	B	A	B	C	C	A	B	B	A	A	B	B	B	A	B	B
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
John James Audubon Pkwy	Forest Rd	A	A	A	A	A	A	A	A	B	A	A	A	B	B	A	B	A
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	A	NA	A	A	A

* = Unsignalized Intersection

Table 5. Existing Weekday: PM Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	C	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	C	C	B	B	B	C	A	B	NA
Eggert Rd	Alberta Dr	A	A	A	A	A	A	A	A	D	C	C	C	C	C	C	C	C
Niagara Falls Blvd	Eggert Rd	E	B	A	C	D	B	A	B	NA	D	B	C	E	D	C	D	C
Eggert Rd	Sheridan Dr	D	D	C	D	D	D	B	D	D	C	A	C	NA	D	D	D	C
Niagara Falls Blvd	Sheridan Dr	NA	C	B	C	E	C	B	C	E	C	A	D	D	D	A	D	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	B	NA	NA	NA	A	A	A	NA	C	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	E	C	B	C	D	B	B	B	E	D	C	D	D	E	B	D	B
Niagara Falls Blvd	Boulevard Mall	E	B	B	B	D	B	A	B	E	E	B	D	E	D	B	C	B
Niagara Falls Blvd	Brighton Rd/Maple Rd	E	D	B	D	E	D	D	D	D	E	D	E	D	E	C	D	D
Maple Rd	Alberta Dr	C	C	A	C	C	B	A	B	B	B	A	B	B	B	B	B	B
Maple Rd	N Bailey Ave	D	D	B	D	F	D	C	F	C	C	A	C	C	C	B	C	D
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	A	NA	A	NA	B	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	C	NA	B	B	D	D	A	D	NA	A	A	A	B	A	NA	A	A
Maple Rd	Sweet Home Rd	F	E	C	E	F	F	D	F	E	D	B	D	D	D	A	D	E
Sweet Home Rd	Rensch Rd	E	D	A	D	D	C	B	C	D	D	C	D	D	D	B	C	C
John James Audubon Pkwy	Rensch Rd	D	C	A	D	C	C	C	C	D	B	B	B	D	C	B	C	C
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	B	B	A	B	C	C	C	C	B
John James Audubon Pkwy	Forest Rd	B	B	B	B	C	B	A	B	B	B	A	B	C	C	B	C	B
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	B	NA	A	A	A

* = Unsignalized Intersection

Table 6. Existing Vehicular Travel Time

Corridor	Direction	Distance (mi)	AM		MD		PM	
			Vissim (min)	Google (min)	Vissim (min)	Google (min)	Vissim (min)	Google (min)
Niagara Falls Blvd	NB	1.3	3:23	-	4:21	-	4:08	-
	SB	1.3	2:51	-	3:17	-	3:24	-
Maple Rd	EB	0.9	2:31	-	2:46	-	2:48	-
	WB	0.9	2:31	-	3:13	-	3:04	-
Sweet Home Rd	NB	0.7	1:23	-	1:20	-	1:36	-
	SB	0.7	1:25	-	1:40	-	3:03	-
Rensch Rd	EB	0.1	0:19	-	0:17	-	0:23	-
	WB	0.1	0:50	-	0:39	-	0:53	-
John James Audubon Pkwy	NB	1.8	3:04	-	2:55	-	3:13	-
	SB	1.8	3:21	-	3:13	-	3:50	-
Network	NB	4.8	10:40	9:00 - 14:00		10:00 - 20:00	12:08	10:00 - 20:00
	SB	4.8	10:58	9:00 - 14:00	12:02	10:00 - 22:00	14:14	10:00 - 22:00

Two study intersections fail to operate at an overall LOS D or better in all peak hours within the existing condition models. The intersection of Niagara Falls Boulevard and Brighton Road/Maple Road operates at LOS E in the Midday peak hour and the intersection of Maple Road and Sweet Home Road operates at LOS E in the PM peak hour. There are several individual movements that have LOS F during various time periods. These movements are indicated in Table 3, Table 4, and Table 5.

Table 6 contains the travel time results for the AM, Midday, and PM peak hour existing condition VISSIM models. The results are the average of five runs using different random number seeds. Note that when compared to the Google Maps travel time range for the same date and time when data collection was completed, the network performs as expected in both directions of travel.

5.0 Future Conditions

5.1 Forecasted Growth

As part of the analysis, future conditions were also analyzed. This process involved growing the existing traffic demand to the estimated volumes of the target future year (2040). The growth rates were applied on a corridor level to the network and were based on estimated travel demand from a TransCAD model provided by GBNRTC. Any negative growth rates identified were assumed to be 0% growth to be conservative. Table 7 contains the growth rates implemented for the future year models.

Table 7. Corridor Growth Rates for Future Conditions

Corridor	Percent Change		
	AM	MD	PM
Niagara Falls Boulevard	0%	0%	0%
Maple Road	12%	18%	11%
Sweet Home Road	2%	1%	0%
Rensch Road	0%	0%	0%
John James Audubon Pkwy	0%	4%	3%
Eggert Road	8%	24%	14%
Sheridan Dr	0%	0%	0%

5.2 No Action Condition: Unoptimized

To prepare an alternative to the implementation of the Metro Rail Expansion in the target future year, a No Action condition VISSIM model was constructed. This model used an identical network to the existing conditions VISSIM model, but had adjusted growth rates to simulate the expected demand in the target future year.

Table 8, Table 9, and Table 10 illustrate the AM, Midday, and PM peak hour operational results from the No Action condition VISSIM models. The results are the average of five runs using different random number seeds.

Table 8. No Action Weekday: AM Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	B	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	B	C	A	B	B	B	A	A	NA
Eggert Rd	Alberta Dr	A	A	A	A	A	A	A	A	D	D	D	D	D	C	B	C	C
Niagara Falls Blvd	Eggert Rd	E	A	A	B	D	A	A	A	NA	D	B	D	E	D	C	D	C
Eggert Rd	Sheridan Dr	D	D	B	D	D	D	B	D	C	C	A	B	NA	C	B	C	C
Niagara Falls Blvd	Sheridan Dr	NA	C	A	B	E	C	A	C	E	D	A	D	D	D	A	D	C
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	A	NA	NA	NA	A	A	A	NA	A	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	D	B	A	B	D	A	A	A	E	D	B	C	E	E	A	D	B
Niagara Falls Blvd	Boulevard Mall	E	A	A	A	C	A	A	A	A	A	A	NA	F	A	A	B	A
Niagara Falls Blvd	Brighton Rd/Maple Rd	D	D	B	C	E	C	C	C	E	E	E	E	D	D	A	C	D
Maple Rd	Alberta Dr	B	B	A	B	B	B	A	B	A	A	A	A	A	A	A	A	A
Maple Rd	N Bailey Ave	B	C	A	C	C	B	A	B	B	C	A	C	B	B	A	B	B
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	C	NA	A	C	A	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	B	NA	A	A	C	C	B	C	NA	A	A	A	B	A	NA	A	A
Maple Rd	Sweet Home Rd	D	D	B	D	C	C	A	C	C	C	A	C	C	D	A	C	C
Sweet Home Rd	Rensch Rd	D	C	A	C	C	B	B	C	D	D	C	D	D	D	A	C	C
John James Audubon Pkwy	Rensch Rd	C	C	A	C	C	C	A	C	C	B	A	B	C	B	A	B	B
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
John James Audubon Pkwy	Forest Rd	B	B	A	A	B	B	A	B	A	A	A	A	B	B	B	B	B
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	B	NA	A	A	A

* = Unsignalized Intersection

Table 9. No Action Weekend: Midday Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	C	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	B	D	A	B	B	C	A	A	NA
Eggert Rd	Alberta Dr	B	B	A	A	B	A	A	A	D	C	C	C	D	C	C	C	C
Niagara Falls Blvd	Eggert Rd	E	B	B	B	D	B	A	B	NA	D	B	C	E	D	D	D	C
Eggert Rd	Sheridan Dr	D	D	C	D	E	D	C	D	D	C	A	C	NA	C	C	C	D
Niagara Falls Blvd	Sheridan Dr	NA	C	B	C	F	C	B	D	F	D	A	E	D	D	A	D	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	C	NA	NA	NA	A	A	A	NA	C	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	E	C	B	C	D	B	B	B	D	D	C	D	D	D	B	C	C
Niagara Falls Blvd	Boulevard Mall	D	C	B	C	D	B	A	B	D	D	A	D	D	D	B	C	B
Niagara Falls Blvd	Brighton Rd/Maple Rd	F	D	C	D	E	D	D	D	F	F	F	F	F	F	F	F	F
Maple Rd	Alberta Dr	C	C	B	C	C	D	B	C	B	C	A	C	C	C	C	C	C
Maple Rd	N Bailey Ave	E	E	D	E	F	F	E	F	C	C	A	C	C	C	C	C	E
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	C	NA	A	C	A	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	C	NA	A	B	A	A	A	NA	NA	A	A	A	A	A	NA	A	A
Maple Rd	Sweet Home Rd	D	D	A	D	C	D	B	C	D	C	A	C	C	D	A	C	C
Sweet Home Rd	Rensch Rd	D	C	A	C	B	B	B	B	D	D	B	D	C	C	A	B	B
John James Audubon Pkwy	Rensch Rd	C	B	A	B	C	C	A	B	B	A	A	B	B	B	A	B	B
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
John James Audubon Pkwy	Forest Rd	A	A	A	A	A	A	A	A	A	A	A	A	B	B	A	B	A
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	A	NA	A	A	A

* = Unsignalized Intersection

Table 10. No Action Weekday: PM Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	C	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	C	C	B	B	C	B	A	B	NA
Eggert Rd	Alberta Dr	A	A	A	A	A	A	A	A	D	C	C	C	D	C	C	C	C
Niagara Falls Blvd	Eggert Rd	E	B	A	C	D	B	A	B	NA	D	B	C	E	D	C	D	C
Eggert Rd	Sheridan Dr	D	D	C	D	D	D	B	D	D	C	A	C	NA	C	C	C	C
Niagara Falls Blvd	Sheridan Dr	NA	C	B	B	E	C	B	C	D	D	A	D	D	D	A	D	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	B	NA	NA	NA	A	A	A	NA	B	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	E	B	B	C	D	B	B	B	E	D	C	D	D	E	B	D	B
Niagara Falls Blvd	Boulevard Mall	E	B	B	B	D	A	A	B	D	E	A	D	E	D	B	C	B
Niagara Falls Blvd	Brighton Rd/Maple Rd	E	D	B	D	E	D	D	D	F	F	E	F	E	E	C	D	D
Maple Rd	Alberta Dr	C	C	A	C	C	C	A	B	B	C	A	B	B	B	A	B	B
Maple Rd	N Bailey Ave	E	E	D	E	F	F	E	F	C	C	A	C	D	C	C	C	E
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	A	NA	A	NA	B	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	C	NA	B	B	D	C	A	D	NA	A	A	A	B	A	NA	A	A
Maple Rd	Sweet Home Rd	F	E	C	E	F	F	E	F	E	D	B	D	F	F	C	E	F
Sweet Home Rd	Rensch Rd	E	D	A	C	D	C	B	C	E	D	C	D	D	D	B	C	C
John James Audubon Pkwy	Rensch Rd	D	C	A	C	D	C	C	C	C	B	B	B	C	C	B	C	C
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	B	B	B	B	B	C	C	C	B
John James Audubon Pkwy	Forest Rd	B	B	B	B	C	B	A	C	B	B	A	B	C	C	C	C	B
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	B	NA	A	A	A

* = Unsignalized Intersection

Table 11. No Action Vehicular Travel Times

Corridor	Direction	Distance (mi)	AM		MD		PM	
			Vissim (min)	Google (min)	Vissim (min)	Google (min)	Vissim (min)	Google (min)
Niagara Falls Blvd	NB	1.3	3:33	-	4:20	-	4:11	-
	SB	1.3	2:56	-	3:16	-	3:23	-
Maple Rd	EB	0.9	2:31	-	2:46	-	2:54	-
	WB	0.9	2:32	-	4:40	-	3:09	-
Sweet Home Rd	NB	0.7	1:22	-	1:22	-	1:30	-
	SB	0.7	1:31	-	1:41	-	4:03	-
Rensch Rd	EB	0.1	0:18	-	0:15	-	0:20	-
	WB	0.1	0:43	-	0:41	-	0:55	-
John James Audubon Pkwy	NB	1.8	3:04	-	2:55	-	3:10	
	SB	1.8	3:21	-	3:19	-	3:48	-
Network	NB	4.8	10:48	9:00 - 14:00	11:38	10:00 - 20:00	12:05	10:00 - 20:00
	SB	4.8	11:03	9:00 - 14:00	13:37	10:00 - 22:00	15:18	10:00 - 22:00

In the No Action condition, all but three study intersections operate at a LOS D or better. In the Midday peak hour, Niagara Falls Boulevard and Brighton Road/Maple Road and Maple Road and N. Bailey Avenue operate at LOS F and LOS E, respectively. During the PM peak hour, Maple Road and N. Bailey Avenue and Maple Road and Sweet Home Road operate at LOS E and LOS F, respectively. There are several individual movements that have LOS F during various time periods. These movements are indicated in Table 8, Table 9, and Table 10.

Table 11 contains the travel time results for the AM, Midday, and PM peak hour No Action condition VISSIM models. The results are the average of five runs using different random number seeds. Note that when compared to the Google Maps travel time range, the network performs similar to existing conditions in both directions of travel.

5.3 No Action Condition: Optimized

To model the best-case No Action condition, intersections with degraded LOS were mitigated with signal optimization to represent the best operations without geometric improvements. The following intersections were identified for signal timing optimization:

- Niagara Falls Boulevard and Brighton Road/Maple Road
- Maple Road and N. Bailey Avenue
- Maple Road and Sweet Home Road

The timings improvements consisted of cycle length and phase splits adjustments as necessary.

Table 12, Table 13 and Table 14 illustrate the AM, Midday, and PM peak hour operational results from the No Action optimized condition VISSIM models. The results are the average of five runs using different random number seeds.

Table 12. No Action Optimized Weekday: AM Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	B	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	B	C	A	B	B	C	A	A	NA
Eggert Rd	Alberta Dr	A	A	A	A	A	A	A	A	D	D	C	D	D	C	B	C	C
Niagara Falls Blvd	Eggert Rd	E	A	A	B	D	A	A	A	NA	D	B	D	E	D	C	D	C
Eggert Rd	Sheridan Dr	D	D	B	D	D	D	B	D	C	C	A	B	NA	C	B	C	C
Niagara Falls Blvd	Sheridan Dr	NA	C	A	B	E	C	A	C	D	D	A	D	D	D	A	D	C
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	A	NA	NA	NA	A	A	A	NA	A	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	C	B	A	B	D	A	A	A	E	D	B	C	E	E	A	D	A
Niagara Falls Blvd	Boulevard Mall	D	A	A	A	C	A	A	A	A	A	A	NA	F	A	A	B	A
Niagara Falls Blvd	Brighton Rd/Maple Rd	D	C	B	C	D	C	C	C	C	D	C	D	C	C	A	C	C
Maple Rd	Alberta Dr	B	B	A	B	B	C	A	B	A	A	A	A	A	A	A	A	A
Maple Rd	N Bailey Ave	B	C	A	C	C	B	A	C	B	C	A	C	B	B	A	B	B
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	B	NA	A	B	A	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	B	NA	A	A	C	C	A	C	A	A	A	A	B	A	NA	A	A
Maple Rd	Sweet Home Rd	C	D	B	C	C	C	A	C	C	C	A	C	C	D	A	C	C
Sweet Home Rd	Rensch Rd	D	C	A	C	C	B	B	C	D	D	C	D	D	D	A	C	C
John James Audubon Pkwy	Rensch Rd	C	C	A	C	C	C	A	C	C	A	A	B	C	B	A	B	B
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
John James Audubon Pkwy	Forest Rd	B	B	A	A	B	B	A	B	A	A	A	A	B	B	B	B	B
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	B	NA	A	A	A

* = Unsignalized Intersection

Table 13. No Action Optimized Weekend: Midday Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	C	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	B	C	A	B	B	A	A	A	NA
Eggert Rd	Alberta Dr	B	B	A	A	B	A	A	A	D	C	C	C	D	C	C	C	C
Niagara Falls Blvd	Eggert Rd	E	B	B	C	D	B	A	B	NA	D	B	C	E	D	D	D	C
Eggert Rd	Sheridan Dr	D	D	C	D	E	D	C	D	D	C	A	C	NA	C	C	C	D
Niagara Falls Blvd	Sheridan Dr	NA	C	B	C	F	C	B	C	F	D	A	E	D	D	A	D	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	B	NA	NA	NA	A	A	A	NA	C	NA	A	B	NA
Niagara Falls Blvd	Treadwell Rd	E	C	B	C	D	B	B	B	D	D	C	D	E	D	B	C	C
Niagara Falls Blvd	Boulevard Mall	F	C	B	C	D	A	A	B	D	D	B	D	D	D	B	C	B
Niagara Falls Blvd	Brighton Rd/Maple Rd	E	E	C	D	F	D	D	E	D	E	D	D	E	D	F	E	E
Maple Rd	Alberta Dr	C	C	B	C	C	C	B	C	B	C	A	C	C	B	C	C	C
Maple Rd	N Bailey Ave	E	E	D	E	D	C	B	C	D	D	A	D	E	E	D	E	D
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	C	NA	A	C	A	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	C	NA	A	B	A	A	A	NA	A	A	A	A	A	A	NA	A	A
Maple Rd	Sweet Home Rd	D	D	A	D	D	D	B	C	D	C	A	C	C	D	A	C	C
Sweet Home Rd	Rensch Rd	D	C	A	B	B	B	A	B	D	D	B	D	C	C	A	B	B
John James Audubon Pkwy	Rensch Rd	C	B	A	B	C	C	A	B	B	A	A	B	B	B	A	B	B
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
John James Audubon Pkwy	Forest Rd	A	A	A	A	A	A	A	A	A	A	A	A	B	B	A	B	A
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	A	NA	A	A	A

* = Unsignalized Intersection

Table 14. No Action Optimized Weekday: PM Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	A	A	A	C	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	A	NA	NA	NA	A	NA	NA	NA	C	C	B	B	B	D	A	B	NA
Eggert Rd	Alberta Dr	A	A	A	A	A	A	A	A	D	C	C	C	D	C	C	C	C
Niagara Falls Blvd	Eggert Rd	E	B	A	C	D	B	A	B	NA	D	B	C	E	D	C	D	C
Eggert Rd	Sheridan Dr	D	D	C	D	D	D	B	D	D	C	A	C	NA	C	C	C	C
Niagara Falls Blvd	Sheridan Dr	NA	C	B	B	E	C	B	C	D	D	A	D	D	D	A	D	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	A	NA	NA	NA	B	NA	NA	NA	A	A	A	NA	C	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	E	B	B	C	D	B	B	B	E	D	C	D	E	D	B	D	C
Niagara Falls Blvd	Boulevard Mall	E	B	B	B	C	A	A	A	E	E	A	D	E	D	B	C	B
Niagara Falls Blvd	Brighton Rd/Maple Rd	E	D	B	C	D	D	D	D	C	D	C	D	D	D	C	D	D
Maple Rd	Alberta Dr	C	C	A	C	B	B	A	B	B	B	A	B	B	B	B	B	B
Maple Rd	N Bailey Ave	D	D	B	C	D	C	A	C	D	D	A	D	D	D	C	D	D
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	A	NA	A	NA	C	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	C	NA	B	B	D	D	A	D	B	A	A	A	B	A	NA	A	A
Maple Rd	Sweet Home Rd	F	D	C	E	F	F	C	E	E	D	B	D	F	F	D	F	E
Sweet Home Rd	Rensch Rd	E	D	A	C	D	C	C	C	D	D	C	D	D	D	B	C	C
John James Audubon Pkwy	Rensch Rd	D	C	A	D	D	C	B	C	D	B	B	B	C	B	A	C	C
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	B	B	A	B	C	C	B	C	B
John James Audubon Pkwy	Forest Rd	B	B	B	B	C	B	A	C	B	B	A	B	C	C	B	C	B
John James Audubon Pkwy	Gordon R Yaeger Dr	A	A	A	A	A	A	NA	A	NA	NA	NA	NA	B	NA	A	A	A

* = Unsignalized Intersection

Table 15. No Action Optimized Vehicular Travel Times

Corridor	Direction	Distance (mi)	AM		MD		PM	
			Vissim (min)	Google (min)	Vissim (min)	Google (min)	Vissim (min)	Google (min)
Niagara Falls Blvd	NB	1.3	3:28	-	4:27	-	4:00	-
	SB	1.3	2:47	-	3:13	-	3:16	-
Maple Rd	EB	0.9	2:29	-	3:11	-	3:09	-
	WB	0.9	2:25	-	3:35	-	3:00	-
Sweet Home Rd	NB	0.7	1:24	-	1:20	-	1:29	-
	SB	0.7	1:24	-	1:48	-	2:50	-
Rensch Rd	EB	0.1	0:18	-	0:15	-	0:21	-
	WB	0.1	0:45	-	0:39	-	0:57	-
John James Audubon Pkwy	NB	1.8	3:04	-	2:54	-	3:13	
	SB	1.8	3:23	-	3:15	-	3:47	-
Network	NB	4.8	10:43	9:00 - 14:00	12:07	10:00 - 20:00	12:12	10:00 - 20:00
	SB	4.8	10:44	9:00 - 14:00	12:30	10:00 - 22:00	13:50	10:00 - 22:00

In the No Action optimized condition, all but two study intersections operate at a LOS D or better. In the Midday peak hour, Niagara Falls Boulevard and Brighton Road/Maple Road operates at LOS E. During the PM peak hour, the intersection of Maple Road and Sweet Home Road operates at LOS E. There are several individual movements that have LOS F during various time periods. These movements are indicated in Table 12, Table 13, and Table 14.

Table 15 contains the travel time results for the AM, Midday, and PM peak hour no-build optimized condition VISSIM models. The results are the average of five runs using different random number seeds. Note that when compared to the No Action unoptimized models the travel times are slightly improved.

5.4 Proposed Action

A future year alternative which included the Proposed Action was also modeled in VISSIM. The purpose of this modeling was to determine the operational impacts of a LRT system within the current roadway network.

5.4.1 LRT Alignment Adjustments

During the iterative design process of the final Proposed Action, two major alignments to the Metro Rail Expansion alignment were implemented to improve vehicular operations.

- Metro Rail transitions from center running to shoulder running from Niagara Falls Boulevard at Treadwell Road to the intersection of Maple Road at Alberta Drive (thus avoiding any impact to the intersection of Niagara Falls Boulevard and Brighton Road/ Maple Road).
- Metro Rail is grade separated (below grade) as it traverses the intersection of Maple Road at Sweet Home Road.

The benefit to these alignment changes allow the key intersections of Niagara Falls Boulevard at Brighton Road/Maple Road and Maple Road at Sweet Home Road to operate without pre-emption improving the vehicle operations.

5.4.2 Required Network Changes

The inclusion of the Metro Rail system within the existing roadway network required laneage reductions along Niagara Falls Boulevard and Maple Road. The capacity changes required to implement the Metro Rail Expansion on these corridors is noted below:

- Niagara Falls Boulevard
    - Northbound: Removed through lane from Longmeadow Road to Maple Road

- Southbound: Removed through lane from Brighton Road to Longmeadow Road

- Maple Road
  - Eastbound: None
  - Westbound: Removed through lane from Bowmart Pkwy to Niagara Falls Boulevard

At unsignalized intersections where the Metro Rail interacts with other methods of transportation, only right-turns will be permitted for vehicular traffic. This prevents an unsafe left-turn or through movement in conflict with the LRT. At signalized intersection locations, all permissive left turn phases were modified to run as protected-only. This operational adjustment serves the same purpose; to inhibit motorists from interacting with the LRT in an unsafe manner.

Furthermore, pre-emption techniques are also proposed for the LRT to enhance progression through traffic signals at various signalized locations within the Metro Rail Expansion corridor. The purpose of the pre-emption is to ensure that the LRT does not stop at signalized intersections, thus reducing the required travel time. Additionally, the pre-emption prevents conflicting traffic from interacting with the tram as only non-conflicting movements can progress through the intersection when the LRT is approaching.

5.4.3 Desired Network Changes

The Proposed Action models were tested with the required network changes previously mentioned and existing signal timings. Upon inspection of the results, the network experienced severe queuing and delay due to an increased traffic demand, significant capacity reductions due to the integration of the Metro Rail Expansion, unoptimized and uncoordinated signalization, and LRT preemption demand. To counteract this, the signals along Niagara Falls Boulevard and Maple Road were coordinated and all signalized locations were optimized to meet the future traffic demand. After additional testing of the VISSIM models, it was decided that capacity improvements were required to achieve acceptable metrics along the network. The capacity improvements in the Proposed Action VISSIM models are as follows:

- Niagara Falls Boulevard Corridor
  - Northbound: Bus pull-out zones for all stops from Longmeadow Road to Betina Avenue
  - Southbound: Bus pull-out zones for all stops from Moore Avenue to Longmeadow Road

- Niagara Falls Boulevard Corridor

- Northbound: Install a dedicated right turn lane at Longmeadow Road

- Niagara Falls Boulevard and Eggert Road
  - Southbound: Additional left turn bay and dual left turn, two through travel lanes
- Niagara Falls Boulevard and Sheridan Drive
  - Eastbound: Restrict right turns (right turns can be completed at the upstream intersection of Eggert Road and Sheridan Drive)
- Niagara Falls Boulevard and Brighton Road/Maple Road
  - Westbound: Additional left turn bay and dual left turn
  - Eastbound: Additional through lane beginning at Blackstone Boulevard
- Maple Road and N. Bailey Avenue
  - Northbound: Additional through lane from Argosy Drive
  - Southbound: Additional left turn bay and dual left turn
- Maple Road and Sweet Home Road
  - Northbound: Change right turn only lane to shared through/right turn lane
  - Northbound and Southbound: Restrict left turns at driveways south of I-290 Bridge (access becomes right-in/right-out)
  - Southbound: Additional through lane beginning at Maple Ridge Centre with additional 200 foot southbound receiving lane.
- Sweet Home Road and Rensch Road
  - Westbound: Additional left turn bay and change shared through/left turn lane to through lane only
- John James Audubon Pkwy and Sylvan Pkwy
  - Signalize intersection

Ultimately, the summarized Proposed Action VISSIM models included these desired network changes in all three time periods. Table 16, Table 17, and Table 18 illustrate the AM, Midday, and PM peak hour operational results from the Proposed Action VISSIM models. The results are the average of five runs using different random number seeds.

The Proposed Action VISSIM models had all but two study intersections operate at a LOS D or better. In the Midday peak hour, the intersection of Maple Road and N. Bailey Avenue operated at an overall LOS E. This intersection also had an overall LOS E in the PM peak hour. Likewise, a LOS E was also achieved by the intersection of Maple Road and Sweet Home Road in the PM peak hour. There are several individual movements that have LOS F during various time periods. These movements are indicated in Table 16, Table 17, and Table 18.

Intersection		NB				SB				EB				WB			
	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	
	Longmeadow Rd	NA	D	C	D	F	A	NA	B	NA	NA	NA	NA	E	NA	D	
	Highland Ave/Ruth Dr*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	B	B	NA	NA	B	
	Alberta Dr	B	B	A	B	B	B	A	B	B	A	A	A	A	A	A	
	Eggert Rd	E	C	A	C	E	B	B	B	NA	C	B	C	F	D	D	
	Sheridan Dr	E	D	C	D	D	D	B	D	D	C	A	C	NA	C	C	
	Sheridan Dr	NA	C	C	C	F	C	C	E	E	D	NA	D	F	E	A	
	Franklin Ave/Rochelle Pl*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	A	NA	NA	NA	A	
	Treadwell Rd	D	B	B	B	D	B	B	B	D	D	B	C	D	C	B	
	Boulevard Mall	E	C	C	C	D	B	B	B	D	D	B	D	D	D	A	
	Brighton Rd/Maple Rd	E	E	C	E	D	C	B	C	C	D	C	D	D	E	B	
	Alberta Dr	D	C	B	C	C	C	B	C	E	D	D	D	E	A	A	
	N Bailey Ave	F	F	B	E	F	D	C	E	E	E	E	E	F	E	E	
	Bowmart Pkwy	NA	NA	NA	NA	A	NA	A	NA	B	A	NA	A	NA	B	A	
	Hillcrest Dr	C	A	A	B	D	C	A	C	C	B	B	B	C	C	NA	
	Sweet Home Rd	E	D	C	D	E	D	C	D	C	C	A	C	D	D	A	
	Rensch Rd	E	D	A	D	C	C	C	C	D	E	C	D	D	D	B	
n Pkwy	Rensch Rd	D	D	B	D	D	D	C	D	D	B	B	C	C	C	B	
n Pkwy*	Core Rd/Lee Rd*	B	A	B	B	A	A	A	A	B	B	A	B	C	C	C	
n Pkwy	Forest Rd	E	D	D	D	F	C	C	E	C	C	B	C	E	E	E	
n Pkwy	Gordon R Yaeger Dr	NA	C	B	B	B	A	NA	A	NA	NA	NA	NA	B	NA	A	
ersection																	

Table 19 contains the travel time results for the AM, Midday, and PM peak hour Proposed Action VISSIM models. The results are the average of five runs using different random number seeds. Note that when compared to the Google Maps travel time range, the network performs similar to existing conditions in both directions of travel.

Lastly, the travel time for the LRT to complete one trip from end-to-end along the Metro Rail Expansion is about 22 minutes, including all station dwell times. This time does not fluctuate between time periods as the pre-emption routines at signalized locations ensure that the train never stops due to conflicting traffic.

Table 16. Build Weekday: AM Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	B	A	B	E	B	NA	B	NA	NA	NA	NA	D	NA	A	C	B
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	A	A	NA	NA	A	A	NA
Eggert Rd	Alberta Dr	B	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
Niagara Falls Blvd	Eggert Rd	D	B	A	B	E	B	B	B	NA	D	A	C	E	D	C	D	C
Eggert Rd	Sheridan Dr	D	D	B	D	D	D	B	D	C	C	A	C	NA	C	B	C	C
Niagara Falls Blvd	Sheridan Dr	NA	C	C	C	E	B	B	C	E	D	NA	D	E	D	A	D	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	A	A	NA	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	C	A	A	A	E	D	C	D	D	E	B	C	D	D	A	C	C
Niagara Falls Blvd	Boulevard Mall	B	A	B	A	C	B	B	B	A	A	A	NA	D	A	A	B	B
Niagara Falls Blvd	Brighton Rd/Maple Rd	D	C	B	C	D	C	A	C	C	D	C	D	D	D	A	C	C
Maple Rd	Alberta Dr	D	D	D	D	D	D	B	C	E	B	B	B	D	A	A	B	B
Maple Rd	N Bailey Ave	C	D	A	C	E	C	A	D	E	B	B	C	E	C	B	C	C
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	C	NA	A	C	A	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	C	A	A	A	D	C	B	D	A	B	B	B	C	A	NA	A	B
Maple Rd	Sweet Home Rd	D	D	C	D	D	C	B	C	C	C	A	C	B	C	A	C	C
Sweet Home Rd	Rensch Rd	D	C	B	C	C	B	B	B	D	E	C	D	D	D	A	C	C
John James Audubon Pkwy	Rensch Rd	D	D	B	C	D	D	B	C	D	B	B	C	C	B	A	B	C
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
John James Audubon Pkwy	Forest Rd	D	C	B	C	C	B	A	C	B	B	A	B	C	C	C	C	C
John James Audubon Pkwy	Gordon R Yaeger Dr	NA	B	B	B	B	A	NA	A	NA	NA	NA	NA	C	NA	A	B	A

* = Unsignalized Intersection

Table 17. Build Weekend: Midday Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	C	B	C	D	A	NA	A	NA	NA	NA	NA	C	NA	B	C	B
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	A	A	NA	NA	A	A	NA
Eggert Rd	Alberta Dr	B	B	A	B	B	B	A	B	B	A	A	A	B	A	A	A	A
Niagara Falls Blvd	Eggert Rd	A	C	B	C	E	A	A	B	NA	D	A	C	E	D	D	D	C
Eggert Rd	Sheridan Dr	D	D	C	D	D	D	B	D	D	C	A	C	NA	C	C	C	C
Niagara Falls Blvd	Sheridan Dr	NA	C	C	C	F	C	C	D	F	D	NA	E	F	E	A	E	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	A	A	NA	NA	B	B	NA
Niagara Falls Blvd	Treadwell Rd	E	B	B	C	D	B	B	B	D	D	B	D	E	D	B	C	C
Niagara Falls Blvd	Boulevard Mall	F	B	B	B	E	B	B	B	E	E	B	D	E	E	B	D	B
Niagara Falls Blvd	Brighton Rd/Maple Rd	E	D	C	D	E	C	A	C	D	E	D	E	F	F	C	F	D
Maple Rd	Alberta Dr	E	E	D	E	C	E	C	D	E	D	D	D	E	C	B	C	D
Maple Rd	N Bailey Ave	E	D	A	D	F	E	E	E	F	D	D	D	F	D	D	E	E
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	D	NA	A	D	A	A	NA	A	NA	A	A	A	A
Maple Rd	Hillcrest Dr	D	A	B	C	A	A	A	NA	A	A	A	A	D	A	NA	A	A
Maple Rd	Sweet Home Rd	D	D	C	D	E	D	B	C	C	C	A	C	B	C	B	C	C
Sweet Home Rd	Rensch Rd	D	C	A	B	B	A	A	A	D	D	B	C	C	C	A	B	B
John James Audubon Pkwy	Rensch Rd	C	C	B	C	C	C	B	B	B	A	A	B	C	B	A	B	B
John James Audubon Pkwy*	Core Rd/Lee Rd*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
John James Audubon Pkwy	Forest Rd	B	B	A	B	C	B	A	B	B	B	A	B	B	B	B	B	B
John James Audubon Pkwy	Gordon R Yaeger Dr	NA	B	B	B	B	A	NA	A	NA	NA	NA	NA	B	NA	A	B	A

* = Unsignalized Intersection

Table 18. Build Weekday: PM Peak Hour Levels of Service

Intersection		NB				SB				EB				WB				Total
Major	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	
Niagara Falls Blvd	Longmeadow Rd	NA	D	C	D	F	A	NA	B	NA	NA	NA	NA	E	NA	D	E	C
Niagara Falls Blvd*	Highland Ave/Ruth Dr*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	B	B	NA	NA	B	B	NA
Eggert Rd	Alberta Dr	B	B	A	B	B	B	A	B	B	A	A	A	A	A	A	A	A
Niagara Falls Blvd	Eggert Rd	E	C	A	C	E	B	B	B	NA	C	B	C	F	D	D	E	C
Eggert Rd	Sheridan Dr	E	D	C	D	D	D	B	D	D	C	A	C	NA	C	C	C	C
Niagara Falls Blvd	Sheridan Dr	NA	C	C	C	F	C	C	E	E	D	NA	D	F	E	A	E	D
Niagara Falls Blvd*	Franklin Ave/Rochelle Pl*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	A	NA	NA	NA	A	A	NA
Niagara Falls Blvd	Treadwell Rd	D	B	B	B	D	B	B	B	D	D	B	C	D	C	B	C	B
Niagara Falls Blvd	Boulevard Mall	E	C	C	C	D	B	B	B	D	D	B	D	D	D	A	C	C
Niagara Falls Blvd	Brighton Rd/Maple Rd	E	E	C	E	D	C	B	C	C	D	C	D	D	E	B	D	D
Maple Rd	Alberta Dr	D	C	B	C	C	C	B	C	E	D	D	D	E	A	A	C	C
Maple Rd	N Bailey Ave	F	F	B	E	F	D	C	E	E	E	E	E	F	E	E	E	E
Maple Rd	Bowmart Pkwy	NA	NA	NA	NA	A	NA	A	NA	B	A	NA	A	NA	B	A	B	B
Maple Rd	Hillcrest Dr	C	A	A	B	D	C	A	C	C	B	B	B	C	C	NA	C	C
Maple Rd	Sweet Home Rd	E	D	C	D	E	D	C	D	C	C	A	C	D	D	A	D	D
Sweet Home Rd	Rensch Rd	E	D	A	D	C	C	C	C	D	E	C	D	D	D	B	C	C
John James Audubon Pkwy	Rensch Rd	D	D	B	D	D	D	C	D	D	B	B	C	C	C	B	C	C
John James Audubon Pkwy*	Core Rd/Lee Rd*	B	A	B	B	A	A	A	A	B	B	A	B	C	C	C	C	B
John James Audubon Pkwy	Forest Rd	E	D	D	D	F	C	C	E	C	C	B	C	E	E	E	E	D
John James Audubon Pkwy	Gordon R Yaeger Dr	NA	C	B	B	B	A	NA	A	NA	NA	NA	NA	B	NA	A	B	B

* = Unsignalized Intersection

Table 19. Build Vehicular Travel Times

Corridor	Direction	Distance (mi)	AM		MD		PM	
			Vissim (min)	Google (min)	Vissim (min)	Google (min)	Vissim (min)	Google (min)
Niagara Falls Blvd	NB	1.3	3:26	-	4:26	-	4:43	-
	SB	1.3	3:58	-	3:18	-	3:48	-
Maple Rd	EB	0.9	2:49	-	3:12	-	4:07	-
	WB	0.9	2:34	-	4:15	-	4:05	-
Sweet Home Rd	NB	0.7	1:30	-	1:22	-	1:42	-
	SB	0.7	1:33	-	1:45	-	1:41	-
Rensch Rd	EB	0.1	0:28	-	0:17	-	0:26	-
	WB	0.1	1:00	-	0:38	-	0:47	-
John James Audubon Pkwy	NB	1.8	3:27	-	3:10	-	4:02	
	SB	1.8	3:38	-	3:32	-	4:17	-
Network	NB	4.8	11:39	9:00 - 14:00	12:33	10:00 - 20:00	15:00	10:00 - 20:00
	SB	4.8	12:46	9:00 - 14:00	13:29	10:00 - 22:00	14:38	10:00 - 22:00

6.0 Conclusions

This section summarizes the results from the preceding transportation analyses conducted for the proposed Metro Rail Expansion.

6.1 Existing Traffic Operations

Table 3, Table 4, and Table 5 illustrate the AM, Midday, and PM peak hour operational results from the existing condition VISSIM models, respectively. The results are the average of five runs using different random number seeds.

Two study intersections fail to operate at an overall LOS D or better in all peak hours. The intersection of Niagara Falls Boulevard and Brighton Road/Maple Road operates at LOS E in the Midday peak hour and the intersection of Maple Road and Sweet Home Road operates at LOS E in the PM peak hour. There are several individual movements that have LOS F during various time periods. These movements are indicated in Table 3, Table 4, and Table 5.

Table 6 contains the travel time results for the AM, Midday, and PM peak hour existing condition VISSIM models. The results are the average of five runs using different random number seeds. Note that when compared to the Google Maps travel time range for the same date and time when data collection was completed, the network performs as expected in both directions of travel.

6.2 Future Traffic Operations

6.2.1 No Action Condition

Table 8, Table 9, and Table 10 illustrate the AM, Midday, and PM peak hour operational results from the No Action condition VISSIM models. The results are the average of five runs using different random number seeds.

In the No Action condition VISSIM models, all but three study intersections operate at a LOS D or better. In the Midday peak hour, Niagara Falls Boulevard and Brighton Road/Maple Road and Maple Road and N. Bailey Avenue operate at LOS F and LOS E, respectively. During the PM peak hour, Maple Road and N. Bailey Avenue and Maple Road and Sweet Home Road operate at LOS E and LOS F, respectively. There are several individual movements that have LOS F during various time periods. Although, the overall severity and frequency of failing movements was improved by instituting signal optimization. These movements are indicated in Table 8, Table 9, and Table 10.

Table 11 contains the travel time results for the AM, Midday, and PM peak hour No Action condition VISSIM models. The results are the average of five runs using different random

number seeds. Note that when compared to the Google Maps travel time range, the network performs similar to existing conditions in both directions of travel.

6.2.2 No Action Optimized Condition

Table 12, Table 13, and Table 14. illustrate the AM, Midday, and PM peak hour operational results from the No Action condition VISSIM models. The results are the average of five runs using different random number seeds.

In the No Action optimized condition, all but two study intersections operate at a LOS D or better. In the Midday peak hour, Niagara Falls Boulevard and Brighton Road/Maple Road operates at LOS E. During the PM peak hour, the intersection of Maple Road and Sweet Home Road operates at LOS E. There are several individual movements that have LOS F during various time periods. These movements are indicated in Table 12, Table 13, and Table 14.

Table 15 contains the travel time results for the AM, Midday, and PM peak hour No Action optimized condition VISSIM models. The results are the average of five runs using different random number seeds. Note that when compared to the No Action unoptimized models the travel times are slightly improved.

6.2.3 Proposed Action

Table 16, Table 17, and Table 18 illustrate the AM, Midday, and PM peak hour operational results from the Proposed Action VISSIM models. The results are the average of five runs using different random number seeds.

The Proposed Action VISSIM models had all but two study intersections operate at a LOS D or better. In the Midday peak hour, the intersection of Maple Road and N. Bailey Avenue operated at an overall LOS E. Likewise, a LOS E was also achieved by the intersection of Maple Road and N. Bailey Avenue in the PM peak hour. There are several individual movements that have LOS F during various time periods. These movements are indicated in Table 16, Table 17, and Table 18.

Intersection		NB				SB				EB				WB			
	Minor	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	Approach	UT/LT	TH	RT	
	Longmeadow Rd	NA	D	C	D	F	A	NA	B	NA	NA	NA	NA	E	NA	D	
	Highland Ave/Ruth Dr*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	B	B	NA	NA	B	
	Alberta Dr	B	B	A	B	B	B	A	B	B	A	A	A	A	A	A	
	Eggert Rd	E	C	A	C	E	B	B	B	NA	C	B	C	F	D	D	
	Sheridan Dr	E	D	C	D	D	D	B	D	D	C	A	C	NA	C	C	
	Sheridan Dr	NA	C	C	C	F	C	C	E	E	D	NA	D	F	E	A	
	Franklin Ave/Rochelle Pl*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	A	NA	NA	NA	A	
	Treadwell Rd	D	B	B	B	D	B	B	B	D	D	B	C	D	C	B	
	Boulevard Mall	E	C	C	C	D	B	B	B	D	D	B	D	D	D	A	

	Brighton Rd/Maple Rd	E	E	C	E	D	C	B	C	C	D	C	D	D	E	B	
	Alberta Dr	D	C	B	C	C	C	B	C	E	D	D	D	E	A	A	
	N Bailey Ave	F	F	B	E	F	D	C	E	E	E	E	E	F	E	E	
	Bowmart Pkwy	NA	NA	NA	NA	A	NA	A	NA	B	A	NA	A	NA	B	A	
	Hillcrest Dr	C	A	A	B	D	C	A	C	C	B	B	B	C	C	NA	
	Sweet Home Rd	E	D	C	D	E	D	C	D	C	C	A	C	D	D	A	
	Rensch Rd	E	D	A	D	C	C	C	C	D	E	C	D	D	D	B	
n Pkwy	Rensch Rd	D	D	B	D	D	D	C	D	D	B	B	C	C	C	B	
n Pkwy*	Core Rd/Lee Rd*	B	A	B	B	A	A	A	A	B	B	A	B	C	C	C	
n Pkwy	Forest Rd	E	D	D	D	F	C	C	E	C	C	B	C	E	E	E	
n Pkwy	Gordon R Yaeger Dr	NA	C	B	B	B	A	NA	A	NA	NA	NA	NA	B	NA	A	
ersection																	

Table 19 contains the travel time results for the AM, Midday, and PM peak hour Proposed Action VISSIM models. The results are the average of five runs using different random number seeds. Note that when compared to the Google Maps travel time range, the network performs similar to existing conditions in both directions of travel.