Appendix

9

Preferred concept traffic analysis

Inner Loop North
Transformation
Planning Study

To: City of Rochester DES, NYSDOT-R4, MCDOT, GTC

From: David Schwartz, PE, PTOE

Date: March 01, 2022

Re: Inner Loop North Transformation Study
Preferred Concept Traffic Analysis

Inner Loop North Transformation Study
City of Rochester

PREFERRED CONCEPT TRAFFIC ANALYSIS

This memo provides an update of the traffic assessment being performed as part of the Inner Loop North Transformation Study. After vetting six (6) overall concepts, including additional sub-concepts, with the City of Rochester, MCDOT, NYSDOT, GTC, technical and community advisory committees, and the public, a preferred concept was identified. The preferred concept is a refinement of *Concept 6, Alternate 2: City Grid Restoration* which retains a fully directional interchange with I-490 at the western limit of the study corridor (see **Appendix A** for plan-view sketch). This memo seeks to further assess traffic operations associated with this preferred concept while also addressing comments provided by the NYSDOT in a letter dated 11/1/21 (see **Appendix B**). Attached to this memo are graphics of the existing and redistributed traffic volumes at I-490 interchanges (**Appendix C**) and the Genesee River crossings (**Appendix D**). **Appendix E** provides a table of the reasonable assumptions for existing daily traffic volumes and redistributed daily traffic volumes for the preferred concept. Also, attached to this memo are exported report from the HCS Analysis (**Appendix F**) and Synchro Analysis (**Appendix G**). The process for determining reasonable assumptions is summarized below:

Since the GTC's regional travel demand model utilizes a base year of 2015, a reasonable existing traffic volume was calculated by considering either the most recent pre-pandemic NYSDOT traffic count, or, if none were available, the traffic counts collected as part of this study in November 2020. These November 2020 counts were increased by a factor of 20% to account for the impacts of the Covid-19 shutdown. Reasonable redistributed traffic volumes were calculated by applying the traffic percent increase or decrease provided by the GTC's model. In some cases, the reasonable redistributed traffic volumes were manually determined. All volumes along I-490 and its ramps were balanced for the purposes of an HCS analysis.

For the intersection Level-of-Service (LOS) analysis, existing turning movement traffic volumes were obtained from the Monroe County Department of Transportation (MCDOT) Synchro models for the AM and PM peak hours. These volumes were redistributed using available AADTs from the GTC models and the available NYSDOT count program. Note that the date of the MCDOT counts were not available and NYSDOT counts were not available at all for several of the side streets. Further analysis should be conducted for all critical intersections including obtaining new traffic count data, origin-destination data for key destinations and at interchange locations, and possible consideration of additional traffic growth from future development. The intersection analysis contained below is intended to provide reasonably conservative analysis of future traffic operations of many of the critical intersections in the study area.

Preferred Concept

The preferred concept brings the ILN corridor to grade and removes all expressway infrastructure, while providing all on and off ramp connections between the ILN corridor and I-490 in both directions. Below are summaries of some of the major volumes changes resulting from the preferred concept.

1. **Inner Loop North Corridor**
   a. **ILN; West of Genesee River**
      i. **Proposed Central Avenue (At-Grade Roadway to Replace Elevated ILN Expressway)**
         - Traffic is expected to decrease substantially along the ILN corridor between Plymouth Avenue and the Genesee River. The redistributed volumes along the proposed Central Avenue are likely to be approximately 16,000 to 22,000 vpd compared to its existing volume of 43,000 to 47,000 vpd. These volumes are near the upper limits of what can be supported by the proposed two-lane roadway. Providing an additional westbound through lane from State Street to the I-490 interchange ramps would improve operations at the two signals of State Street and Plymouth Avenue, as described below. (Note that NYSDOT has proposed divesture of Plymouth Avenue.)
         - Replacing the ILN with an at-grade Central Avenue will create two signalized intersections at Plymouth Avenue and State Street. One of the biggest concerns for this area raised by NYSDOT was the ability to adequately process the traffic going to and from the I-490 ramps in the AM peak hour. Two alternatives were assessed. One assumed a one-lane westbound approach on Central Ave at both locations. The other removed the proposed parking lane on the northern side of Central Avenue in favor of two westbound lanes through both intersections, from Mill Street to the ramps. This would allow traffic going to I-490 to fully utilize the two receiving lanes on the west side of Plymouth Avenue. With only one westbound through lane, both intersections are expected to operate at LOS F, with delays of just over 112 seconds/vehicle at Plymouth Avenue and just over 101 seconds/vehicle delay at State Street. While these delays would occur predominately in the westbound direction during the peak 15 minutes of the peak hours, the additional time for the westbound approach would impact operations on other approaches as well. By adding a 2^{nd} westbound through lane, operations at both signals would be vastly improved to a LOS D with under 42 seconds of average delay/vehicle at both intersections. A more detailed analysis of the intersections with up-to-date ADTs and Turning Movement Counts should be conducted.
   b. **ILN East of the Genesee River (City Grid Restoration)**
      i. **Proposed Cumberland Street (At-Grade Roadway to Replace Depressed ILN Expressway)**
         - There is expected to be a 78% decrease in traffic along the proposed Cumberland Street between St. Paul Street and North Street/North Chestnut Street. The redistributed volumes will likely be 7,000 to 9,000 vpd. The proposed two-lane roadway would be able to support these volumes.
      ii. **Central Avenue**
         - Central Avenue from St. Paul Street to N. Clinton Street is currently a one-way eastbound roadway and has very low traffic volumes, approximately 1,500 vpd. The preferred concept would convert it to a two-way two-lane roadway and add an expected 11,000 vpd (733% increase) for a total of 12,500 vpd. The proposed two-lane roadway would be able to support these volumes.
         - Central Avenue from N. Clinton Avenue to North Street would have a redistributed volume likely between 10,000 to 11,000 vpd. The current configuration of this roadway would support this volume.

iii. University Avenue

One of the major concerns of some members of the public was the additional traffic along University Avenue and its impact on future traffic delays. The additional traffic and the resulting delays for several key intersections were analyzed.

- With the removal of the Inner Loop and the reconnection of University Avenue near Union Street at Anderson Park, additional traffic will likely utilize University Avenue of North Chestnut Street. Approximately 5,300 vpd (113% increase) are expected to be added to University Avenue. The new daily total will likely be 8,000 to 12,000 vpd compared to its existing volume of 4,000 to 5,000 vpd.
- To assess the impacts of this additional volume, Level-of-Service (LOS) and intersection delays were calculated more fully along University at N. Chestnut/North Street, Scio Street, and East Main Street using Synchro. Existing LOS grades at the four signalized intersections along University Avenue are shown in **Figure 1**. These four intersections currently perform at a LOS of C or better. Expected LOS grades for the four existing signals and the new signal at University Ave/Gibbs St under the preferred concept are shown in **Figure 2**. It was initially assumed that all existing curb lines and lane configurations would be maintained. Under this assumption all intersections are likely to perform at an LOS of D or better, except the North St/N. Chestnut St/University Ave intersection, which is expected to operate at a borderline LOS E/F with an average vehicle delay of approximately 80 seconds. While this E/F LOS is anticipated to only occur during the peak 15 minutes of the peak hour, intersection improvements were explored to improve operations. The addition of short right-turn lanes along the northbound and westbound approaches would likely bring the intersection to an acceptable LOS D, even under these peak traffic conditions. Currently, the lots on the northeast and southeast corners are vacant, so addition of short right-turning lanes would not require demolition or relocation of existing users. A more detailed analysis of this intersection with up-to-date ADTs and Turning Movement Counts should be conducted for this location.

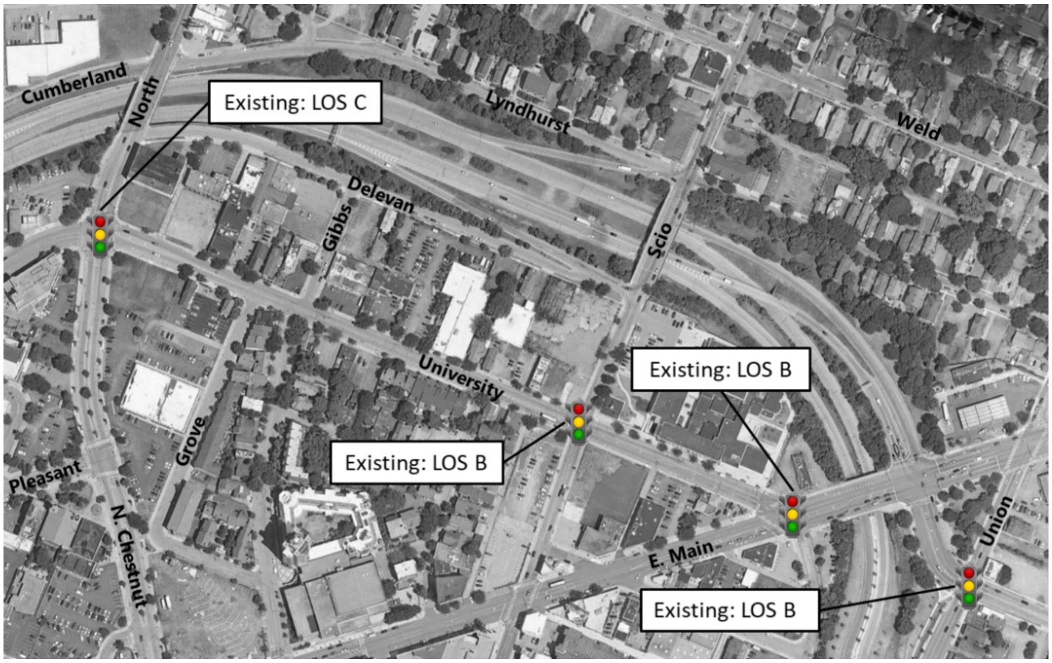


Figure 1: Existing Level-of-Service (LOS) Grades at Signalized Intersections along University Avenue

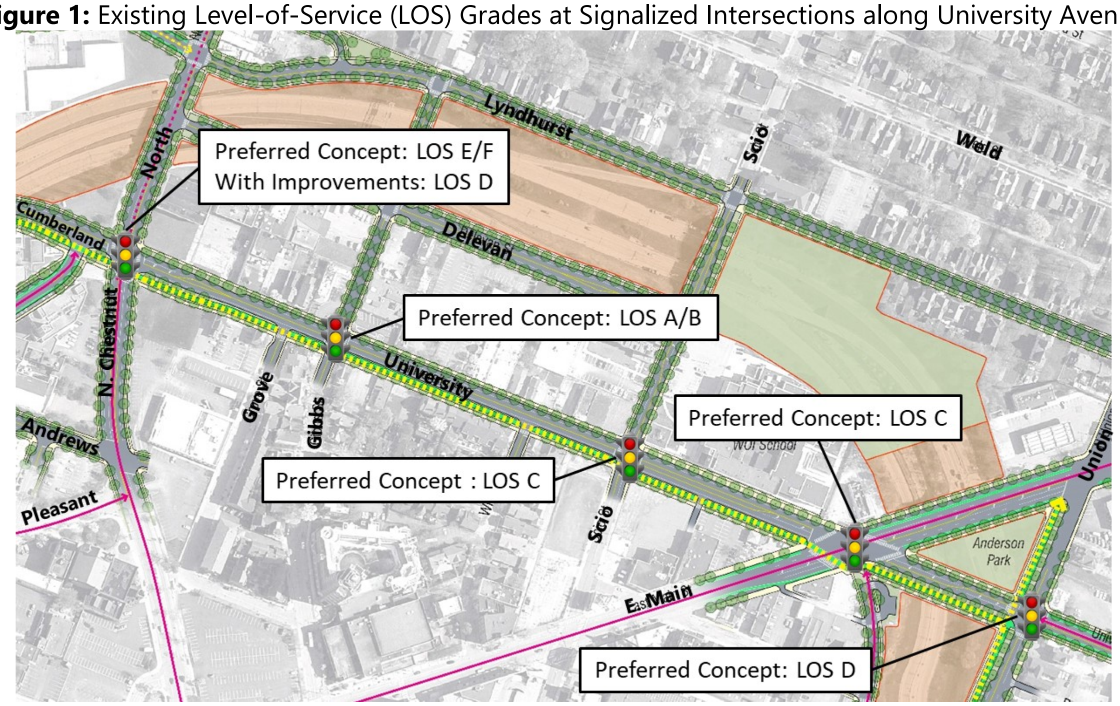


Figure 2: Expected Level-of-Service (LOS) Grades at Signalized Intersections along University Avenue under the preferred concept

iv. Lyndhurst Street

Lyndhurst Street from North Street to Scio Street is currently a one-way eastbound roadway. The preferred concept would convert it to a two-way, two-lane roadway. Some members of the public expressed concern about additional volumes that may use this roadway as a result.

- After careful assessment of existing traffic and GTC models, it is anticipated that the volume along the roadway will stay approximately the same. However, it should be noted that the traffic analysis did not consider any future growth associated with new development along Lyndhurst.

- Lyndhurst Street from Scio Street to Union Street will be maintained as a one-way roadway. This block will experience a likely decrease of 200 vpd (17% decrease). This can be attributed to removal of the Inner Loop on-ramp at the intersection of Lyndhurst Street and Scio Street.

v. Union Street

When the Inner Loop East expressway was removed, much of the traffic that had previously used the expressway were redistributed to Union Street. Some stakeholders and members of NYSDOT were concerned about the potential impact of adding additional traffic along this already heavily traveled corridor. Union Street is currently a three-lane road with one lane in each direction and a center turn lane (CTL) from Howell Street to Broad Street with the CTL converting to an additional northbound lane to East Main Street.

- Between Howell Street and East Avenue, there will be a likely increase of 7,100 vpd (93% increase) for a total of 14,700 vpd and between East Avenue and E. Main Street, there will be a likely increase of 5,100 vpd (69% increase) for a total of 12,500 vpd. These volumes are at the upper limit of what this roadway could support.
- Level of Service and intersection delays were calculated at the intersection of Union Street and East Avenue. Using the best available data, the intersection is expected to operate at a borderline LOS E/F, with an average vehicle delay of just over 85 seconds. Most of the highest delays would occur during the peak 15 minutes of the PM peak hour. The most severe delays would occur along the northbound approach. However, the only NYSDOT ADT counts along Union Street nearby were north of the intersection, so volumes on the southern leg of the intersection, and by extension, the northbound approach, were difficult to accurately determine. New ADT and turning movement counts would provide a higher level of confidence in the volumes of this approach and the operations at the intersection.

2. Genesee River Crossings

a. Removal of vehicular traffic on the E. Broad Street bridge (*Aqueduct Re-imagined* project) and the preferred concept is likely to result in increases along the other Genesee River crossings. Court Street is expected to experience the largest percent increase, while I-490 is expected to experience the largest magnitude increase. While this high-level analysis suggests these crossings would likely be able to support these increases, localized improvements may be needed. The existing facilities at these crossings will need to be further evaluated to determine if the crossings and adjacent roadway sections can support these increases in their current configurations. Some of these detailed analyses will likely occur during the City's upcoming Aqueduct Re-imagined project. Please refer to **Appendix D** for graphics depicting the existing and expected redistributed traffic volumes at the Genesee River crossing. Also, refer to the I-490 section below for more information about the area of the expressway near the Frederick Douglass–Susan B. Anthony Memorial Bridge.

i. Driving Park Avenue: +2,400 vpd (14% increase)
ii. Smith Street/Bausch Street: +2,500 vpd (16% increase)
iii. ILN Corridor (Proposed Central Avenue): -30,800 vpd (65% decrease)
iv. Andrews Street: +3,100 vpd (49% increase)
v. E. Main Street: +3,600 vpd (30% increase)
vi. E. Broad Street: -8,600 vpd (100% decrease)
vii. Court Street: +4,900 vpd (84% increase)
viii. I-490: +13,600 vpd (15% increase)
ix. Ford Street: +800 vpd (4% increase)

Overall, the total number of river crossings is expected to decrease from 226,300 in the existing conditions to approximately 217,800 in the preferred concept; an overall decrease of 8,500 vpd (4% decrease). Some of the decrease can be accounted for from existing local traffic along the I-490 and ILN interchange ramps making large U-Turns from the east side of the river to the west side and back again. Based on the location of the ramps, 1,000 vpd cross the river on the ILN WB from the east, continue to I-490 EB, and then cross back to the east side. An additional 1,000 vpd make the opposite move from I-490 WB to ILN EB. These large U-Turns will likely be greatly reduced, and possibly eliminated altogether, with the removal of the high-speed ILN. In other words, vehicles on the east side of the river who made these moves will likely stay on the east side and use the other roads in the network. These 2,000 vpd account for approximately 4,000 of the daily river crossings. The remaining 4,500 vpd reduction of the river crossings may be the result of crossings along parallel roadways to the north and south of the study area. These movements may be further accounted for with an expanded GTC model.

3. I-490

a. Expressway Mainline

i. East of the ILN/I-490 interchange, the I-490 mainline volumes are likely to increase due to traffic diverting from the ILN corridor to I-490. To the West, however, the I-490 mainline volumes are likely to decrease slightly. This may be due to vehicles that formerly used the ILN to access I-490 WB diverting to other routes. Some of this is illustrated with the expected increase at the I-490 WB on-ramp from Brown Street. The remaining traffic likely uses other parallel routes, possibly to the north of the study area. These movements may be further accounted for with an expanded GTC model.

ii. A limited HCS analysis was completed for the I-490 mainline between the ILN corridor and the S. Clinton/South/Howell Interchange. This is where I-490 is expected to experience the largest percent increases. It should be noted that the traffic volumes were derived from ADT data and were not based on hourly counts during the peak hours. Furthermore, HCS calculations are high-level checks and do not consider the interactions between merge/diverge points, weave sections, and on and off-ramps. Due to the complexity of I-490 in the area, further analysis should be completed as detailed in the Recommendations section below. The HCS analysis conducted illustrates what areas will likely be the most heavily impacted by the ILN removal and provides a reasonably conservative estimate of traffic operations.

iii. I-490 WB between S. Plymouth and ILN Corridor

- Basic Freeway Section
- Existing Peak Hour LOS: B
- Redistributed Peak Hour LOS: C

iv. I-490 EB between ILN Corridor and S. Plymouth

- Basic Freeway Section
- Existing Peak Hour LOS: C
- Redistributed Peak Hour LOS: C

v. I-490 WB between S. Clinton/South/Howell and S. Plymouth

- Weave Freeway Section
- Existing Peak Hour LOS: C
- Redistributed Peak Hour LOS: E

vi. I-490 EB between S. Plymouth and S. Clinton/South/Howell

- Weave Freeway Section
- Existing Peak Hour LOS: D
- Redistributed Peak Hour LOS: E

This analysis reveals that there is virtually no degradation of service expected along I-490 west of the ILN interchange ramp. The less than 1 mile stretch of I-490 between S. Plymouth and the S. Clinton/South/Howell interchange, however, will likely experience some degradation of service during the peak hours of operation. While they do not reach a failing level-of-service, they are expected to drop from LOS C and D to a concerning LOS E. Under these conditions, traffic volumes are approaching the capacity of the freeway and operations become more volatile. Speeds slow noticeably, there is little room to maneuver, vehicles entering on ramps may cause a disruption wave through the traffic stream, but traffic typically does not gridlock. As noted previously, however, these analyses are based on peak hour volumes derived from ADT volumes, not up to date hourly counts. New analysis with hourly counts, specific O-D data, and using a model that considers interactions of merge/diverge points, weave areas, and ramps should be conducted to identify and evaluate feasible I—490 mainline and/or ramp mitigation strategies.

b. Interchange with ILN Corridor

i. The preferred concept preserves the two off-ramps from I-490 EB and WB to ILN corridor and the two on-ramps to I-490 EB and WB from ILN corridor. Since the ILN is brought to grade under this concept, there is only one ramp connecting I-490 WB from Plymouth and the ILN corridor.

ii. The off-ramp from I-490 EB to the ILN corridor is expected to experience a decrease of 5,600 vpd (30% decrease) in traffic. Under the preferred concept, the existing off-ramp from I-490 EB to Cascade Drive/Allen Street is removed.

iii. The on-ramp to I-490 WB at the ILN corridor (Plymouth Avenue) is expected to experience a decrease of 9,700 vpd (50% decrease) in traffic.

iv. The off-ramp from I-490 WB to the former ILN is expected to experience an increase of 4,600 vpd (230% increase). This increase can be explained by new access opportunities being created, resulting in substantial shifts in traffic patterns. Currently, the only on and off-ramps to I-490 from local (non-ILN) streets are at the S. Plymouth interchange. The I-490 WB off-ramp to Spring Street, shows a likely 2,100 vpd decrease (24% decrease), as these vehicles will shift to the new ILN ramp. The remaining increase likely comes from vehicles that previously used the ILN east of the Genesee River, but now will use I-490 WB to cross the river. The expected 4,600 vpd on the new ILN off-ramp should be further analyzed in detail at key locations, particularly Plymouth Avenue and possibly State Street to determine what, if any, mitigation efforts may be required.

v. The on-ramp to I-490 EB from former ILN is expected to experience an increase of 6,500 vpd (176% increase). As with the other ramp, the increase can be explained by new access opportunities being created, resulting in substantial shifts in traffic patterns. Approximately 1,400 vpd likely shift from the on-ramp to I-490 EB from S. Plymouth Avenue. Again, the remaining increase likely comes from vehicles that previously used the ILN east of the Genesee River, but now will use I-490 EB to cross the river. These 10,200 total vehicles can likely be served by the proposed on-ramp, as a typical ramp can adequately serve up approximately 19,000 vpd.

c. Adjacent Interchanges

i. The adjacent interchanges are expected to experience slight increases on most movements. This makes sense since the ILN corridor acts as a raceway to/from I-490 and with its removal traffic redistributes to other ramps.

ii. Brown/Broad Interchange

- +700 vpd (14% increase) for I-490 WB on-ramp from W. Broad Street
- -2,400 vpd (73% decrease) for I-490 EB on-ramp from Allen Street

iii. S. Plymouth Interchange

- -2,100 vpd (24% decrease) for I-490 WB off-ramp to Spring Street
- -1,400 vpd (42% decrease) for I-490 EB on-ramp from S. Plymouth Avenue

iv. S. Clinton/South/Howell Interchange

- +3,800 vpd (60% increase) for I-490 WB on-ramp from Howell Street
- +4,200 vpd (102% increase) for I-490 EB off-ramp to Howell Street

4. Travel Time Comparison

A travel time analysis was performed along the ILN corridor to assess some of the impacts and efficiency of a slower, at-grade roadway with traffic signals, particularly for the movement of freight traffic to and through the area. These runs were performed during off-peak hours since most deliveries are conducted during those times. The travel runs extended from the I-490 interchange to several key destinations in the study area. Existing travel time runs were conducted along the existing ILN corridor. Future travel times were estimated based on reduced average travel speeds and added delays associated with the introduction of new signalized intersections.

The existing and future travel times and the difference between them are summarized in the table below.

Trip	Direction	Average Measured Existing Off-Peak Travel Time	Average Estimated Future Off-Peak Travel Time	Difference between Existing & Future
Inner Loop Corridor: I-490 to E. Main St	EB	1 min, 30 sec +/-	6 min +/-	4 min, 30 sec +/-
Inner Loop Corridor: E. Main Street to I-490	WB	2 min +/-	5 min, 30 sec +/-	3 min, 30 sec +/-
I-490 to St. Paul St at St. Bridgets Dr	EB	3 min +/-	3 min, 30 sec +/-	30 sec +/-
St. Paul St at St. Bridgets Dr to I-490	WB	1 min, 30 sec +/-	3 min +/-	1 min, 30 sec +/-
I-490 to Scio St at Davis St	EB	3 min, 30 sec +/-	7 min +/-	3 min, 30 sec +/-
Scio St at Davis St to I-490	WB	2 min, 30 sec +/-	6 min, 30 sec +/-	4 min +/-

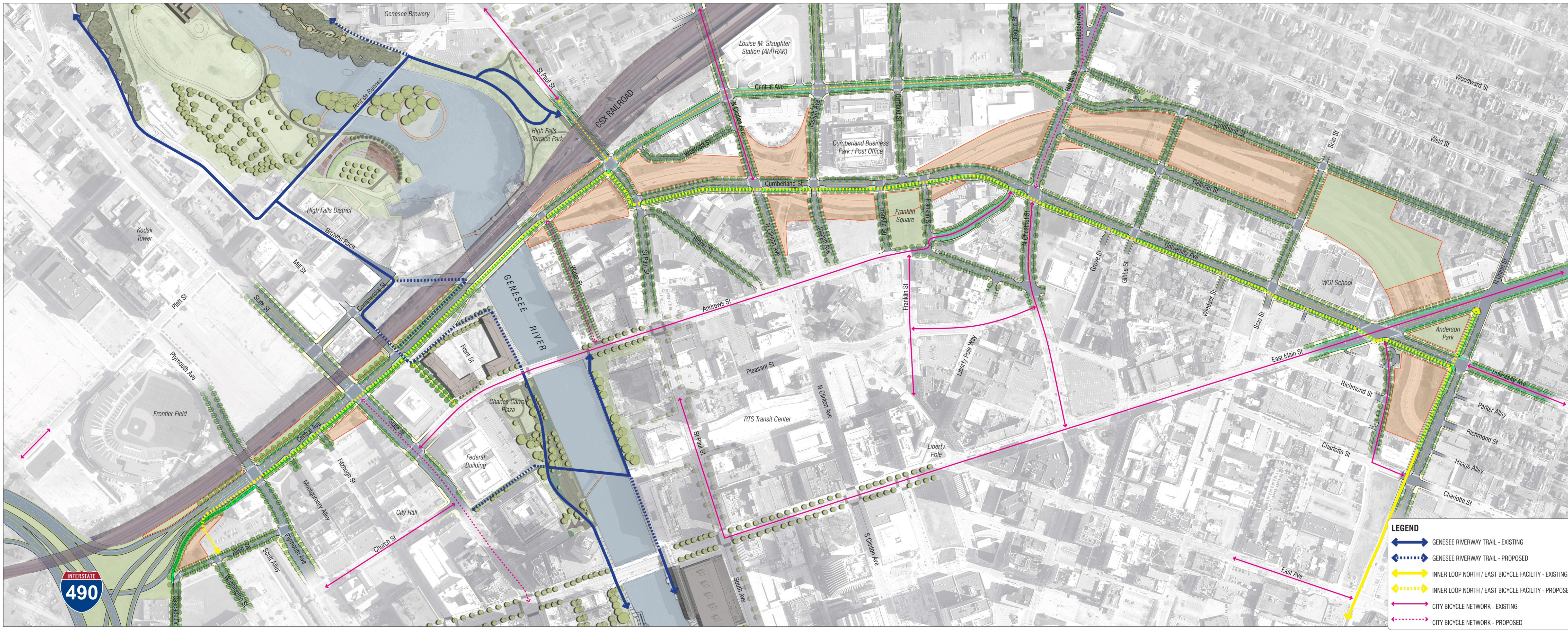
While the travel times under the future conditions are obviously increased, due to desired slower corridor speeds and the introduction of new signals, most of the increases are deemed to be acceptable additions. Traversing the entire corridor from the I-490 interchange to East Main Street (the current terminus of the ILN) is only expected to take approximately 4½ minutes more under the proposed route along Central and University than the existing route along the ILN expressway.

Recommendations

As recommended by NYSDOT in their 11/1/2021 letter, the traffic analysis provided in this memo should be further refined, particularly for traffic operations at key intersections in the City Grid restoration. A full network analysis with a microsimulation tool may help to better assess the interactions of traffic throughout the system, rather than just at selected locations.

- Additional pre and post pandemic traffic data (possibly utilizing "Big Data" sources in combination with localized traffic data collection) will be required to conduct a more detailed and accurate Level-of-Service analysis for critical intersections effected by this proposed corridor transformation.
- Additional pre and post pandemic origin-destination data (possibly via "Big Data" sources) should also be obtained to further help determine traffic redistribution and more accurate future trip estimations.
- The I-490 corridor is very complex through this area with numerous lane drops, lane additions, weave areas, and merge/diverge points within a relatively short stretch. Additional data, such as peak hour count data and O-D information to better assess the impacts of the additional traffic on I-490 should be obtained (possibly utilizing "Big Data" in combination with localized traffic data collection). After obtaining this data, a more detailed analysis using a simulation model, such as VISSIM, should be conducted to fully account for all movements and traffic interactions. This assessment will help determine if feasible I-490 mainline and/or ramp mitigation measures will be necessary as part of the Inner Loop North Project.
- The GTC travel demand model should be updated to existing volumes, as indicated in NYSDOT's 11/1/2021 letter. Also indicated in the letter is that additional traffic analyses should be expanded to include other river crossings and other roadways outside of the downtown area, include additional roadways of Mount Read (Route 104) and Lake Avenue, to account for the wider impacts of the ILN removal. Ideally, it should also include Ford Street and other interchanges west and east of the study area to determine how vehicles are accessing I-490 in the absence of the ILN expressway.

APPENDIX A


Genesee Brewery
Louise M. Slaughter Station (AMTRAK)
Central Ave
CSX RAILROAD
St Paul St
High Falls Terrace Park
Pont de Rennes
High Falls District
Browns Race
Kodak Tower
Mill St
Platt St
Commercial St
State St
Plymouth Ave
Frontier Field
GENESEE RIVER
Front St
Charles Carroll Plaza
Federal Building
City Hall
Church St
Fitzhugh St
Montgomery Alley
Allen St
Scott Alley
Washington St
Andrews St
Pleasant St
RTS Transit Center
N Clinton Ave
S Clinton Ave
South Ave
Liberty Pole Way
Liberty Pole
Franklin St
Franklin Square
Cumberland St
Cumberland Business Park / Post Office
Joseph Ave
Hudson Ave
N Chestnut St
Lyndhurst St
Delevan St
University Ave
Scio St
Grove St
Gibbs St
Windsor St
WOI School
Anderson Park
East Main St
Richmond St
Parker Alley
Charlotte St
Haags Alley
East Ave
Woodward St
Weld St
N Union St
INTERSTATE
490
LEGEND
GENESEE RIVERWAY TRAIL - EXISTING
GENESEE RIVERWAY TRAIL - PROPOSED
INNER LOOP NORTH / EAST BICYCLE FACILITY - EXISTING
INNER LOOP NORTH / EAST BICYCLE FACILITY - PROPOSED
CITY BICYCLE NETWORK - EXISTING
CITY BICYCLE NETWORK - PROPOSED

APPENDIX B

November 1, 2021

Mr. Erik Frisch
Manager of Special Projects
City of Rochester DES
Architecture & Engineering Bureau
30 Church Street, Room 300B
Rochester, NY 14614-1279

Re: Inner Loop North Transformation Planning Study
PIN 4CR0.10

Dear Mr. Frisch,

At the October 7 Technical Advisory Committee (TAC) meeting for the Inner Loop North Transformation Study, TAC members were informed that the community's preferred concept is Concept #6 "Restore the Grid". The primary version of Concept #6 involves removal of the interchange ramps connecting I-490 to the western end of the Inner Loop North corridor. Two sub-concepts are also being considered, which allow the option to retain the interchange fully or partially.

NYSDOT Region 4 has reviewed materials provided by the City's prime consultant that depict Concept #6 and its sub-concepts. While it is not possible to foresee every possible impact of this project at the current preliminary stage, we envision several traffic-related challenges on I-490 mainline, adjacent interchanges, and other State-owned highways in the vicinity. We believe that mitigation may be necessary, particularly if interchange ramps are to be removed.

We offer the following comments:

1. The "heat maps" depicting changes in traffic volumes on adjacent roads resulting from diversion from the Inner Loop are based on AADT, which is somewhat deceiving. To obtain a more comprehensive understanding of the traffic impacts associated with Concept 6 and its sub-concepts, it is very important to analyze traffic diversion during the morning and evening peak hours, when many adjacent roads may already be operating near capacity. This should be done before a final concept and configuration is selected.

2. We are concerned that peak hour traffic volume increases at several locations – including nearby I-490 interchange ramps and portions of I-490 mainline such as the weave section in the vicinity of the Susan B. Anthony Bridge – may be difficult to mitigate without substantial improvements. The nature of these improvements will depend upon the final Inner Loop North configuration and the above-mentioned traffic analysis.

3. The current traffic diversion analysis does not include Lake Avenue and Mount Read Boulevard, which could be impacted by the Inner Loop North Transformation. Impacts to these facilities should be analyzed and considered.

4. The GTC traffic model utilizes 2015 traffic volumes. Will the anticipated economic development along the Inner Loop North corridor generate an increase in traffic volumes? Should the traffic analysis be done using these volumes?

5. NYSDOT will propose State divesture of Plymouth Avenue under any alternative. We believe it will be more appropriate for the City of Rochester to have maintenance jurisdiction under the final configuration.

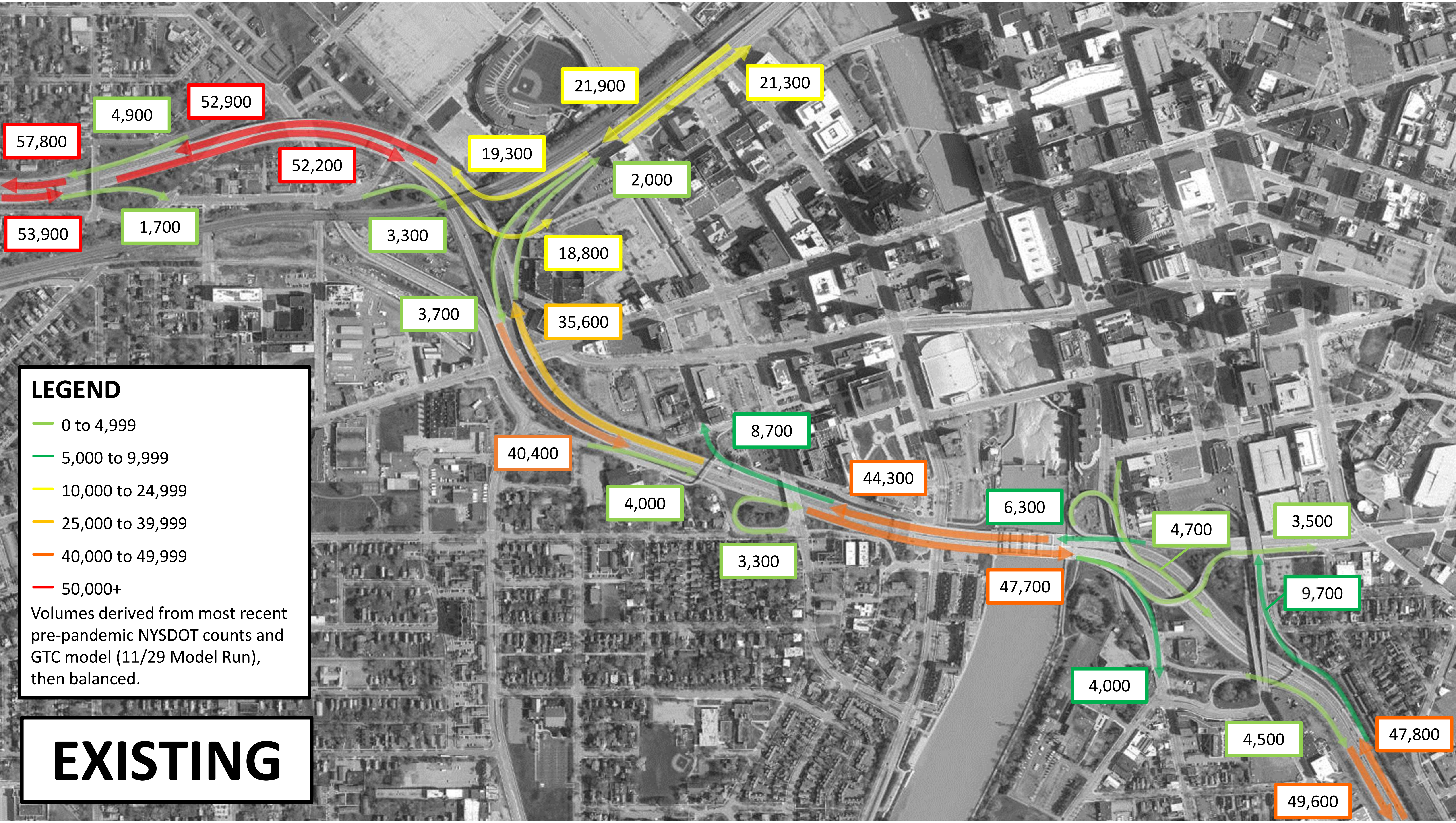
While there is potential for tremendous benefits associated with this innovative project, we are concerned about the traffic impacts Concept #6 may have on State-owned facilities in the vicinity. We look forward to working with the City to resolve these concerns.

Sincerely,

Christopher T. Reeve, P.E.
Acting Regional Director
NYSDOT Region 4

cc: Mark J. McAnany, P.E., Principal Engineer, Bergmann Associates
Joel A. Kleinberg, Acting Regional Planning & Program Manager, NYSDOT Region 4
Paul J. Spitzer, P.E., Acting Design Engineer, NYSDOT Region 4
Matthew C. Oravec, P.E., Acting Traffic Engineer, NYSDOT Region 4
Jay R. Reisinger, P.E., Regional Local Projects Liaison, NYSDOT Region 4

APPENDIX C


57,800
4,900
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52,200
53,900
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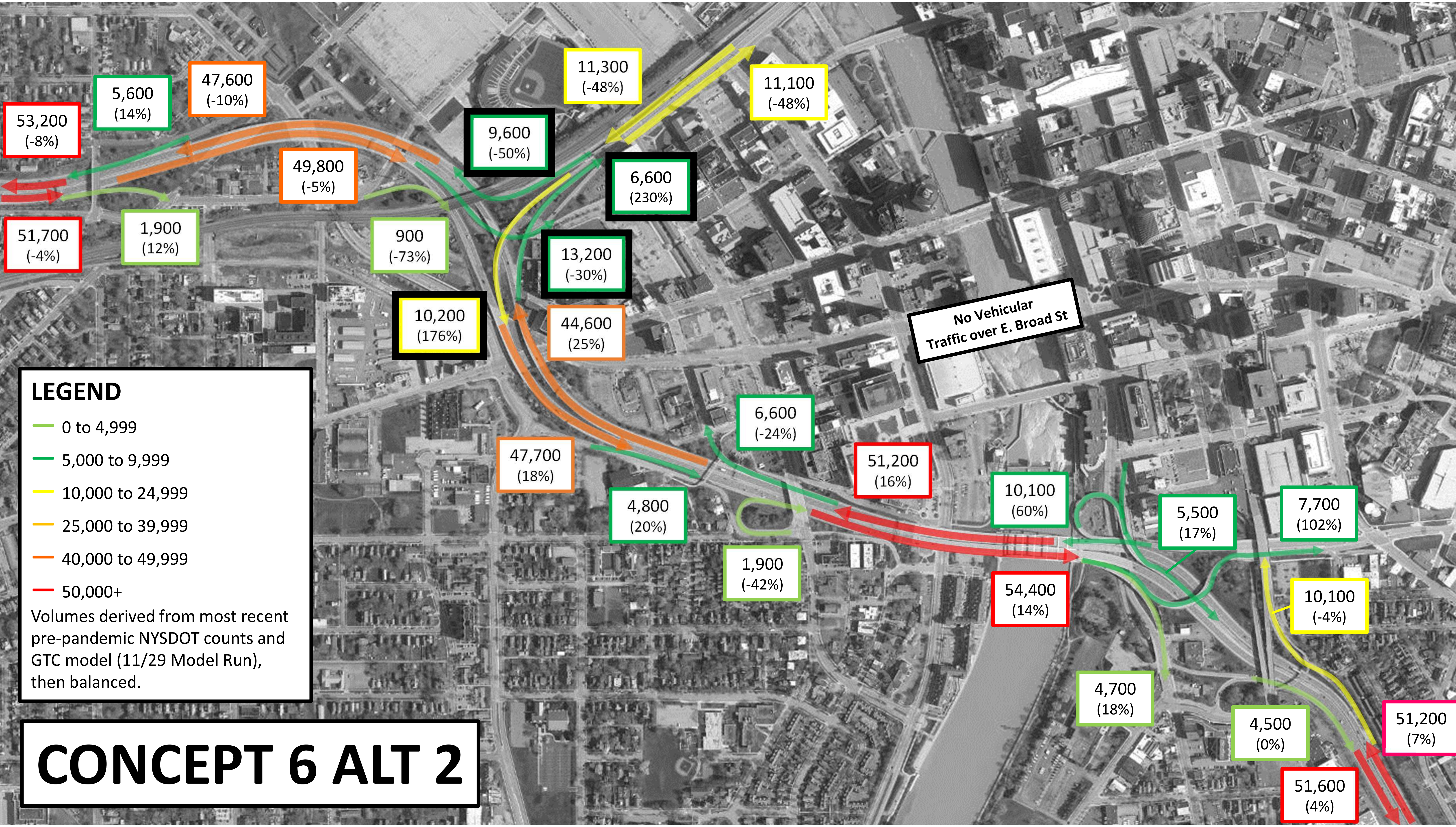
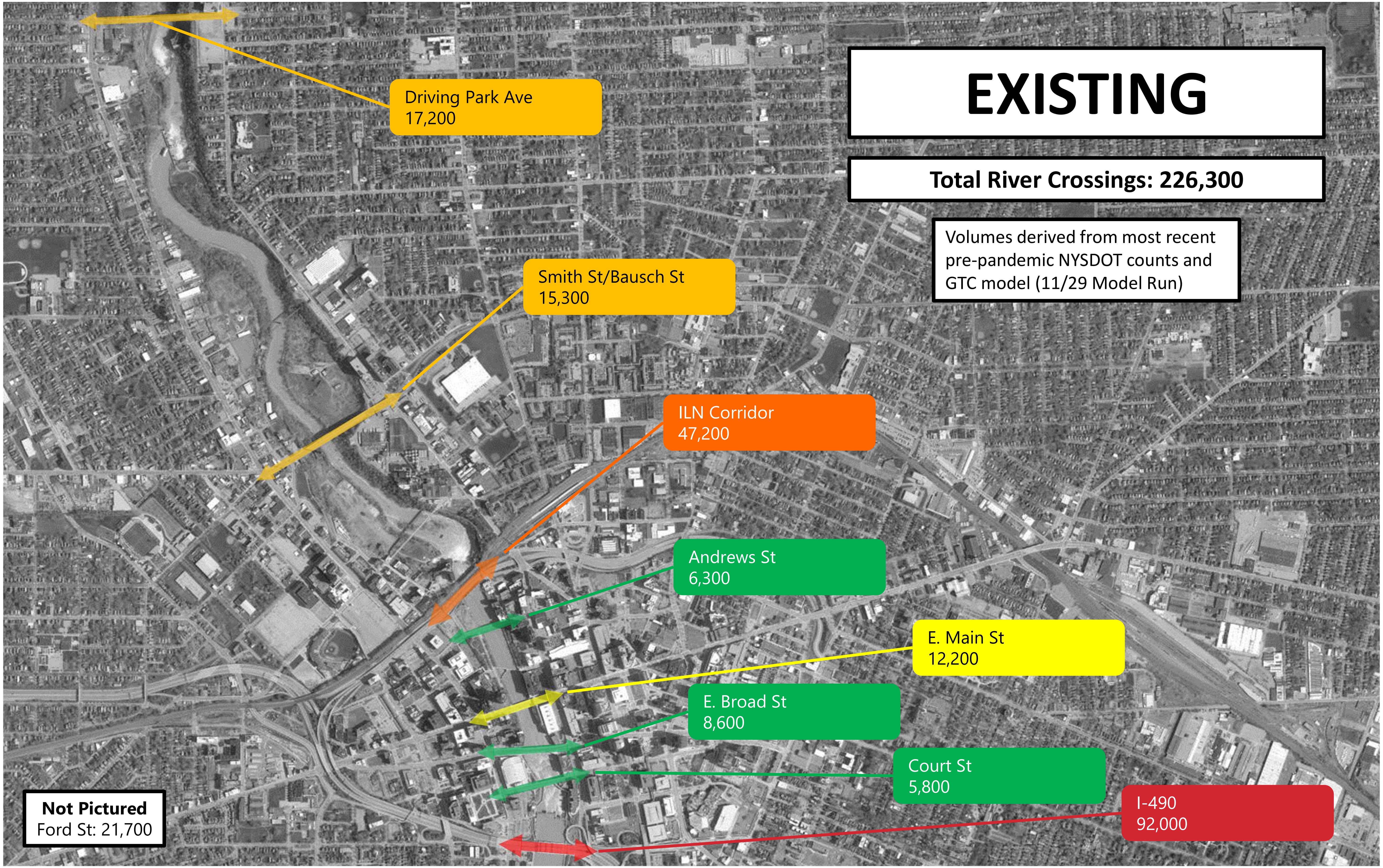
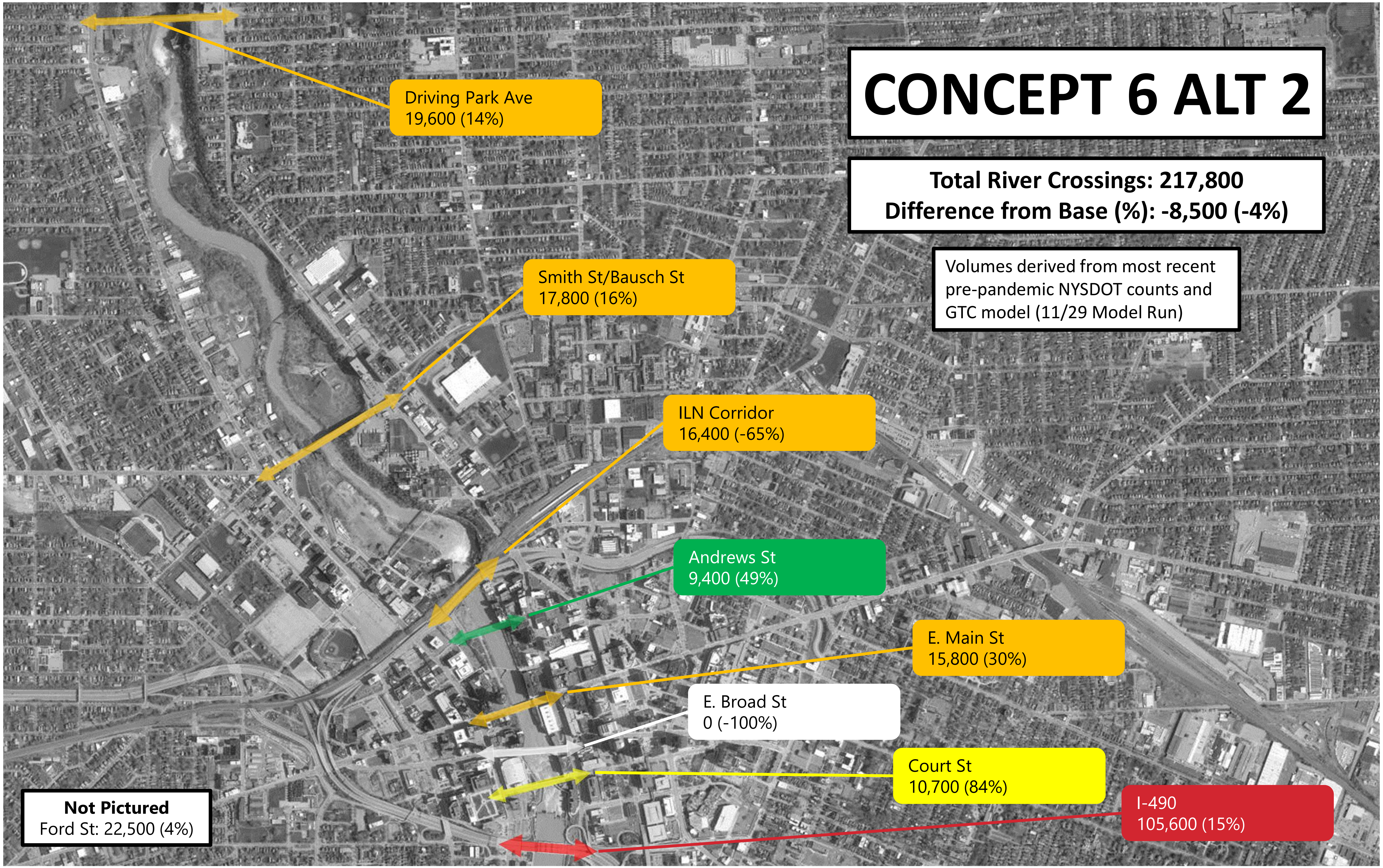
35,600
40,400
8,700
44,300
4,000
6,300
4,700
3,500
3,300
47,700
9,700
4,000
4,500
47,800
49,600
LEGEND
0 to 4,999
5,000 to 9,999
10,000 to 24,999
25,000 to 39,999
40,000 to 49,999
50,000+
Volumes derived from most recent pre-pandemic NYSDOT counts and GTC model (11/29 Model Run), then balanced.
EXISTING


CONCEPT 6 ALT 2
LEGEND
0 to 4,999
5,000 to 9,999
10,000 to 24,999
25,000 to 39,999
40,000 to 49,999
50,000+
Volumes derived from most recent pre-pandemic NYSDOT counts and GTC model (11/29 Model Run), then balanced.
No Vehicular Traffic over E. Broad St
53,200 (-8%)
5,600 (14%)
47,600 (-10%)
51,700 (-4%)
1,900 (12%)
49,800 (-5%)
900 (-73%)
9,600 (-50%)
11,300 (-48%)
11,100 (-48%)
6,600 (230%)
13,200 (-30%)
10,200 (176%)
44,600 (25%)
47,700 (18%)
4,800 (20%)
1,900 (-42%)
6,600 (-24%)
51,200 (16%)
10,100 (60%)
54,400 (14%)
5,500 (17%)
7,700 (102%)
10,100 (-4%)
4,700 (18%)
4,500 (0%)
51,200 (7%)
51,600 (4%)

APPENDIX D


EXISTING
Total River Crossings: 226,300
Volumes derived from most recent pre-pandemic NYSDOT counts and GTC model (11/29 Model Run)
Driving Park Ave 17,200
Smith St/Bausch St 15,300
ILN Corridor 47,200
Andrews St 6,300
E. Main St 12,200
E. Broad St 8,600
Court St 5,800
I-490 92,000
Not Pictured
Ford St: 21,700



CONCEPT 6 ALT 2
Total River Crossings: 217,800
Difference from Base (%): -8,500 (-4%)
Volumes derived from most recent pre-pandemic NYSDOT counts and GTC model (11/29 Model Run)
Driving Park Ave
19,600 (14%)
Smith St/Bausch St
17,800 (16%)
ILN Corridor
16,400 (-65%)
Andrews St
9,400 (49%)
E. Main St
15,800 (30%)
E. Broad St
0 (-100%)
Court St
10,700 (84%)
I-490
105,600 (15%)
Not Pictured
Ford St: 22,500 (4%)

APPENDIX E

BERGMANN
ARCHITECTS ENGINEERS PLANNERS

	ROADWAY	Reasonable Assumption Existing Traffic Volume	Reasonable Assumption Future Traffic Volume	Percent Change
I-490/BROWN/BROAD/ALLEN INTERCHANGE	I-490 WB; West of Interchange	57,800	53,200	-8%
	I-490 EB; West of Interchange	53,900	51,700	-4%
	I-490 WB; East of Interchange	52,900	47,600	-10%
	I-490 EB; East of Interchange	52,200	49,800	-5%
	Ramp I-490 EB to Brown	1,700	1,900	12%
	Ramp Broad to I-490 WB	4,900	5,600	14%
	Ramp Allen to I-490 EB	3,300	900	-73%
I-490/ILN INTERCHANGE	I-490 WB; West of ILN	52,900	47,600	-10%
	I-490 EB; West of ILN	52,200	49,800	-5%
	I-490 WB; East of ILN	35,600	44,600	25%
	I-490 EB; East of ILN	40,400	47,700	18%
	Ramp I-490 EB to ILN EB/Plymouth	18,800	13,200	-30%
	Ramp I-490 WB to ILN EB	2,000	6,600	230%
	Ramp ILN WB/Plymouth to I-490 WB	19,300	9,600	-50%
	Ramp ILN WB to I-490 EB	3,700	10,200	176%
I-490/BOYS CLUB/ S. PLYMOUTH	I-490 WB; West of Interchange	35,600	44,600	25%
	I-490 EB; West of Interchange	40,400	47,700	18%
	I-490 WB; East of Interchange	44,300	51,200	16%
	I-490 EB; East of Interchange	47,700	54,400	14%
	Ramp Boys Club to I-490 EB	4,000	4,800	20%
	Ramp S. Plymouth to I-490 EB	3,300	1,900	-42%
	Ramp I-490 WB to Spring	8,700	6,600	-24%
I-490/SOUTH AVE/CLINTION INTERCHANGE	I-490 WB; West of Interchange	44,300	51,200	16%
	I-490 EB; West of Interchange	47,700	54,400	14%
	I-490 WB; East of Interchange	47,800	51,200	7%
	I-490 EB; East of Interchange	49,600	51,600	4%
	Ramp I-490 EB to South/Howell	7,500	12,400	65%
	Ramp I-490 EB to South	4,000	4,700	18%
	Ramp I-490 EB to Howell	3,500	7,700	120%
	Ramp Howell to I-490 WB	6,300	10,100	60%
	Ramp Howell to I-490 EB	4,700	5,500	17%
	Ramp South to I-490 EB (South)	4,500	4,500	0%
	Ramp I-490 WB to S. Clinton	9,700	10,100	4%
COMBINED ILN AND PARALLEL ROADS	Plymouth to State WB (Allen+ILN)	21,900	11,300	-48%
	Plymouth to State EB (Allen+ILN)	21,300	11,100	-48%
	Plymouth to State Combined (Allen+ILN)	43,200	22,300	-48%
	State to St. Paul (Allen+ILN)	47,200	16,400	-65%
	St. Paul to N. Clinton (Central+ILN+Cumberland)	42,400	21,700	-49%
	N. Clinton to Joseph (Central+ILN+Cumberland)	42,000	19,500	-54%
	Joseph to North (Central+ILN+Cumberland)	40,800	17,800	-56%
	North to Scio (Lyndhurst+ILN+University)	38,200	10,100	-74%
	Scio to Union (Lyndhurst+ILN+University)	27,200	9,400	-65%
CITY GRID RESTORATION	St. Paul over ILN	13,600	15,700	15%
	Central; Between St. Paul & N. Clinton	1,500	12,500	733%
	ILN; Between St. Paul & N. Clinton	41,900	9,200	-78%
	Central; Between N. Clinton & Joseph	1,500	10,600	607%
	ILN; Between N. Clinton & Joseph	40,900	8,900	-78%
	Central; Between Joseph & North	5,100	10,000	96%
	ILN; Between Joseph & Franklin Square	35,700	7,800	-78%
	Andrews; Between Joseph & Franklin Square	6,200	6,400	3%
	ILN; Between Franklin Square & North	35,700	8,500	-76%
	Andrews; Between Franklin Square & North	6,200	900	-85%
	Lyndhurst; Between North & Scio	1,100	1,000	-9%
	ILN; Between North & Scio	33,100	0	-100%
	University; Between North & Scio	4,700	9,900	111%
	Lyndhurst; Between Scio & Union	1,200	1,000	-17%
	University; Between Scio & E. Main	4,600	11,900	159%
UNION STREET	Howell to East	7,600	14,700	93%
	East to E. Main	7,400	12,500	69%
INNER LOOP RAMPS	Inner Loop WB to State	4,300	0	-100%
	State to Inner Loop EB	5,700	0	-100%
	St. Paul to Inner Loop WB	12,500	0	-100%
	Inner Loop EB to St. Paul	8,900	0	-100%
	Inner Loop WB to Joseph	2,600	0	-100%
	Joseph to Inner Loop EB	1,700	0	-100%
	Scio to Inner Loop WB	5,700	0	-100%
	Inner Loop EB to Scio	4,800	0	-100%
	E. Main to Inner Loop WB	11,200	0	-100%
	Inner Loop EB to E. Main	9,700	0	-100%
	Union to Inner Loop WB	1,500	0	-100%
	Inner Loop EB to Union	1,600	0	-100%

GENESEE RIVER BRIDGE CROSSINGS	Driving Park	17,200	19,600	14%
	Smith/Bausch	15,300	17,800	16%
	Inner Loop	47,200	16,400	-65%
	Andrews	6,300	9,400	49%
	E. Main	12,200	15,800	30%
	E. Broad	8,600	0	-100%
	Court	5,800	10,700	84%
	I-490	92,000	105,600	15%
	Ford	21,700	22,500	4%
PERPENDICULAR ROADWAYS	Plymouth; North of ILN	4,800	4,400	-8%
	Plymouth; South of ILN	11,400	9,500	-17%
	State; North of ILN	24,700	21,100	-15%
	State; South of ILN	17,500	18,700	7%
	St. Paul; North of ILN	14,300	18,000	26%
	St. Paul; South of ILN	9,000	9,900	10%
	N. Clinton; North of ILN	10,000	10,900	9%
	N. Clinton; South of ILN	10,900	9,700	-11%
	Joseph; North of ILN	10,600	11,500	8%
	North; North of ILN	11,200	12,800	14%
	North; South of ILN	12,100	10,200	-16%
	Scio; North of ILN	9,000	5,800	-36%
	Scio; South of ILN	3,800	4,400	16%
	E. Main; West of University	9,100	12,000	32%
	E. Main; East of University	20,200	17,000	-16%
AQUEDUCT	Exchange (North of Main)	17,400	17,200	-1%
	Exchange (Main to Broad)	13,500	11,500	-15%
	Exchange (Broad to Court)	13,400	20,500	53%
	Exchange (South of Court)	10,600	10,800	2%
	South (Main to Broad)	8,400	10,400	24%
	South (Broad to Court)	15,000	13,300	-11%
	South (South of Court)	15,300	14,800	-3%
	Clinton (Main to Broad)	12,100	12,200	1%
	Clinton (Broad to Court)	14,200	13,100	-8%
	Clinton (Court to Woodbury)	17,100	17,200	1%
	Clinton (South of Woodbury)	17,500	17,900	2%
	Main (West of Exchange)	10,700	14,200	33%
	Main (Exchange to South)	12,200	15,800	30%
	Main (South to Clinton)	10,600	13,200	25%
	Broad (West of Exchange)	7,500	3,400	-55%
	Broad (Exchange to South)	8,600	0	-100%
	Broad (South to Clinton)	7,800	3,700	-53%
	Court (Exchange to South)	5,800	10,900	88%
	Court (South to Clinton)	6,100	9,200	51%
	Woodbury (South to Clinton)	17,000	16,400	-4%
	I-490 WB	44,300	51,200	16%
	I-490 EB	47,700	54,400	14%
UNIVERSITY AVE NEIGHBORHOOD	North (North of Central)	12,400	13,300	7%
	North (South of Central)	16,300	13,500	-17%
	Chestnut (South of University)	11,400	11,800	4%
	Scio (North of Lyndhurst)	9,000	5,900	-34%
	Scio (Lyndhurst to Delevan)	6,200	4,000	-35%
	Scio (Delevan to University)	3,900	4,000	3%
	Scio (South of University)	3,800	3,700	-3%
	Central (West of North)	5,100	10,000	96%
	Lyndhurst (North to Scio)	1,100	1,000	-9%
	Lyndhurst (Scio to Union)	1,200	1,000	-17%
	University (North to Windsor)	4,700	9,900	111%
	University (Windsor to Scio)	4,800	8,200	71%
	University (Scio to Main)	4,600	11,900	159%
	Andrews (West of North)	6,200	900	-85%
	E. Main; West of University	9,100	12,000	32%
	E. Main; East of University	20,200	17,000	-16%

APPENDIX F

HCS7 Basic Freeway Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Existing
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	4.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.1
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3151	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1199
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2351
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2351
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.51
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	65.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.4
Total Ramp Density Adjustment	10.3	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	65.1		

HCS7 Basic Freeway Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Redistributed
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	4.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.1
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3721	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1416
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2351
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2351
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	65.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	21.8
Total Ramp Density Adjustment	10.3	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	65.1		

HCS7 Basic Freeway Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Existing
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	4.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.1
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4497	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1711
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2351
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2351
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.73
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.9
Total Ramp Density Adjustment	10.3	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	65.1		

HCS7 Basic Freeway Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Redistributed
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	4.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.1
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4046	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1540
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2351
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2351
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.66
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	64.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.8
Total Ramp Density Adjustment	10.3	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	65.1		

HCS7 Basic Freeway Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Existing
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	4.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.1
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3062	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1165
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2351
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2351
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.50
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	65.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	17.9
Total Ramp Density Adjustment	10.3	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	65.1		

HCS7 Basic Freeway Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Redistributed
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	4.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.1
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3836	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor (PHF)	0.92	Flow Rate (v_p), pc/h/ln	1460
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2351
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2351
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.62
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	65.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.5
Total Ramp Density Adjustment	10.3	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	65.1		

HCS7 Freeway Weaving Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Existing
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Short Length (L_S), ft	1230	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	4.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Volume (V_i), veh/h	4021	242	81	654
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	5.00	5.00	0.00	5.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.952	1.000	0.952
Flow Rate (v_i), pc/h	4591	276	88	747

Weaving Flow Rate (v_W), pc/h	1023	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	4679	Density-Based Capacity (c_{IWL}), pc/h/ln	2163
Total Flow Rate (v), pc/h	5702	Demand Flow-Based Capacity (c_{IW}), pc/h	13408
Volume Ratio (VR)	0.179	Weaving Segment Capacity (c_W), veh/h	6178
Minimum Lane Change Rate (LC_{MIN}), lc/h	1023	Adjusted Weaving Area Capacity (c_{wa}), veh/h	6178
Maximum Weaving Length (L_{MAX}), ft	4323	Volume-to-Capacity Ratio (v/c)	0.88

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2302	Average Weaving Speed (S_W), mi/h	53.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2732	Average Non-Weaving Speed (S_{NW}), mi/h	58.9
Weaving Lane Change Rate (LC_W), lc/h	1411	Average Speed (S), mi/h	57.7
Total Lane Change Rate (LC_{All}), lc/h	4143	Density (D), pc/mi/ln	32.9
Weaving Intensity Factor (W)	0.589	Level of Service (LOS)	D

HCS7 Freeway Weaving Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Redistributed
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Short Length (L_S), ft	1230	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	4.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Volume (V_i), veh/h	4177	125	61	1154
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	5.00	5.00	0.00	5.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.952	1.000	0.952
Flow Rate (v_i), pc/h	4769	143	66	1318

Weaving Flow Rate (v_W), pc/h	1461	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	4835	Density-Based Capacity (c_{IWL}), pc/h/ln	2122
Total Flow Rate (v), pc/h	6296	Demand Flow-Based Capacity (c_{IW}), pc/h	10345
Volume Ratio (VR)	0.232	Weaving Segment Capacity (c_W), veh/h	6060
Minimum Lane Change Rate (LC_{MIN}), lc/h	1461	Adjusted Weaving Area Capacity (c_{wa}), veh/h	6060
Maximum Weaving Length (L_{MAX}), ft	4866	Volume-to-Capacity Ratio (v/c)	0.99

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2379	Average Weaving Speed (S_W), mi/h	51.8
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2767	Average Non-Weaving Speed (S_{NW}), mi/h	54.8
Weaving Lane Change Rate (LC_W), lc/h	1849	Average Speed (S), mi/h	54.1
Total Lane Change Rate (LC_{All}), lc/h	4616	Density (D), pc/mi/ln	38.8
Weaving Intensity Factor (W)	0.642	Level of Service (LOS)	E

HCS7 Freeway Weaving Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Existing
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Short Length (L_S), ft	1230	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	4.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Volume (V_i), veh/h	3234	411	137	620
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	5.00	5.00	0.00	5.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.952	1.000	0.952
Flow Rate (v_i), pc/h	3692	469	149	708

Weaving Flow Rate (v_W), pc/h	1177	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	3841	Density-Based Capacity (c_{IWL}), pc/h/ln	2119
Total Flow Rate (v), pc/h	5018	Demand Flow-Based Capacity (c_{IW}), pc/h	10213
Volume Ratio (VR)	0.235	Weaving Segment Capacity (c_W), veh/h	6052
Minimum Lane Change Rate (LC_{MIN}), lc/h	1177	Adjusted Weaving Area Capacity (c_{wa}), veh/h	6052
Maximum Weaving Length (L_{MAX}), ft	4897	Volume-to-Capacity Ratio (v/c)	0.79

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1890	Average Weaving Speed (S_W), mi/h	66.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	-632	Average Non-Weaving Speed (S_{NW}), mi/h	58.9
Weaving Lane Change Rate (LC_W), lc/h	1565	Average Speed (S), mi/h	60.4
Total Lane Change Rate (LC_{All}), lc/h	933	Density (D), pc/mi/ln	27.7
Weaving Intensity Factor (W)	0.182	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	PSC	Date	12/10/2021
Agency	Bergmann	Analysis Year	2021
Jurisdiction	NYSDOT	Time Period Analyzed	Redistributed
Project Description	ILN		

Geometric Data

Number of Lanes (N), ln	3	Segment Type	Freeway
Short Length (L_S), ft	1230	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	4.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Volume (V_i), veh/h	4170	589	290	284
Peak Hour Factor (PHF)	0.92	0.92	0.92	0.92
Total Trucks, %	5.00	5.00	0.00	5.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.952	1.000	0.952
Flow Rate (v_i), pc/h	4761	672	315	324

Weaving Flow Rate (v_W), pc/h	996	Freeway Max Capacity (c_{IFL}), pc/h/ln	2400
Non-Weaving Flow Rate (v_{NW}), pc/h	5076	Density-Based Capacity (c_{IWL}), pc/h/ln	2175
Total Flow Rate (v), pc/h	6072	Demand Flow-Based Capacity (c_{IW}), pc/h	14634
Volume Ratio (VR)	0.164	Weaving Segment Capacity (c_W), veh/h	6212
Minimum Lane Change Rate (LC_{MIN}), lc/h	996	Adjusted Weaving Area Capacity (c_{wa}), veh/h	6212
Maximum Weaving Length (L_{MAX}), ft	4171	Volume-to-Capacity Ratio (v/c)	0.93

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2497	Average Weaving Speed (S_W), mi/h	52.8
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2821	Average Non-Weaving Speed (S_{NW}), mi/h	58.5
Weaving Lane Change Rate (LC_W), lc/h	1384	Average Speed (S), mi/h	57.5
Total Lane Change Rate (LC_{All}), lc/h	4205	Density (D), pc/mi/ln	35.2
Weaving Intensity Factor (W)	0.596	Level of Service (LOS)	E

APPENDIX G

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	558	25	25	447	35	150	200	136	25	148	0
Future Volume (vph)	8	558	25	25	447	35	150	200	136	25	148	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.96			1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1767	1848		1770	1840			3308			1847	
Flt Permitted	0.23	1.00		0.12	1.00			0.78			0.89	
Satd. Flow (perm)	428	1848		229	1840			2608			1657	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	9	620	28	28	497	39	167	222	151	28	164	0
RTOR Reduction (vph)	0	2	0	0	3	0	0	37	0	0	0	0
Lane Group Flow (vph)	9	646	0	28	533	0	0	503	0	0	192	0
Confl. Peds. (#/hr)	4		5	5		4	2		11	11		2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.3	39.3		39.3	39.3			48.7			48.7	
Effective Green, g (s)	40.8	40.8		40.8	40.8			50.2			50.2	
Actuated g/C Ratio	0.41	0.41		0.41	0.41			0.50			0.50	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			2.0			2.0	
Lane Grp Cap (vph)	174	753		93	750			1309			831	
v/s Ratio Prot		c0.35			0.29							
v/s Ratio Perm	0.02			0.12				c0.19			0.12	
v/c Ratio	0.05	0.86		0.30	0.71			0.38			0.23	
Uniform Delay, d1	17.9	27.0		20.0	24.7			15.4			14.0	
Progression Factor	1.72	1.46		1.29	1.35			0.37			1.13	
Incremental Delay, d2	0.1	8.5		1.7	2.9			0.4			0.6	
Delay (s)	30.9	47.8		27.5	36.3			6.1			16.5	
Level of Service	C	D		C	D			A			B	
Approach Delay (s)		47.6			35.8			6.1			16.5	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	216	148	34	29	156	134	64	507	29	121	519	125
Future Volume (vph)	216	148	34	29	156	134	64	507	29	121	519	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.93		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1586	3088		1586	2930		1587	3146		1586	3025	
Flt Permitted	0.53	1.00		0.60	1.00		0.17	1.00		0.23	1.00	
Satd. Flow (perm)	879	3088		993	2930		287	3146		389	3025	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.88	0.88	0.88	0.93	0.93	0.93
Adj. Flow (vph)	300	206	47	32	170	146	73	576	33	130	558	134
RTOR Reduction (vph)	0	19	0	0	99	0	0	4	0	0	21	0
Lane Group Flow (vph)	300	234	0	32	217	0	73	605	0	130	671	0
Confl. Peds. (#/hr)	11		5	5		11	46		56	56		46
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	3 4			4		2	1		2	1	
Permitted Phases	3 4			4			1			1		
Actuated Green, G (s)	47.5	52.5		32.1	32.1		32.5	25.1		32.5	25.1	
Effective Green, g (s)	47.5	52.5		32.1	32.1		32.5	25.1		32.5	25.1	
Actuated g/C Ratio	0.48	0.52		0.32	0.32		0.32	0.25		0.32	0.25	
Clearance Time (s)	5.0			5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0			3.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	526	1621		318	940		189	789		215	759	
v/s Ratio Prot	c0.09	0.08			0.07		0.03	0.19		c0.04	c0.22	
v/s Ratio Perm	c0.18			0.03			0.10			0.15		
v/c Ratio	0.57	0.14		0.10	0.23		0.39	0.77		0.60	0.88	
Uniform Delay, d1	17.0	12.2		23.8	24.9		37.4	34.7		36.7	36.0	
Progression Factor	0.74	0.52		1.10	1.18		0.89	1.08		0.64	0.99	
Incremental Delay, d2	0.7	0.0		0.6	0.6		0.5	6.9		3.2	14.0	
Delay (s)	13.3	6.4		26.8	29.9		33.6	44.3		26.8	49.6	
Level of Service	B	A		C	C		C	D		C	D	
Approach Delay (s)		10.1			29.6			43.1			46.0	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	314	21	4	147	77	36	186	14	61	132	53
Future Volume (vph)	59	314	21	4	147	77	36	186	14	61	132	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0		6.0	6.0	
Lane Util. Factor		0.95			0.95			0.95		1.00	1.00	
Frpb, ped/bikes		1.00			0.98			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		0.98	1.00	
Frt		0.99			0.95			0.99		1.00	0.96	
Flt Protected		0.99			1.00			0.99		0.95	1.00	
Satd. Flow (prot)		3459			3297			3469		1742	1772	
Flt Permitted		0.85			0.95			0.88		0.58	1.00	
Satd. Flow (perm)		2967			3130			3060		1072	1772	
Peak-hour factor, PHF	0.81	0.81	0.81	0.92	0.92	0.92	0.87	0.87	0.87	0.78	0.78	0.78
Adj. Flow (vph)	73	388	26	4	160	84	41	214	16	78	169	68
RTOR Reduction (vph)	0	4	0	0	47	0	0	4	0	0	15	0
Lane Group Flow (vph)	0	483	0	0	201	0	0	267	0	78	222	0
Confl. Peds. (#/hr)	23		14	14		23	7		10	10		7
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		44.0			44.0			44.0		44.0	44.0	
Effective Green, g (s)		44.0			44.0			44.0		44.0	44.0	
Actuated g/C Ratio		0.44			0.44			0.44		0.44	0.44	
Clearance Time (s)		6.0			6.0			6.0		6.0	6.0	
Lane Grp Cap (vph)		1305			1377			1346		471	779	
v/s Ratio Prot											c0.13	
v/s Ratio Perm		c0.16			0.06			0.09		0.07		
v/c Ratio		0.37			0.15			0.20		0.17	0.29	
Uniform Delay, d1		18.7			16.8			17.2		16.9	17.9	
Progression Factor		1.14			0.52			0.90		1.00	1.00	
Incremental Delay, d2		0.8			0.2			0.3		0.8	0.9	
Delay (s)		22.1			8.9			15.8		17.7	18.9	
Level of Service		C			A			B		B	B	
Approach Delay (s)		22.1			8.9			15.8			18.6	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER	SER2
Lane Configurations											
Traffic Volume (vph)	6	450	196	75	432	144	0	0	256	24	4
Future Volume (vph)	6	450	196	75	432	144	0	0	256	24	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.5	6.0	6.0			6.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			0.97		
Frt	1.00	1.00	0.85	1.00	1.00	0.85			0.99		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00			0.96		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583			3407		
Flt Permitted	0.37	1.00	1.00	0.25	1.00	1.00			0.96		
Satd. Flow (perm)	691	1863	1583	466	1863	1583			3407		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	7	500	218	83	480	160	0	0	284	27	4
RTOR Reduction (vph)	0	0	65	0	0	66	0	0	80	0	0
Lane Group Flow (vph)	7	500	153	83	480	94	0	0	235	0	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm			Prot		
Protected Phases		1		3	1 3				2		
Permitted Phases	1		1	1 3		1 3					
Actuated Green, G (s)	37.6	37.6	37.6	58.5	65.0	65.0			23.0		
Effective Green, g (s)	37.6	37.6	37.6	58.5	58.5	58.5			23.0		
Actuated g/C Ratio	0.38	0.38	0.38	0.58	0.58	0.58			0.23		
Clearance Time (s)	6.0	6.0	6.0	6.5					6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0					3.0		
Lane Grp Cap (vph)	259	700	595	545	1089	926			783		
v/s Ratio Prot		c0.27		0.03	c0.26				c0.07		
v/s Ratio Perm	0.01		0.10	0.06		0.06					
v/c Ratio	0.03	0.71	0.26	0.15	0.44	0.10			0.30		
Uniform Delay, d1	19.7	26.6	21.6	10.8	11.6	9.2			31.8		
Progression Factor	0.79	0.85	0.81	0.40	0.30	0.24			0.83		
Incremental Delay, d2	0.2	4.8	0.8	0.1	0.3	0.0			0.2		
Delay (s)	15.7	27.3	18.3	4.5	3.8	2.2			26.6		
Level of Service	B	C	B	A	A	A			C		
Approach Delay (s)		24.5			3.5		0.0		26.6		
Approach LOS		C			A		A		C		

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	550	9	100	1000	124	100	625	125	200	925	50
Future Volume (vph)	50	550	9	100	1000	124	100	625	125	200	925	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	3.5		2.5	3.5		2.5	3.5		2.5	3.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.98		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1858		1770	1832		1770	3451		1770	3512	
Flt Permitted	0.08	1.00		0.21	1.00		0.16	1.00		0.15	1.00	
Satd. Flow (perm)	154	1858		392	1832		302	3451		274	3512	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	611	10	111	1111	138	111	694	139	222	1028	56
RTOR Reduction (vph)	0	1	0	0	4	0	0	17	0	0	4	0
Lane Group Flow (vph)	56	620	0	111	1245	0	111	816	0	222	1080	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	50.0	46.8		53.6	48.6		27.2	23.2		33.2	26.2	
Effective Green, g (s)	53.0	48.3		56.6	50.1		30.2	24.7		35.7	27.7	
Actuated g/C Ratio	0.53	0.48		0.57	0.50		0.30	0.25		0.36	0.28	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	157	897		311	917		171	852		224	972	
v/s Ratio Prot	0.02	0.33		c0.02	c0.68		0.04	0.24		c0.08	c0.31	
v/s Ratio Perm	0.17			0.18			0.16			0.27		
v/c Ratio	0.36	0.69		0.36	1.36		0.65	0.96		0.99	1.11	
Uniform Delay, d1	21.5	20.1		13.8	24.9		28.3	37.1		28.0	36.1	
Progression Factor	1.93	0.56		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	2.2		0.7	167.9		8.2	22.2		57.4	64.5	
Delay (s)	42.9	13.5		14.5	192.8		36.5	59.4		85.4	100.7	
Level of Service	D	B		B	F		D	E		F	F	
Approach Delay (s)		15.9			178.3			56.7			98.1	
Approach LOS		B			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	101.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	550	680	40	1100	80	170	500	20	10	350	90
Future Volume (vph)	330	550	680	40	1100	80	170	500	20	10	350	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	3.5	2.5	2.5	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00			0.95			0.95	
Frt	1.00	1.00	0.85	1.00	0.99			1.00			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	3539	1583	1770	1844			3481			3429	
Flt Permitted	0.08	1.00	1.00	0.41	1.00			0.57			0.93	
Satd. Flow (perm)	149	3539	1583	755	1844			2010			3197	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	367	611	756	44	1222	89	189	556	22	11	389	100
RTOR Reduction (vph)	0	0	119	0	3	0	0	2	0	0	22	0
Lane Group Flow (vph)	367	611	637	44	1308	0	0	765	0	0	478	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	7	4	5	3	8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	61.0	51.1	55.1	51.9	46.0			29.0			21.0	
Effective Green, g (s)	62.5	52.6	58.1	54.9	47.5			30.5			22.5	
Actuated g/C Ratio	0.62	0.53	0.58	0.55	0.48			0.30			0.22	
Clearance Time (s)	4.0	5.0	4.0	4.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	295	1861	919	489	875			693			719	
v/s Ratio Prot	c0.16	0.17	0.04	0.01	c0.71			c0.06				
v/s Ratio Perm	0.62		0.36	0.04				c0.28			0.15	
v/c Ratio	1.24	0.33	0.69	0.09	1.50			1.10			0.67	
Uniform Delay, d1	32.2	13.6	14.7	10.4	26.2			34.8			35.3	
Progression Factor	1.00	1.00	1.00	0.68	0.51			1.00			1.00	
Incremental Delay, d2	135.1	0.1	2.3	0.0	223.4			66.2			2.3	
Delay (s)	167.3	13.7	17.0	7.1	236.7			100.9			37.6	
Level of Service	F	B	B	A	F			F			D	
Approach Delay (s)		47.6			229.3			100.9			37.6	
Approach LOS		D			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	112.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	126.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	550	680	40	1100	80	170	500	20	10	350	90
Future Volume (vph)	330	550	680	40	1100	80	170	500	20	10	350	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	3.5	2.5	2.5	3.5			3.5			3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			0.95			0.95	
Frt	1.00	1.00	0.85	1.00	0.99			1.00			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3503			3481			3429	
Flt Permitted	0.11	1.00	1.00	0.42	1.00			0.59			0.93	
Satd. Flow (perm)	196	3539	1583	783	3503			2074			3201	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	367	611	756	44	1222	89	189	556	22	11	389	100
RTOR Reduction (vph)	0	0	113	0	5	0	0	2	0	0	21	0
Lane Group Flow (vph)	367	611	643	44	1306	0	0	765	0	0	479	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	7	4	5	3	8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	53.7	44.0	52.2	39.7	34.0			36.3			24.1	
Effective Green, g (s)	55.2	45.5	55.2	42.7	35.5			37.8			25.6	
Actuated g/C Ratio	0.55	0.46	0.55	0.43	0.36			0.38			0.26	
Clearance Time (s)	4.0	5.0	4.0	4.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	378	1610	873	405	1243			920			819	
v/s Ratio Prot	c0.17	0.17	0.07	0.01	c0.37			c0.08				
v/s Ratio Perm	0.37		0.33	0.04				c0.23			0.15	
v/c Ratio	0.97	0.38	0.74	0.11	1.05			0.83			0.59	
Uniform Delay, d1	29.9	18.0	16.9	16.8	32.2			28.2			32.6	
Progression Factor	1.00	1.00	1.00	0.83	0.58			1.00			1.00	
Incremental Delay, d2	38.4	0.2	3.3	0.1	33.7			6.5			1.1	
Delay (s)	68.3	18.1	20.2	14.1	52.3			34.7			33.6	
Level of Service	E	B	C	B	D			C			C	
Approach Delay (s)		29.6			51.0			34.7			33.6	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	37.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↑↱		↰	↑↱		↰	↑↱	
Traffic Volume (vph)	50	550	9	100	1000	124	100	625	125	200	925	50
Future Volume (vph)	50	550	9	100	1000	124	100	625	125	200	925	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	3.5		2.5	3.5		2.5	3.5		2.5	3.5	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.98		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1858		1770	3481		1770	3451		1770	3512	
Flt Permitted	0.11	1.00		0.10	1.00		0.13	1.00		0.13	1.00	
Satd. Flow (perm)	200	1858		190	3481		234	3451		245	3512	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	611	10	111	1111	138	111	694	139	222	1028	56
RTOR Reduction (vph)	0	1	0	0	10	0	0	16	0	0	4	0
Lane Group Flow (vph)	56	620	0	111	1239	0	111	817	0	222	1080	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	35.7		43.2	37.8		35.6	30.3		44.9	35.6	
Effective Green, g (s)	42.0	37.2		46.2	39.3		38.6	31.8		46.4	37.1	
Actuated g/C Ratio	0.42	0.37		0.46	0.39		0.39	0.32		0.46	0.37	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	159	691		196	1368		194	1097		298	1302	
v/s Ratio Prot	0.02	0.33		c0.04	c0.36		0.04	0.24		c0.09	c0.31	
v/s Ratio Perm	0.13			0.22			0.18			0.26		
v/c Ratio	0.35	0.90		0.57	0.91		0.57	0.74		0.74	0.83	
Uniform Delay, d1	21.9	29.6		21.1	28.6		22.6	30.5		19.8	28.6	
Progression Factor	1.15	0.49		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	13.7		3.7	8.8		4.0	4.6		9.7	6.2	
Delay (s)	26.5	28.3		24.8	37.4		26.7	35.1		29.5	34.8	
Level of Service	C	C		C	D		C	D		C	C	
Approach Delay (s)		28.1			36.4			34.1			33.9	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	490	140	90	340	70	80	1240	250	90	600	50
Future Volume (vph)	50	490	140	90	340	70	80	1240	250	90	600	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5		3.5	4.5		3.5	3.5		3.5	3.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	0.99		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.97		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1766	1750		1752	1784		1770	3395		1770	1811	
Flt Permitted	0.25	1.00		0.09	1.00		0.95	1.00		0.08	1.00	
Satd. Flow (perm)	458	1750		174	1784		1770	3395		145	1811	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	544	156	100	378	78	89	1378	278	100	667	56
RTOR Reduction (vph)	0	0	0	0	6	0	0	14	0	0	0	0
Lane Group Flow (vph)	56	700	0	100	450	0	89	1642	0	100	723	0
Confl. Peds. (#/hr)	27		50	50		27	62		27	27		62
Confl. Bikes (#/hr)												20
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2						8		
Actuated Green, G (s)	43.2	40.0		44.8	40.8		5.0	50.0		55.0	50.0	
Effective Green, g (s)	46.2	41.5		47.8	42.3		6.5	51.5		58.0	51.5	
Actuated g/C Ratio	0.39	0.35		0.40	0.35		0.05	0.43		0.48	0.43	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)	227	605		141	628		95	1457		158	777	
v/s Ratio Prot	0.01	c0.40		c0.03	0.25		c0.05	c0.48		0.03	0.40	
v/s Ratio Perm	0.09			0.25						0.27		
v/c Ratio	0.25	1.16		0.71	0.72		0.94	1.13		0.63	0.93	
Uniform Delay, d1	25.4	39.2		29.5	33.7		56.5	34.2		26.9	32.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	88.2		12.5	6.9		70.5	66.5		6.0	17.8	
Delay (s)	25.6	127.5		42.0	40.5		127.1	100.7		32.9	50.4	
Level of Service	C	F		D	D		F	F		C	D	
Approach Delay (s)		119.9			40.8			102.1			48.2	
Approach LOS		F			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	85.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	320	25	100	450	140	60	460	135	130	440	80
Future Volume (vph)	175	320	25	100	450	140	60	460	135	130	440	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96	1.00	1.00	0.93	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1593	1658		1590	1676	1366	1593	1676	1321	1584	1637	
Flt Permitted	0.14	1.00		0.38	1.00	1.00	0.19	1.00	1.00	0.21	1.00	
Satd. Flow (perm)	234	1658		631	1676	1366	314	1676	1321	350	1637	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.90	0.92	0.90	0.88	0.88	0.93	0.93	0.90
Adj. Flow (vph)	194	356	28	109	500	152	67	523	153	140	473	89
RTOR Reduction (vph)	0	3	0	0	0	67	0	0	67	0	7	0
Lane Group Flow (vph)	194	381	0	109	500	85	67	523	86	140	555	0
Confl. Peds. (#/hr)				5		11			56	56		
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	43.7	34.9		36.9	31.5	35.5	40.9	37.7	43.1	42.5	38.5	
Effective Green, g (s)	43.7	34.9		36.9	31.5	35.5	40.9	37.7	43.1	42.5	38.5	
Actuated g/C Ratio	0.44	0.35		0.37	0.32	0.36	0.41	0.38	0.43	0.42	0.38	
Clearance Time (s)	4.0	5.0		4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	2.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	221	578		284	527	484	169	631	569	198	630	
v/s Ratio Prot	c0.08	0.23		0.02	c0.30	0.01	0.01	0.31	0.01	c0.03	c0.34	
v/s Ratio Perm	0.30			0.12		0.06	0.15		0.06	0.27		
v/c Ratio	0.88	0.66		0.38	0.95	0.18	0.40	0.83	0.15	0.71	0.88	
Uniform Delay, d1	22.1	27.5		21.9	33.5	22.2	20.9	28.2	17.3	25.3	28.6	
Progression Factor	1.00	1.00		0.79	0.87	0.79	1.00	1.00	1.00	0.88	0.35	
Incremental Delay, d2	30.0	5.8		0.8	27.0	0.2	1.5	8.4	0.1	9.7	12.0	
Delay (s)	52.1	33.3		18.1	56.2	17.6	22.4	36.6	17.4	32.1	22.0	
Level of Service	D	C		B	E	B	C	D	B	C	C	
Approach Delay (s)		39.6			43.0			31.4			24.0	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	320	25	100	450	140	60	460	135	130	440	80
Future Volume (vph)	175	320	25	100	450	140	60	460	135	130	440	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1593	1658		1590	1600		1593	1586		1593	1637	
Flt Permitted	0.11	1.00		0.35	1.00		0.19	1.00		0.10	1.00	
Satd. Flow (perm)	191	1658		592	1600		316	1586		174	1637	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.90	0.92	0.90	0.88	0.88	0.93	0.93	0.90
Adj. Flow (vph)	194	356	28	109	500	152	67	523	153	140	473	89
RTOR Reduction (vph)	0	3	0	0	11	0	0	11	0	0	7	0
Lane Group Flow (vph)	194	381	0	109	641	0	67	665	0	140	555	0
Confl. Peds. (#/hr)				5		11			56	56		
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.2	35.2		39.2	34.2		41.0	37.8		42.6	38.6	
Effective Green, g (s)	41.2	35.2		39.2	34.2		41.0	37.8		42.6	38.6	
Actuated g/C Ratio	0.41	0.35		0.39	0.34		0.41	0.38		0.43	0.39	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.0		3.0	2.0	
Lane Grp Cap (vph)	162	583		281	547		170	599		130	631	
v/s Ratio Prot	c0.07	0.23		0.02	0.40		0.01	c0.42		c0.04	0.34	
v/s Ratio Perm	c0.42			0.13			0.15			0.41		
v/c Ratio	1.20	0.65		0.39	1.17		0.39	1.11		1.08	0.88	
Uniform Delay, d1	26.6	27.3		20.6	32.9		20.8	31.1		28.7	28.5	
Progression Factor	1.00	1.00		0.77	0.89		1.00	1.00		1.97	0.38	
Incremental Delay, d2	133.7	5.6		0.8	94.3		1.5	71.0		96.1	11.6	
Delay (s)	160.3	32.9		16.6	123.5		22.3	102.1		152.7	22.4	
Level of Service	F	C		B	F		C	F		F	C	
Approach Delay (s)		75.7			108.2			95.0			48.4	
Approach LOS		E			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	82.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	106.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	450	15	140	430	5	50	645	200	50	500	300
Future Volume (vph)	280	450	15	140	430	5	50	645	200	50	500	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		4.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00		1.00	1.00		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1854		1770	1859		1770	3414		1770	3539	1583
Flt Permitted	0.12	1.00		0.30	1.00		0.29	1.00		0.20	1.00	1.00
Satd. Flow (perm)	226	1854		560	1859		531	3414		365	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	311	500	17	156	478	6	56	717	222	56	556	333
RTOR Reduction (vph)	0	1	0	0	1	0	0	28	0	0	0	93
Lane Group Flow (vph)	311	516	0	156	483	0	56	911	0	56	556	240
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	50.8	37.1		36.6	27.9		38.2	38.2		30.8	30.8	48.7
Effective Green, g (s)	50.8	37.1		36.6	27.9		38.2	38.2		30.8	30.8	48.7
Actuated g/C Ratio	0.51	0.37		0.37	0.28		0.38	0.38		0.31	0.31	0.49
Clearance Time (s)	5.0	6.0		5.0	6.0		4.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	391	687		310	518		244	1304		112	1090	850
v/s Ratio Prot	c0.14	0.28		0.04	c0.26		0.01	c0.27			0.16	0.05
v/s Ratio Perm	0.26			0.14			0.08			0.15		0.10
v/c Ratio	0.80	0.75		0.50	0.93		0.23	0.70		0.50	0.51	0.28
Uniform Delay, d1	24.6	27.4		22.7	35.1		20.5	26.0		28.3	28.4	15.3
Progression Factor	1.11	1.24		1.00	1.00		0.81	0.80		1.00	1.00	1.00
Incremental Delay, d2	7.3	3.1		1.3	23.9		0.4	2.8		15.1	1.7	0.2
Delay (s)	34.8	37.0		24.0	59.1		17.1	23.7		43.4	30.1	15.4
Level of Service	C	D		C	E		B	C		D	C	B
Approach Delay (s)		36.2			50.5			23.3			25.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	470	75	50	475	150	10
Future Volume (vph)	470	75	50	475	150	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.0	5.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.98			1.00	0.99	
Flt Protected	1.00			1.00	0.96	
Satd. Flow (prot)	1828			1854	1764	
Flt Permitted	1.00			0.90	0.96	
Satd. Flow (perm)	1828			1683	1764	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	522	83	56	528	167	11
RTOR Reduction (vph)	4	0	0	0	3	0
Lane Group Flow (vph)	601	0	0	584	175	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	74.8			74.8	15.2	
Effective Green, g (s)	74.8			74.8	15.2	
Actuated g/C Ratio	0.75			0.75	0.15	
Clearance Time (s)	5.0			5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1367			1258	268	
v/s Ratio Prot	0.33				c0.10	
v/s Ratio Perm				c0.35		
v/c Ratio	0.44			0.46	0.65	
Uniform Delay, d1	4.7			4.9	39.9	
Progression Factor	1.76			0.52	1.00	
Incremental Delay, d2	0.5			0.8	5.7	
Delay (s)	8.9			3.3	45.6	
Level of Service	A			A	D	
Approach Delay (s)	8.9			3.3	45.6	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	515	10	35	570	170	15	125	70	135	125	5
Future Volume (vph)	25	515	10	35	570	170	15	125	70	135	125	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	0.98		1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt		1.00		1.00	0.97		1.00	0.95		1.00	0.99	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1852		1754	1769		1755	1736		1762	1850	
Flt Permitted		0.77		0.35	1.00		0.65	1.00		0.35	1.00	
Satd. Flow (perm)		1422		642	1769		1205	1736		658	1850	
Peak-hour factor, PHF	0.81	0.81	0.81	0.92	0.92	0.92	0.87	0.87	0.87	0.78	0.78	0.78
Adj. Flow (vph)	31	636	12	38	620	185	17	144	80	173	160	6
RTOR Reduction (vph)	0	0	0	0	11	0	0	21	0	0	1	0
Lane Group Flow (vph)	0	679	0	38	794	0	17	203	0	173	165	0
Confl. Peds. (#/hr)	23		14	14		23	7		10	10		7
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		55.4		55.4	55.4		20.7	19.5		32.6	26.4	
Effective Green, g (s)		55.4		55.4	55.4		20.7	19.5		32.6	26.4	
Actuated g/C Ratio		0.55		0.55	0.55		0.21	0.20		0.33	0.26	
Clearance Time (s)		6.0		6.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		787		355	980		256	338		303	488	
v/s Ratio Prot					0.45		0.00	0.12		c0.05	0.09	
v/s Ratio Perm		c0.48		0.06			0.01			c0.14		
v/c Ratio		0.86		0.11	0.81		0.07	0.60		0.57	0.34	
Uniform Delay, d1		19.0		10.6	18.1		31.7	36.7		25.8	29.7	
Progression Factor		0.61		1.09	1.10		0.76	0.86		1.00	1.00	
Incremental Delay, d2		11.5		0.6	7.2		0.1	2.9		2.6	0.4	
Delay (s)		23.1		12.2	27.1		24.4	34.3		28.4	30.1	
Level of Service		C		B	C		C	C		C	C	
Approach Delay (s)		23.1			26.4			33.6			29.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	600	85	80	410	35	150	460	150	15	400	15
Future Volume (vph)	15	600	85	80	410	35	150	460	150	15	400	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.99			0.97			1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	1828		1770	1838			3368			1850	
Flt Permitted	0.43	1.00		0.09	1.00			0.63			0.96	
Satd. Flow (perm)	799	1828		167	1838			2159			1775	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	17	667	94	89	456	39	167	511	167	17	444	17
RTOR Reduction (vph)	0	6	0	0	4	0	0	22	0	0	1	0
Lane Group Flow (vph)	17	755	0	89	491	0	0	823	0	0	477	0
Confl. Peds. (#/hr)				5		4			11	11		
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.4	41.4		47.8	47.8			32.2			32.2	
Effective Green, g (s)	41.4	41.4		47.8	47.8			32.2			32.2	
Actuated g/C Ratio	0.46	0.46		0.53	0.53			0.36			0.36	
Clearance Time (s)	5.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			2.0			2.0	
Lane Grp Cap (vph)	367	840		131	976			772			635	
v/s Ratio Prot		c0.41		0.02	c0.27							
v/s Ratio Perm	0.02			0.34				c0.38			0.27	
v/c Ratio	0.05	0.90		0.68	0.50			1.07			0.75	
Uniform Delay, d1	13.4	22.4		18.0	13.5			28.9			25.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	12.3		13.1	0.4			51.3			8.0	
Delay (s)	13.5	34.7		31.2	13.9			80.2			33.3	
Level of Service	B	C		C	B			F			C	
Approach Delay (s)		34.3			16.5			80.2			33.3	
Approach LOS		C			B			F			C	

Intersection Summary			
HCM 2000 Control Delay	44.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			