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March 3rd 2020
Town of Cobourg
Public Works Division
740 Division Street, Building 7
Cobourg, Ontario
K9A 0H6

Attn: Mr. Terry Hoekstra, C.E.T.
Manager of Engineering and Capital Projects

**Re: Traffic Impact Brief**
**Proposed Residential Development**
**377 William Street**
**Town of Cobourg**
**Our File No. W20003**

Dear Mr. Hoekstra:

This letter documents the results of our traffic impact analysis for the proposed Residential Development at 377 William Street, in the Town of Cobourg. We have assessed the existing and future total traffic conditions at the intersections of William Street at University Avenue West and William Street at King Street West along with the future total traffic conditions at the proposed Site Access at William Street intersection.

It is anticipated that the development will be fully built-out and occupied by 2022. As a result, a horizon year of 2027 was analyzed, representing a five (5) year post built-out horizon.

The findings are summarized in the following sections.

**THE PROPOSED DEVELOPMENT AND THE STUDY AREA**

The Subject Development is located immediately west of William Street and is approximately 75 metres south of University Avenue West, in the Town of Cobourg. The total area of the property is 1.66 acres.

The Subject Development is surrounded by the following land uses:

- To the north, existing residential with University Avenue West beyond,
- To the east, William Street with existing commercial and an existing place of worship beyond,
- To the south, existing residential,
- To the west, existing residential with Margaret Street beyond.

The location of the proposed Residential Development is illustrated in **Figure 1**.

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**THE PROPOSED DEVELOPMENT AND THE STUDY AREA (CONT'D)**

The proposed Residential Development comprises ten (10) freehold townhouse units and four (4) semi-detached units. The proposed Residential Development will be serviced by a private road that connects with William Street. Six (6) visitor parking spaces (includes one (1) accessible parking space) and 28 resident parking spaces are provided by the proposed Residential Development. The visitor parking spaces are adjacent to the private roadway and are located at the west end of the Subject Property. For each dwelling unit, a parking space is provided in a private driveway and a parking space is provided in a private garage.

It is anticipated that the development will be fully built-out by 2022. The proposed Site Plan is provided in **Figure 2**.

For the traffic impact analysis, the existing road network comprises William Street, University Avenue West and King Street West.

**William Street**

Within the vicinity of the proposed Residential Development, William Street is a north-south arterial road under the jurisdiction of the Town of Cobourg. William Street is a four (4) lane roadway north of King Street West and is a two (2) lane roadway south of King Street West. Within the vicinity of the proposed Residential Development, William Street has an urban cross-section with an assumed speed limit of 50 km/h and with pedestrian sidewalks on both sides of the roadway. It is anticipated that the roadway will not be widened by the horizon year[1].

[1] Transportation Master Plan for The Town of Cobourg, HDR, August 2011.

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**THE PROPOSED DEVELOPMENT AND THE STUDY AREA (CONT'D)**

**University Avenue West**

University Avenue West is an arterial road east of William Street and is a local road west of William Street. To the east, the roadway connects with Cottesmore Avenue. To the west, the roadway terminates at approximately 150 metres west of William Street. University Avenue West is a two (2) lane roadway with an urban cross-section. Within the vicinity of the proposed Residential Development, the roadway has a posted speed limit of 40 km/h. Within the vicinity of the proposed Residential Development, east of William Street, the roadway has pedestrian sidewalks on both sides. West of William Street, a pedestrian sidewalk is provided on the north side of the roadway. It is anticipated that the roadway will not be widened by the horizon year.

**King Street West**

King Street West is an arterial road east of William Street and is a collector road west of William Street. Within the vicinity of William Street, King Street West is a two (2) lane roadway with an urban cross-section and with a posted speed limit of 50 km/h. Within the vicinity of William Street, pedestrian sidewalks are provided on both sides of the roadway and the roadway is shared between bicycles and automobiles in both directions. It is anticipated that the roadway will not be widened by the horizon year.

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**EXISTING TRAFFIC**

The Existing (2020) Traffic Volumes for the intersections of William Street at University Avenue West and William Street at King Street West are based on 2020 Peak Hour Traffic Counts conducted by Ontario Traffic Inc. (OTI) on Tuesday January 28, 2020. In order to capture both Peak Hours (i.e. A.M. Peak Hour and the P.M. Peak Hour) of the adjacent street traffic, counts were conducted from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. For the intersection of William Street at University Avenue West, the A.M. and P.M. Peak Hour traffic volumes occurred between 8:00 a.m. and 9:00 a.m. and between 4:15 p.m. and 5:15 p.m. For the intersection of William Street at King Street West, the A.M. and P.M. Peak Hour traffic volumes occurred between 8:00 a.m. and 9:00 a.m. and between 4:00 p.m. and 5:00 p.m.

The turning movement counts provided by Ontario Traffic Inc. (OTI) are provided in **Appendix A** and the Existing (2020) Traffic Volumes used in the analysis are illustrated in **Figures 3 and 4** for the A.M. and the P.M. Peak Hours.

**EXISTING (2020) TRAFFIC ANALYSIS**

The Existing (2020) Peak Hour traffic volumes are provided in **Figures 3 and 4** and were analyzed using the procedures of the Highway Capacity Manual 2000/2010 as employed by SYNCHRO (version 9.0) software[2]. The Peak Hour Factor (PHF) for the intersections of William Street at University Avenue West and William Street at King Street West were derived from the available turning movement counts based on 15 minute intervals.

The intersection of William Street at University Avenue West was analyzed as an actuated uncoordinated signalized intersection with William Street as the main street. The signal timing plans used in the analysis are based on the signal timing plans that we have received from the Town of Cobourg, which are provided in **Appendix B**. The lane configuration used in the analysis comprises: a left, a through and a shared through-right turning lane at the northbound and southbound approaches; a shared left-through-right turning lane at the eastbound approach; and a shared through-left and a right turning lane at the westbound approach.

[2] Synchro 9 Traffic Signal Optimization and Simulation Modeling Software, Version 9, Trafficware Corporation, 2014.

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**EXISTING (2020) TRAFFIC ANALYSIS (CONT'D)**

The intersection of William Street at King Street West was analyzed as an actuated uncoordinated signalized intersection with William Street as the main street. The signal timing plans were optimized in the analysis with the intersection comprised of a protected northbound left turn, a protected southbound left turn and a protected westbound right turn. The lane configuration used in the analysis comprises: a left and a shared through-right turning lane at the northbound and southbound approaches; and a shared through-left and a right turning lane at the eastbound and westbound approaches.

The lane configurations and the intersection control types used in the analysis are provided in **Figure 13**.

The results of the analysis are summarized in **Table 1** and the related calculations are provided in **Appendix D**. The Level of Service (LOS) definition for signalized and un-signalized intersections are included in **Appendix C** for reference.

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## EXISTING (2020) TRAFFIC ANALYSIS (CONT'D)

**Table 1: Existing (2020) Traffic – Level of Service**

| Intersection | Turning Movement | A.M. Peak Hour | | | | P.M. Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | V/C | LOS | Delay[1] (seconds) | 95th % Queue (m) | V/C | LOS | Delay[1] (seconds) | 95th % Queue (m) |
| William Street at University Avenue West (Signalized) | **Overall** | **0.47** | **B** | **10.6** | **n/a** | **0.52** | **B** | **10.9** | **n/a** |
| | NBL | 0.01 | A | 7.0 | 0.8 | 0.01 | A | 6.8 | 1.3 |
| | NBT | 0.23 | B | 17.5 | 21.8 | 0.25 | B | 17.8 | 25.6 |
| | NBR | 0.23 | B | 17.5 | 21.8 | 0.25 | B | 17.8 | 25.6 |
| | EBL | 0.12 | B | 19.5 | 12.4 | 0.10 | B | 19.5 | 11.1 |
| | EBT | 0.12 | B | 19.5 | 12.4 | 0.10 | B | 19.5 | 11.1 |
| | EBR | 0.12 | B | 19.5 | 12.4 | 0.10 | B | 19.5 | 11.1 |
| | SBL | 0.42 | A | 8.5 | 27.5 | 0.49 | A | 9.3 | 35.7 |
| | SBT | 0.14 | A | 8.6 | 17.6 | 0.15 | A | 8.5 | 20.5 |
| | SBR | 0.14 | A | 8.6 | 17.6 | 0.15 | A | 8.5 | 20.5 |
| | WBL | 0.08 | B | 19.8 | 8.6 | 0.12 | C | 20.4 | 13.4 |
| | WBT | 0.08 | B | 19.8 | 8.6 | 0.12 | C | 20.4 | 13.4 |
| | WBR | 0.47 | A | 5.9 | 14.0 | 0.52 | A | 6.2 | 18.1 |
| William Street at King Street West (Signalized) | **Overall** | **0.25** | **A** | **10.0** | **n/a** | **0.21** | **B** | **10.1** | **n/a** |
| | NBL | 0.01 | A | 6.4 | 1.8 | 0.01 | A | 6.3 | 1.8 |
| | NBT | 0.13 | B | 13.9 | 14.2 | 0.07 | B | 13.2 | 10.4 |
| | NBR | 0.13 | B | 13.9 | 14.2 | 0.07 | B | 13.2 | 10.4 |
| | EBL | 0.25 | B | 16.0 | 19.3 | 0.21 | B | 15.0 | 17.5 |
| | EBT | 0.25 | B | 16.0 | 19.3 | 0.21 | B | 15.0 | 17.5 |
| | EBR | 0.04 | A | 0.2 | 0.0 | 0.01 | A | 0.0 | 0.0 |
| | SBL | 0.21 | A | 7.1 | 17.2 | 0.17 | A | 6.9 | 14.8 |
| | SBT | 0.09 | A | 9.8 | 15.4 | 0.06 | A | 9.9 | 11.6 |
| | SBR | 0.09 | A | 9.8 | 15.4 | 0.06 | A | 9.9 | 11.6 |
| | WBL | 0.10 | B | 14.4 | 10.1 | 0.10 | B | 14.0 | 10.2 |
| | WBT | 0.10 | B | 14.4 | 10.1 | 0.10 | B | 14.0 | 10.2 |
| | WBR | 0.22 | A | 7.1 | 19.1 | 0.13 | A | 6.6 | 12.1 |

*Note 1: Delays are measured in seconds per vehicle*

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**EXISTING (2020) TRAFFIC ANALYSIS (CONT'D)**

The Existing (2020) Traffic Analysis indicates that the signalized intersection of William Street at University Avenue West operates at an overall Level of Service "B" during the A.M. and P.M. Peak Hours. During the P.M. Peak Hour, the queue length at the shared westbound through-left turning lane may result in a spillback of vehicles into the right turning lane. However, all of the turning movements operate at a Level of Service "B" or better during the A.M. Peak Hour and at a Level of Service "C" or better during the P.M. Peak Hour.

The Existing (2020) Traffic Analysis indicates that the signalized intersection of William Street at King Street West operates at an overall Level of Service "A" during the A.M. Peak Hour and at an overall Level of Service "B" during P.M. Peak Hour. All of the turning movements operate at a Level of Service "B" or better during the A.M. and P.M. Peak Hours.

**ANTICIPATED BACKGROUND DEVELOPMENT**

This Traffic Impact Brief will consider one (1) anticipated background development within the vicinity of the proposed Residential Development.

A residential development is being proposed at 315-325 University Avenue West, which is immediately west of William Street and is immediately south of University Avenue West. Details regarding the anticipated background development and its site-generated traffic volumes were taken from its Transportation Impact Study[3]. Excerpts from the Transportation Impact Study are provided in **Appendix E** for reference.

The anticipated background development is an infill development, which will replace four (4) dwelling units with driveways connected to University Avenue West. The anticipated background development comprises 71 apartment units and a full-moves access at University Avenue West. In addition, the anticipated background development will share the existing right-in/right-out access at 387 William Street with an existing two-storey residential home.

[3] Transportation Impact Study – Proposed Residential Development – 315-325 University Avenue West, LEA Consulting Ltd., April 2019

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**ANTICIPATED BACKGROUND DEVELOPMENT (CONT'D)**

The Transportation Impact Study applied the trip rates from the ITE Trip Generation Manual (ITE 2017) for a Multi-Family Housing (Mid-Rise) Land Use (Land Use 221) and the number of apartment units to determine the total number of site-generated trips[4].

The anticipated background development is expected to generate a total of 23 trips (6 inbound trips and 17 outbound trips) during the A.M. Peak Hour and 29 trips (17 inbound trips and 12 outbound trips) during the P.M. Peak Hour.

The trip distribution and trip assignment for the site-generated volumes from the anticipated background development were taken from the Transportation Impact Study. However, the trip assignment did not include the intersection of William Street at King Street West. For the intersection of William Street at King Street West, this Traffic Impact Brief will adopt the Transportation Impact Study's approach by determining the trip assignment based on the existing traffic patterns. The trip distribution and trip assignment used in this Traffic Impact Brief for the site-generated volumes from the anticipated background development is provided in **Figures 5 and 6**.

**FUTURE BACKGROUND TRAFFIC GROWTH**

A conservative growth rate of 2% per year was assumed for William Street, University Avenue West and King Street West. The traffic growth rates were used to project the Existing (2020) Traffic Volumes from 2020 to 2027.

For the intersection of William Street at University Avenue West, the growth rate for William Street was applied to the through movements along William Street and the inbound volumes from the westbound approach of University Avenue West and the growth rate for University Avenue West was applied to the inbound volumes from William Street.

[4] Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, 2017.

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**FUTURE BACKGROUND TRAFFIC GROWTH (CONT'D)**

For the intersection of William Street at King Street West, the growth rate for William Street was applied to the through movements along William Street and the inbound volumes from the westbound approach of King Street West and the growth rate for King Street West was applied to the inbound volumes from William Street.

**FUTURE (2027) TOTAL BACKGROUND TRAFFIC VOLUMES**

The Future (2027) Total Background Traffic Volumes are based on the Existing (2020) Traffic Volumes with a growth in background traffic for seven (7) years plus the anticipated trips from the anticipated background development at 315-325 University Avenue West.

The Future (2027) Total Background Traffic Volumes during the A.M. and P.M. Peak Hours are illustrated in **Figures 7 and 8**.

**TRIP GENERATION**

The fitted curve equations from the ITE Trip Generation Manual (ITE 2017) were used for the A.M. and P.M. Peak Hours of street traffic for the proposed freehold townhouse units and the proposed semi-detached units (Land Use 220 – Multifamily Housing (Low-Rise)), quoted on the basis of trips per dwelling unit.

The fitted curve equations and the percentages of incoming and outgoing trips in the A.M. and P.M. Peak Hours for the land use of the development are provided in **Table 2**.

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**TRIP GENERATION (CONT'D)**

**Table 2: Trip Generation Equations and Inbound and Outbound Percentages**

| ITE Land Use | A.M. Peak Hour | | | P.M. Peak Hour | | |
|---|---|---|---|---|---|---|
| | Fitted Curve Equation | % In | % Out | Fitted Curve Equation | % In | % Out |
| **Multifamily Housing (Low-Rise) (LU 220)** | Ln (T) = 0.95 Ln(X) – 0.51 | 23% | 77% | Ln (T) = 0.89 Ln(X) – 0.02 | 63% | 37% |

Note: T represents the total number of trips and X represents the total number of dwelling units.

**TOTAL SITE-GENERATED TRIPS**

The resulting number of trips generated is determined by the fitted curve equations provided in **Table 2** and the number of dwelling units. The proposed Residential Development comprises 14 dwelling units.

The resulting total number of trips to be generated in the A.M. and P.M. Peak Hours are summarized in **Table 3**.

**Table 3: Site-Generated Trips**

| ITE Land Use | Dwelling Units | A.M. Peak Hour (Adj. Street) | | | P.M. Peak Hour (Adj. Street) | | |
|---|---|---|---|---|---|---|---|
| | | Trips In | Trips Out | Total | Trips In | Trips Out | Total |
| Multifamily Housing (Low-Rise) | 14 | 2 | 5 | **7** | 6 | 4 | **10** |

The proposed Residential Development is expected to generate 7 trips during the A.M. Peak Hour (2 inbound trips and 5 outbound trips) and 10 trips during the P.M. Peak Hour (6 inbound trips and 4 outbound trips).

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**TRIP DISTRIBUTION AND ASSIGNMENT**

The assumed trip distribution and assignment is based on the existing traffic patterns, which was derived from the turning movement counts taken for the intersections of William Street at University Avenue West and William Street at King Street West.

**Figures 9 and 10** illustrate the Site-Generated Traffic volumes used in the analysis.

**FUTURE (2027) TOTAL TRAFFIC ANALYSIS**

The Future (2027) Total Traffic Volumes are based on the Future (2027) Total Background Traffic Volumes plus the site-generated trips from the proposed Residential Development. **Figures 11 and 12** illustrate the Future (2027) Total Traffic Volumes for the existing William Street at University Avenue West and William Street at King Street West intersections along with the proposed Site Access at William Street intersection.

For the William Street at University Avenue West and William Street at King Street West intersections, the lane configurations and the signal timing plans used in the Existing (2020) Traffic Analysis are used in the Future (2027) Total Traffic Analysis.

For the proposed Site Access at William Street intersection, the intersection was analyzed as an un-signalized intersection with a stop-control at the eastbound approach. The lane configuration used in the analysis comprises: a shared through-left and a through lane at the northbound approach; a through and a shared through-right turning lane at the southbound approach; and a shared left-right turning lane at the westbound approach.

The lane configurations and the intersection control types used in the analysis are provided in **Figure 13**.

The Future (2027) Total Traffic Conditions were analyzed using the procedures of the Highway Capacity Manual 2000/2010 as employed by SYNCHRO (version 9.0) software. The results of the analysis are summarized in **Table 4** and the related calculations are provided in **Appendix D**.

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## FUTURE (2027) TOTAL TRAFFIC ANALYSIS (CONT'D)

**Table 4: Future (2027) Total Traffic – Level of Service**

| Intersection | Turning Movement | A.M. Peak Hour | | | | P.M. Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | V/C | LOS | Delay[1] (seconds) | 95th % Queue (m) | V/C | LOS | Delay[1] (seconds) | 95th % Queue (m) |
| William Street at University Avenue West (Signalized) | **Overall** | **0.52** | **B** | **11.0** | **n/a** | **0.57** | **B** | **11.4** | **n/a** |
| | NBL | 0.01 | A | 6.8 | 1.4 | 0.01 | A | 6.9 | 1.8 |
| | NBT | 0.27 | B | 18.0 | 25.0 | 0.30 | B | 18.6 | 29.2 |
| | NBR | 0.27 | B | 18.0 | 25.0 | 0.30 | B | 18.6 | 29.2 |
| | EBL | 0.15 | B | 19.5 | 14.2 | 0.12 | B | 19.5 | 12.3 |
| | EBT | 0.15 | B | 19.5 | 14.2 | 0.12 | B | 19.5 | 12.3 |
| | EBR | 0.15 | B | 19.5 | 14.2 | 0.12 | B | 19.5 | 12.3 |
| | SBL | 0.49 | A | 9.2 | 31.9 | 0.57 | B | 10.3 | 41.7 |
| | SBT | 0.16 | A | 8.7 | 20.2 | 0.17 | A | 8.6 | 23.7 |
| | SBR | 0.16 | A | 8.7 | 20.2 | 0.17 | A | 8.6 | 23.7 |
| | WBL | 0.09 | C | 20.1 | 9.0 | 0.14 | C | 21.0 | 15.2 |
| | WBT | 0.09 | C | 20.1 | 9.0 | 0.14 | C | 21.0 | 15.2 |
| | WBR | 0.52 | A | 6.1 | 14.6 | 0.57 | A | 6.5 | 19.4 |
| William Street at King Street West (Signalized) | **Overall** | **0.28** | **B** | **10.1** | **n/a** | **0.21** | **B** | **10.0** | **n/a** |
| | NBL | 0.01 | A | 6.4 | 1.8 | 0.01 | A | 6.3 | 1.8 |
| | NBT | 0.18 | B | 14.4 | 15.9 | 0.08 | B | 13.3 | 12.0 |
| | NBR | 0.18 | B | 14.4 | 15.9 | 0.08 | B | 13.3 | 12.0 |
| | EBL | 0.25 | B | 16.1 | 19.3 | 0.21 | B | 15.0 | 17.5 |
| | EBT | 0.25 | B | 16.1 | 19.3 | 0.21 | B | 15.0 | 17.5 |
| | EBR | 0.04 | A | 0.2 | 0.0 | 0.01 | A | 0.0 | 0.0 |
| | SBL | 0.28 | A | 7.6 | 20.4 | 0.20 | A | 7.2 | 17.1 |
| | SBT | 0.13 | B | 10.1 | 17.4 | 0.07 | B | 10.0 | 13.1 |
| | SBR | 0.13 | B | 10.1 | 17.4 | 0.07 | B | 10.0 | 13.1 |
| | WBL | 0.10 | B | 14.4 | 10.1 | 0.10 | B | 14.0 | 10.2 |
| | WBT | 0.10 | B | 14.4 | 10.1 | 0.10 | B | 14.0 | 10.2 |
| | WBR | 0.25 | A | 7.3 | 22.1 | 0.15 | A | 6.7 | 13.9 |

*Note 1: Delays are measured in seconds per vehicle*

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**FUTURE (2027) TOTAL TRAFFIC ANALYSIS (CONT'D)**

**Table 4: Future (2027) Total Traffic – Level of Service - Continued**

| Intersection | Turning Movement/ Approach | A.M. Peak Hour | | | | P.M. Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | V/C | LOS | Delay[1] (seconds) | 95th % Queue (m) | V/C | LOS | Delay[1] (seconds) | 95th % Queue (m) |
| Proposed Site Access at William Street (Un-signalized) | **Overall** | **0.11** | **A** | **0.1** | **n/a** | **0.13** | **A** | **0.1** | **n/a** |
| | NBL | 0.00 | A | 0.1 | 0.0 | 0.00 | A | 0.3 | 0.0 |
| | NBT | 0.11 | A | 0.0 | 0.0 | 0.07 | A | 0.0 | 0.0 |
| | EB Approach | 0.01 | B | 10.1 | 0.2 | 0.01 | A | 9.9 | 0.1 |
| | SBT | 0.11 | A | 0.0 | 0.0 | 0.13 | A | 0.0 | 0.0 |
| | SBR | 0.06 | A | 0.0 | 0.0 | 0.07 | A | 0.0 | 0.0 |

*Note 1: Delays are measured in seconds per vehicle*

The Future (2027) Total Traffic Analysis indicates that the signalized intersection of William Street at University Avenue West will continue to operate at an overall Level of Service "B" during the A.M. and P.M. Peak Hours. During the P.M. Peak Hour, the queue lengths at the southbound left and the shared westbound through-left turning lanes may result in a spillback of vehicles into the adjacent lane. However, all of the turning movements will operate at a Level of Service "C" or better during the A.M. and P.M. Peak Hours.

The Future (2027) Total Traffic Analysis indicates that the signalized intersection of William Street at King Street West will begin to operate at an overall Level of Service "B" during the A.M. Peak Hour and will continue to operate at an overall Level of Service "B" during the P.M. Peak Hour. All of the turning movements will continue to operate at a Level of Service "B" or better during the A.M. and P.M. Peak Hours.

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**FUTURE (2027) TOTAL TRAFFIC ANALYSIS (CONT'D)**

The Future (2027) Total Traffic Analysis indicates that the un-signalized proposed Site Access at William Street intersection will operate at an overall Level of Service "A" during the A.M. and P.M. Peak Hours. During the A.M. and P.M. Peak Hours, the delays at the shared through-left turning lane in the northbound approach are minimal. In addition, the worse-case for the eastbound approach is an average delay of 10.1 seconds per vehicle. A maximum queue of one (1) vehicle is expected for all of the turning movements during the A.M. and P.M. Peak Hours. Therefore, the northbound left turning vehicles will not interfere with the eastbound left turning vehicles leaving the site.

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**SUMMARY**

The proposed Residential Development is expected to generate 7 trips during the A.M. Peak Hour (2 inbound trips and 5 outbound trips) and 10 trips during the P.M. Peak Hour (6 inbound trips and 4 outbound trips).

By the 2027 horizon year, during the A.M. and P.M. Peak Hours, the existing William Street at University Avenue West and William Street at King Street West intersections will operate at acceptable Levels of Service.

For the proposed Site Access at William Street intersection, the following recommendations should be considered for the 2027 horizon year:

- An eastbound approach that comprises a shared left-right turning lane that is stop-controlled.

The recommended lane configuration and intersection control type for the proposed Site Access at William Street intersection is illustrated in **Figure 13**.

By the 2027 horizon year, the traffic analysis indicates that during the A.M. and P.M. Peak Hours the queue lengths at the northbound left turning lane for the intersection of William Street at University Avenue West will not interfere with the eastbound left turning vehicles at the proposed Site Access at William Street.

Attn: Mr. Terry Hoekstra, C.E.T.
Manager of Engineering and Capital Projects

**Re: Traffic Impact Brief**
**Proposed Residential Development**
**377 William Street**
**Town of Cobourg**
**Our File No. W20003**

We trust that this Traffic Impact Brief supports the proposed Residential Development. However, if you have any questions please advise.

Yours truly,
**CANDEVCON LIMITED**

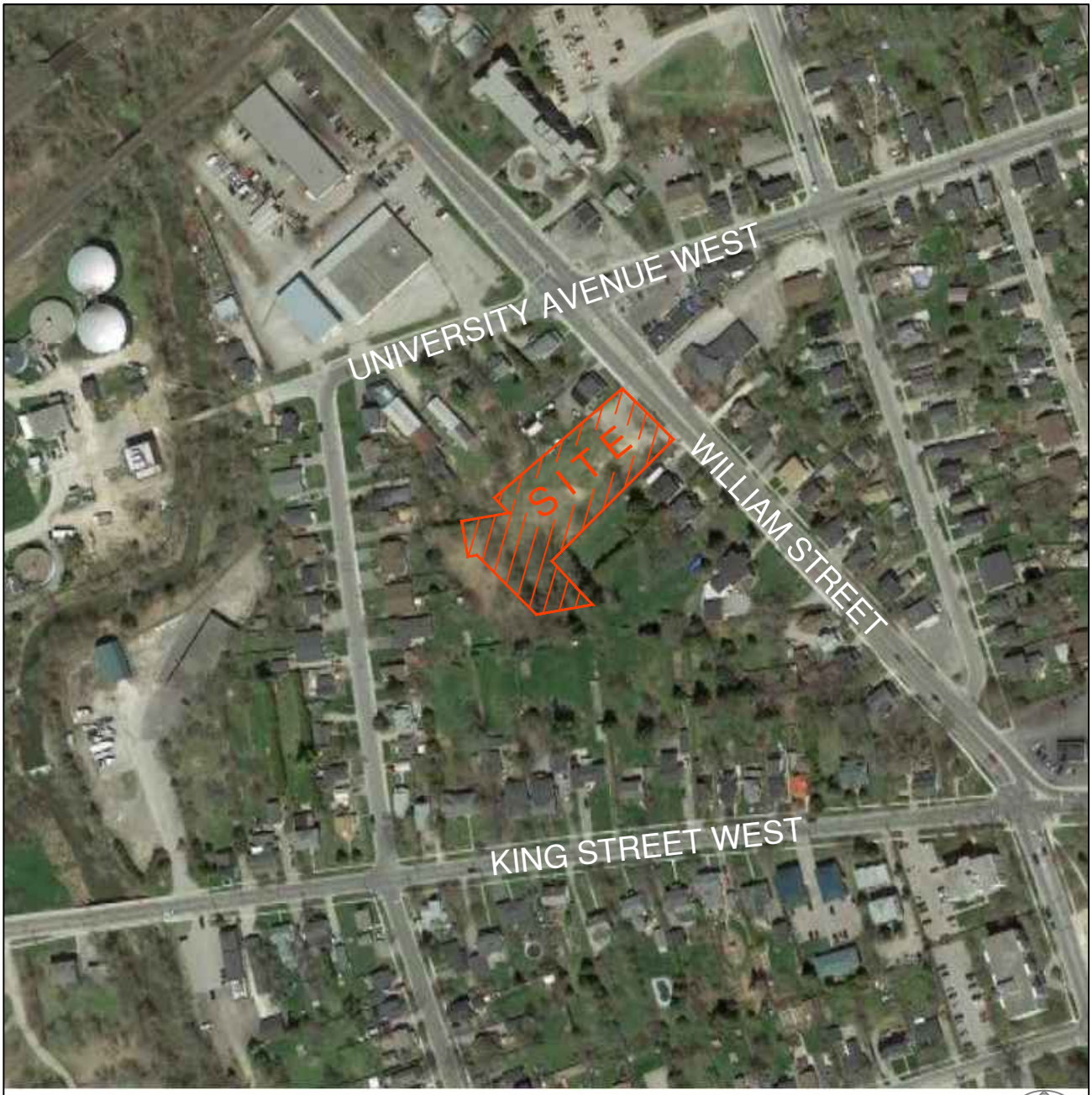
LICENSED PROFESSIONAL ENGINEER
B. WONG
100179468
3/3/2020
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
D. LEE
100083628
March 3, 20
PROVINCE OF ONTARIO

**Brian Wong, P. Eng.**
**Intermediate Transportation Engineer**

**David Lee, P. Eng.**
**Project Manager**

Attachment: Figure 1 – Location Plan,
Figure 2 – Proposed Site Plan,
Figures 3 and 4 – Existing (2020) Traffic Volumes,
Figures 5 and 6 – Trip Assignment for Anticipated Background Development,
Figures 7 and 8 – Future (2027) Total Background Volumes,
Figures 9 and 10 – Site Generated Trip Assignment,
Figures 11 and 12 – Future (2027) Total Traffic Volumes,
Figure 13 – Future (2027) Road Network,
Appendix A – Turning Movement Counts Provided by Ontario Traffic Inc.,
Appendix B – Signal Timing Plans Received by the Town of Cobourg,
Appendix C – Level of Service (LOS) Definitions,
Appendix D – Synchro Analysis: Existing (2020) and Future (2027) Total Traffic Conditions,
Appendix E – Excerpts from the Transportation Impact Study prepared by LEA Consulting Ltd.




JOSHANI HOMES LTD.

# PROPOSED RESIDENTIAL DEVELOPMENT

377 WILLIAMS STREET
TOWN OF COBOURG

# LOCATION PLAN

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794-0600 FAX (905) 794-0611

| | |
|---|---|
| DRAWN BY: K.F. | PROJECT No. W20003 |
| CHECKED BY: B.W. | FIGURE No. 1 |
| SCALE: N.T.S. | |
| DATE: FEB., 21st 2020 | |


WILLIAM STREET

JOSHANI HOMES LTD.
PROPOSED RESIDENTIAL DEVELOPMENT
377 WILLIAM STREET
TOWN OF COBOURG

# PROPOSED SITE PLAN

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794-0600 FAX (905) 794-0611

| | | | |
|---|---|---|---|
| DATE | FEB., 21st 2020 | PROJECT No | W20003 |
| DRAWN | K.F. | FIGURE No. | 2 |
| SCALE | N.T.S. | | |

# Existing (2020) Traffic Volumes - A.M. Peak Hour

**W20003**
**Proposed Residential Development at 377 William Street**
**Town of Cobourg**
**Joshani Homes Ltd.**

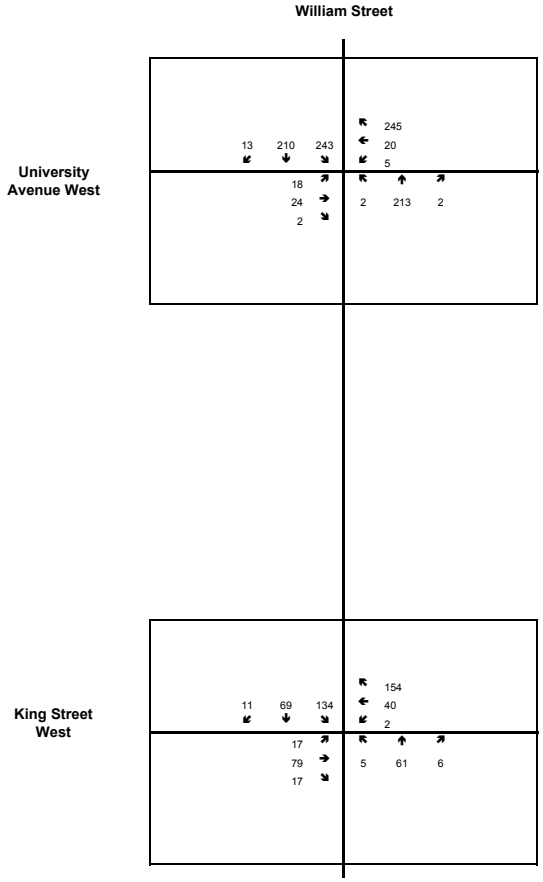



**Figure No:** 3

**Date:** February 21 2020

**Prepared by:** B.W.

N

# Existing (2020) Traffic Volumes - P.M. Peak Hour

W20003
Proposed Residential Development at 377 William Street
Town of Cobourg
Joshani Homes Ltd.

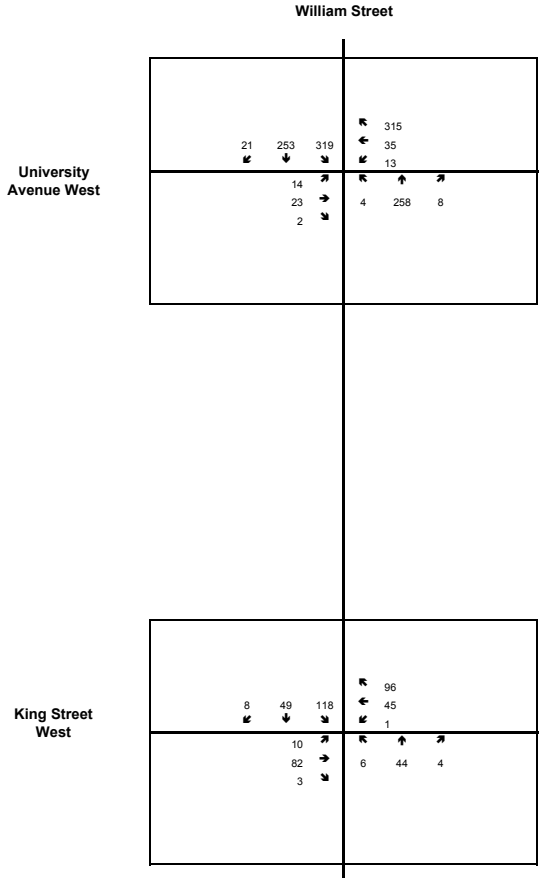



**Figure No:** 4

**Date:** February 21 2020

**Prepared by:** B.W.

N

# Trip Assignment for Anticipated Background Development - A.M. Peak Hour

W20003
Proposed Residential Development at 377 William Street
Town of Cobourg
Joshani Homes Ltd.

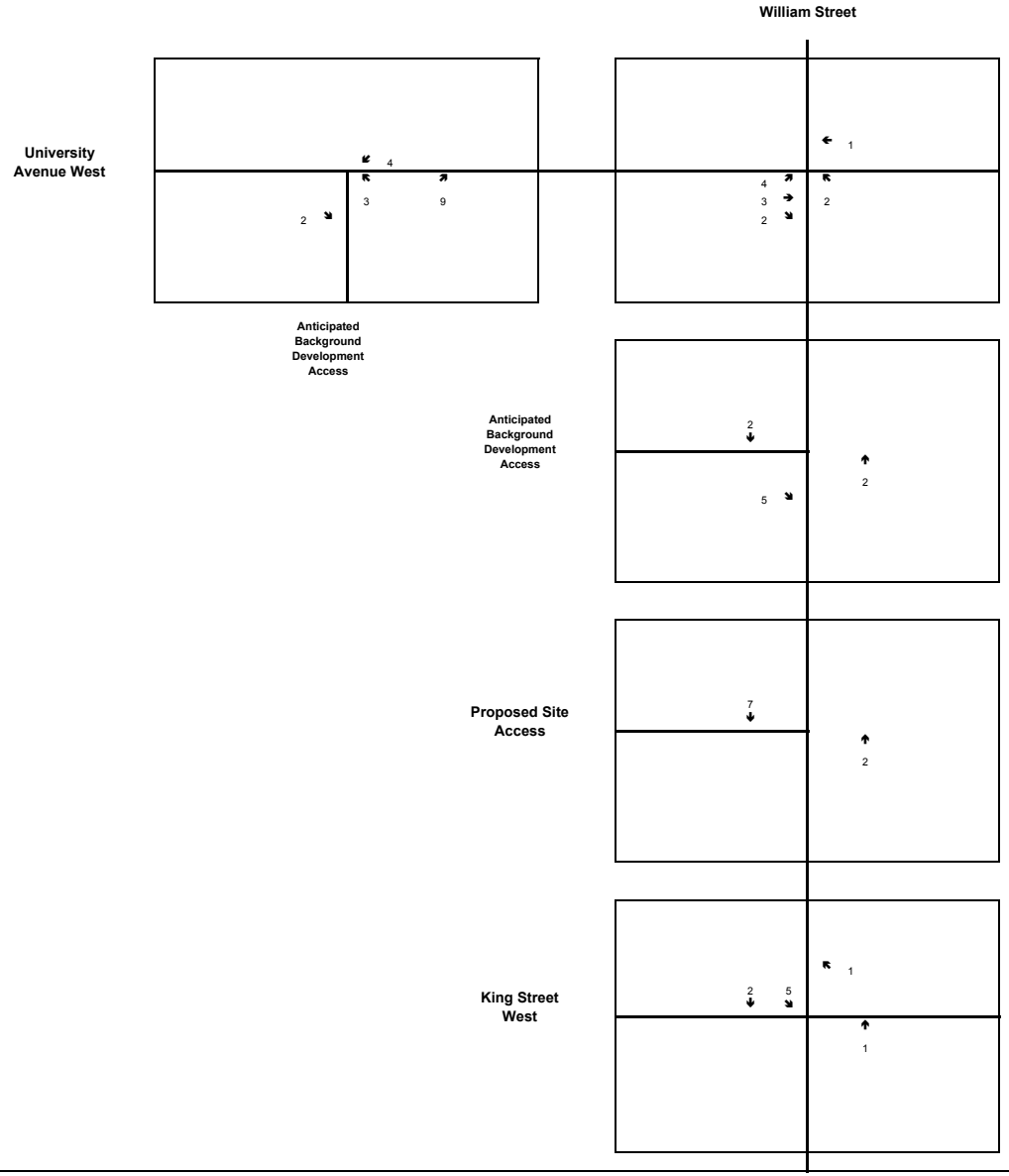



Figure No: 5

Date: February 24 2020

Prepared by: B.W.

N

# Trip Assignment for Anticipated Background Development - P.M. Peak Hour

W20003
Proposed Residential Development at 377 William Street
Town of Cobourg
Joshani Homes Ltd.

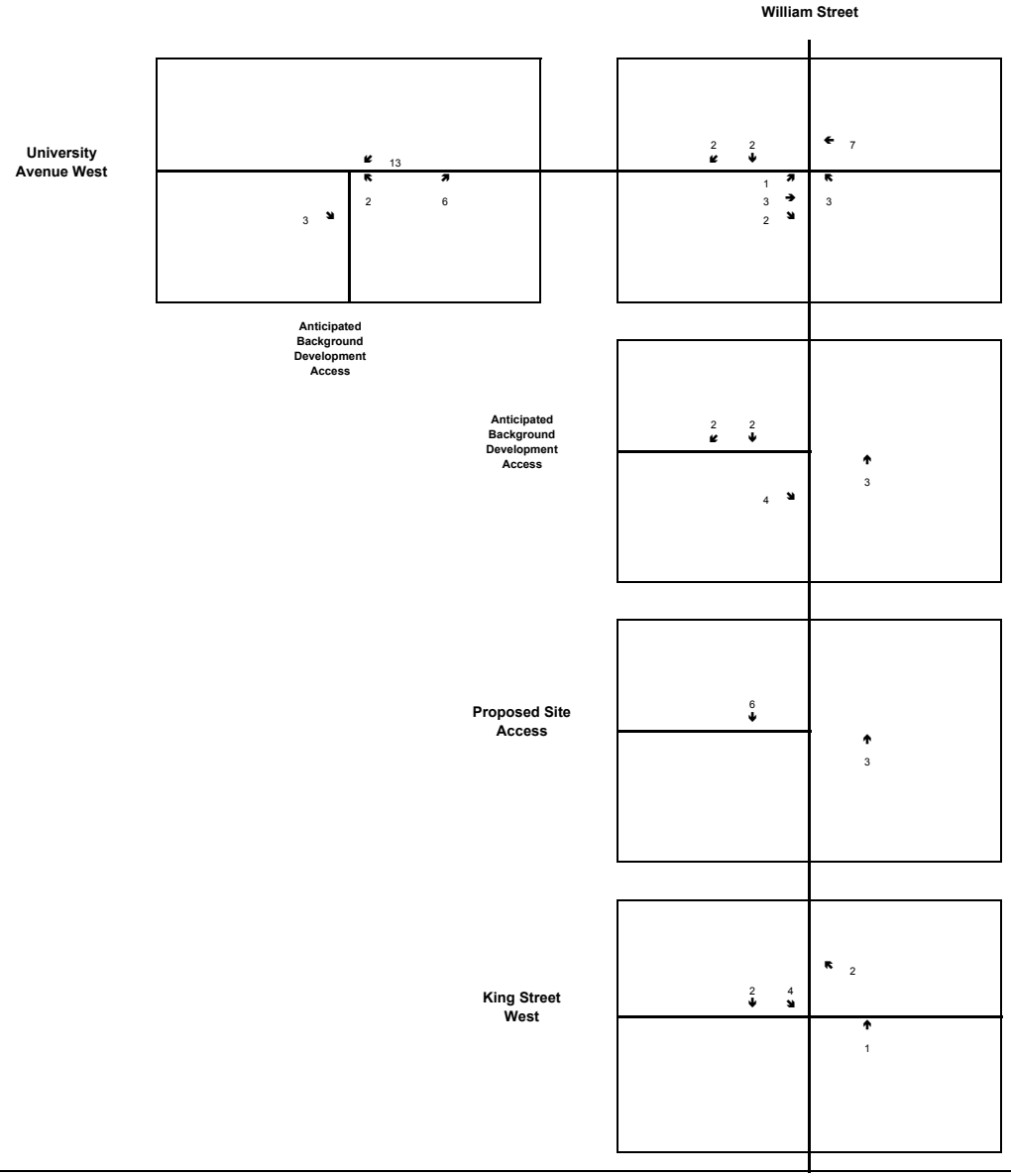



**Figure No:** 6

**Date:** February 24 2020

**Prepared by:** B.W.

N

# Future (2027) Total Background Traffic Volumes - A.M. Peak Hour

**W20003**
**Proposed Residential Development at 377 William Street**
**Town of Cobourg**
**Joshani Homes Ltd.**

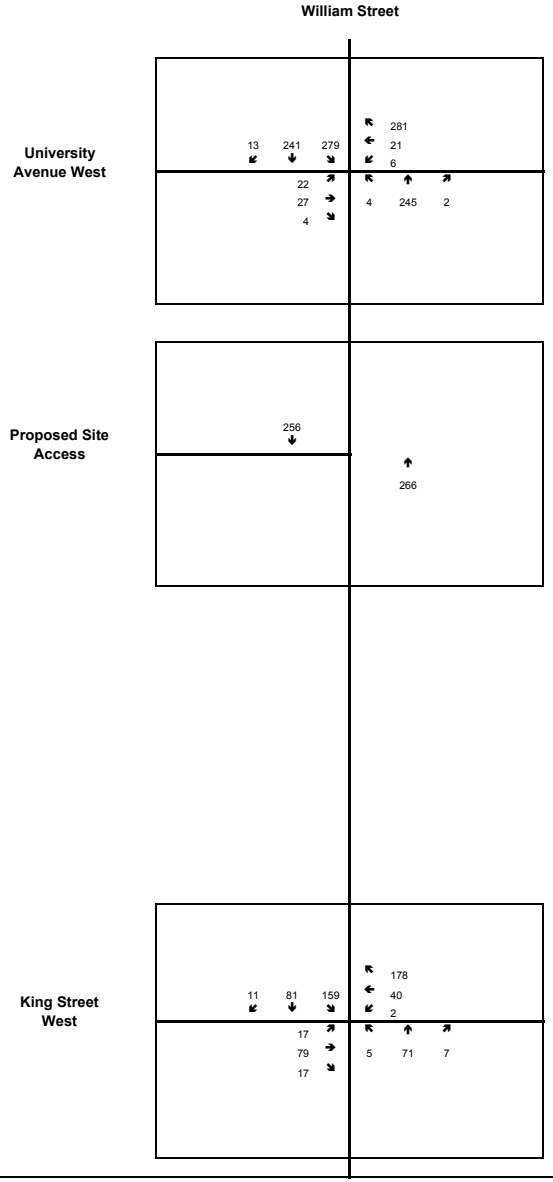



**Figure No:** 7

**Date:** February 24 2020

**Prepared by:** B.W.

N

# Future (2027) Total Background Traffic Volumes - P.M. Peak Hour

W20003
Proposed Residential Development at 377 William Street
Town of Cobourg
Joshani Homes Ltd.

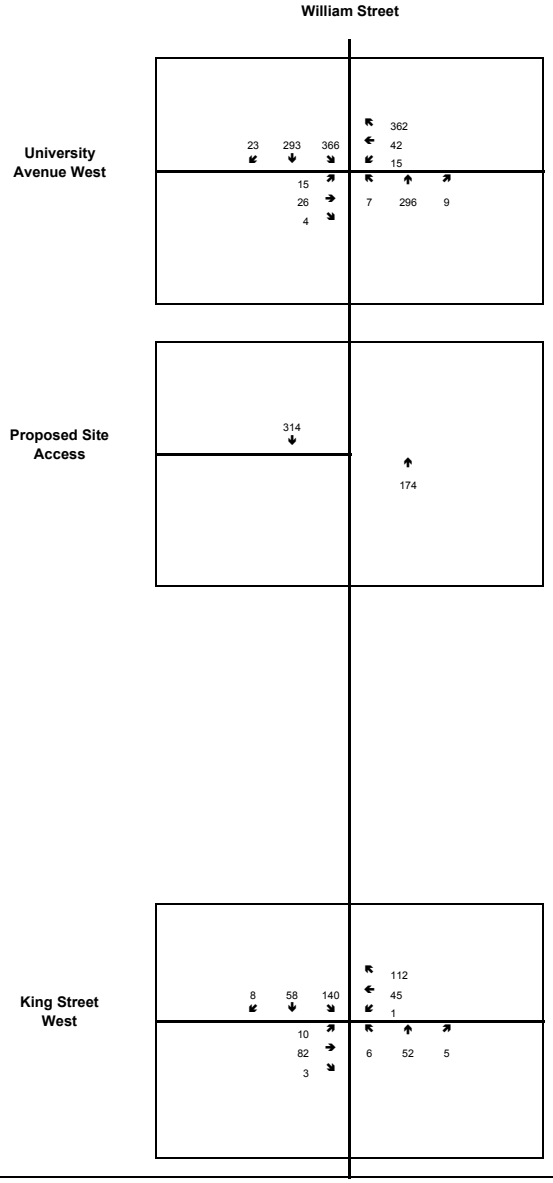



**Figure No:** 8

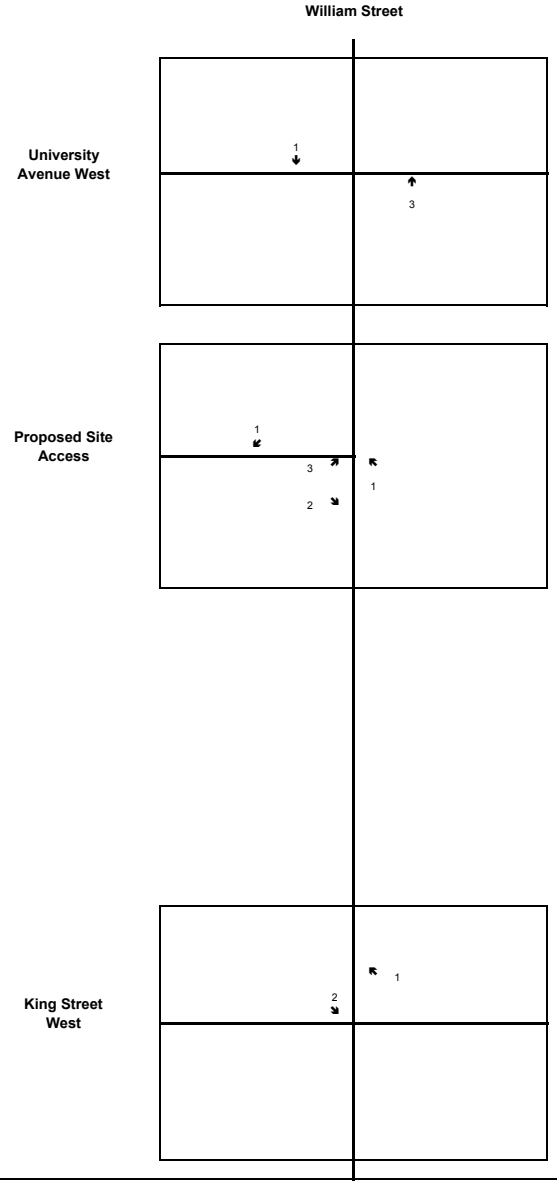
**Date:** February 24 2020

**Prepared by:** B.W.

N

# Site-Generated Trip Assignment - A.M. Peak Hour

**W20003**
**Proposed Residential Development at 377 William Street**
**Town of Cobourg**
**Joshani Homes Ltd.**




| | |
|---|---|
| Trips In | 2 |
| Trips Out | 5 |
| Total Trips | 7 |

**Figure No:** 9

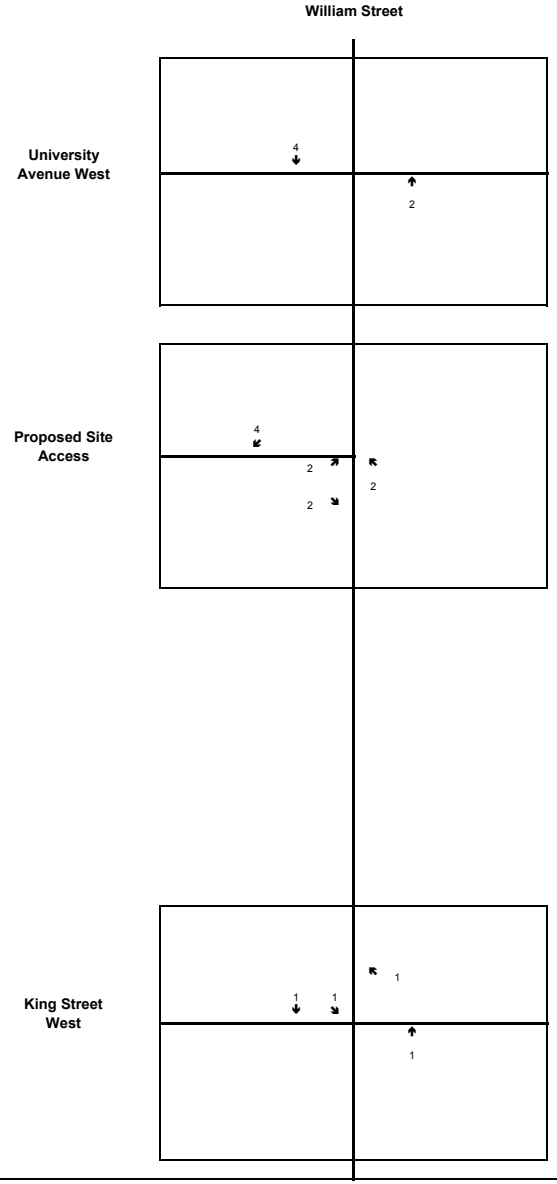
**Date:** February 25 2020

**Prepared by:** B.W.

N

# Site-Generated Trip Assignment - P.M. Peak Hour

**W20003**
**Proposed Residential Development at 377 William Street**
**Town of Cobourg**
**Joshani Homes Ltd.**




| | |
|---|---|
| Trips In | 6 |
| Trips Out | 4 |
| Total Trips | 10 |

**Figure No:** **10**

**Date:** **February 25 2020**

**Prepared by:** **B.W.**

**N**

# Future (2027) Total Traffic Volumes - A.M. Peak Hour

W20003
Proposed Residential Development at 377 William Street
Town of Cobourg
Joshani Homes Ltd.

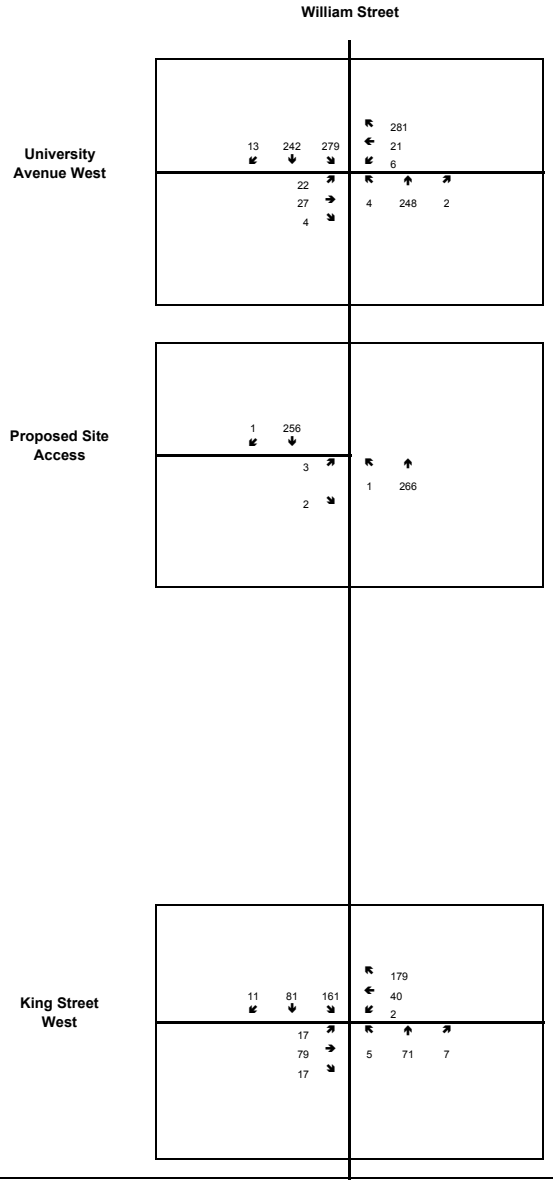



**Figure No:** 11

**Date:** February 25 2020

**Prepared by:** B.W.

N

# Future (2027) Total Traffic Volumes - P.M. Peak Hour

W20003
Proposed Residential Development at 377 William Street
Town of Cobourg
Joshani Homes Ltd.

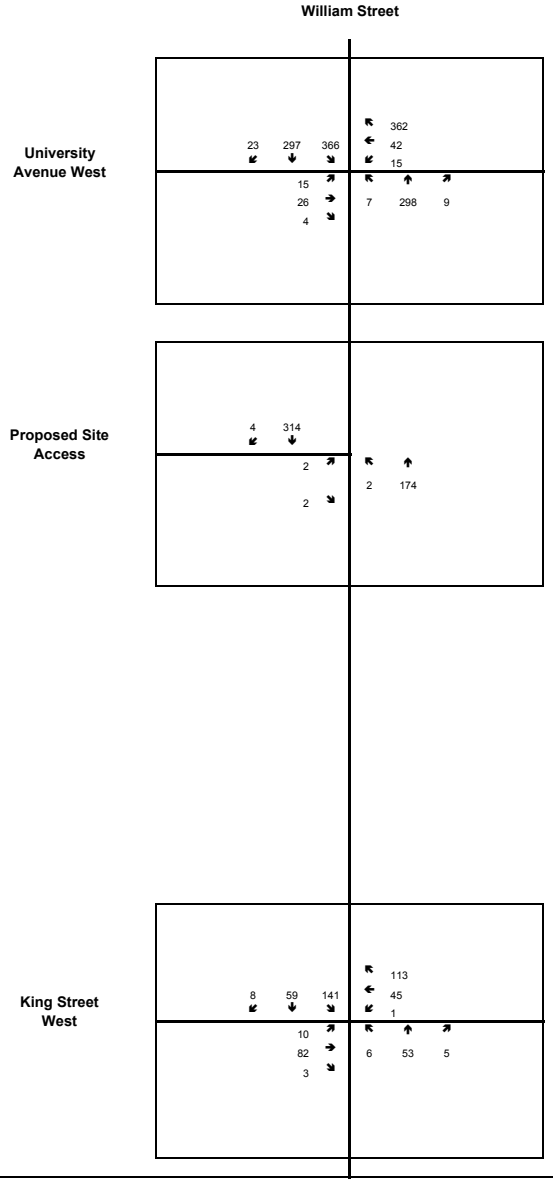
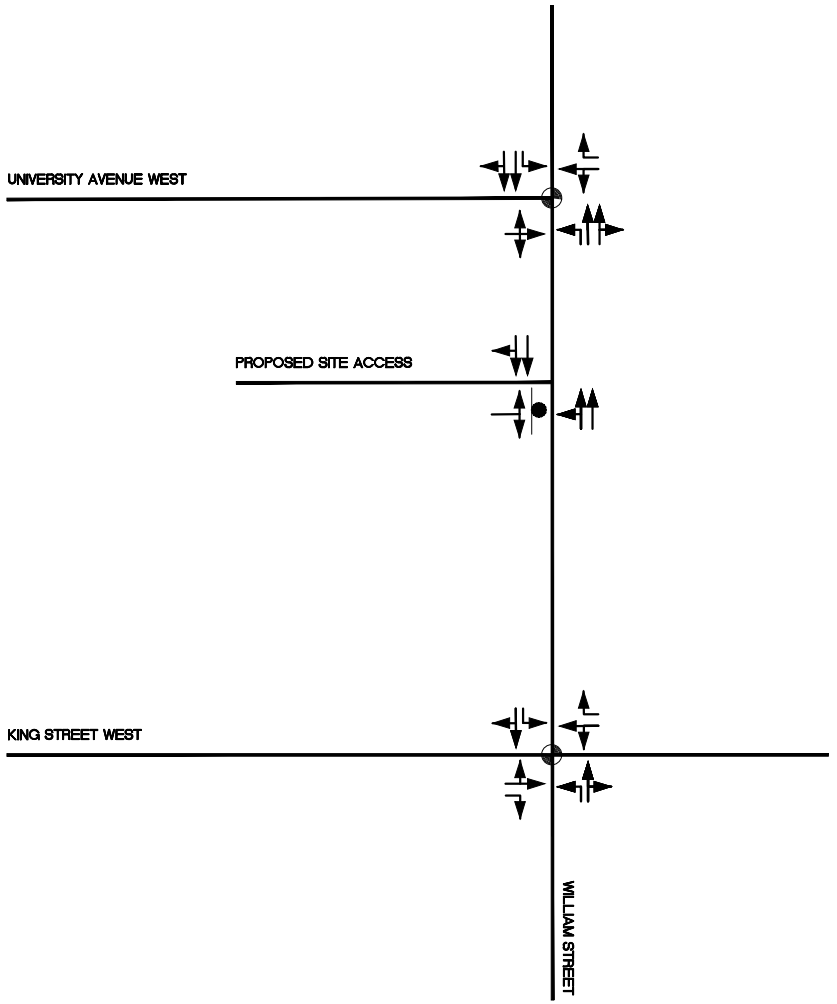



**Figure No:** 12

**Date:** February 25 2020

**Prepared by:** B.W.

N




NOTE:
1. DRAWING IS FOR SCHEMATIC PURPOSES ONLY AND NOT TO BE SCALED.

LEGEND:

SIGNAL CONTROL

STOP SIGN

TRAFFIC IMPACT BRIEF
JOSHANI HOMES LTD.
377 WILLIAM STREET
TOWN OF COBOURG

FUTURE (2027) ROAD NETWORK

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE BRAMPTON, ONTARIO L6P 0M7
TEL. (905) 794-0600 FAX. (905) 794-0611

| | |
|---|---|
| DATE: MARCH 3, 2020 | JOB No. W20003 |
| DRAWN BY: B.W. | FIG. No. 13 |
| SCALE: N.T.S. | |

# APPENDIX A

# TURNING MOVEMENT COUNTS
# PROVIDED BY
# ONTARIO TRAFFIC INC.

# Peak Hour Diagram

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

| Specified Period | | One Hour Peak | |
|---|---|---|---|
| From: | 07:00:00 | From: | 08:00:00 |
| To: | 09:00:00 | To: | 09:00:00 |

**Intersection:** William St & University Ave W
**Site ID:** 2002000001
**Count Date:** Jan 28, 2020

**Weather conditions:**

**** Signalized Intersection ****

**Major Road:** William St runs N/S

## North Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 450 | 462 | 912 |
| Trucks | 16 | 14 | 30 |
| | **466** | **476** | **942** |

## William St

| | | | | |
|---|---|---|---|---|
| Trucks | 0 | 10 | 6 | 0 |
| Cars | 13 | 200 | 237 | 0 |
| **Totals** | **13** | **210** | **243** | **0** |

## East Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 257 | 263 | 520 |
| Trucks | 13 | 6 | 19 |
| | **270** | **269** | **539** |

## University Ave W

| Trucks | Cars | Totals | |
|---|---|---|---|
| 0 | 0 | **0** | |
| 0 | 18 | **18** | |
| 0 | 24 | **24** | |
| 0 | 2 | **2** | |

Peds: 2

Peds: 3

N
W
E
S

Peds: 3

Peds: 1

## University Ave W

| | Totals | Cars | Trucks |
|---|---|---|---|
| | **0** | 0 | 0 |
| | **245** | 237 | 8 |
| | **20** | 15 | 5 |
| | **5** | 5 | 0 |

## West Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 44 | 29 | 73 |
| Trucks | 0 | 6 | 6 |
| | **44** | **35** | **79** |

## William St

| | | | | |
|---|---|---|---|---|
| **Totals** | **2** | **213** | **2** | **0** |
| Cars | 1 | 207 | 2 | 0 |
| Trucks | 1 | 6 | 0 | 0 |

## South Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 210 | 207 | 417 |
| Trucks | 7 | 10 | 17 |
| | **217** | **217** | **434** |

Cars - Cars

Trucks - Trucks

## Comments

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

# Peak Hour Summary

Intersection: William St & University Ave W
Count Date: Jan 28, 2020
Period: 07:00 - 09:00

## Peak Hour Data (08:00 - 09:00)

| Start Time | North Approach William St | | | | | | South Approach William St | | | | | | East Approach University Ave W | | | | | | West Approach University Ave W | | | | | | Total Vehicles |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peds | Total | | | | | Peds | Total | | | | | Peds | Total | | | | | Peds | Total | |
| 08:00 | 38 | 64 | 4 | 0 | 0 | 106 | 0 | 46 | 2 | 0 | 0 | 48 | 1 | 0 | 34 | 0 | 1 | 35 | 3 | 7 | 0 | 0 | 2 | 10 | 199 |
| 08:15 | 62 | 55 | 2 | 0 | 1 | 119 | 1 | 59 | 0 | 0 | 1 | 60 | 0 | 5 | 70 | 0 | 0 | 75 | 4 | 4 | 1 | 0 | 1 | 9 | 263 |
| 08:30 | 67 | 44 | 4 | 0 | 1 | 115 | 0 | 48 | 0 | 0 | 0 | 48 | 2 | 9 | 61 | 0 | 1 | 72 | 3 | 5 | 0 | 0 | 0 | 8 | 243 |
| 08:45 | 76 | 47 | 3 | 0 | 0 | 126 | 1 | 60 | 0 | 0 | 0 | 61 | 2 | 6 | 80 | 0 | 1 | 88 | 8 | 8 | 1 | 0 | 0 | 17 | 292 |
| **Grand Total** | **243** | **210** | **13** | **0** | **2** | **466** | **2** | **213** | **2** | **0** | **1** | **217** | **5** | **20** | **245** | **0** | **3** | **270** | **18** | **24** | **2** | **0** | **3** | **44** | **997** |
| **Approach %** | 52.1 | 45.1 | 2.8 | 0 | | - | 0.9 | 98.2 | 0.9 | 0 | | - | 1.9 | 7.4 | 90.7 | 0 | | - | 40.9 | 54.5 | 4.5 | 0 | | - | |
| **Totals %** | 24.4 | 21.1 | 1.3 | 0 | | 46.7 | 0.2 | 21.4 | 0.2 | 0 | | 21.8 | 0.5 | 2 | 24.6 | 0 | | 27.1 | 1.8 | 2.4 | 0.2 | 0 | | 4.4 | |
| **PHF** | **0.8** | **0.82** | **0.81** | **0** | | **0.92** | **0.5** | **0.89** | **0.25** | **0** | | **0.89** | **0.63** | **0.56** | **0.77** | **0** | | **0.77** | **0.56** | **0.75** | **0.5** | **0** | | **0.65** | **0.85** |
| **Cars** | 237 | 200 | 13 | 0 | | 450 | 1 | 207 | 2 | 0 | | 210 | 5 | 15 | 237 | 0 | | 257 | 18 | 24 | 2 | 0 | | 44 | 961 |
| **% Cars** | 97.5 | 95.2 | 100 | 0 | | 96.6 | 50 | 97.2 | 100 | 0 | | 96.8 | 100 | 75 | 96.7 | 0 | | 95.2 | 100 | 100 | 100 | 0 | | 100 | 96.4 |
| **Trucks** | 6 | 10 | 0 | 0 | | 16 | 1 | 6 | 0 | 0 | | 7 | 0 | 5 | 8 | 0 | | 13 | 0 | 0 | 0 | 0 | | 0 | 36 |
| **% Trucks** | 2.5 | 4.8 | 0 | 0 | | 3.4 | 50 | 2.8 | 0 | 0 | | 3.2 | 0 | 25 | 3.3 | 0 | | 4.8 | 0 | 0 | 0 | 0 | | 0 | 3.6 |
| **Peds** | | | | | 2 | - | | | | | 1 | - | | | | | 3 | - | | | | | 3 | - | 9 |
| **% Peds** | | | | | 22.2 | - | | | | | 11.1 | - | | | | | 33.3 | - | | | | | 33.3 | - | |

# Peak Hour Diagram

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

| Specified Period | | One Hour Peak | |
|---|---|---|---|
| From: | 16:00:00 | From: | 16:15:00 |
| To: | 18:00:00 | To: | 17:15:00 |

**Intersection:** William St & University Ave W
**Site ID:** 2002000001
**Count Date:** Jan 28, 2020

**Weather conditions:**

**** Signalized Intersection ****

**Major Road:** William St runs N/S

## North Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 589 | 583 | 1172 |
| Trucks | 4 | 4 | 8 |
| | **593** | **587** | **1180** |

## William St

| | | | | |
|---|---|---|---|---|
| Trucks | 1 | 1 | 2 | 0 |
| Cars | 20 | 252 | 317 | 0 |
| **Totals** | **21** | **253** | **319** | **0** |

Peds: 1

## East Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 363 | 347 | 710 |
| Trucks | 0 | 3 | 3 |
| | **363** | **350** | **713** |

## University Ave W

| Trucks | Cars | Totals | |
|---|---|---|---|
| 0 | 0 | **0** | |
| 0 | 14 | **14** | |
| 1 | 22 | **23** | |
| 0 | 2 | **2** | |

Peds: 4


Peds: 9

## University Ave W

| | Totals | Cars | Trucks |
|---|---|---|---|
| | **0** | 0 | 0 |
| | **315** | 315 | 0 |
| | **35** | 35 | 0 |
| | **13** | 13 | 0 |

Peds: 2

## West Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 38 | 59 | 97 |
| Trucks | 1 | 1 | 2 |
| | **39** | **60** | **99** |

## William St

| | | | | |
|---|---|---|---|---|
| **Totals** | **4** | **258** | **8** | **0** |
| Cars | 4 | 254 | 8 | 0 |
| Trucks | 0 | 4 | 0 | 0 |

## South Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 266 | 267 | 533 |
| Trucks | 4 | 1 | 5 |
| | **270** | **268** | **538** |

- Cars

- Trucks

## Comments

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

# Peak Hour Summary

Intersection: William St & University Ave W
Count Date: Jan 28, 2020
Period: 16:00 - 18:00

## Peak Hour Data (16:15 - 17:15)

| Start Time | North Approach William St | | | | | | South Approach William St | | | | | | East Approach University Ave W | | | | | | West Approach University Ave W | | | | | | Total Vehicles |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ↰ | ↑ | ↱ | ↶ | Peds | Total | ↰ | ↑ | ↱ | ↶ | Peds | Total | ↰ | ↑ | ↱ | ↶ | Peds | Total | ↰ | ↑ | ↱ | ↶ | Peds | Total | |
| 16:15 | 85 | 69 | 6 | 0 | 1 | 160 | 1 | 66 | 5 | 0 | 0 | 72 | 2 | 9 | 76 | 0 | 1 | 87 | 5 | 11 | 1 | 0 | 0 | 17 | 336 |
| 16:30 | 92 | 63 | 4 | 0 | 0 | 159 | 1 | 72 | 0 | 0 | 2 | 73 | 4 | 6 | 69 | 0 | 3 | 79 | 3 | 5 | 1 | 0 | 3 | 9 | 320 |
| 16:45 | 67 | 59 | 7 | 0 | 0 | 133 | 0 | 56 | 1 | 0 | 0 | 57 | 2 | 13 | 73 | 0 | 1 | 88 | 4 | 4 | 0 | 0 | 0 | 8 | 286 |
| 17:00 | 75 | 62 | 4 | 0 | 0 | 141 | 2 | 64 | 2 | 0 | 0 | 68 | 5 | 7 | 97 | 0 | 4 | 109 | 2 | 3 | 0 | 0 | 1 | 5 | 323 |
| **Grand Total** | **319** | **253** | **21** | **0** | **1** | **593** | **4** | **258** | **8** | **0** | **2** | **270** | **13** | **35** | **315** | **0** | **9** | **363** | **14** | **23** | **2** | **0** | **4** | **39** | **1265** |
| **Approach %** | 53.8 | 42.7 | 3.5 | 0 | | - | 1.5 | 95.6 | 3 | 0 | | - | 3.6 | 9.6 | 86.8 | 0 | | - | 35.9 | 59 | 5.1 | 0 | | - | |
| **Totals %** | 25.2 | 20 | 1.7 | 0 | | 46.9 | 0.3 | 20.4 | 0.6 | 0 | | 21.3 | 1 | 2.8 | 24.9 | 0 | | 28.7 | 1.1 | 1.8 | 0.2 | 0 | | 3.1 | |
| **PHF** | **0.87** | **0.92** | **0.75** | **0** | | **0.93** | **0.5** | **0.9** | **0.4** | **0** | | **0.92** | **0.65** | **0.67** | **0.81** | **0** | | **0.83** | **0.7** | **0.52** | **0.5** | **0** | | **0.57** | **0.94** |
| **Cars** | 317 | 252 | 20 | 0 | | 589 | 4 | 254 | 8 | 0 | | 266 | 13 | 35 | 315 | 0 | | 363 | 14 | 22 | 2 | 0 | | 38 | 1256 |
| **% Cars** | 99.4 | 99.6 | 95.2 | 0 | | 99.3 | 100 | 98.4 | 100 | 0 | | 98.5 | 100 | 100 | 100 | 0 | | 100 | 100 | 95.7 | 100 | 0 | | 97.4 | 99.3 |
| **Trucks** | 2 | 1 | 1 | 0 | | 4 | 0 | 4 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | 0 | | 1 | 9 |
| **% Trucks** | 0.6 | 0.4 | 4.8 | 0 | | 0.7 | 0 | 1.6 | 0 | 0 | | 1.5 | 0 | 0 | 0 | 0 | | 0 | 0 | 4.3 | 0 | 0 | | 2.6 | 0.7 |
| **Peds** | | | | | 1 | - | | | | | 2 | - | | | | | 9 | - | | | | | 4 | - | 16 |
| **% Peds** | | | | | 6.3 | - | | | | | 12.5 | - | | | | | 56.3 | - | | | | | 25 | - | |

# Peak Hour Diagram

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

| Specified Period | | One Hour Peak | |
|---|---|---|---|
| From: | 07:00:00 | From: | 08:00:00 |
| To: | 09:00:00 | To: | 09:00:00 |

**Intersection:** William St-Ontario St & King St W
**Site ID:** 2002000002
**Count Date:** Jan 28, 2020

**Weather conditions:**

**** Signalized Intersection ****

**Major Road:** King St W runs E/W

## North Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 207 | 227 | 434 |
| Trucks | 7 | 5 | 12 |
| | **214** | **232** | **446** |

## William St

| | | | | |
|---|---|---|---|---|
| Trucks | 1 | 1 | 5 | 0 |
| Cars | 10 | 68 | 129 | 0 |
| **Totals** | **11** | **69** | **134** | **0** |

## East Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 192 | 211 | 403 |
| Trucks | 4 | 8 | 12 |
| | **196** | **219** | **415** |

## King St W

| Trucks | Cars | Totals | |
|---|---|---|---|
| 0 | 0 | **0** | |
| 0 | 17 | **17** | |
| 3 | 76 | **79** | |
| 0 | 17 | **17** | |

Peds: 2

Peds: 3


Peds: 10

Peds: 3

## King St W

| Totals | Cars | Trucks | |
|---|---|---|---|
| **0** | 0 | 0 | |
| **154** | 150 | 4 | |
| **40** | 40 | 0 | |
| **2** | 2 | 0 | |

## West Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 110 | 55 | 165 |
| Trucks | 3 | 1 | 4 |
| | **113** | **56** | **169** |

| | | | | |
|---|---|---|---|---|
| **Totals** | **5** | **61** | **6** | **0** |
| Cars | 5 | 60 | 6 | 0 |
| Trucks | 0 | 1 | 0 | 0 |

Ontario St

## South Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 71 | 87 | 158 |
| Trucks | 1 | 1 | 2 |
| | **72** | **88** | **160** |

- Cars

- Trucks

## Comments

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

# Peak Hour Summary

Intersection: William St-Ontario St & King St W
Count Date: Jan 28, 2020
Period: 07:00 - 09:00

## Peak Hour Data (08:00 - 09:00)

| Start Time | North Approach William St | | | | | | South Approach Ontario St | | | | | | East Approach King St W | | | | | | West Approach King St W | | | | | | Total Vehicles |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peds | Total | | | | | Peds | Total | | | | | Peds | Total | | | | | Peds | Total | |
| 08:00 | 55 | 13 | 2 | 0 | 0 | 70 | 1 | 14 | 3 | 0 | 0 | 18 | 0 | 4 | 34 | 0 | 2 | 38 | 6 | 27 | 2 | 0 | 0 | 35 | 161 |
| 08:15 | 38 | 21 | 3 | 0 | 1 | 62 | 1 | 20 | 1 | 0 | 0 | 22 | 0 | 14 | 45 | 0 | 4 | 59 | 4 | 17 | 4 | 0 | 1 | 25 | 168 |
| 08:30 | 17 | 13 | 5 | 0 | 0 | 35 | 1 | 10 | 1 | 0 | 3 | 12 | 2 | 15 | 35 | 0 | 2 | 52 | 2 | 12 | 3 | 0 | 1 | 17 | 116 |
| 08:45 | 24 | 22 | 1 | 0 | 1 | 47 | 2 | 17 | 1 | 0 | 0 | 20 | 0 | 7 | 40 | 0 | 2 | 47 | 5 | 23 | 8 | 0 | 1 | 36 | 150 |
| **Grand Total** | **134** | **69** | **11** | **0** | **2** | **214** | **5** | **61** | **6** | **0** | **3** | **72** | **2** | **40** | **154** | **0** | **10** | **196** | **17** | **79** | **17** | **0** | **3** | **113** | **595** |
| **Approach %** | 62.6 | 32.2 | 5.1 | 0 | | - | 6.9 | 84.7 | 8.3 | 0 | | - | 1 | 20.4 | 78.6 | 0 | | - | 15 | 69.9 | 15 | 0 | | - | |
| **Totals %** | 22.5 | 11.6 | 1.8 | 0 | | 36 | 0.8 | 10.3 | 1 | 0 | | 12.1 | 0.3 | 6.7 | 25.9 | 0 | | 32.9 | 2.9 | 13.3 | 2.9 | 0 | | 19 | |
| **PHF** | **0.61** | **0.78** | **0.55** | **0** | | **0.76** | **0.63** | **0.76** | **0.5** | **0** | | **0.82** | **0.25** | **0.67** | **0.86** | **0** | | **0.83** | **0.71** | **0.73** | **0.53** | **0** | | **0.78** | **0.89** |
| **Cars** | 129 | 68 | 10 | 0 | | 207 | 5 | 60 | 6 | 0 | | 71 | 2 | 40 | 150 | 0 | | 192 | 17 | 76 | 17 | 0 | | 110 | 580 |
| **% Cars** | 96.3 | 98.6 | 90.9 | 0 | | 96.7 | 100 | 98.4 | 100 | 0 | | 98.6 | 100 | 100 | 97.4 | 0 | | 98 | 100 | 96.2 | 100 | 0 | | 97.3 | 97.5 |
| **Trucks** | 5 | 1 | 1 | 0 | | 7 | 0 | 1 | 0 | 0 | | 1 | 0 | 0 | 4 | 0 | | 4 | 0 | 3 | 0 | 0 | | 3 | 15 |
| **% Trucks** | 3.7 | 1.4 | 9.1 | 0 | | 3.3 | 0 | 1.6 | 0 | 0 | | 1.4 | 0 | 0 | 2.6 | 0 | | 2 | 0 | 3.8 | 0 | 0 | | 2.7 | 2.5 |
| **Peds** | | | | | 2 | - | | | | | 3 | - | | | | | 10 | - | | | | | 3 | - | 18 |
| **% Peds** | | | | | 11.1 | - | | | | | 16.7 | - | | | | | 55.6 | - | | | | | 16.7 | - | |

# Peak Hour Diagram

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

| Specified Period | | One Hour Peak | |
|---|---|---|---|
| From: | 16:00:00 | From: | 16:00:00 |
| To: | 18:00:00 | To: | 17:00:00 |

**Intersection:** William St-Ontario St & King St W
**Site ID:** 2002000002
**Count Date:** Jan 28, 2020

**Weather conditions:**

**** Signalized Intersection ****

**Major Road:** King St W runs E/W

## North Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 175 | 146 | 321 |
| Trucks | 0 | 4 | 4 |
| | **175** | **150** | **325** |

## William St

| | | | | |
|---|---|---|---|---|
| Trucks | 0 | 0 | 0 | 0 |
| Cars | 8 | 49 | 118 | 0 |
| **Totals** | **8** | **49** | **118** | **0** |

Peds: 0

## East Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 137 | 201 | 338 |
| Trucks | 5 | 3 | 8 |
| | **142** | **204** | **346** |

## King St W

| Trucks | Cars | Totals | |
|---|---|---|---|
| 0 | 0 | **0** | |
| 1 | 9 | **10** | |
| 3 | 79 | **82** | |
| 0 | 3 | **3** | |

Peds: 4


Peds: 6

## King St W

| Totals | Cars | Trucks | |
|---|---|---|---|
| **0** | 0 | 0 | |
| **96** | 94 | 2 | |
| **45** | 42 | 3 | |
| **1** | 1 | 0 | |

Peds: 6

## West Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 91 | 56 | 147 |
| Trucks | 4 | 3 | 7 |
| | **95** | **59** | **154** |

| | | | | |
|---|---|---|---|---|
| **Totals** | **6** | **44** | **4** | **0** |
| Cars | 6 | 43 | 4 | 0 |
| Trucks | 0 | 1 | 0 | 0 |

Ontario St

## South Approach

| | Out | In | Total |
|---|---|---|---|
| Cars | 53 | 53 | 106 |
| Trucks | 1 | 0 | 1 |
| | **54** | **53** | **107** |

Cars - Cars

Trucks - Trucks

## Comments

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

# Peak Hour Summary

Intersection: William St-Ontario St & King St W
Count Date: Jan 28, 2020
Period: 16:00 - 18:00

## Peak Hour Data (16:00 - 17:00)

| Start Time | North Approach William St | | | | | | South Approach Ontario St | | | | | | East Approach King St W | | | | | | West Approach King St W | | | | | | Total Vehicles |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peds | Total | | | | | Peds | Total | | | | | Peds | Total | | | | | Peds | Total | |
| 16:00 | 30 | 10 | 2 | 0 | 0 | 42 | 2 | 12 | 1 | 0 | 2 | 15 | 1 | 12 | 26 | 0 | 2 | 39 | 3 | 14 | 0 | 0 | 0 | 17 | 113 |
| 16:15 | 29 | 11 | 1 | 0 | 0 | 41 | 0 | 11 | 2 | 0 | 1 | 13 | 0 | 9 | 24 | 0 | 1 | 33 | 3 | 21 | 1 | 0 | 2 | 25 | 112 |
| 16:30 | 28 | 16 | 2 | 0 | 0 | 46 | 2 | 14 | 0 | 0 | 1 | 16 | 0 | 12 | 24 | 0 | 0 | 36 | 2 | 17 | 2 | 0 | 2 | 21 | 119 |
| 16:45 | 31 | 12 | 3 | 0 | 0 | 46 | 2 | 7 | 1 | 0 | 2 | 10 | 0 | 12 | 22 | 0 | 3 | 34 | 2 | 30 | 0 | 0 | 0 | 32 | 122 |
| **Grand Total** | **118** | **49** | **8** | **0** | **0** | **175** | **6** | **44** | **4** | **0** | **6** | **54** | **1** | **45** | **96** | **0** | **6** | **142** | **10** | **82** | **3** | **0** | **4** | **95** | **466** |
| **Approach %** | 67.4 | 28 | 4.6 | 0 | | - | 11.1 | 81.5 | 7.4 | 0 | | - | 0.7 | 31.7 | 67.6 | 0 | | - | 10.5 | 86.3 | 3.2 | 0 | | - | |
| **Totals %** | 25.3 | 10.5 | 1.7 | 0 | | 37.6 | 1.3 | 9.4 | 0.9 | 0 | | 11.6 | 0.2 | 9.7 | 20.6 | 0 | | 30.5 | 2.1 | 17.6 | 0.6 | 0 | | 20.4 | |
| **PHF** | **0.95** | **0.77** | **0.67** | **0** | | **0.95** | **0.75** | **0.79** | **0.5** | **0** | | **0.84** | **0.25** | **0.94** | **0.92** | **0** | | **0.91** | **0.83** | **0.68** | **0.38** | **0** | | **0.74** | **0.95** |
| **Cars** | 118 | 49 | 8 | 0 | | 175 | 6 | 43 | 4 | 0 | | 53 | 1 | 42 | 94 | 0 | | 137 | 9 | 79 | 3 | 0 | | 91 | 456 |
| **% Cars** | 100 | 100 | 100 | 0 | | 100 | 100 | 97.7 | 100 | 0 | | 98.1 | 100 | 93.3 | 97.9 | 0 | | 96.5 | 90 | 96.3 | 100 | 0 | | 95.8 | 97.9 |
| **Trucks** | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | 0 | | 1 | 0 | 3 | 2 | 0 | | 5 | 1 | 3 | 0 | 0 | | 4 | 10 |
| **% Trucks** | 0 | 0 | 0 | 0 | | 0 | 0 | 2.3 | 0 | 0 | | 1.9 | 0 | 6.7 | 2.1 | 0 | | 3.5 | 10 | 3.7 | 0 | 0 | | 4.2 | 2.1 |
| **Peds** | | | | | 0 | - | | | | | 6 | - | | | | | 6 | - | | | | | 4 | - | 16 |
| **% Peds** | | | | | 0 | - | | | | | 37.5 | - | | | | | 37.5 | - | | | | | 25 | - | |

# APPENDIX B

# SIGNAL TIMING PLANS – RECEIVED BY THE TOWN OF COBOURG

# Programmed EPAC Data

9/25/201
7:07:14AM

**Intersection Name:** Cobourg University and William **Intersection Alias:** 997

Access Code: 9999 Channel: 6 Address: 5 Revision: 2.29m

**Access Data**

Port 2 Comm :1200 Baud
Port 3 Comm :1200 Baud

## Phase Data

### Vehical Basic Timings

| Phase | Min_Grn | Passage | Max1 | Max2 | Yellow | All Red |
|---|---|---|---|---|---|---|
| 1 | 6 | 3.0 | 15 | 15 | 3.0 | 2.0 |
| 2 | 10 | 0.0 | 20 | 15 | 5.0 | 2.0 |
| 4 | 15 | 2.5 | 20 | 25 | 3.0 | 2.0 |
| 5 | 6 | 3.0 | 9 | 9 | 3.0 | 2.0 |
| 6 | 10 | 0.0 | 20 | 15 | 5.0 | 2.0 |

### Vehical Density Timings

| Added Initial | Max_Initial | Time B4 Reduction | Cars Before | Time To Reduce | Min_Gap |
|---|---|---|---|---|---|
| 0.0 | 0 | 0 | 0 | 0 | 0.0 |
| 0.0 | 0 | 0 | 0 | 0 | 0.0 |
| 0.0 | 0 | 0 | 0 | 0 | 0.0 |
| 0.0 | 0 | 0 | 0 | 0 | 0.0 |
| 0.0 | 0 | 0 | 0 | 0 | 0.0 |

### Pedestrian Timing

| Phase | Walk | Ped Clear | Flashing Walk | Extended Actuated Ped Clear | Rest in Walk |
|---|---|---|---|---|---|
| 1 | 0 | 0 | No | 0 | No |
| 2 | 10 | 10 | No | 0 | No |
| 4 | 14 | 10 | No | 0 | No |
| 5 | 0 | 0 | No | 0 | No |
| 6 | 10 | 10 | No | 0 | No |

### General Control

| Initialize | Non-Act Response | Veh Recall | Ped Recall | Recall Delay |
|---|---|---|---|---|
| Inactive | None | None | None | 0 |
| Yellow | NonActI | None | Non Act | 0 |
| Inactive | NonActII | None | None | 0 |
| Inactive | None | None | None | 0 |
| Yellow | NonActI | None | Non Act | 0 |

### Miscellaneous

| Non Lock | Dual Entry | Last Car Passage | Conditional Service | No Simultaneous Gap Out |
|---|---|---|---|---|
| Yes | No | No | No | No |
| No | Yes | No | No | No |
| Yes | No | No | No | No |
| Yes | No | No | No | No |
| No | Yes | No | No | No |

### Special Sequence

**Default Data**

### Vehical Detector Phase Assignment

| Assigned Phase | Mode | Switched Phase | Extend | Delay |
|---|---|---|---|---|

**Default Data**

### Pedestrian Detector

**Default Data**

### Special Detector Phase Assignment

| Assign Phase | Mode | Switched Phase | Extend | Delay |
|---|---|---|---|---|

:

**Default Data**

## Unit Data

### General Control

Startup Time: 5sec Startup State: Flash Red Revert: 4sec

Auto Ped Clear: No Stop Time Reset: No Alternate Sequence: 0

ABC connector Input Modes: 0

ABC connector Output Modes: 0

D connector Input Modes: 0

D connector Output Modes: 0

| Ring | Input Respons | Output Selection |
|---|---|---|
| 1 | Ring 1 | Ring 1 |
| 2 | Ring 2 | Ring 2 |
| 3 | None | None |
| 4 | None | Ring 2 |

### Remote Flash

Test A = Flash

| Phase | Flash Entry Phase | Flash Exit Phase |
|---|---|---|

**Default Data - No Flash**

| Channel | Flash Color | Flash Alternat |
|---|---|---|

**Default Data - No Flash**

### Overlaps

Overlaps

| Phase(s) | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 3 | | | | | | | | | | | | | |
| | 2 | | 4 | | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trail Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Trail Yellow | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Trail Red | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Plus Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Minus Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Ring

| Phase | Ring | Next Phase |
|---|---|---|
| 1 | 1 | 2 |
| 2 | 1 | 3 |
| 4 | 1 | 1 |
| 5 | 2 | 6 |
| 6 | 2 | 7 |

Phase(s)

| Concurrent Phases | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 1 | 3 | 3 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| | 5 | 5 | 7 | 7 | 2 | 2 | 4 | 4 | | | | | | | | |
| | 6 | 6 | 8 | 8 | 5 | 6 | 7 | 8 | | | | | | | | |

## Alternate Sequences

Alternate Sequences

| Phase Pair(s) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 2 | 3 4 | 1 2 | 5 6 | 1 2 | 3 4 | 1 2 | 7 8 | 1 2 | 3 4 | 1 2 | 5 6 | 1 2 | 3 4 | 1 2 |
| 2 | 0 0 | 0 0 | 3 4 | 0 0 | 5 6 | 5 6 | 3 4 | 0 0 | 7 8 | 7 8 | 3 4 | 7 8 | 5 6 | 5 6 | 3 4 |
| 3 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 5 6 | 0 0 | 0 0 | 0 0 | 7 8 | 0 0 | 7 8 | 7 8 | 5 6 |
| 4 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 7 8 |

## Port 1 Data

| BIU Addr | Port Status | Message |
|---|---|---|
| | | 40 |

Default Data

## Channel Assignment

| Control | Channel | Hardware Pin Set | | Control | Channel | Hardware Pin Set | | Control | Channel | Hardware Pin Set | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph.1 Veh | 1 | 1 - Ph.1 RYG | 1 | Ph.2 Veh | 2 | 2 - Ph.2 RYG | 2 | Ph.3 Veh | 3 | 3 - Ph.3 RYG | 3 |
| Ph.4 Veh | 4 | 4 - Ph.4 RYG | 4 | Ph.5 Veh | 5 | 5 - Ph.5 RYG | 5 | Ph.6 Veh | 6 | 6 - Ph.6 RYG | 6 |
| Ph.7 Veh | 7 | 7 - Ph.7 RYG | 7 | Ph.8 Veh | 8 | 8 - Ph.8 RYG | 8 | Ph.2 Ped | 9 | 10 - Ph.2 DPW | 10 |
| Ph.4 Ped | 10 | 12 - Ph.4 DPW | 12 | Ph.6 Ped | 11 | 14 - Ph.6 DPW | 14 | Ph.8 Ped | 12 | 16 - Ph.8 DPW | 16 |
| Ph.1 OLP | 13 | 17 - Ph.1 RYG | 17 | Ph.2 OLP | 14 | 18 - Ph.2 RYG | 18 | Ph.3 OLP | 15 | 19 - Ph.3 RYG | 19 |
| Ph.4 OLP | 16 | 20 - Ph.4 RYG | 20 | Ph.1 Ped | 17 | 9 - Ph.1 DPW | 9 | Ph.3 Ped | 18 | 11 - Ph.3 DPW | 11 |
| Ph.5 Ped | 19 | 13 - Ph.5 DPW | 13 | Ph.7 Ped | 20 | 15 - Ph.7 DPW | 15 | Ph.5 OLP | 21 | 21 - Ph.5 RYG | 21 |
| Ph.6 OLP | 22 | 22 - Ph.6 RYG | 22 | Ph.7 OLP | 23 | 23 - Ph.7 RYG | 23 | Ph.8 OLP | 24 | 24 - Ph.8 RYG | 24 |

## Coordination Data

**Dial/Split Cycle**

/

General Coordination Data

Operation Mode: 1=Auto
Coordination Mode: 0=Permissive
Maximun Mode: 2=Max 2
Correction Mode: 0=Dwell

Offset Mode: 0=Beg Grn
Force Mode: 0=Plan
Max Dwell Time: 0
Yield Period: 0

Manual Dial: 0
Manual Split: 0
Manual Offset: 0

### Split Times and Phase Modes

Dial / Split

| Ph. | Splits | Ph. Mode | Ph. | Splits | Ph. Mode | Ph. | Splits | Ph. Mode | Ph. | Splits | Ph. Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|

### Traffic Plan Data

Plan: // Offset Time: Alt. Sequence: Mode: Rg 2 Lag Time: Rg 3 Lag Time: Rg 4 Lag Time:

## Local TBC Data

Start of Daylight Saving Month: 4 Week: 1 Cycle Zero ReferenceHours: 24 Min: 0

End of Daylight Saving Month: 10 Week: 5

| Source Day | Equate Days 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 2 | 3 | 4 | 5 | 6 | 0 | 0 | 0 |

### Traffic Data

| vent | Day | Time | D/S/O | flash | PHASE FUNCTION 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 14:0 | 0/0/0 | | | X | | X | | X | | | | | | | | | | |
| 2 | 2 | 16:0 | 0/0/4 | | | | | | | | | | | | | | | | | |

## AUX. Events

| Event | Program Day | Hour | Min. | Aux 1 | Ouputs 2 | 3 | Det. Diag. D1 | Det. Rpt. D2 | Det. Mult100 D3 | Dimming | Special Function Outputs 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Default Data - No Special Day(s) or Week(s) Programmed

## Special Functions

| Function | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## Phase Function

| Phase Function Map | PF1 | PF2 | PF3 | PF4 | PF5 | PF6 | PF7 | PF8 | PF9 | PF10 | PF11 | PF12 | PF13 | PF14 | PF15 | PF16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## Dimming Data

| Channel | Red | Yellow | Green | Alternate |
|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ |

Default Data - No Dimming Programmed

# Preemption Data

## General Preemption Data

| Ring | Min Grn/Walk Time |
|---|---|
| 1 | 10 |
| 2 | 10 |
| 3 | 10 |
| 4 | 10 |

Flash > Preepmt 1
Preepmt 1 > Preempt 2
Preepmt 2 = Preempt 3
Preepmt 3 = Preempt 4
Preepmt 4 = Preempt 5
Preepmt 5 = Preempt 6

## Preempt Timers

| Preempt | Non-Locking | Link to Preempt | Delay | Extend | Duration | MaxCall | Lock-Out | Select: Ped Clear | Select: Yel | Select: Red | Track: Grn | Track: Ped | Track: Yel | Track: Red | Dwell Green | Return: Ped Clear | Return: Yel | Return: Red |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | No | 0 | 0 | 5 | 0 | 100 | 0 | 8 | 4.0 | 2.0 | 0 | 0 | 0.0 | 0.0 | 10 | 8 | 4.0 | 2.0 |
| 2 | No | 0 | 0 | 5 | 0 | 100 | 0 | 8 | 4.0 | 2.0 | 0 | 0 | 0.0 | 0.0 | 10 | 8 | 4.0 | 2.0 |
| 3 | No | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 4.0 | 2.0 | 10 | 8 | 4.0 | 2.0 | 10 | 8 | 4.0 | 2.0 |
| 4 | No | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 4.0 | 2.0 | 10 | 8 | 4.0 | 2.0 | 10 | 8 | 4.0 | 2.0 |
| 5 | No | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 4.0 | 2.0 | 10 | 8 | 4.0 | 2.0 | 10 | 8 | 4.0 | 2.0 |
| 6 | No | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 4.0 | 2.0 | 10 | 8 | 4.0 | 2.0 | 10 | 8 | 4.0 | 2.0 |

Preempt 1

| Phase | Exit Phase | Exit Calls |
|---|---|---|
| 1 | No | Yes |
| 2 | Yes | Yes |
| 3 | No | Yes |
| 4 | No | Yes |
| 5 | No | Yes |
| 6 | Yes | Yes |
| 7 | No | Yes |
| 8 | No | Yes |

Preempt 2

| Phase | Exit Phase | Exit Calls |
|---|---|---|
| 1 | No | Yes |
| 2 | Yes | Yes |
| 3 | No | Yes |
| 4 | No | Yes |
| 5 | No | Yes |
| 6 | Yes | Yes |
| 7 | No | Yes |
| 8 | No | Yes |

Preempt 3

| Phase | Exit Phase | Exit Calls |
|---|---|---|
| 1 | No | Yes |
| 2 | Yes | Yes |
| 3 | No | Yes |
| 4 | No | Yes |
| 5 | No | Yes |
| 6 | Yes | Yes |
| 7 | No | Yes |
| 8 | No | Yes |

Preempt 4

| Phase | Exit Phase | Exit Calls |
|---|---|---|
| 1 | No | Yes |
| 2 | Yes | Yes |
| 3 | No | Yes |
| 4 | No | Yes |
| 5 | No | Yes |
| 6 | Yes | Yes |
| 7 | No | Yes |
| 8 | No | Yes |

Preempt 5

| Phase | Exit Phase | Exit Calls |
|---|---|---|
| 1 | No | Yes |
| 2 | Yes | Yes |
| 3 | No | Yes |
| 4 | No | Yes |
| 5 | No | Yes |
| 6 | Yes | Yes |
| 7 | No | Yes |
| 8 | No | Yes |

Preempt 6

| Phase | Exit Phase | Exit Calls |
|---|---|---|
| 1 | No | Yes |
| 2 | Yes | Yes |
| 3 | No | Yes |
| 4 | No | Yes |
| 5 | No | Yes |
| 6 | Yes | Yes |
| 7 | No | Yes |
| 8 | No | Yes |

Priority Timers

| Priority | Non-Locking | Delay | Extend | Duration | Dwell | Max_Call | Lock-Out | Skip Phases |
|---|---|---|---|---|---|---|---|---|
| 1 | No | 0 | 0 | 0 | 0 | 0 | 0 | 0=Do not Skip Phases |
| 2 | No | 0 | 0 | 0 | 0 | 0 | 0 | 0=Do not Skip Phases |
| 3 | No | 0 | 0 | 0 | 0 | 0 | 0 | 0=Do not Skip Phases |
| 4 | No | 0 | 0 | 0 | 0 | 0 | 0 | 0=Do not Skip Phases |
| 5 | No | 0 | 0 | 0 | 0 | 0 | 0 | 0=Do not Skip Phases |
| 6 | No | 0 | 0 | 0 | 0 | 0 | 0 | 0=Do not Skip Phases |

Priority 1

| Phase | Exit Phase | Exit Calls |
|---|---|---|

Priority 2

| Phase | Exit Phase | Exit Calls |
|---|---|---|

Priority 3

| Phase | Exit Phase | Exit Calls |
|---|---|---|

Priority 4

| Phase | Exit Phase | Exit Calls |
|---|---|---|

Priority 5

| Phase | Exit Phase | Exit Calls |
|---|---|---|

Priority 6

| Phase | Exit Phase | Exit Calls |
|---|---|---|

Preempt 1

Vehical Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|
| 2 | Red | Green | No |
| 6 | Red | Green | No |

Pedestrian Phases

| Ph | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Overlaps

| Ovlp | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Preempt 2

Vehical Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|
| 4 | Red | Green | No |

Pedestrian Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Overlaps

| Ovlp. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Preempt 3

Vehical Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Pedestrian Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Overlaps

| Ovlp. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Preempt 4

Vehical Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Pedestrian Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Overlaps

| Ovlp. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Preempt 5

Vehical Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Pedestrian Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Overlaps

| Ovlp. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Preempt 6

Vehical Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Pedestrian Phases

| Ph. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

Overlaps

| Ovlp. | Track | Dwell | Cycle |
|---|---|---|---|

**Default Data**

# System/Detectors Data

## Local Critical Alarms

Revert to Backup: 15 1st Phone:

Local Free: No Cycle Failure: No Coord Failure: No Conflict Flash: No Remote Flash: No 2nd Phone:

Local Fash: No Cycle Fault: No Coord Fault: No Premption: No Voltage Monitor: No

Special Status 1: No Special Status 2: No Special Status 3: No Special Status 4: No Special Status 5: No Special Status 6: No

## Traffic Responsive

| System Detector | Detector Channel | Average Veh/Hr | Occupancy Time(mins) | Occupancy Correction/10 | Min Volume % | Queue 1 Detectors | System Detectors | Weight Factor | Queue 2 Detectors | System Detectors | Weight Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Default Data**
Sample Interval:

**Default Data**
Queue: 1 Input Selection: 0=Average
Detector Failed Level : 0
Queue: 2 Input Selection: 0=Average
Detector Failed Level : 0

**Default Data**
Queue:

| Level | Enter | Leave | Dial / Split / Offset |
|---|---|---|---|
| | | | / / |

**Default Data**

Vehical Detector
Diagnostic Value 0

| Detector | Max Presence | No Activity | Erratic Count |
|---|---|---|---|

**Default Data - Diag 0 Values**

Vehical Detector
Diagnostic Value 1

| Detector | Max Presence | No Activity | Erratic Count |
|---|---|---|---|

**Default Data - No Diag 1 Values**

Special Detector
Diagnostic Value 0

| Detector | Max Presence | No Activity | Erratic Count |
|---|---|---|---|

**Default Data - No Diag 0 Valı**

Pedestrian Detector
Diagnostic Value 0

| Detector | Max Presence | No Activity | Erratic Count |
|---|---|---|---|

**Default Data - No Diag 0 Values**

Pedestrian Detector
Diagnostic Value 1

| Detector | Max Presence | No Activity | Erratic Count |
|---|---|---|---|

**Default Data - No Diag 1 Values**

Special Detector
Diagnostic Value 1

| Detector | Max Presence | No Activity | Erratic Count |
|---|---|---|---|

**Default Data - No Diag 1 Values**

## Speed Trap Data

Speed Trap:

Measurement:

| Detector 1 | Detector_2 | Distance : |
|---|---|---|

Dial/Split/Offset
//

**Default Data**

| Speed Trap Low Treshold | Speed Trap High Treshold |
|---|---|

**Default Data**

## Volume Detector Data

| Volume Detector Number | Report Interval Controller Detector Channel |
|---|---|

**Default Data**

# APPENDIX C

# LEVEL OF SERVICE (LOS) DEFINITIONS

## LEVEL OF SERVICE DEFINITIONS

### Level of Service Criteria for Signalized Intersections

| Level of Service | Control Delay per Vehicle (seconds) | Interpretation |
|---|---|---|
| A | ≤ 10 | **Excellent.** Progression is extremely favourable and most of the vehicles arrive during the green phase. Most vehicles do not stop at all |
| B | >10 & ≤ 20 | **Very Good.** Good progressing, short cycle lengths or both. More vehicles stop than with LOS "A", causing higher levels of average delay. |
| C | >20 & ≤ 35 | **Good.** Fair progressing, longer cycle lengths or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping. |
| D | >35 & ≤ 55 | **Fair.** At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high V/C ratio. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable. |
| E | >55 & ≤ 80 | **Poor.** This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. |
| F | >80 | **Unsatisfactory.** This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occurs at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such delays. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. |

Source: *From Highway Capacity Manual Special Report 209-Table 9-1, Page 9-7*

## LEVEL OF SERVICE DEFINITIONS

**Level of Service Criteria for Two Way Stop Control (TWSC) Intersections**

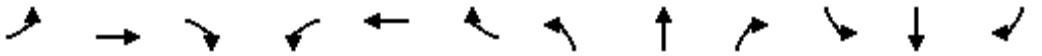
| Level of Service | Control Delay per Vehicle (seconds) | Interpretation |
|---|---|---|
| A | ≤ 10 | **Excellent.** Large & frequent gaps in traffic on the main roadway. Queuing on the minor street is rare |
| B | >10 & ≤ 15 | **Very Good**. Fewer gaps exist in the traffic on the main roadway. Queuing on the minor street is minimal. |
| C | >15 & ≤ 25 | **Good.** Fewer gaps exist in traffic on the main roadway. Delay on the minor approach becomes more noticeable. |
| D | >25 & ≤ 35 | **Fair.** Infrequent & shorter gaps in traffic on the main roadway. Queuing lengths develop on the minor street. |
| E | >35 & ≤ 50 | **Poor.** Very infrequent gaps in traffic on the main roadway. Queuing lengths become noticeable. |
| F | >50 | **Unsatisfactory.** Very few gaps in traffic on the main roadway. Excessive delays with significant queue lengths on the minor street |

Source: *From Highway Capacity Manual Special Report 209-Table 10-7, Page No.10-25*

# APPENDIX D

# SYNCHRO ANALYSIS

- **EXISTING (2020) TRAFFIC CONDITIONS**
- **FUTURE (2027) TOTAL TRAFFIC CONDITIONS**

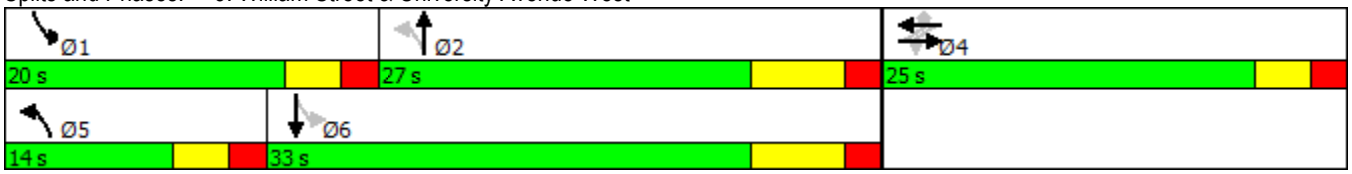


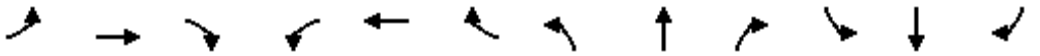
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 18 | 24 | 2 | 5 | 20 | 245 | 2 | 213 | 2 | 243 | 210 | 13 |
| Future Volume (vph) | 18 | 24 | 2 | 5 | 20 | 245 | 2 | 213 | 2 | 243 | 210 | 13 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 |
| Storage Length (m) | 0.0 | | 0.0 | 10.0 | | 0.0 | 30.0 | | 0.0 | 35.0 | | 0.0 |
| Storage Lanes | 0 | | 0 | 1 | | 1 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 0 | 1872 | 0 | 0 | 1577 | 1597 | 1190 | 3540 | 0 | 1750 | 3449 | 0 |
| Flt Permitted | | 0.897 | | | 0.958 | | 0.590 | | | 0.493 | | |
| Satd. Flow (perm) | 0 | 1712 | 0 | 0 | 1526 | 1574 | 736 | 3540 | 0 | 905 | 3449 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 2 | | | | 288 | | 1 | | | 10 | |
| Link Speed (k/h) | | 40 | | | 40 | | | 50 | | | 50 | |
| Link Distance (m) | | 87.1 | | | 278.4 | | | 71.3 | | | 86.1 | |
| Travel Time (s) | | 7.8 | | | 25.1 | | | 5.1 | | | 6.2 | |
| Confl. Peds. (#/hr) | 2 | | 1 | 1 | | 2 | 3 | | 3 | 3 | | 3 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 3% | 25% | 0% | 50% | 3% | 0% | 2% | 5% | 0% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 51 | 0 | 0 | 30 | 288 | 2 | 253 | 0 | 286 | 262 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 4 | | 4 | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | | 4 | 4 | 4 | 5 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 15.0 | 15.0 | | 15.0 | 15.0 | 15.0 | 6.0 | 10.0 | | 6.0 | 10.0 | |
| Minimum Split (s) | 24.0 | 24.0 | | 24.0 | 24.0 | 24.0 | 11.0 | 27.0 | | 11.0 | 27.0 | |
| Total Split (s) | 25.0 | 25.0 | | 25.0 | 25.0 | 25.0 | 14.0 | 27.0 | | 20.0 | 33.0 | |
| Total Split (%) | 34.7% | 34.7% | | 34.7% | 34.7% | 34.7% | 19.4% | 37.5% | | 27.8% | 45.8% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | | 3.0 | 5.0 | |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lost Time Adjust (s) | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | | 5.0 | | | 5.0 | 5.0 | 5.0 | 7.0 | | 5.0 | 7.0 | |
| Lead/Lag | | | | | | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | | None | None | None | None | Max | | None | Max | |
| Act Effct Green (s) | | 15.8 | | | 15.8 | 15.8 | 28.1 | 20.1 | | 37.7 | 33.7 | |
| Actuated g/C Ratio | | 0.25 | | | 0.25 | 0.25 | 0.44 | 0.32 | | 0.59 | 0.53 | |
| v/c Ratio | | 0.12 | | | 0.08 | 0.47 | 0.01 | 0.23 | | 0.42 | 0.14 | |
| Control Delay | | 19.5 | | | 19.8 | 5.9 | 7.0 | 17.5 | | 8.5 | 8.6 | |
| Queue Delay | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | | 19.5 | | | 19.8 | 5.9 | 7.0 | 17.5 | | 8.5 | 8.6 | |
| LOS | | B | | | B | A | A | B | | A | A | |
| Approach Delay | | 19.5 | | | 7.2 | | | 17.4 | | | 8.5 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Queue Length 50th (m) | | 4.6 | | | 2.8 | 0.0 | 0.1 | 11.5 | | 14.5 | 6.6 | |
| Queue Length 95th (m) | | 12.4 | | | 8.6 | 14.0 | 0.8 | 21.8 | | 27.5 | 17.6 | |
| Internal Link Dist (m) | | 63.1 | | | 254.4 | | | 47.3 | | | 62.1 | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turn Bay Length (m) | | | | | | | 30.0 | | | 35.0 | | |
| Base Capacity (vph) | | 542 | | | 482 | 694 | 425 | 1119 | | 737 | 1836 | |
| Starvation Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | | 0.09 | | | 0.06 | 0.41 | 0.00 | 0.23 | | 0.39 | 0.14 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 72 | | | |
| Actuated Cycle Length: 63.5 | | | |
| Natural Cycle: 65 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.47 | | | |
| Intersection Signal Delay: 10.6 | | Intersection LOS: B | |
| Intersection Capacity Utilization 58.9% | | ICU Level of Service B | |
| Analysis Period (min) 15 | | | |

Splits and Phases: 3: William Street & University Avenue West



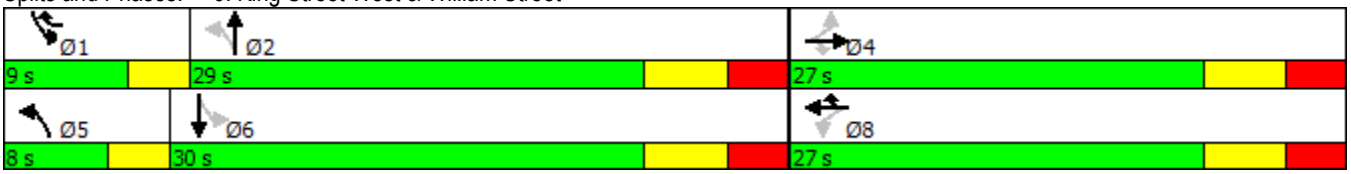


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 17 | 79 | 17 | 2 | 40 | 154 | 5 | 61 | 6 | 134 | 69 | 11 |
| Future Volume (vph) | 17 | 79 | 17 | 2 | 40 | 154 | 5 | 61 | 6 | 134 | 69 | 11 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 |
| Storage Length (m) | 0.0 | | 15.0 | 0.0 | | 0.0 | 18.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 0 | | 1 | 0 | | 1 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 0 | 1843 | 1597 | 0 | 1917 | 1551 | 1785 | 1854 | 0 | 1716 | 1838 | 0 |
| Flt Permitted | | 0.927 | | | 0.981 | | 0.699 | | | 0.603 | | |
| Satd. Flow (perm) | 0 | 1723 | 1557 | 0 | 1884 | 1551 | 1307 | 1854 | 0 | 1073 | 1838 | 0 |
| Right Turn on Red | | | Yes | | | No | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 117 | | | | | 7 | | | 12 | |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | 50 | |
| Link Distance (m) | | 183.2 | | | 179.1 | | | 126.4 | | | 288.5 | |
| Travel Time (s) | | 13.2 | | | 12.9 | | | 9.1 | | | 20.8 | |
| Confl. Peds. (#/hr) | 2 | | 3 | 3 | | | 3 | | 10 | 10 | | 3 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Heavy Vehicles (%) | 0% | 4% | 0% | 0% | 0% | 3% | 0% | 2% | 0% | 4% | 1% | 9% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 108 | 19 | 0 | 47 | 173 | 6 | 76 | 0 | 151 | 90 | 0 |
| Turn Type | Perm | NA | Perm | Perm | NA | pt+ov | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | 1 8 | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 1 8 | 5 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | | 5.0 | 10.0 | | 5.0 | 10.0 | |
| Minimum Split (s) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | | 8.0 | 26.0 | | 8.0 | 26.0 | |
| Total Split (s) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | | 8.0 | 29.0 | | 9.0 | 30.0 | |
| Total Split (%) | 41.5% | 41.5% | 41.5% | 41.5% | 41.5% | | 12.3% | 44.6% | | 13.8% | 46.2% | |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 3.0 | 4.0 | | 3.0 | 4.0 | |
| All-Red Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 0.0 | 3.0 | | 0.0 | 3.0 | |
| Lost Time Adjust (s) | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | | 7.0 | 7.0 | | 7.0 | | 3.0 | 7.0 | | 3.0 | 7.0 | |
| Lead/Lag | | | | | | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | None | None | None | | None | Min | | None | Min | |
| Act Effct Green (s) | | 11.7 | 11.7 | | 11.7 | 23.0 | 24.0 | 14.7 | | 27.8 | 24.4 | |
| Actuated g/C Ratio | | 0.25 | 0.25 | | 0.25 | 0.50 | 0.52 | 0.32 | | 0.60 | 0.53 | |
| v/c Ratio | | 0.25 | 0.04 | | 0.10 | 0.22 | 0.01 | 0.13 | | 0.21 | 0.09 | |
| Control Delay | | 16.0 | 0.2 | | 14.4 | 7.1 | 6.4 | 13.9 | | 7.1 | 9.8 | |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | | 16.0 | 0.2 | | 14.4 | 7.1 | 6.4 | 13.9 | | 7.1 | 9.8 | |
| LOS | | B | A | | B | A | A | B | | A | A | |
| Approach Delay | | 13.6 | | | 8.7 | | | 13.4 | | | 8.1 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Queue Length 50th (m) | | 6.9 | 0.0 | | 2.9 | 6.1 | 0.3 | 4.3 | | 5.2 | 3.3 | |
| Queue Length 95th (m) | | 19.3 | 0.0 | | 10.1 | 19.1 | 1.8 | 14.2 | | 17.2 | 15.4 | |
| Internal Link Dist (m) | | 159.2 | | | 155.1 | | | 102.4 | | | 264.5 | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turn Bay Length (m) | | | 15.0 | | | | 18.0 | | | | | |
| Base Capacity (vph) | | 766 | 757 | | 838 | 872 | 732 | 924 | | 732 | 1098 | |
| Starvation Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | | 0.14 | 0.03 | | 0.06 | 0.20 | 0.01 | 0.08 | | 0.21 | 0.08 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 65 | | | |
| Actuated Cycle Length: 46.1 | | | |
| Natural Cycle: 65 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.25 | | | |
| Intersection Signal Delay: 10.0 | | Intersection LOS: A | |
| Intersection Capacity Utilization 44.1% | | ICU Level of Service A | |
| Analysis Period (min) 15 | | | |

Splits and Phases: 6: King Street West & William Street

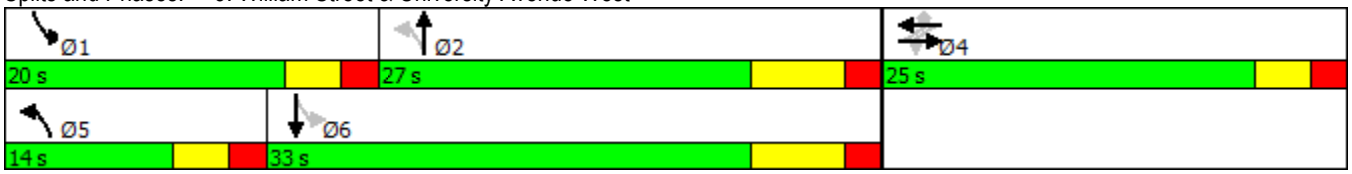


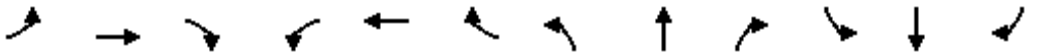
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 14 | 23 | 2 | 13 | 35 | 315 | 4 | 258 | 8 | 319 | 253 | 21 |
| Future Volume (vph) | 14 | 23 | 2 | 13 | 35 | 315 | 4 | 258 | 8 | 319 | 253 | 21 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 |
| Storage Length (m) | 0.0 | | 0.0 | 10.0 | | 0.0 | 30.0 | | 0.0 | 35.0 | | 0.0 |
| Storage Lanes | 0 | | 0 | 1 | | 1 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 0 | 1829 | 0 | 0 | 1894 | 1597 | 1785 | 3559 | 0 | 1767 | 3589 | 0 |
| Flt Permitted | | 0.909 | | | 0.933 | | 0.574 | | | 0.479 | | |
| Satd. Flow (perm) | 0 | 1693 | 0 | 0 | 1791 | 1576 | 1073 | 3559 | 0 | 883 | 3589 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 2 | | | | 335 | | 4 | | | 13 | |
| Link Speed (k/h) | | 40 | | | 40 | | | 50 | | | 50 | |
| Link Distance (m) | | 87.1 | | | 278.4 | | | 71.3 | | | 86.1 | |
| Travel Time (s) | | 7.8 | | | 25.1 | | | 5.1 | | | 6.2 | |
| Confl. Peds. (#/hr) | 1 | | 2 | 2 | | 1 | 4 | | 9 | 9 | | 4 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Heavy Vehicles (%) | 0% | 4% | 0% | 0% | 0% | 0% | 0% | 2% | 0% | 1% | 0% | 5% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 41 | 0 | 0 | 51 | 335 | 4 | 283 | 0 | 339 | 291 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 4 | | 4 | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | | 4 | 4 | 4 | 5 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 15.0 | 15.0 | | 15.0 | 15.0 | 15.0 | 6.0 | 10.0 | | 6.0 | 10.0 | |
| Minimum Split (s) | 24.0 | 24.0 | | 24.0 | 24.0 | 24.0 | 11.0 | 27.0 | | 11.0 | 27.0 | |
| Total Split (s) | 25.0 | 25.0 | | 25.0 | 25.0 | 25.0 | 14.0 | 27.0 | | 20.0 | 33.0 | |
| Total Split (%) | 34.7% | 34.7% | | 34.7% | 34.7% | 34.7% | 19.4% | 37.5% | | 27.8% | 45.8% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | | 3.0 | 5.0 | |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lost Time Adjust (s) | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | | 5.0 | | | 5.0 | 5.0 | 5.0 | 7.0 | | 5.0 | 7.0 | |
| Lead/Lag | | | | | | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | | None | None | None | None | Max | | None | Max | |
| Act Effct Green (s) | | 15.8 | | | 15.8 | 15.8 | 28.1 | 20.1 | | 38.5 | 34.5 | |
| Actuated g/C Ratio | | 0.25 | | | 0.25 | 0.25 | 0.44 | 0.31 | | 0.60 | 0.54 | |
| v/c Ratio | | 0.10 | | | 0.12 | 0.52 | 0.01 | 0.25 | | 0.49 | 0.15 | |
| Control Delay | | 19.5 | | | 20.4 | 6.2 | 6.8 | 17.8 | | 9.3 | 8.5 | |
| Queue Delay | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | | 19.5 | | | 20.4 | 6.2 | 6.8 | 17.8 | | 9.3 | 8.5 | |
| LOS | | B | | | C | A | A | B | | A | A | |
| Approach Delay | | 19.5 | | | 8.0 | | | 17.7 | | | 8.9 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Queue Length 50th (m) | | 3.8 | | | 5.0 | 0.0 | 0.2 | 13.2 | | 17.7 | 7.4 | |
| Queue Length 95th (m) | | 11.1 | | | 13.4 | 18.1 | 1.3 | 25.6 | | 35.7 | 20.5 | |
| Internal Link Dist (m) | | 63.1 | | | 254.4 | | | 47.3 | | | 62.1 | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turn Bay Length (m) | | | | | | | 30.0 | | | 35.0 | | |
| Base Capacity (vph) | | 529 | | | 558 | 722 | 619 | 1113 | | 735 | 1931 | |
| Starvation Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | | 0.08 | | | 0.09 | 0.46 | 0.01 | 0.25 | | 0.46 | 0.15 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 72 | | | |
| Actuated Cycle Length: 64.3 | | | |
| Natural Cycle: 65 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.52 | | | |
| Intersection Signal Delay: 10.9 | | Intersection LOS: B | |
| Intersection Capacity Utilization 63.2% | | ICU Level of Service B | |
| Analysis Period (min) 15 | | | |

Splits and Phases: 3: William Street & University Avenue West



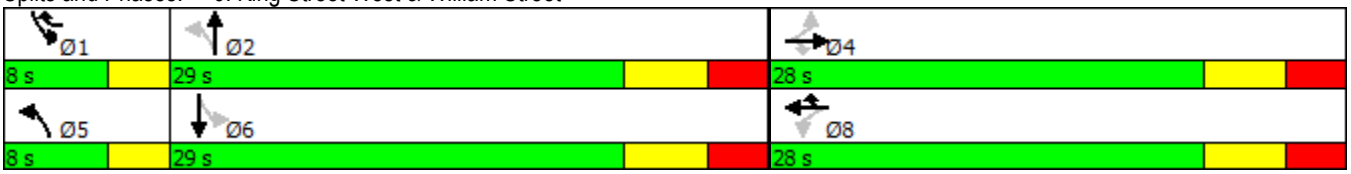


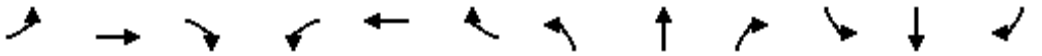
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 82 | 3 | 1 | 45 | 96 | 6 | 44 | 4 | 118 | 49 | 8 |
| Future Volume (vph) | 10 | 82 | 3 | 1 | 45 | 96 | 6 | 44 | 4 | 118 | 49 | 8 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 |
| Storage Length (m) | 0.0 | | 15.0 | 0.0 | | 0.0 | 18.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 0 | | 1 | 0 | | 1 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 0 | 1824 | 1597 | 0 | 1796 | 1566 | 1785 | 1859 | 0 | 1785 | 1876 | 0 |
| Flt Permitted | | 0.952 | | | 0.991 | | 0.718 | | | 0.619 | | |
| Satd. Flow (perm) | 0 | 1747 | 1550 | 0 | 1781 | 1566 | 1341 | 1859 | 0 | 1152 | 1876 | 0 |
| Right Turn on Red | | | Yes | | | No | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 117 | | | | | 4 | | | 8 | |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | 50 | |
| Link Distance (m) | | 183.2 | | | 179.1 | | | 126.4 | | | 288.5 | |
| Travel Time (s) | | 13.2 | | | 12.9 | | | 9.1 | | | 20.8 | |
| Confl. Peds. (#/hr) | | | 6 | 6 | | | 4 | | 6 | 6 | | 4 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles (%) | 10% | 4% | 0% | 0% | 7% | 2% | 0% | 2% | 0% | 0% | 0% | 0% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 97 | 3 | 0 | 48 | 101 | 6 | 50 | 0 | 124 | 60 | 0 |
| Turn Type | Perm | NA | Perm | Perm | NA | pt+ov | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | 1 8 | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 1 8 | 5 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | | 5.0 | 10.0 | | 5.0 | 10.0 | |
| Minimum Split (s) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | | 8.0 | 26.0 | | 8.0 | 26.0 | |
| Total Split (s) | 28.0 | 28.0 | 28.0 | 28.0 | 28.0 | | 8.0 | 29.0 | | 8.0 | 29.0 | |
| Total Split (%) | 43.1% | 43.1% | 43.1% | 43.1% | 43.1% | | 12.3% | 44.6% | | 12.3% | 44.6% | |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 3.0 | 4.0 | | 3.0 | 4.0 | |
| All-Red Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 0.0 | 3.0 | | 0.0 | 3.0 | |
| Lost Time Adjust (s) | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | | 7.0 | 7.0 | | 7.0 | | 3.0 | 7.0 | | 3.0 | 7.0 | |
| Lead/Lag | | | | | | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | None | None | None | | None | Min | | None | Min | |
| Act Effct Green (s) | | 11.9 | 11.9 | | 11.9 | 22.2 | 23.8 | 17.7 | | 25.7 | 22.8 | |
| Actuated g/C Ratio | | 0.27 | 0.27 | | 0.27 | 0.51 | 0.54 | 0.40 | | 0.59 | 0.52 | |
| v/c Ratio | | 0.21 | 0.01 | | 0.10 | 0.13 | 0.01 | 0.07 | | 0.17 | 0.06 | |
| Control Delay | | 15.0 | 0.0 | | 14.0 | 6.6 | 6.3 | 13.2 | | 6.9 | 9.9 | |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | | 15.0 | 0.0 | | 14.0 | 6.6 | 6.3 | 13.2 | | 6.9 | 9.9 | |
| LOS | | B | A | | B | A | A | B | | A | A | |
| Approach Delay | | 14.5 | | | 9.0 | | | 12.5 | | | 7.9 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Queue Length 50th (m) | | 6.0 | 0.0 | | 2.9 | 3.4 | 0.3 | 2.7 | | 4.2 | 2.2 | |
| Queue Length 95th (m) | | 17.5 | 0.0 | | 10.2 | 12.1 | 1.8 | 10.4 | | 14.8 | 11.6 | |
| Internal Link Dist (m) | | 159.2 | | | 155.1 | | | 102.4 | | | 264.5 | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turn Bay Length (m) | | | 15.0 | | | | 18.0 | | | | | |
| Base Capacity (vph) | | 873 | 833 | | 890 | 958 | 782 | 1091 | | 751 | 1103 | |
| Starvation Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | | 0.11 | 0.00 | | 0.05 | 0.11 | 0.01 | 0.05 | | 0.17 | 0.05 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 65 | | | |
| Actuated Cycle Length: 43.8 | | | |
| Natural Cycle: 65 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.21 | | | |
| Intersection Signal Delay: 10.1 | | Intersection LOS: B | |
| Intersection Capacity Utilization 44.9% | | ICU Level of Service A | |
| Analysis Period (min) 15 | | | |

Splits and Phases: 6: King Street West & William Street



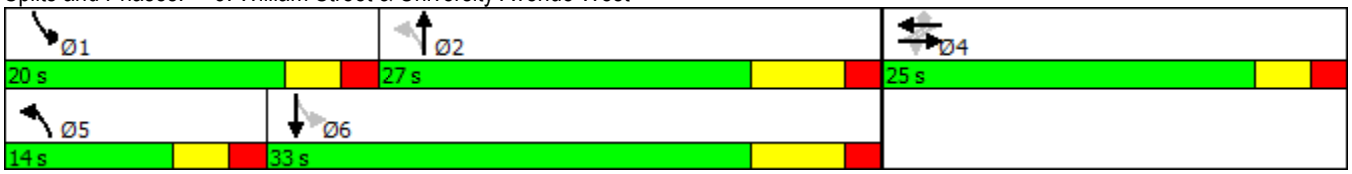


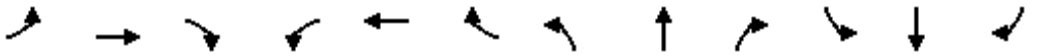
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 22 | 27 | 4 | 6 | 21 | 281 | 4 | 248 | 2 | 279 | 242 | 13 |
| Future Volume (vph) | 22 | 27 | 4 | 6 | 21 | 281 | 4 | 248 | 2 | 279 | 242 | 13 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 |
| Storage Length (m) | 0.0 | | 0.0 | 10.0 | | 0.0 | 30.0 | | 0.0 | 35.0 | | 0.0 |
| Storage Lanes | 0 | | 0 | 1 | | 1 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 0 | 1860 | 0 | 0 | 1581 | 1597 | 1190 | 3540 | 0 | 1750 | 3452 | 0 |
| Flt Permitted | | 0.890 | | | 0.950 | | 0.569 | | | 0.474 | | |
| Satd. Flow (perm) | 0 | 1688 | 0 | 0 | 1518 | 1574 | 710 | 3540 | 0 | 870 | 3452 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 5 | | | | 331 | | 1 | | | 8 | |
| Link Speed (k/h) | | 40 | | | 40 | | | 50 | | | 50 | |
| Link Distance (m) | | 87.1 | | | 278.4 | | | 71.3 | | | 86.1 | |
| Travel Time (s) | | 7.8 | | | 25.1 | | | 5.1 | | | 6.2 | |
| Confl. Peds. (#/hr) | 2 | | 1 | 1 | | 2 | 3 | | 3 | 3 | | 3 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 3% | 25% | 0% | 50% | 3% | 0% | 2% | 5% | 0% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 63 | 0 | 0 | 32 | 331 | 5 | 294 | 0 | 328 | 300 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 4 | | 4 | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | | 4 | 4 | 4 | 5 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 15.0 | 15.0 | | 15.0 | 15.0 | 15.0 | 6.0 | 10.0 | | 6.0 | 10.0 | |
| Minimum Split (s) | 24.0 | 24.0 | | 24.0 | 24.0 | 24.0 | 11.0 | 27.0 | | 11.0 | 27.0 | |
| Total Split (s) | 25.0 | 25.0 | | 25.0 | 25.0 | 25.0 | 14.0 | 27.0 | | 20.0 | 33.0 | |
| Total Split (%) | 34.7% | 34.7% | | 34.7% | 34.7% | 34.7% | 19.4% | 37.5% | | 27.8% | 45.8% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | | 3.0 | 5.0 | |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lost Time Adjust (s) | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | | 5.0 | | | 5.0 | 5.0 | 5.0 | 7.0 | | 5.0 | 7.0 | |
| Lead/Lag | | | | | | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | | None | None | None | None | Max | | None | Max | |
| Act Effct Green (s) | | 15.8 | | | 15.8 | 15.8 | 28.1 | 20.1 | | 38.3 | 34.3 | |
| Actuated g/C Ratio | | 0.25 | | | 0.25 | 0.25 | 0.44 | 0.31 | | 0.60 | 0.54 | |
| v/c Ratio | | 0.15 | | | 0.09 | 0.52 | 0.01 | 0.27 | | 0.49 | 0.16 | |
| Control Delay | | 19.5 | | | 20.1 | 6.1 | 6.8 | 18.0 | | 9.2 | 8.7 | |
| Queue Delay | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | | 19.5 | | | 20.1 | 6.1 | 6.8 | 18.0 | | 9.2 | 8.7 | |
| LOS | | B | | | C | A | A | B | | A | A | |
| Approach Delay | | 19.5 | | | 7.4 | | | 17.9 | | | 9.0 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Queue Length 50th (m) | | 5.6 | | | 3.1 | 0.0 | 0.2 | 13.8 | | 17.0 | 7.8 | |
| Queue Length 95th (m) | | 14.2 | | | 9.0 | 14.6 | 1.4 | 25.0 | | 31.9 | 20.2 | |
| Internal Link Dist (m) | | 63.1 | | | 254.4 | | | 47.3 | | | 62.1 | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turn Bay Length (m) | | | | | | | 30.0 | | | 35.0 | | |
| Base Capacity (vph) | | 531 | | | 475 | 720 | 411 | 1107 | | 726 | 1850 | |
| Starvation Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | | 0.12 | | | 0.07 | 0.46 | 0.01 | 0.27 | | 0.45 | 0.16 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 72 | | | |
| Actuated Cycle Length: 64.1 | | | |
| Natural Cycle: 65 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.52 | | | |
| Intersection Signal Delay: 11.0 | | Intersection LOS: B | |
| Intersection Capacity Utilization 61.1% | | ICU Level of Service B | |
| Analysis Period (min) 15 | | | |

Splits and Phases: 3: William Street & University Avenue West



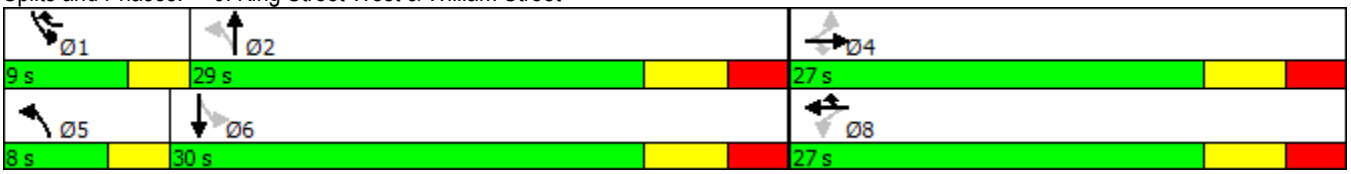


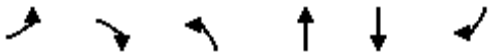
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 17 | 79 | 17 | 2 | 40 | 179 | 5 | 71 | 7 | 161 | 81 | 11 |
| Future Volume (vph) | 17 | 79 | 17 | 2 | 40 | 179 | 5 | 71 | 7 | 161 | 81 | 11 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 |
| Storage Length (m) | 0.0 | | 15.0 | 0.0 | | 0.0 | 18.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 0 | | 1 | 0 | | 1 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 0 | 1843 | 1597 | 0 | 1917 | 1551 | 1785 | 1854 | 0 | 1716 | 1847 | 0 |
| Flt Permitted | | 0.934 | | | 0.985 | | 0.690 | | | 0.585 | | |
| Satd. Flow (perm) | 0 | 1737 | 1557 | 0 | 1892 | 1551 | 1291 | 1854 | 0 | 1041 | 1847 | 0 |
| Right Turn on Red | | | Yes | | | No | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 117 | | | | | 8 | | | 11 | |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | 50 | |
| Link Distance (m) | | 183.2 | | | 179.1 | | | 126.4 | | | 288.5 | |
| Travel Time (s) | | 13.2 | | | 12.9 | | | 9.1 | | | 20.8 | |
| Confl. Peds. (#/hr) | 2 | | 3 | 3 | | | 3 | | 10 | 10 | | 3 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Heavy Vehicles (%) | 0% | 4% | 0% | 0% | 0% | 3% | 0% | 2% | 0% | 4% | 1% | 9% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 108 | 19 | 0 | 47 | 201 | 6 | 88 | 0 | 181 | 103 | 0 |
| Turn Type | Perm | NA | Perm | Perm | NA | pt+ov | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | 1 8 | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 1 8 | 5 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | | 5.0 | 10.0 | | 5.0 | 10.0 | |
| Minimum Split (s) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | | 8.0 | 26.0 | | 8.0 | 26.0 | |
| Total Split (s) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | | 8.0 | 29.0 | | 9.0 | 30.0 | |
| Total Split (%) | 41.5% | 41.5% | 41.5% | 41.5% | 41.5% | | 12.3% | 44.6% | | 13.8% | 46.2% | |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 3.0 | 4.0 | | 3.0 | 4.0 | |
| All-Red Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 0.0 | 3.0 | | 0.0 | 3.0 | |
| Lost Time Adjust (s) | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | | 7.0 | 7.0 | | 7.0 | | 3.0 | 7.0 | | 3.0 | 7.0 | |
| Lead/Lag | | | | | | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | None | None | None | | None | Min | | None | Min | |
| Act Effct Green (s) | | 11.8 | 11.8 | | 11.8 | 25.0 | 21.8 | 12.7 | | 25.6 | 20.6 | |
| Actuated g/C Ratio | | 0.25 | 0.25 | | 0.25 | 0.52 | 0.46 | 0.27 | | 0.53 | 0.43 | |
| v/c Ratio | | 0.25 | 0.04 | | 0.10 | 0.25 | 0.01 | 0.18 | | 0.28 | 0.13 | |
| Control Delay | | 16.1 | 0.2 | | 14.4 | 7.3 | 6.4 | 14.4 | | 7.6 | 10.1 | |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | | 16.1 | 0.2 | | 14.4 | 7.3 | 6.4 | 14.4 | | 7.6 | 10.1 | |
| LOS | | B | A | | B | A | A | B | | A | B | |
| Approach Delay | | 13.7 | | | 8.7 | | | 13.9 | | | 8.5 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Queue Length 50th (m) | | 6.9 | 0.0 | | 2.9 | 7.2 | 0.3 | 5.0 | | 6.3 | 3.9 | |
| Queue Length 95th (m) | | 19.3 | 0.0 | | 10.1 | 22.1 | 1.8 | 15.9 | | 20.4 | 17.4 | |
| Internal Link Dist (m) | | 159.2 | | | 155.1 | | | 102.4 | | | 264.5 | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turn Bay Length (m) | | | 15.0 | | | | 18.0 | | | | | |
| Base Capacity (vph) | | 740 | 730 | | 807 | 838 | 641 | 873 | | 643 | 921 | |
| Starvation Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | | 0.15 | 0.03 | | 0.06 | 0.24 | 0.01 | 0.10 | | 0.28 | 0.11 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 65 | | | |
| Actuated Cycle Length: 47.9 | | | |
| Natural Cycle: 65 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.28 | | | |
| Intersection Signal Delay: 10.1 | | Intersection LOS: B | |
| Intersection Capacity Utilization 45.7% | | ICU Level of Service A | |
| Analysis Period (min) 15 | | | |

Splits and Phases: 6: King Street West & William Street

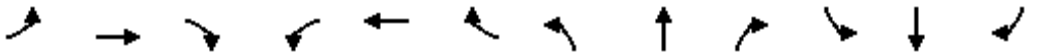




| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 3 | 2 | 1 | 266 | 256 | 1 |
| Future Volume (Veh/h) | 3 | 2 | 1 | 266 | 256 | 1 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 3 | 2 | 1 | 289 | 278 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | 289 | 71 | |
| pX, platoon unblocked | 0.97 | 0.97 | 0.97 | | | |
| vC, conflicting volume | 425 | 140 | 279 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 352 | 58 | 202 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 602 | 968 | 1330 | | | |

| Direction, Lane # | EB 1 | NB 1 | NB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|
| Volume Total | 5 | 97 | 193 | 185 | 94 |
| Volume Left | 3 | 1 | 0 | 0 | 0 |
| Volume Right | 2 | 0 | 0 | 0 | 1 |
| cSH | 709 | 1330 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.01 | 0.00 | 0.11 | 0.11 | 0.06 |
| Queue Length 95th (m) | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 10.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| Lane LOS | B | A | | | |
| Approach Delay (s) | 10.1 | 0.0 | | 0.0 | |
| Approach LOS | B | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.1 | | |
| Intersection Capacity Utilization | 18.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

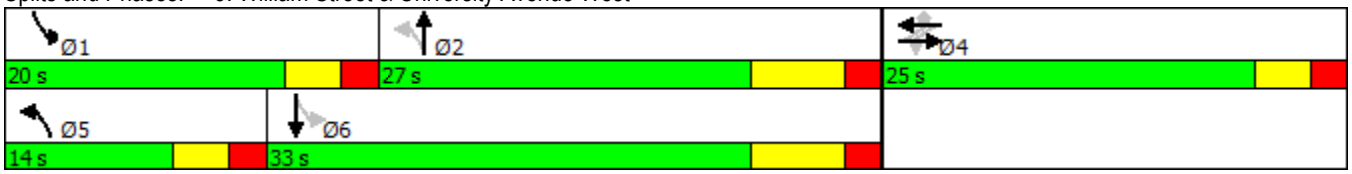


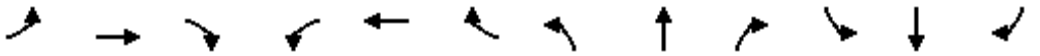
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 15 | 26 | 4 | 15 | 42 | 362 | 7 | 298 | 9 | 366 | 297 | 23 |
| Future Volume (vph) | 15 | 26 | 4 | 15 | 42 | 362 | 7 | 298 | 9 | 366 | 297 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 |
| Storage Length (m) | 0.0 | | 0.0 | 10.0 | | 0.0 | 30.0 | | 0.0 | 35.0 | | 0.0 |
| Storage Lanes | 0 | | 0 | 1 | | 1 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 0 | 1825 | 0 | 0 | 1896 | 1597 | 1785 | 3559 | 0 | 1767 | 3590 | 0 |
| Flt Permitted | | 0.912 | | | 0.931 | | 0.547 | | | 0.459 | | |
| Satd. Flow (perm) | 0 | 1691 | 0 | 0 | 1788 | 1576 | 1023 | 3559 | 0 | 846 | 3590 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 4 | | | | 385 | | 4 | | | 12 | |
| Link Speed (k/h) | | 40 | | | 40 | | | 50 | | | 50 | |
| Link Distance (m) | | 87.1 | | | 278.4 | | | 71.3 | | | 86.1 | |
| Travel Time (s) | | 7.8 | | | 25.1 | | | 5.1 | | | 6.2 | |
| Confl. Peds. (#/hr) | 1 | | 2 | 2 | | 1 | 4 | | 9 | 9 | | 4 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Heavy Vehicles (%) | 0% | 4% | 0% | 0% | 0% | 0% | 0% | 2% | 0% | 1% | 0% | 5% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 48 | 0 | 0 | 61 | 385 | 7 | 327 | 0 | 389 | 340 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 4 | | 4 | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | | 4 | 4 | 4 | 5 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 15.0 | 15.0 | | 15.0 | 15.0 | 15.0 | 6.0 | 10.0 | | 6.0 | 10.0 | |
| Minimum Split (s) | 24.0 | 24.0 | | 24.0 | 24.0 | 24.0 | 11.0 | 27.0 | | 11.0 | 27.0 | |
| Total Split (s) | 25.0 | 25.0 | | 25.0 | 25.0 | 25.0 | 14.0 | 27.0 | | 20.0 | 33.0 | |
| Total Split (%) | 34.7% | 34.7% | | 34.7% | 34.7% | 34.7% | 19.4% | 37.5% | | 27.8% | 45.8% | |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 5.0 | | 3.0 | 5.0 | |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lost Time Adjust (s) | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | | 5.0 | | | 5.0 | 5.0 | 5.0 | 7.0 | | 5.0 | 7.0 | |
| Lead/Lag | | | | | | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | | None | None | None | None | Max | | None | Max | |
| Act Effct Green (s) | | 15.8 | | | 15.8 | 15.8 | 28.1 | 20.1 | | 39.3 | 35.3 | |
| Actuated g/C Ratio | | 0.24 | | | 0.24 | 0.24 | 0.43 | 0.31 | | 0.60 | 0.54 | |
| v/c Ratio | | 0.12 | | | 0.14 | 0.57 | 0.01 | 0.30 | | 0.57 | 0.17 | |
| Control Delay | | 19.5 | | | 21.0 | 6.5 | 6.9 | 18.6 | | 10.3 | 8.6 | |
| Queue Delay | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | | 19.5 | | | 21.0 | 6.5 | 6.9 | 18.6 | | 10.3 | 8.6 | |
| LOS | | B | | | C | A | A | B | | B | A | |
| Approach Delay | | 19.5 | | | 8.4 | | | 18.3 | | | 9.5 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Queue Length 50th (m) | | 4.4 | | | 6.1 | 0.0 | 0.4 | 16.0 | | 21.1 | 8.8 | |
| Queue Length 95th (m) | | 12.3 | | | 15.2 | 19.4 | 1.8 | 29.2 | | 41.7 | 23.7 | |
| Internal Link Dist (m) | | 63.1 | | | 254.4 | | | 47.3 | | | 62.1 | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turn Bay Length (m) | | | | | | | 30.0 | | | 35.0 | | |
| Base Capacity (vph) | | 523 | | | 550 | 751 | 594 | 1099 | | 723 | 1950 | |
| Starvation Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | | 0 | | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | | 0.09 | | | 0.11 | 0.51 | 0.01 | 0.30 | | 0.54 | 0.17 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 72 | | | |
| Actuated Cycle Length: 65.1 | | | |
| Natural Cycle: 65 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.57 | | | |
| Intersection Signal Delay: 11.4 | | Intersection LOS: B | |
| Intersection Capacity Utilization 66.1% | | ICU Level of Service C | |
| Analysis Period (min) 15 | | | |

Splits and Phases: 3: William Street & University Avenue West



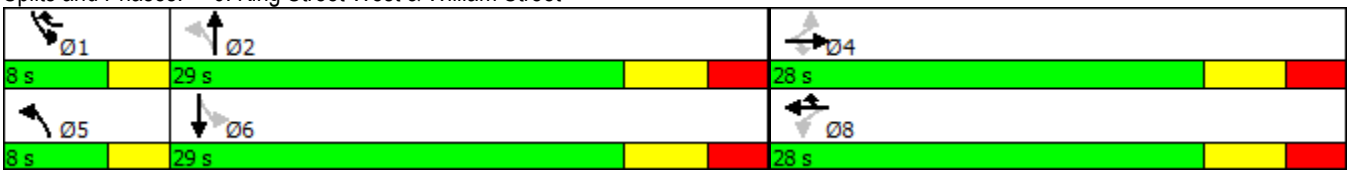


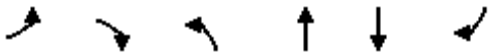
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 82 | 3 | 1 | 45 | 113 | 6 | 53 | 5 | 141 | 59 | 8 |
| Future Volume (vph) | 10 | 82 | 3 | 1 | 45 | 113 | 6 | 53 | 5 | 141 | 59 | 8 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.7 | 3.5 |
| Storage Length (m) | 0.0 | | 15.0 | 0.0 | | 0.0 | 18.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 0 | | 1 | 0 | | 1 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Satd. Flow (prot) | 0 | 1824 | 1597 | 0 | 1796 | 1566 | 1785 | 1859 | 0 | 1785 | 1883 | 0 |
| Flt Permitted | | 0.952 | | | 0.991 | | 0.711 | | | 0.613 | | |
| Satd. Flow (perm) | 0 | 1747 | 1550 | 0 | 1781 | 1566 | 1328 | 1859 | 0 | 1141 | 1883 | 0 |
| Right Turn on Red | | | Yes | | | No | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 117 | | | | | 5 | | | 8 | |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | 50 | |
| Link Distance (m) | | 183.2 | | | 179.1 | | | 126.4 | | | 288.5 | |
| Travel Time (s) | | 13.2 | | | 12.9 | | | 9.1 | | | 20.8 | |
| Confl. Peds. (#/hr) | | | 6 | 6 | | | 4 | | 6 | 6 | | 4 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles (%) | 10% | 4% | 0% | 0% | 7% | 2% | 0% | 2% | 0% | 0% | 0% | 0% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 97 | 3 | 0 | 48 | 119 | 6 | 61 | 0 | 148 | 70 | 0 |
| Turn Type | Perm | NA | Perm | Perm | NA | pt+ov | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | 1 8 | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 1 8 | 5 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | | 5.0 | 10.0 | | 5.0 | 10.0 | |
| Minimum Split (s) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | | 8.0 | 26.0 | | 8.0 | 26.0 | |
| Total Split (s) | 28.0 | 28.0 | 28.0 | 28.0 | 28.0 | | 8.0 | 29.0 | | 8.0 | 29.0 | |
| Total Split (%) | 43.1% | 43.1% | 43.1% | 43.1% | 43.1% | | 12.3% | 44.6% | | 12.3% | 44.6% | |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 3.0 | 4.0 | | 3.0 | 4.0 | |
| All-Red Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 0.0 | 3.0 | | 0.0 | 3.0 | |
| Lost Time Adjust (s) | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | | 7.0 | 7.0 | | 7.0 | | 3.0 | 7.0 | | 3.0 | 7.0 | |
| Lead/Lag | | | | | | | Lead | Lag | | Lead | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | None | None | None | None | None | | None | Min | | None | Min | |
| Act Effct Green (s) | | 11.9 | 11.9 | | 11.9 | 22.2 | 23.8 | 17.7 | | 25.7 | 22.8 | |
| Actuated g/C Ratio | | 0.27 | 0.27 | | 0.27 | 0.51 | 0.54 | 0.40 | | 0.59 | 0.52 | |
| v/c Ratio | | 0.21 | 0.01 | | 0.10 | 0.15 | 0.01 | 0.08 | | 0.20 | 0.07 | |
| Control Delay | | 15.0 | 0.0 | | 14.0 | 6.7 | 6.3 | 13.3 | | 7.2 | 10.0 | |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | | 15.0 | 0.0 | | 14.0 | 6.7 | 6.3 | 13.3 | | 7.2 | 10.0 | |
| LOS | | B | A | | B | A | A | B | | A | B | |
| Approach Delay | | 14.5 | | | 8.8 | | | 12.7 | | | 8.1 | |
| Approach LOS | | B | | | A | | | B | | | A | |
| Queue Length 50th (m) | | 6.0 | 0.0 | | 2.9 | 4.0 | 0.3 | 3.3 | | 5.1 | 2.6 | |
| Queue Length 95th (m) | | 17.5 | 0.0 | | 10.2 | 13.9 | 1.8 | 12.0 | | 17.1 | 13.1 | |
| Internal Link Dist (m) | | 159.2 | | | 155.1 | | | 102.4 | | | 264.5 | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turn Bay Length (m) | | | 15.0 | | | | 18.0 | | | | | |
| Base Capacity (vph) | | 873 | 833 | | 890 | 958 | 777 | 1092 | | 746 | 1107 | |
| Starvation Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | | 0.11 | 0.00 | | 0.05 | 0.12 | 0.01 | 0.06 | | 0.20 | 0.06 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 65 | | | |
| Actuated Cycle Length: 43.8 | | | |
| Natural Cycle: 65 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.21 | | | |
| Intersection Signal Delay: 10.0 | | Intersection LOS: B | |
| Intersection Capacity Utilization 44.9% | | ICU Level of Service A | |
| Analysis Period (min) 15 | | | |

Splits and Phases: 6: King Street West & William Street





| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 2 | 2 | 2 | 174 | 314 | 4 |
| Future Volume (Veh/h) | 2 | 2 | 2 | 174 | 314 | 4 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 2 | 2 | 2 | 189 | 341 | 4 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | 289 | 71 | |
| pX, platoon unblocked | 0.96 | 0.96 | 0.96 | | | |
| vC, conflicting volume | 442 | 172 | 345 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 339 | 59 | 238 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 606 | 956 | 1274 | | | |

| Direction, Lane # | EB 1 | NB 1 | NB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|
| Volume Total | 4 | 65 | 126 | 227 | 118 |
| Volume Left | 2 | 2 | 0 | 0 | 0 |
| Volume Right | 2 | 0 | 0 | 0 | 4 |
| cSH | 742 | 1274 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.01 | 0.00 | 0.07 | 0.13 | 0.07 |
| Queue Length 95th (m) | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 9.9 | 0.3 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | A | | | |
| Approach Delay (s) | 9.9 | 0.1 | | 0.0 | |
| Approach LOS | A | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.1 | | |
| Intersection Capacity Utilization | 18.8% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

# APPENDIX E

# EXCERPTS FROM THE TRANSPORTATION IMPACT STUDY PREPARED BY LEA CONSULTING LTD.

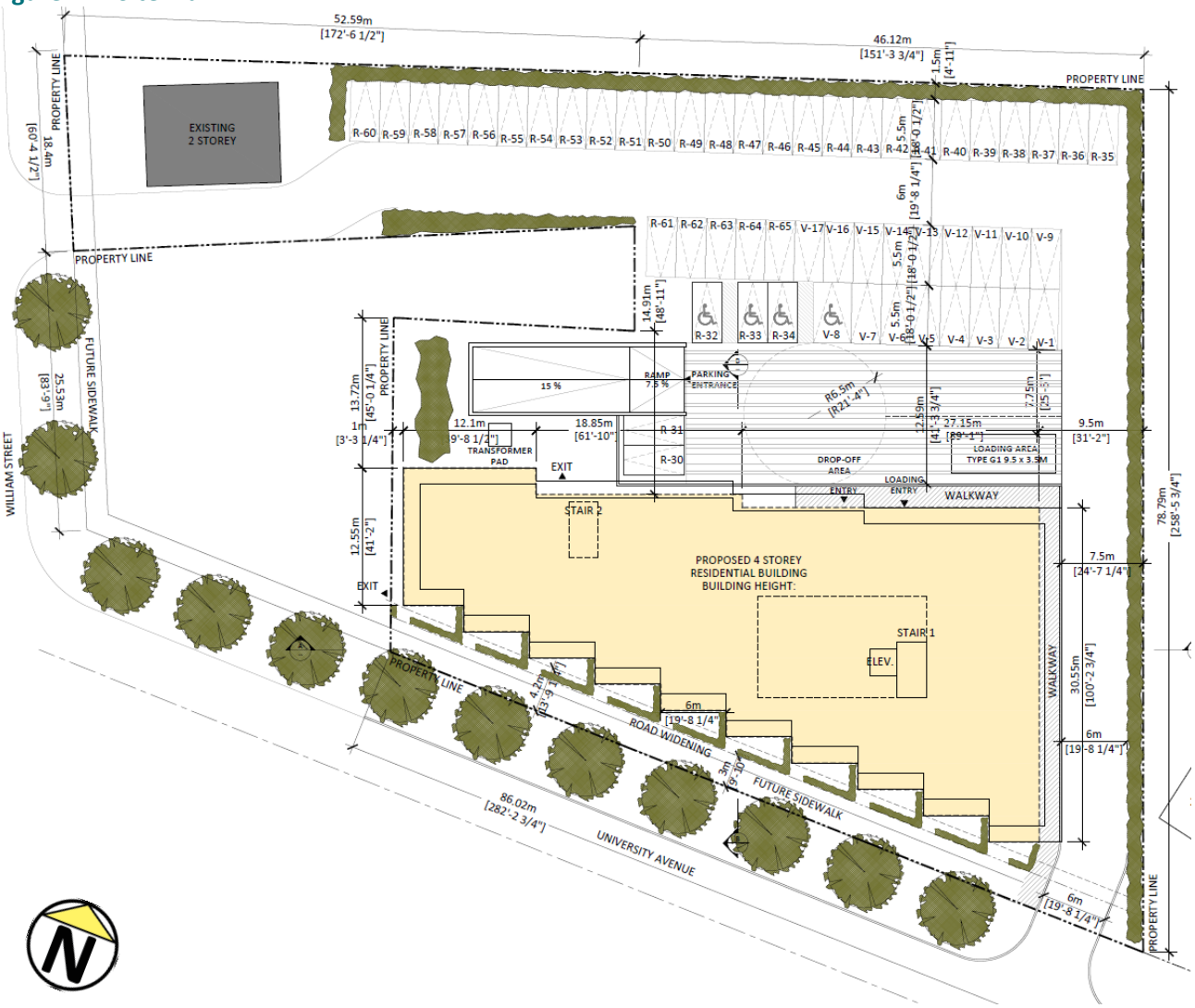
# 1 INTRODUCTION

LEA Consulting Ltd. (LEA) was retained by Balder Corporation to prepare a Transportation Impact Study (TIS) in support of the rezoning application for the proposed residential development on 315-325 University Ave West in the Town of Cobourg (herein referred to as the Subject Site). The subject site is currently occupied by existing single-detached residential houses and. **Figure 1.1** shows the subject site and the immediate surrounding area.

**Figure 1.1: Site Location**


The proposed development consists of a four-storey residential building, composed of 71 units, to be constructed on the subject site. It is proposed that the subject site will be accessible from an access on University Ave W and a shared access with the neighbouring existing two-storey building. The proposed site plan is shown in **Figure 1.2**.

## Figure 1.2: Site Plan




*Source: Studio JCI (April 2019)*

A minor increase to the overall V/C of the signalized intersection is expected as a result of background traffic growth. As with the existing traffic condition, no capacity constraints are identified as all intersection movements are operating with a V/C below 0.85. All movements of interest are expected to continue operating significantly below capacity in the future background traffic condition. Detailed capacity analysis outputs can be found in **Appendix C**.

## 3.2 SITE TRAFFIC

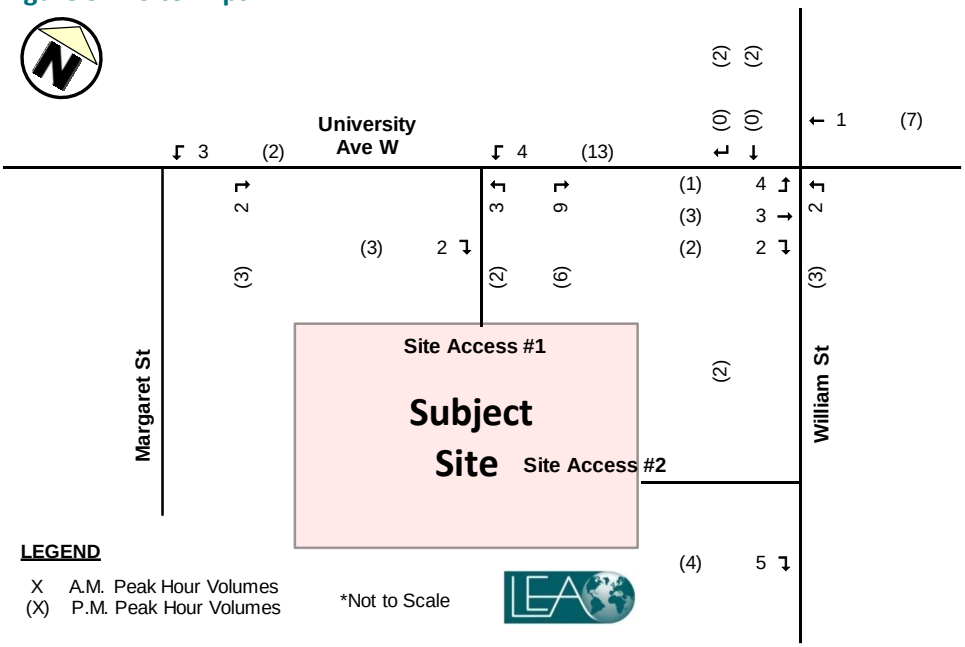
Trip generation for the proposed development is based on the ITE Trip Generation Manual 10th Edition. Given the proposed use, LUC 221 Multifamily Housing (Mid-Rise) was used for the development. **Table 3.2** summarizes the trip generation of the subject site.

Table 3.2: Site Trip Distribution

| Proposed Development | | | Weekday AM Peak Hour (Vehicle Trips/Unit) | | | Weekday PM Peak Hour (Vehicle Trips/Unit) | | |
|---|---|---|---|---|---|---|---|---|
| | | | In | Out | Total | In | Out | Total |
| Multifamily Housing (Mid-Rise) | 71 units | Trips per Unit | 0.09 | 0.23 | 0.32 | 0.25 | 0.16 | 0.41 |
| | | Trips Generated | 6 | 17 | 23 | 17 | 12 | 29 |
| | | **Total Trips** | **6** | **17** | **23** | **17** | **12** | **29** |

Trip distribution of these site trips is expected to follow the existing distribution of traffic in the studied network. **Figure 3.2** illustrates the site trips.

**Figure 3.2: Site Trips**




## 3.3 FUTURE TOTAL TRAFFIC CONDITIONS

The future total traffic is the sum of the future background volumes and site-generated traffic. Access to the subject site will be provided from the Rear Lane. Future total volumes are illustrated in **Figure 3.3**. Movements of interests are summarized in **Table 3.3**.