

RANGEVIEW ESTATES

Urban Transportation Considerations

City of Mississauga

Development Master Plan (DMP) and Development Master Plan
(DMP) Official Plan Amendment (OPA)

Prepared For: Rangeview Landowners Group Inc.

September 2023



RANGEVIEW ESTATES RESPONSES TO CITY & REGION COMMENTS

FEBRUARY 2023: CITY OF MISSISSAUGA COMMENTS (DMP)

LANDSCAPE ARCHITECTURE

Comment 3.2:

The master plan is to be coordinated with the proposed Lakeshore BRT Plan (30%) to ensure the future road design is incorporated and to identify opportunities for enhancing the public realm. An upgraded boulevard treatment will be required along Lakeshore Road and in key high density urban areas as identified by City staff to be determined at the rezoning stage. A Streetscape Feasibility Study will be required for the areas requiring an amended boulevard treatment. The purpose of the Streetscape Feasibility Study is to evaluate the adequacy of the proposed building setback by confirming that an appropriate boulevard treatment can be accommodated within the public right of way along the frontages of developments in accordance with City policies.

Response:

The applicant team has obtained the Lakeshore BRT Plan (represents 30% design) and has incorporated the plans within the updated functional road plan included in **Appendix C** of BA Group's Updated September 2023 Transportation Considerations Report. It is noted that the City of Mississauga Environmental Project Report (EPR) became available for 30-day public review on July 27, 2023; it is these materials that represent the 30% design.

Comment 3.3: The proposed road design and boulevard treatment are a continuation of the Lakeview Village right-of-ways. Proposed road cross-sections include City of Mississauga standards, as well as above and below grade setback/buffer requirements.

Response:

Noted. The transportation elements of the proposed road design are a continuation of the Lakeview Village road network rights-of-way (ROW), with notable changes at the approaches to Lakeshore Road East, given the added vehicle turn lanes. The proposed road cross-sections, representing transportation elements for the purposes of this report, are illustrated in **Figure 6** to **Figure 12** and **Appendix C** of BA Group's Updated September 2023 Transportation Considerations Report and include City of Mississauga standards.

MIWAY

Comment 4.1:

MiWay requires 3.5m lane widths on all roadways where transit will operate (including Lakefront Promenade).

Response:

It is acknowledged that future transit routes are planned along both Lakefront Promenade and Hydro Road. However, as per the City's **Comment 3.3** above, the functional road plans and cross-sections for the Rangeview Estates site aligns with, and are a continuation, of the Lakeview Village right-of ways. Adjustments to any lane widths to accommodate transit as proposed by the City, would create inconsistencies between the cross-sections within Rangeview Estates and Lakeview Village. It is suggested that changes to the proposed cross-sections be addressed as part of comprehensive road network comments for both Rangeview Estates and Lakeview Village, in order to ensure consistency between the sites. For these reasons, the width of the vehicle travel lanes along the planned future transit routes within Rangeview (Lakefront Promenade and Hydro Road) continue to be shown as 3.35 metres wide.

Comment 4.2:

Stops on Lakeshore Road should be maintained or consolidated in alignment with the Lakeshore TMP and Lakeshore BRT project.

Response:

Noted. Bus stops on Lakeshore Road East are illustrated in the July 2023 Lakeshore BRT Plan at the following locations:

- Lakeshore Road East / Lakefront Promenade
- Lakeshore Road East / Haig Boulevard
- Lakeshore Road East / Dixie Road

No changes to the bus stop locations are proposed as part of this application. The platform locations are transposed onto BA Group's functional road plan (**Appendix C** of BA Group's Updated September 2023 Transportation Considerations Report), as illustrated by the City of Mississauga.

Comment 4.3:

The proposed park space along Lakefront Promenade means that residential buildings will set back from MiWay bus stops on Lakefront Promenade which increases the walking distance for customers looking to access transit.

Response:

Noted.

Comment 4.4:

If park space is still recommended along Lakefront Promenade and is not reallocated to increase the size of other parks within the site, MiWay requires high-quality walking connections to transit stops that are direct and well-lit to improve the customer experience for transit riders accessing MiWay service.

Response:

This will be coordinated and included as part of the final plan.

ACTIVE TRANSPORTATION

Comment 6.1:

In some locations, where parking is adjacent to the cycle track, there is a 0.7 m buffer/curb zone between the parked cars and cycle track shown in the cross-sections. We recommend this be at least 1.0 m, as per Ontario Traffic Manual Book 18 (cycling facilities), to accommodate for door swing. This could be accomplished by narrowing the curb zone on the non-parking side of the street.

Response:

As per the City's **Comment 3.3** above, the proposed road design and boulevard treatment for the Rangeview Estates site aligns with, and are a continuation, of the Lakeview Village right-of-ways. Adjustments to the buffer provided between cycle tracks and parked cars as suggested by the City, would create inconsistencies between the cross-sections within Rangeview Estates and Lakeview Village. It is suggested that changes to the proposed cross-sections be addressed as part comprehensive road network comments for both Rangeview Estates and Lakeview Village in order to ensure consistency between the sites.

TRAFFIC

Comment 9.1

A Traffic Impact Study prepared by BA Group Ltd. dated November 2022 was submitted in support of the Rangeview Development Master Plan. Based on the information provided to date, staff provide the following comments:

1. Figure 5 does not appear to be consistent with OPA 125. Please revise and confirm with Table 4
2. The proposed cross-sections for existing and proposed roads within the Rangeview Estates lands (i.e. East Avenue, Lakefront Promenade, Street 'F' (Ogden Avenue Extension), Hydro Road, Street 'L', Street 'G') appear to be in general conformity with the proposed Lakeview Village cross-sections. Notwithstanding, this section strongly advises that the proposed right-of-ways may be subject to change through the detailed review of a right-of-way design package to refine right-of-way design elements and dimensions as part of a formal development application. For the purposes of this Development Master Plan review, these cross-sections will form the base case scenario.
3. The report identifies proposed intersection controls for new intersections. Notwithstanding, this section strongly advises that the intersection designs (geometric design, lane configurations and controls) may be subject to change through the detailed review of a site specific



transportation study as part of a formal development application. For the purposes of this Development Master Plan review, these intersections will form the base case scenario.

4. Provide figures showing the following:

- a. Existing lane configurations and intersection controls;
- b. Future lane configurations and intersection controls resulting from Lakeview Village;
- c. Future lane configurations and intersection controls resulting from Rangeview Estates, including the different phasing scenarios.

5. In addition to the area wide transportation study, the Owner/Applicants are to include a microsimulation (VISSIM) analysis in support of the Development Master Plan. The Transportation Consultant may contact this reviewer to discuss Terms of Reference with the City's long term Transportation Planning section.

6. Provide a recommendations section that include, but are not limited to:

- a. Access control for future development blocks within the proposed road network;
- b. Provisions for future traffic monitoring and studies, including warrants for auxiliary turn lanes, all-way stop controls and traffic signals;
- c. Implementation of Interim and Ultimate conditions in accordance with the proposed development phasing including participating and non-participating land owners.

7. Update Appendices to include Synchro Reports

8. Include an analysis of the existing conditions that were carried forward in the future background and future total scenarios.

Response:

1. Figure 5 has been updated to align with Table 4 within BA Group's Updated September 2023 Transportation Considerations Report.
2. Noted.
3. Noted.
4. Figures have been added to the Updated BA Group Report that includes a) existing lane configurations and intersection controls, inclusive of future lane configurations and intersection controls resulting from both Rangeview Estates and Lakeview Village.
5. A microsimulation (VISSIM) analysis has been included as part of BA Group's 2023 Updated Report.
6. Information regarding vehicle access control for interim phases of development has been included in BA Group's 2023 Updated Report in **Section 3.1.3**. Stop controlled driveways will be provided, with the location and design details to be confirmed at a later stage. Driveways will be consolidated where possible with access from the minor streets preferred. The need for future traffic control upgrades (i.e. all-way stop control to traffic signals) can be assessed as development progresses, through updated traffic studies.
7. BA Group's Updated September 2023 Transportation Considerations Report includes detailed Synchro reports within **Appendix E**.



Comment 9.2

For clarity, current study assumes the following:

Scenario 1:

This scenario assumes the following:

- Includes 7,500 Residential Units and 67% Non-Residential (1.4 million sq.ft) of Lakeview Village.
- Lakeview Village development related road improvements are in place.

Scenario 2: 3,700 Residential Units and 100% Non-Residential (95,000 sq.ft) of Rangeview

This scenario assumes the following:

- Includes 8,050 Residential Units and 100% Non-Residential (2.1 million sq.ft) of Lakeview Village.
- Lakeview Village development related road improvements are in place.
- Full Ogden Avenue extension is in place.

Scenario 3A: 5,300 Residential Units and 100% Non-Residential (95,000 sq.ft) of Rangeview (with Haig Boulevard)

This scenario assumes the following:

- Includes 8,050 Residential Units and 100% Non-Residential (2.1 million sq.ft) of Lakeview Village.
- Lakeview Village development related road improvements are in place.
- Full Ogden Avenue extension is in place.
- Includes 100% Non-Residential (449,000 sq.ft) of Serson.
- Full Haig Boulevard extension is in place.

Scenario 3B: 5,300 Residential Units and 100% Non-Residential (95,000 sq.ft) of Rangeview (without Haig Boulevard)

This scenario assumes the following:

- Includes 8,050 Residential Units and 100% Non-Residential (2.1 million sq.ft) of Lakeview Village.
- Lakeview Village development related road improvements are in place.
- Full Ogden Avenue extension is in place.
- Double left-turn lane at Lakeshore Avenue East and Lakefront Promenade.

Recommendations for the implementation of these development scenarios are to be provided for review and further discussed with City staff.

Response:

Further discussions with the City regarding the development scenarios are welcome. It is noted that to determine the travel demand for each scenario, trip rates were established from the April 2021 TMIG report. The travel demand for the BA Group traffic analysis includes a total non-residential GFA of 2.1 million ft², inclusive of the proposed office, recreational community centre, retail, school, daycare and hotel, in order to align with the traffic volume layers included with the April 2021 TMIG study. Since completion of the April 2021 TMIG report, as per TMIG's discussions with City Staff, it was agreed that the recreational community centre would likely be an off-peak generator, hence the traffic analysis is conservative as the travel demand for all proposed non-residential uses has been considered.

FEBRUARY 2023: REGION OF PEEL COMMENTS (DMP)

Comment 14.24: All traffic comments related to nearby Regional Roads (Cawthra Rd and Dixie Rd) have been provided through the on-going Lakeview application. Should there be significant changes to the proposed Rangeview Estates Development, the Region may have new comments.

Response:

Noted.

AUGUST 2023: CITY OF MISSISSAUGA COMMENTS (DARC)

Comment 57: (i) All damaged or disturbed areas within the municipal right-of-way are to be reinstated at the Owner's expense.; (ii) All landscaping and grading within close proximity to the proposed access points is to be designed to ensure that adequate sight distances are available for all approaching and exiting motorists and pedestrians.; (iii) The portion of the driveway within the municipal boulevard is to be paved by the Owner.; (iv) Driveway accesses shall maintain a 1.5m setback from aboveground features such as utilities and trees.; (v) Any above ground utilities located within 1.5m of a proposed access are to be relocated at the Owner's expense.; (vi) The cost for any/all road improvements required in support of this development application will be borne by the Owner.; (vii) The Owner shall make satisfactory arrangements with the Transportation and Works Department for the design, construction and payment of all costs associated with works necessary to support access to this site.; (viii) Any access to internal servicing shall be provided internally through the site.; (ix) Details of the site specific access configurations will be finalized in conjunction with the Site Plan review/approval process.

Response:

Noted.

Comment 58: City Council has endorsed the Lakeshore Connecting Communities Transportation Master Plan which sets out a long-term vision for transit and corridor improvements along Lakeshore Road from 2020 to 2041 that will support waterfront development. The Owner is also advised to review project details as there will may be impacts to this site, such as future right-of-way widening and restricted access. Project details can be found at: <https://www.mississauga.ca/projects-and-strategies/city-projects/lakeshore-connecting-communities>.

Response:

Noted.

Comment 59: It is not immediately clear how future municipal infrastructure, including lands, will be provided to the City from the multiple landowners. The applicant(s)/owner(s) are to demonstrate a plan to the City's satisfaction that would provide the lands for roads and municipal servicing necessary for the future Rangeview lands as well as for the overall community.

Response:

As Rangeview Estates is comprised of several landowners, the phasing has been designed to allow each existing parcel to develop independently at different periods of the development approvals process. It is particularly important to establish a functional road network where the proposed interim phase creates a partial road network that provides each landowner with temporary access to their property so they can develop without affecting an adjacent parcel. This approach is critical for those parcels that are located mid-block along Lakeshore Road East.

For an interim phase, the approach considers a partially built Street 'L', that extends eastward from East Avenue and terminates in a temporary cul-de-sac centrally located between Lakefront Promenade and East Avenue. East of Lakefront Promenade, the phasing plan considers a partially built Ogden Avenue, north of Rangeview Road, with termination of temporary cul-de-sacs that would eventually be extended as Street 'L', between Lakefront Promenade and Hydro Road. When an individual parcel plans to develop, the public road and/or parkland associated with that parcel, as defined in the Rangeview DMP, will be conveyed to the City of Mississauga in order to ensure that the overall vision demonstrated in the Rangeview DMP can be achieved. Interim access configurations will be considered on a site-by-site basis where needed in cases where the full road network cannot be delivered as part of a project.

In addition, the existing roads within Rangeview Estates (East Avenue, Rangeview Road, Lakefront Promenade and Hydro Road) will be improved over time as part of servicing-related road reconstruction, with interim cross-sections considered in cases where the ultimate right-of-way has not yet been acquired. Interim cross-sections will include consideration for public realm, pedestrians, cycling facilities and traffic operations improvements.

Comment 60: An area-wide Transportation Study (e.g. road network and capacity analysis, active transportation connections and enhanced transit assessment etc.) for the Lakeview Waterfront is required that will examine among other things: (i) Future enhanced transit including its alignment and design; (ii) Multi-modal splits between transit, active transportation and vehicle use; (iii) TDM; (iv) Additional roads; (v) Potential traffic infiltration impacts on adjacent neighbourhoods, (vi) Access Management Plan, and; (vii) Recommendations to incorporate into site specific development proposal(s) [NOTE: The traffic consultant should provide a terms of reference to the City's Traffic Section for review and receive confirmation prior to commencing all traffic related studies that form part of this sections comments (i.e. Transportation Study including Microsimulation Analysis and Phasing)]

Response:

These items have largely been addressed in BA Group's September 2023 Updated Transportation Considerations Report. Further information can however be provided in a future updated report as required.

Comment 61: The Owner/Applicant is advised that a VISSIM analysis will also be required. Note the following requirements for the VISSIM analysis: (i) The consultant will be responsible to produce a calibrated / validated VISSIM model to ensure the model is representative of existing conditions. (ii) The consultant will be responsible for collecting all necessary data needed to calibrate/ validate the VISSIM model. (iii) This VISSIM model shall be calibrated as per industry accepted guidelines (example Federal Highway Administration Microsimulation Guidelines). [NOTE: The transportation consultants are advised to contact this section prior to commencing the study]

Response:

BA Group's September 2023 Updated Transportation Considerations Report includes VISSIM model results that have been calibrated and validated to reflect 2041 build-out conditions. The VISSIM analysis scenarios includes the same scenarios that were analysed within Synchro as follows:

Scenario 3A (2041): Scenario 2 + Haig Boulevard connected to Lakeshore Road East.

Scenario 3B (2041): Scenario 2 + Dual NBL at Lakefront Promenade/Lakeshore Road East (Haig not connected).

Comment 62: The developer shall provide a right-of-way package for all proposed roads within the development. The right-of-way package is to include reference to the relevant City of Mississauga standard drawings with detailed cross-sections that are applicable for each road. The developer should be advised that further comments on the development concept may be provided after the ROW package is submitted and therefore, revisions to the overall draft plan may be required. [***NOTE***] The applicant is advised that any deviation from a City of Mississauga standard is subject to a comprehensive review and approval process by City staff and all affected external agencies. If non-standard cross sections are proposed, the following information will also be required, but not limited to: An extensive right-of-way package that includes details of all design elements within a proposed right-of-way for each proposed street. The right-of-way package is to be prepared in two parts: (A) The right-of-way package shall include plan views and a description for each of the following considerations: (i) Public Transit Facilities; (ii) Pedestrian Facilities; (iii) Cycling Facilities; (iv) On-Street Parking and Curbside Management; and (v) Traffic Calming (B) The right-of-way package shall also include typical cross-section details of each street that include the following information: (i) Street Name; (ii) Road Classification; (iii) Right-of-way widths; (iv) Pavement widths and lane widths; (v) Boulevard widths; (vi) Sidewalks, curbs, splash pads, grades; and (vii) All above and below ground utilities.

Response:

The transportation elements of the proposed road design are a continuation of the Lakeview Village road network rights-of-way (ROW), with notable changes at the approaches to Lakeshore Road East, given the added vehicle turn lanes. The proposed road cross-sections, representing transportation elements for the purposes of this report, are illustrated in **Figure 6** to **Figure 12** and in **Appendix C** of BA Group's Updated September 2023 Transportation Considerations Report and include City of Mississauga standards.

Comment 63: The Owner will be required to gratuitously dedicate the following to the City of Mississauga, but not limited to: (A) MUNICIPAL ROADS (i) Street 'F' (Ogden Avenue Extension) with an approximate right-of-way of 23m-26m for the creation of a Minor Collector road (north-south road connecting Lakeshore Road East to just south of Rangeview Road); (ii) Street 'G' with a right-of-way of approximately 19m-20m for the creation of a Local road (north-south road connecting Rangeview Road to just south); (iii) Street 'L' with a right-of-way approximately 17-20m for the creation of a Local road (east-west road connecting East Avenue to Hydro Road, (iv) Street 'O' (East Avenue Extension) with an approximate right-of-way of 23m; (B) RIGHT OF WAY WIDENINGS (i) All right-of-way widenings on existing municipal roads as may be required through the City's Official Plan; (C) SIGHT TRIANGLES / ROUNDINGS (i) At all municipal intersections in accordance with City Standards and Industry Practices; (D) 0.3 METRE RESERVES (i) 0.3 m reserves will be required and determined further through the Development Application Review process. [NOTE: The applicant is further advised that additional Land Dedications and Easements may be further identified through the development application review process and Lakeshore BRT project]

Response:

Noted.

AUGUST 2023: REGION OF PEEL COMMENTS (DARC)

Comment 50: An updated Traffic Impact Study is required to assess the increase in units proposed in the Rangeview Estates Master Plan Area (and to also appropriately consider in the Province's recent MZO for increased units in the abutting Lakeview Waterfront subdivision on the road system around Rangeview Estates).

Response:

The September 2023 Updated BA Group Transportation Considerations Report evaluates a maximum of 5,300 residential units for Rangeview and a maximum of 8,050 residential units for Lakeview. It is our understanding that TMIG (now TYLin) is currently updating their transportation analysis to consider the increased number of residential units at Lakeview permitted through the MZO. BA Group's Transportation Considerations Report can be updated at a later time, after receipt and review of TYLin's updated transportation analysis.

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EXECUTIVE SUMMARY

Introduction & Background

BA Group was retained by the Rangeview Landowners Group to provide transportation consulting services related to a proposed mixed-use development on a site known as Rangeview Estates (herein referred to as “the Site” and “Rangeview”), in the City of Mississauga. The Site is generally bounded by East Avenue to the west, Lakeshore Road East to the north, Hydro Road to the east and the land parcels located beyond the south side of Rangeview Road. Rangeview Landowners Group Incorporated (LOG) currently represents 9 landholders within Rangeview Estates. The LOG currently owns 21/33 (64%) privately held properties within Rangeview.

A Transportation Considerations Report dated November 2022, was previously prepared by BA Group as part of the **Development Master Plan (DMP)** and **Official Plan Amendment (OPA)** initially submitted to the City. This updated Transportation Considerations Report provides an update to the November 2022 report in order to address comments provided by the City.

The development proposal statistics and proposed internal road network remain largely unchanged since the previous submission, with the exception of minor road design revisions in response to the City’s comments e.g. consideration for the Lakeshore Road BRT (30% design). Key additions to this updated report include the following:

- A traffic analysis scenario for existing conditions; and
- A VISSIM analysis for future total conditions for Scenario 3A (connection of Haig Boulevard to Lakeshore Road East) and Scenario 3B (no connection of Haig Boulevard but dual left-turn lanes on Lakefront Promenade).
- The creation of a video traffic simulation in VISSIM at full build-out of both the Rangeview and Lakeview sites.

A demonstration of the morning peak hour (the most critical time period) traffic simulation at full build-out of both the Rangeview and Lakeview sites in 2041, based on Scenario 3A (with Haig Boulevard), can be viewed at the following YouTube link:

<https://www.youtube.com/watch?v=6H3cA5m3ycU>

Official Plan Amendment (OPA) 89 to the Mississauga Official Plan was enacted and passed on July 4, 2018. The purpose of OPA 89 was to add a new Major Node Character Area to the OP, the Lakeview Waterfront Major Node, and update land use designations to include residential development. Within OPA 89, the Site is located within the Lakeview Waterfront Major Node with the Rangeview lands being permitted to develop 3,700 residential dwelling units. The Lakeview Waterfront Major Node Character Area will be designed to encourage multi-modal transportation with an emphasis on transit and active transportation. The Lakeview Waterfront Major Node Character Area, the lands adjacent to Lakeshore Road East, including Rangeview, will become part of a higher-order transit corridor and transit-oriented community.

Official Plan Amendment (OPA) 125 to the Mississauga Official Plan was passed on November 10, 2021. The purpose of OPA 125 was to revise policies pertaining to the Lakeview Waterfront Major Node Character Area



that reflect planning associated with the lands south and east of the Site. OPA 125 included a revised block structure and a revised planned road network, including a southward extension of Ogden Avenue across Rangeview. With the approval of OPA 125, Rangeview continues to be permitted to develop 3,700 residential dwelling units, while Lakeview Village is permitted to develop 8,050 residential units.

Proposed Development

The Site is currently occupied by a mix of commercial, industrial, retail and services with vehicle access provided through Lakeshore Road East, Rangeview Road, East Avenue, Lakefront Promenade and Hydro Road. The proposed development concept for Rangeview includes consideration for up to 5,300 residential units, as well as a total of 95,000 ft² GFA of retail and office uses. The detailed traffic analysis for this study also considered the travel demands of the adjacent lands to the south and east, inclusive of Lakeview Village (8,050 residential units, along with up to 2.1 million ft² GFA of non-residential uses) and Serson (449,000 ft² GFA of non-residential uses).

Area Street Network

The Site is directly adjacent to Lakeshore Road East (arterial road) with convenient road connections across the City, Peel Region and the Greater Toronto Area (GTA). The public street network surrounding Rangeview includes a hierarchy of road connections that range from arterial roads to local roads and is located just over 2.0 kilometres from the Queen Elizabeth Way (QEW).

The approval of the Lakeview Village development has resulted in planned changes to the local street network that align with the future road network within OPA 125. As part of Rangeview, additional components of the OPA 125 road network are being proposed. The proposed Rangeview road network considers active transportation, ease of access & connectivity for all travel modes, “Complete Streets” and conformity with the planned Lakeview Village road network. The Rangeview proposal includes functional plans and cross-sections for the planned road network, inclusive of East Avenue, Lakefront Promenade, Street F (extension of Ogden Avenue from Lakeshore Road East to the property line, just south of Rangeview Road), Hydro Road, Street L, Rangeview Road and Street G.

Area Transit Network

The Site’s northern boundary is adjacent to the two MiWay surface transit routes, which provide direct connections to area destinations including Dixie Outlet Mall, Port Credit and Long Branch GO stations. With a transfer at the Long Branch GO Station, the Site is connected to GO Transit (Lakeshore West Line) and TTC bus / streetcar service in the east. The plans for a dedicated Bus Rapid Transit (BRT) service along Lakeshore Road East (adjacent to Rangeview), from East Avenue to Etobicoke Creek, are well underway with a current completion date of 2027.

Area Cycling Network

The existing cycling network within 500 metres of the Site area consists of multi-use trails, park trails, and signed bike routes along all sides of the Site perimeter. These cycling connections provide convenient travel opportunities for residents, employees and visitors of the surrounding area, specifically to travel using non-automobile means. The Lakeshore Connecting Communities Transportation Master Plan (TMP), proposes to incorporate uni-directional cycle tracks, separated from vehicle lanes, in each boulevard along the Lakeshore



Road East corridor. Within OPA 125, as part of the planned street network, a series of “Primary Off-Road Routes” and “Primary On-Road / Boulevard Routes” are included primarily within Lakeview Village.

The proposed Rangeview street network will provide connectivity to the Lakeview Village cycling facilities, as well as to Lakeshore Road East, for travel beyond the Site. The proposed Rangeview cycling network includes two-way in-boulevard cycle tracks, where cyclists are separated from vehicles by a curb and buffer, on one side of the road along East Avenue, Lakefront Promenade, Ogden Avenue, Hydro Road and Rangeview Road. Cyclists would be expected to share the road on lower volume streets such as Street L and Street G, where there are no planned designated cycling facilities.

Area Pedestrian Network

The Site is within 500 metres of numerous parks, various restaurants and services, along the Lakeshore Road East corridor that can be reached by walking as Lakeshore Road East includes sidewalks on both sides of the road. The Rangeview proposal includes a planned street network with a high quality urban pedestrian environment with wide sidewalks on most of the proposed streets and pedestrian mews areas to generate pedestrian activity. The proposal for a new traffic signal on Lakeshore Road East at Hydro Road, will provide additional protected crossing opportunities for pedestrians. The pedestrian network proposed for Rangeview will connect to the Lakeview Village pedestrian network, with connectivity to Lake Ontario and beyond.

Transportation Demand Management (TDM)

The TDM strategies incorporated into the development proposal will encourage people to take fewer and shorter vehicle trips in order to support transit and active transportation, as well as enhance public health and reduce harmful environmental impacts. TDM measures have been incorporated into the design and future operations of the proposed Site to include strategies such as the development of a community with a range of land uses with connectivity provided for active modes of travel, convenient connections to transit, cycling facilities & bike repair stations, on-site car/ bike/ scooter sharing facilities and a reduced parking supply for residents and visitors

Potential for a New GO Station

As a result of the advancement of GO Transit in the Greater Toronto & Hamilton Area, there is potential to improve GO Transit in the vicinity of the Site with the addition of a new GO Station. Based on the proximity to local multi-modal connections and distance to nearby existing GO Stations on the Lakeshore West Line (approximately 2.5 km from Port Credit GO Station and approximately 2.5 km from Long Branch GO Station), a potential location for a new station would be east of Cawthra Road and north of Lakeshore Road East.

The relevance of a potential Cawthra GO Station for this study is that it would greatly enhance the multi-modal transportation options available to future residents and visitors to both Rangeview and Lakeview Village. It is important to note however that the traffic analysis undertaken for this report confirms that the future transportation network, even **without** a new GO Station in the area, can acceptably accommodate the expected travel demands of the Rangeview Site with 5,300 residential units, along with the travel demand generated by Lakeview Village and Serson.



Travel Demand & Traffic Analysis

To develop the traffic analysis scenarios for this study, a number of development thresholds were tested for Rangeview to better understand the traffic-related impacts on the overall area road network. As summarized in **Table 1**, each scenario considered the total number of residential units for both Rangeview and Lakeview Village, the total non-residential GFA for Rangeview and Lakeview Village, and the road network and intersection improvements that would be in place at the time of development.

The traffic analysis for this study considers two long-term horizons (2031 and 2041) and generally aligns with the methodology of The Municipal Infrastructure Group's (TMIG) April 2021 Traffic Considerations Report Addendum ("the 2021 April TMIG report") completed for Lakeview Village. As part of the travel demand assessment for the BA Group report, the future travel mode share applied to Rangeview considered that with the implementation of BRT along Lakeshore Road East, the auto driver mode share is expected to decrease from the existing 60% (AM peak)/ 61% (PM peak) to a future 50%, during both peak periods of the day. BA Group adjusted the travel mode shares used in the April 2021 TMIG report to include a future 2% cyclist travel mode share. To determine the background traffic volumes for this study, traffic volume layers, inclusive of Site traffic volumes and background traffic volumes, were taken from the April 2021 TMIG Report. Traffic volume layers were then created for both the Rangeview and Lakeview Village sites that could be added to the future background layers. A key component of the background travel demand assessment included a corridor reduction exercise that estimated how the planned BRT along Lakeshore Road East could be expected to reduce traffic volumes.

TABLE 1 TRAFFIC ANALYSIS SCENARIOS

Development	Existing	Scenario 1 (2031): No Ogden No Haig (with road improvements) ¹	Scenario 2 (2041): Phase 1 + Ogden connected to Lakeshore Road East	Scenario 3A (2041): Phase 2 + Haig connected to Lakeshore Road East	Scenario 3B (2041): Phase 2 + Dual NBL turns at Lakefront Promenade / Lakeshore Road East (Haig not connected)
Rangeview	--	2,500 units + 0% non-residential	3,700 units + 100% non- residential	5,300 units + 100% non- residential	5,300 units + 100% non-residential
Lakeview Village	--	7,500 units + 1.4M ft ² non- residential	8,050 units + 2.1M ft ² non- residential	8,050 units + 2.1M ft ² non- residential	8,050 units + 2.1M ft ² non-residential
Serson	--	0%	0%	100%	0%
Total	Existing Traffic Only	10,000 units	11,750 units	13,350 units	13,350 units



A summary of the traffic analysis undertaken for the scenarios is described below.

Scenario 1: Rangeview with 2,500 units

In consideration of Rangeview with 2,500 residential units and Lakeview Village with 7,500 residential units + 67% development of the non-residential, the combined sites are expected to generate a total of 2,890 and 3,054 two-way vehicle trips, during the morning and afternoon peak period, respectively.

The Scenario 1 road network includes only the list of minor road improvements to be undertaken along Lakeshore Road East. All signalized intersection movements within the study area are expected to operate at v/c equal to, or less than 1.0. All unsignalized intersection movements within the study area are expected to operate at v/c equal to, or less than 1.0, with the exception of the following:

- the southbound left/through/right movement at Lakefront Promenade & Rangeview Road in the afternoon peak hour; and
- the southbound through/right movement at Rangeview Road & Hydro Road, during the afternoon peak hour.

As the concerns noted at the unsignalized intersections occur as part of the interim road network condition, it is expected that when Ogden Avenue is connected, and the road network is built-out as development progresses, operations at the unsignalized intersections noted above would improve. Based on the foregoing, the traffic related to the Scenario 1 development proposal can be acceptably accommodated on the future transportation network.

Scenario 2: Rangeview with 3,700 units + Ogden connected

In consideration of Rangeview with 3,700 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential, the combined sites are expected to generate a total of 3,841 and 4,229 two-way vehicle trips during the morning and afternoon peak period, respectively.

The Scenario 2 road network includes the improvements along Lakeshore Road East related to Scenario 1, in addition to the connection of Ogden Avenue to Lakeshore Road East. All signalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0. All unsignalized intersection movements within the study area are expected to operate at v/c equal, to or less than 1.0, with the exception of the following:

- the northbound left/through/right movement at Ogden Avenue & Street L during both peak periods and the southbound left/through/right movement during the afternoon peak period;
- the northbound left-through/right movements at Ogden Avenue & Rangeview Road during both peak periods;
- the southbound through/right at Hydro Road & Street L during the afternoon peak period; and
- the southbound through/right movement at Hydro Road & Rangeview Road, during the afternoon peak hour.



As development progresses and updated traffic counts become available, the all-way stop control intersections could be reviewed to determine if any intersection warrants traffic signals. All intersections along the north-south streets between Lakeshore Road East and Rangeview Road, could be converted to signalized intersections. Based on the foregoing, the traffic related to the Scenario 2 development proposal can be acceptably accommodated on the future transportation network.

Scenario 3A: Rangeview with 5,300 units + Ogden + Haig

In consideration of Rangeview with 5,300 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential and 100% of the Serson lands developed, the combined sites are expected to generate a total of 4,337 and 4,739 two-way vehicle trips, during the morning and afternoon peak period, respectively.

The Scenario 3A road network includes the improvements along Lakeshore Road East related to Scenario 1, in addition to the connection of Ogden Avenue to Lakeshore Road and the connection of Haig Boulevard to Lakeshore Road East. All signalized intersection movements within the study area are expected to operate at v/c equal to, or less than 1.0, with the exception of the following:

- The southbound right-turn movement at Dixie Road & Lakeshore Road East; and
- the northbound through/left movement at Lakeshore Road East & Haig Boulevard, during the afternoon peak hour.

All unsignalized intersection movements within the study area are expected to operate at v/c equal to, or less than 1.0. Based on the foregoing, the traffic related to the Scenario 3A development proposal can be acceptably accommodated on the future transportation network.

Scenario 3B: Rangeview with 5,300 units + Ogden + Northbound Dual Left-Turn (no Haig)

In consideration of Rangeview with 5,300 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential, the combined sites are expected to generate a total of 4,138 and 4,517 two-way vehicle trips, during the morning and afternoon peak period, respectively.

The Scenario 3B road network includes the improvements along Lakeshore Road East related to Scenario 1, in addition to the connection of Ogden Avenue to Lakeshore Road East, and the northbound dual left-turn implemented on Lakeshore Road East at Lakefront Promenade. The connection of Haig Boulevard to Lakeshore Road East is not included as part of Scenario 3B.

All signalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0, with the exception of the southbound right-turn movement at Dixie Road and Lakeshore Road East during the afternoon peak hour. All unsignalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0, with the exception of a number of intersections along Street L, as well as at Ogden Avenue & Rangeview Road and at Hydro Road & Rangeview Road. As development progresses and updated traffic counts become available, the all-way stop control intersections could be



reviewed to determine if any intersection warrants traffic signals. All intersections along the north-south streets between Lakeshore Road East and Rangeview Road, could be converted to signalized intersections. Based on the foregoing, the traffic related to the Scenario 3B development proposal can be acceptably accommodated on the future transportation network.

Summary of VISSIM Analysis

The VISSIM analysis completed by BA Group confirms the results of the traffic analysis undertaken with Synchro by both TMIG and BA Group. The VISSIM microsimulation analysis included 7 intersections along the Lakeshore Road East corridor for Scenario 3A (Haig connected to Lakeshore Road East) and 3B (no Haig connection but dual left-turning lanes on Lakefront Promenade). A comparison of projected traffic volumes for each scenario versus the VISSIM modelled volumes were used to calculate the GEH values for both Scenario 3A and 3B. As none of the GEH values were greater than the recommended maximum of 5.0, the fit between the simulated and observed flows within the VISSIM model is appropriate.

The VISSIM analysis for **Scenario 3A** shows that the intersections work acceptably with the following exceptions:

- The northbound left-turn/ northbound through movements at Lakeshore Road East & Cawthra Road operate with a LOS F during the afternoon peak hour. This is expected as both of these movements include very low traffic volumes (south approach at this time serves a driveway to only a small office).
- The southbound left-turn movement at Lakeshore Road East & Cawthra Road operates with a LOS F in both the morning and afternoon peak hours due to heavy southbound left-turning volumes. It is noted that this movement already experiences a LOS E during the peak periods under existing conditions.
- All eastbound left-turn/westbound left-turn movements at intersections along Lakeshore Road East are expected to experience poor levels of service with increased delays as a direct result of the implementation of the fully protected left-turn phasing required to accommodate the BRT.

Queuing concerns for **Scenario 3A** were noted as follows:

- Due to high volumes, northbound queues leaving the Site at both East Avenue and Lakefront Promenade may extend beyond the available storage. Northbound queues at the remainder of streets leaving the Site may be lengthy but can be accommodated within the planned available storage.
- During the AM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound vehicles at Cawthra Road and for eastbound vehicles at East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road. It is noted that eastbound right turning volumes are high during the AM peak hour, from Lakeshore Road East to the Site.
- During the PM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound and southbound vehicles at Cawthra Road, and southbound vehicles at Dixie Road.

The VISSIM analysis for **Scenario 3B** shows that the intersections work acceptably with the following exceptions:



- The northbound left-turn/ northbound through movements at Lakeshore Road East & Cawthra Road operate with a LOS F during the afternoon peak hour. This is expected as both of these movements include very low traffic volumes (south approach at this time serves a driveway to only a small office).
- The southbound left-turn movement at Lakeshore Road East & Cawthra Road operates with a LOS F in the morning peak hour due to heavy southbound left-turning volumes. It is noted that this movement already experiences a LOS E during the peak periods under existing conditions.
- The eastbound left-turn at Cawthra Road operates with a LOS F during the afternoon peak period due to high volumes.
- At the intersection of Dixie Road, many movements operate with a LOS F during both the morning and afternoon peak periods due to heavy volumes.
- All eastbound left-turn/westbound left-turn movements at intersections along Lakeshore Road East are expected to experience poor levels of service with increased delays as a direct result of the implementation of the fully protected left-turn phasing required to accommodate the BRT.

Queuing concerns for **Scenario 3B** were noted as follows:

- Due to high volumes, northbound queues leaving the Site at both Lakefront Promenade and Hydro Road may extend beyond the available storage. Northbound queues at the remainder of streets leaving the Site may be lengthy but can be accommodated within the planned available storage.
- During the AM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound vehicles at Cawthra Road and for eastbound vehicles at East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road. It is noted that eastbound right-turning volumes are high during the AM peak hour, from Lakeshore Road East to the Site.
- During the PM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound and southbound vehicles at Cawthra Road, and southbound vehicles at Dixie Road.
- The northbound left-turning volumes at Lakefront Promenade at Lakeshore Road East are expected to be high and queueing could become a concern.
- High volumes of traffic are expected along Lakeshore Road East during the peak periods of the day which could create potential east-west queuing concerns at Cawthra Road, East Avenue, Lakefront Promenade (eastbound only) and Hydro Road (eastbound only).

Conclusions

The traffic analysis indicates that the future transportation network, with BRT along Lakeshore Road East, can acceptably accommodate the travel demands of the Rangeview Site with 5,300 residential units and 95,000 ft² GFA of non-residential uses, if the road network includes the planned upgrades along Lakeshore Road East, in addition to the extension of Ogden Avenue from Lakeshore Road East to Rangeview Road, and **either** the connection of Haig Boulevard to Lakeshore Road East **or** a dual northbound left-turn on Lakefront Promenade at Lakeshore Road East.



1.0 INTRODUCTION

BA Group was retained by the Rangeview Landowners Group to provide transportation consulting services related to a proposed mixed-use development on a site known as Rangeview Estates (herein referred to as “the Site” and “Rangeview”), in the City of Mississauga. The Site is generally bounded by East Avenue to the west, Lakeshore Road East to the north, Hydro Road to the east and the land parcels located beyond the south side of Rangeview Road. All land parcels on the south side of Rangeview Road that have frontage on Rangeview Road are included as part of the Site. Rangeview Landowners Group Incorporated (LOG) currently represents 9 landholders within Rangeview Estates. The LOG currently owns 21/33 (64%) privately held properties within Rangeview. The LOG ownership map is provided in **Appendix A**.

This Transportation Considerations Report has been prepared as part of the updated **Development Master Plan (DMP)** and the **Official Plan Amendment (OPA)**, application being submitted to the City of Mississauga. The location of the Site is illustrated in **Figure 1**.

1.1 BACKGROUND

A Transportation Considerations Report dated November 2022, was previously prepared by BA Group as part of the **Development Master Plan (DMP)** and **Official Plan Amendment (OPA)** initially submitted to the City. This updated Transportation Considerations Report provides an update to the November 2022 report in order to address comments provided by the City.

The development proposal statistics and proposed internal road network remain largely unchanged since the previous submission, with the exception of minor road design revisions in response to the City’s comments e.g. consideration for the Lakeshore Road BRT (30% design). Key additions to this updated report include the following:

- A traffic analysis scenario for existing conditions; and
- A VISSIM analysis for future total conditions for Scenario 3A (connection of Haig Boulevard to Lakeshore Road East) and Scenario 3B (no connection of Haig Boulevard but dual left-turn lanes on Lakefront Promenade).
- The creation of a video traffic simulation in VISSIM at full build-out of both the Rangeview and Lakeview sites.

A demonstration of the morning peak hour (the most critical time period) traffic simulation at full build-out of both the Rangeview and Lakeview sites in 2041, based on Scenario 3A (with Haig Boulevard), can be viewed at the following YouTube link:

<https://www.youtube.com/watch?v=6H3cA5m3ycU>

1.2 EXISTING SITE CONTEXT

The Site is currently occupied by a mix of commercial, industrial, retail and services with vehicle access provided through Lakeshore Road East, Rangeview Road, East Avenue, Lakefront Promenade and Hydro Road.

The existing context of the Site is illustrated in **Figure 2**.





FIGURE 1 SITE LOCATION



FIGURE 2 SITE CONTEXT

1.3 PROPOSED DEVELOPMENT CONCEPT

The proposed development concept includes the following key elements:

- Redevelopment of the Site as a mixed-use area that includes residential and commercial uses.
- The implementation of a road network that facilitates multi-modal connectivity and advances place-making initiatives.
- Redevelopment that is consistent, congruent and supportive of the ongoing Lakeview Village development that is to occur directly south of the Site, given that many of the proposed road network connections are mutually beneficial to both redevelopment proposals.
- As per Official Plan Amendment 89 (OPA 89) to the City of Mississauga Official Plan, the Site is permitted to develop 3,700 residential dwelling units. As part of this application, it is proposed to increase the development allowance on the Site to 5,300 residential dwelling units.
- Consideration for a recommendation that Metrolinx evaluate the potential to introduce a Cawthra Road GO Station along the Lakeshore West GO Train Line, to further facilitate higher order transit access for the Site, as well as the Lakeview Village development.

The Master Plan development concept proposed for Rangeview is illustrated in **Figure 3**. Since the development proposals for the combined lands south of Lakeshore Road East, inclusive of Rangeview, Lakeview Village and Serson, were considered as part of the detailed traffic analysis for this study, **Table 2** includes a development summary for the combined lands. It is important to note however that this application only relates to the approvals related to Rangeview at this time. Reduced scale architectural plans of the Rangeview development proposal are included in **Appendix B**.

TABLE 2 PROPOSED DEVELOPMENT CONCEPT (COMBINED LANDS)

Land Use	Proposed Statistics
Rangeview	
Residential	3,700 to 5,300 units
Retail & Office	95,000 ft ²
Adjacent Lands	
Lakeview Village	
Residential	8,050 units
Retail, Office, Research & Development, School & Daycare, Hotel, Community Centre (GFA)	2.1 million ft ²
Serson	
General Office/ Research & Development Centre (GFA)	449,000 ft ²





FIGURE 3 RANGEVIEW MASTER PLAN DEVELOPMENT CONCEPT

1.4 STUDY SCOPE

The study will be completed in accordance with the City of Mississauga's Traffic Impact Study Guidelines.

A summary of BA Group's review of the urban transportation elements of the development proposal includes the following:

- Review of the relevant transportation planning and policy context;
- Review of the area transportation context;
- Transportation Demand Management (TDM) strategy, inclusive of a vehicle parking strategy;
- Preliminary assessment of the viability of a Cawthra Road GO Station;
- Proposed road network & right-of-ways (ROW);
- Confirmation of the multi-modal travel demand expected to be generated by the combined site; and
- Comprehensive traffic analysis of four different development scenarios.



2.0 TRANSPORTATION PLANNING & POLICY CONTEXT

Public policy with respect to mobility and development planning has changed over recent years with sustainable growth at the forefront of many policy initiatives. Provincial and municipal-wide directives set a planning framework that increasingly aims to mitigate and reduce vehicle traffic through the promotion and facilitation of non-auto trips and the improvement of public transit access and active modes of travel. Greater priority is now being placed on the movement and experience of people, as opposed to vehicle traffic and auto use.

Common themes across provincial and municipal policies and guidelines include:

Planning transit from a network perspective

Public transit is being transformed to achieve an interconnected network of high-order public transit service. Planning and funding efforts are being undertaken by all levels of government to achieve this vision.

Designing streets and public realm for people

While the efficient movement of automobiles has previously been the focus in transportation planning, this is no longer a primary focus. The enjoyment, safety and efficiency of pedestrians has become the primary focus of mobility planning at the regional and municipal levels.

Connecting and expanding cycling infrastructure

The City of Mississauga (and Peel Region) is focusing efforts on expanding their active transportation network. Plans are comprised of a primary network of multi-use trails and a secondary network of shorter local neighbourhood connections that create a continuous network of recreational facilities throughout the City.

Increasing multi-modal mobility options

In addition to public transit and active transportation, shared mobility options such as car-sharing, bike-sharing and ride-sharing, are becoming increasingly common in other parts of the GTA and help reduce the need for individuals to own a private vehicle. These services allow individuals to conveniently and affordably have access to a private vehicle when needed.

Reducing automobile reliance

Regional and municipal policies (Official Plans, Transportation Master Plans, etc.) are placing emphasis on mixed-use developments centered around transit in order to promote non-auto based travel. Transportation Demand Management strategies within new developments also facilitate the efficiency of existing and planned transportation infrastructure.



2.1 PROVINCIAL PLANNING

The **Growth Plan for the Greater Golden Horseshoe (2020)** outlines the importance of supporting the achievement of complete communities through a more compact built form, designed to provide a mix of uses to meet people's daily needs, facilitating aging in place, reducing automobile reliance and promoting non-auto modes. Planning for growth and optimizing infrastructure along transit and transportation corridors, adopting minimum density targets and reduced parking standards in major station areas, and integrating active transportation within the existing and planned street network are priorities.

The **2020 Provincial Policy Statement** encourages the provision of Transportation Demand Management strategies within new developments to increase the efficiency of existing and planned transportation infrastructure. It also encourages transit-oriented development and higher density that adopts a mix of uses to promote non-auto based travel.

The **Metrolinx 2041 Regional Transportation Master Plan** supports intensification in accordance with sustainable transportation objectives. Additional rapid transit options, greater pedestrian connections, and mixed-use density should be considered for the City of Toronto and the surrounding region, including the City of Mississauga.

The **Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe** (February 2022) provides a 30-year vision (i.e. to 2051) to building a more sustainable and resilient transportation system in the Greater Golden Horseshoe (GGH) to enable transit-oriented communities. Planned rapid transit infrastructure expansion is included and outlined in greater detail in **Section 3.2.2**.

2.2 REGIONAL PLANNING

The **Region of Peel Official Plan (OP)** promotes sustainable forms of transportation through Regional Intensification Corridors, which in turn support sustainable development through efficient use of land, densities supportive of transit and pedestrian mobility, and complete urban communities containing living, working and recreational opportunities. Regional Intensification Corridors are characterized by Urban Growth Centres linked by public transit, high intensity, compact urban form with an appropriate mix of uses, transit-supportive and pedestrian-oriented urban forms, and opportunities for higher order transit.

The **Peel Region Sustainable Transportation Strategy (STS)**, approved by Peel Region Council in February 2018, is a framework outlining policies, programs and infrastructure in order to enable and grow the sustainable transportation modes in Peel Region. Most notably, the STS sets a goal for 50% of the morning peak period trips in the Region to be made by sustainable transportation modes by 2041, up from the current 37% sustainable mode share. The STS identifies sustainable transportation modes as trips made by walking, cycling, transit, and carpool as well as trips avoided through teleworking.

Over fifty actions items are identified in the STS, consisting of both short-term and long-term recommendations. The short-term priorities of the STS are supported by two accompanying five-year implementation plans, the 2018-2022 Active Transportation Implementation Plan (ATIP) and the 2018-2022 Transportation Demand Management Implementation Plans (TDMIP). Examples of short-term priorities include encouraging and supporting cycling and walking from transit hub and other community destinations as well as identifying the locations of new and upgraded walking and cycling infrastructure.



2.3 CITY OF MISSISSAUGA & LOCAL PLANNING

2.3.1.1 City of Mississauga Official Plan (OP) (Consolidated October 21, 2021):

The City of Mississauga Official Plan (OP) sets the planning policy framework to guide the future growth and development of the City. It recognizes that new growth will take place primarily through infilling and redevelopment of appropriate areas that can benefit from growth and change. A key priority identified within the OP is to support a strong public transportation system in the City and address the City's long-term sustainability. General support is also indicated for providing more opportunity for transit and active transportation choices to create a more sustainable, multi-modal city.

Major Nodes are intended to be prominent centres of mixed-use activity with a variety of employment opportunities, higher-density housing, and active transportation choices that achieve a high-quality urban environment. The Site is located within the Rangeview Estates precinct of the Lakeview Waterfront Major Node Character Area identified in the City of Mississauga OP. This designation came about through Official Plan Amendment (OPA) 89 and 125 which are discussed in further detail below.

2.3.1.2 City of Mississauga Official Plan: Official Plan Amendment (OPA) 89

Official Plan Amendment (OPA) 89 to the Mississauga Official Plan was enacted and passed on July 4, 2018 through By-law 0169-2018. The purpose of OPA 89 was to add a new Major Node Character Area to the OP, the Lakeview Waterfront Major Node, and update land use designations to include residential development. As a result of OPA 89, the Site is located within the Lakeview Waterfront Major Node and further, the Rangeview lands were permitted to include 3,700 residential dwelling units.

The Lakeview Waterfront Major Node Character Area, specifically, will be designed to encourage multi-modal transportation with an emphasis on transit and active transportation to reduce traffic delays, congestion, energy consumption and pollution. The community will have a highly-connected network of streets and routes for active transportation to support walking and cycling. The community will include a mobility system that encourages all transportation modes and innovative parking solutions.

Furthermore, within the Lakeview Waterfront Major Node Character Area, the lands adjacent to Lakeshore Road East, including the Site, will become part of a higher-order transit corridor and transit-oriented community, once the enhanced transit route planned along the Lakeshore Road East is complete.

2.3.1.3 City of Mississauga Official Plan: Official Plan Amendment (OPA) 125

Official Plan Amendment (OPA) 125 to the Mississauga Official Plan was enacted and passed on November 10, 2021 through By-law 0231-2021. The purpose of OPA 125 was to revise policies pertaining to the Lakeview Waterfront Major Node Character Area reflecting planning associated with the lands to the south and east of the Site, as outlined in **Section 2.3.2**. Key within OPA 125, was a revised block structure (see **Exhibit 1** below) and a revised planned road network (see **Exhibit 2** below), notably including a southward extension of Ogden Avenue (Street F) into the Rangeview Lands and further south).



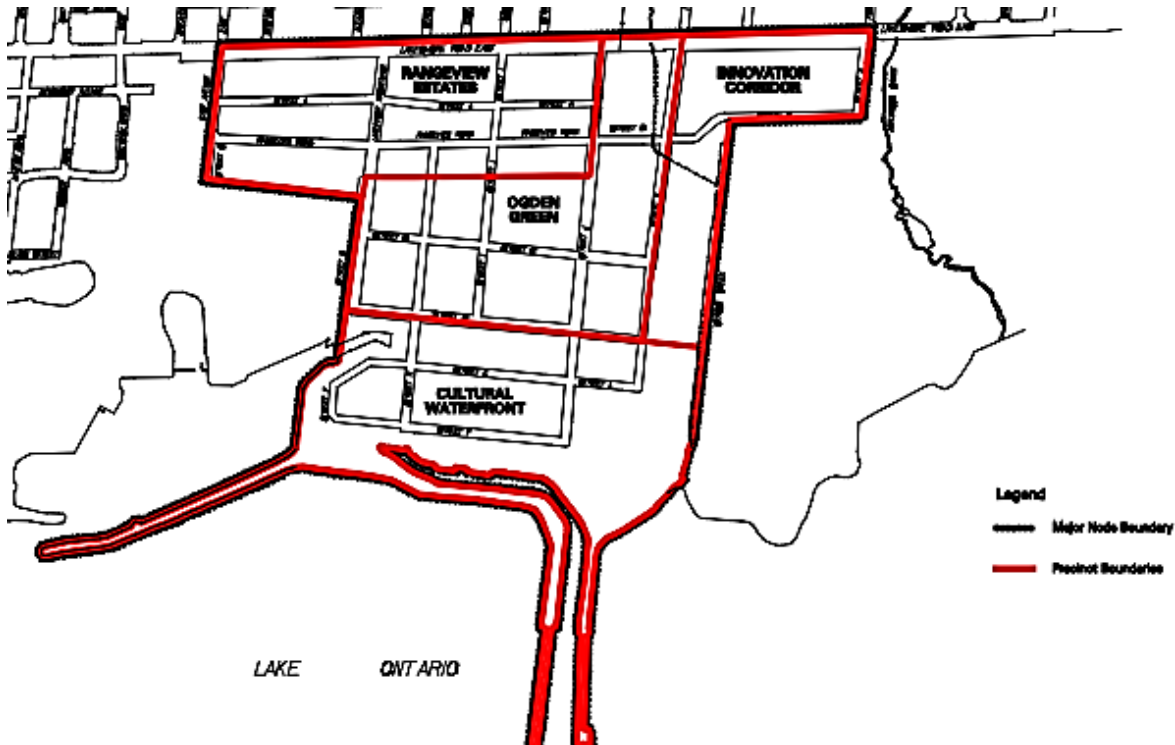


EXHIBIT 1: LAKEVIEW WATERFRONT MAJOR NODE CHARACTER AREA PRECINCTS
(CITY OF MISSISSAUGA OFFICIAL PLAN: MAP 13-3-2)

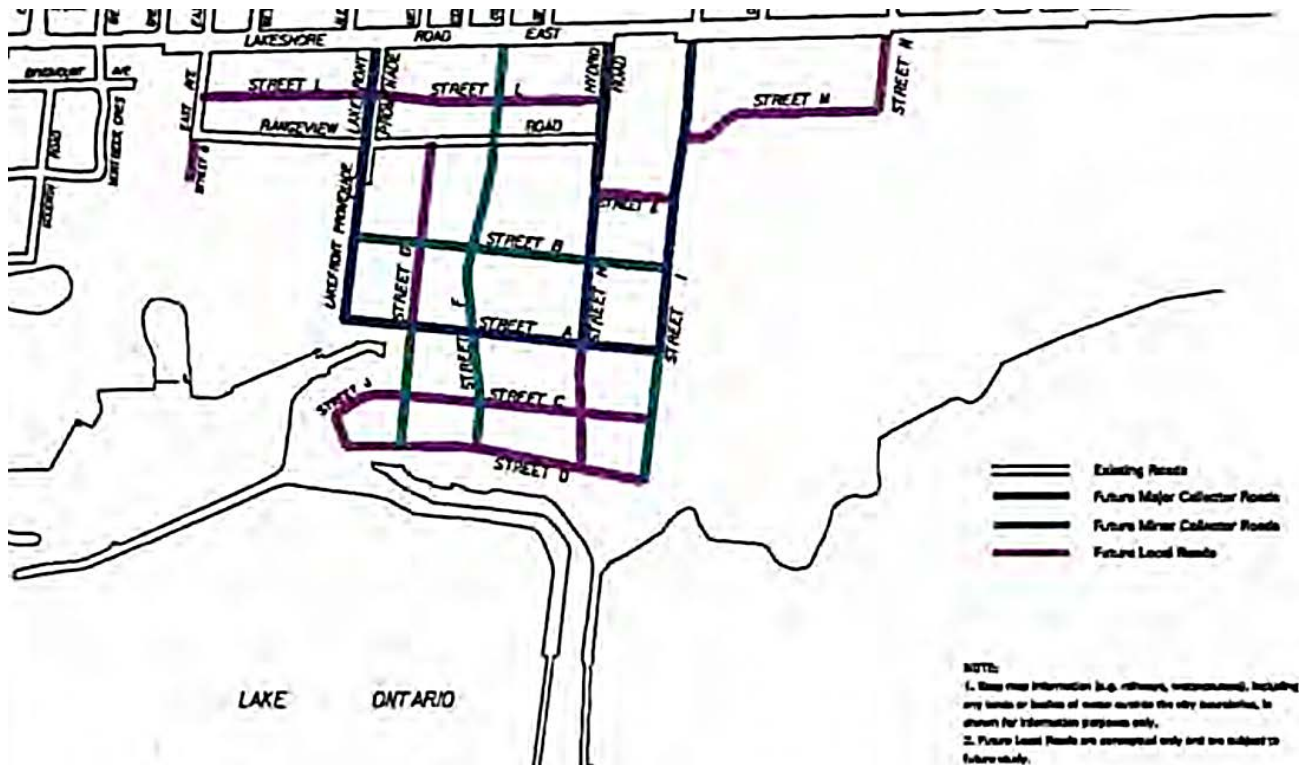


EXHIBIT 2: LAKEVIEW WATERFRONT MAJOR NODE CHARACTER AREA FUTURE ROADS
(CITY OF MISSISSAUGA OFFICIAL PLAN: SECTION 13.3, FIGURE 4)

Conditions of Approval were provided within OPA 125, that pertain to the area street network and other improvements, that will be necessary to accommodate the planned development of both Lakeview Village and Rangeview, and are listed as follows:

42.0 The applicant/owner shall make satisfactory arrangements with the Region of Peel and City of Mississauga for mitigation measures and external road improvements as described in the Transportation Considerations Report, including all addendums as prepared by The Municipal Infrastructure Group Ltd. to support full build-out of the proposed development. The mitigation measures prior to full build-out are as follows:

- a. Construction of westbound right-turn lane at Cawthra Road and Lakeshore Road East;*
- b. Construction of westbound right-turn lane at Dixie Road and Lakeshore Road East;*
- c. Construction of eastbound right-turn lane at Lakefront Promenade and Lakeshore Road East;*
- d. Northbound lanes reconfigured at Lakefront Promenade and Lakeshore Road East to include a dedicated left-turn lane and share through/right lane;*
- e. Construction of eastbound right-turn lane at Hydro Road and Lakeshore Road East;*
- f. Northbound lanes reconfigured at Hydro Road and Lakeshore Road East to include a dedicated left-turn lane and a shared left/through/right lane;*
- g. Signalization of Hydro Road and Lakeshore Road East intersection, as per Lakeshore Connecting Communities BRT roll plan drawings.*

Further considerations may include:

- h. Ogden Avenue and Haig Boulevard road extensions, and the implementation of the Lakeshore Connecting Communities Bus Rapid Transit (BRT) being completed;*
- i. Construction of eastbound right-turn lane at Haig Boulevard and Lakeshore Road East;*
- j. Northbound lanes at Ogden Avenue and Lakeshore Road East configured to include a dedicated left-turn lane and a shared through/right lane;*
- k. Northbound lanes at Haig Boulevard and Lakeshore Road East configured to include a dedicated left-turn lane and a shared through/right lane; and,*
- l. Southbound lanes reconfigured at Dixie Road and Lakeshore Road East to include a dedicated right-turn lane and a shared left/through lane.*

The comprehensive traffic analysis for the proposed development (**Section 7.0** of this report) of the Rangeview Lands, has assumed the completion of the mitigation measures included within the Conditions of Approval as part of future scenarios.

2.3.1.4 Lakeshore Connecting Communities Transportation Master Plan (TMP)

The Lakeshore Connecting Communities Transportation Master Plan (TMP), endorsed by City Council in June 2019, sets out a long-term vision for transit and corridor improvements along Lakeshore Road East from 2020 to 2041 that will support waterfront development. The TMP envisions the Lakeshore Road East corridor as an area that supports all modes of transportation, connects people to places, and moves goods to market.

Of the transit network alternatives considered in the TMP, the preferred transit solution for the 2041 horizon year is express bus / bus rapid transit (BRT) along the extent of Lakeshore Road East in Mississauga; more



detail is provided within **Section 3.2.2**. In addition to provisions for rapid transit, continuous separated/protected bike lanes and sidewalks on both sides of the street are planned through the extent of the route. In January 2021, it was announced that the City of Mississauga would receive federal and provincial funding for transit infrastructure through the Investing in Canada Infrastructure Program (ICIP) to fund projects including the Lakeshore BRT. At this time, completion of the Lakeshore BRT is targeted for 2027.

2.3.2 Lakeview Village

Lakeview Community Partners Limited together with the City, the Region, relevant external agencies, and the community undertook a multi-year process of creating the Lakeview Waterfront Development Master Plan, applicable to the lands (Lakeview Village) immediately south and east of Rangeview, which culminated with Council's endorsement of the Plan on November 6, 2019. Plan of subdivision (illustrated in **Exhibit 3**), rezoning and Official Plan Amendment (OPA) applications were all submitted and have since been approved; By-law 0119-2022 was passed, amending City of Mississauga Zoning By-law 0225-2007, but remains under appeal at the time of writing of this report. As described above, OPA 89 and OPA 125 include Lakeview Village.

Lakeview Village is being planned as a mixed-use development. The following development statistics have been approved to date:

- 8,050 dwelling units (inclusive of low-rise, mid-rise, and high-rise multifamily housing)
- 191 hotel rooms
- 435,856 ft² recreational community centre GFA
- 745,316 ft² office GFA
- 745,316 ft² research & development centre GFA
- 202,718 ft² retail GFA (38,793 ft² retail GFA is considered to be ancillary)
- 850 student capacity elementary school
- 39 child capacity day care centre

From a transportation perspective, the development of Lakeview Village is inter-related with the proposed redevelopment of the Rangeview Site. As illustrated in the Plan of Subdivision (**Exhibit 3**), much of the street network is shared between the two sites, notably including existing and planned Major and Minor Collector Roads (i.e. Lakefront Promenade, the planned Ogden Avenue extension and Hydro Road).

The planned street network for both Rangeview and Lakeview Village, will provide north-south connections to Lakeshore Road East, as well as key east-west connections across both sites. In addition to the shared road network, the existing residential development unit count permissions for Rangeview and Lakeview Village were jointly outlined in OPA 89 and updated in OPA 125, as follows:

- Rangeview (referred to as Rangeview Estates): 3,700 units
- Lakeview Village (referred to as Ogden Green, Cultural Waterfront): 8,050 units

The Lakeview Waterfront Major Node Character Area, inclusive of Rangeview and Lakeview Village, is currently permitted to include a total of 11,750 residential units.



By-law 0119-2022

Within Site-specific By-law 0119-2022 (*under appeal at the time of writing this report*), a number of Holding provisions were imposed on Lakeview Village as part of the rezoning approval which restrict the use of the lands (i.e. maximum residential development of 8,050 dwelling units) until relevant conditions are satisfied. Relevant to transportation conditions, the following are including:

- H2: maximum of 6,800 dwelling units are permitted until such time as “*submission of a transportation study and confirmation that the necessary traffic infrastructure improvements have been secured to adequately accommodate increased traffic volumes to the satisfaction of the Region of Peel (“Region”) and the City.*”
- H3: maximum of 7,500 dwelling units are permitted until such time as “*submission of a transportation study and confirmation that the necessary traffic infrastructure improvements have been constructed to adequately accommodate increased traffic volumes to the satisfaction of the Region and the City.*”
- H6: maximum of 92,900 m² non-residential GFA are permitted until such time as “*submission of a satisfactory transportation study and confirmation that the necessary traffic infrastructure improvements have been constructed to adequately accommodate increased traffic volumes all to the satisfaction of the Region and the City.*”

It is noted that 92,900 m² non-residential GFA is nearly equivalent to 1,000,000 ft² non-residential GFA.



3.0 TRANSPORTATION CONTEXT

3.1 AREA STREET NETWORK

3.1.1 Existing Area Street Network

The Site is well-located relative to roadway connections provided across the City, Peel Region, and the Greater Toronto Area (GTA). The public street network surrounding the Site includes a hierarchy of road connections ranging from arterial roads to local roads. The Site is also located just over 2.0 kilometres from the Queen Elizabeth Way (QEW).

The existing area road network is illustrated in **Figure 4** and a detailed description of the area road network is provided in **Table 3**. Additionally, various local roads north of Lakeshore Road East, provide connections adjacent to the Site (i.e. to Lakeshore Road East). These local roads include the north-south roads, Westmount Avenue, Alexandra Avenue, Meredith Avenue, Edgeleigh Avenue and Strathy Avenue.

TABLE 3 EXISTING AREA STREET NETWORK

Type	Street Name	Description
Regional Arterial	N-S	Cawthra Road
	N-S	Dixie Road
Major Arterial	E-W	Lakeshore Road East
Major Collector	N-S	Ogden Avenue
Minor Collector	N-S	Haig Boulevard
Local Road	N-S	Hydro Road
		East Avenue
		Lakefront Promenade
	E-W	Rangeview Road



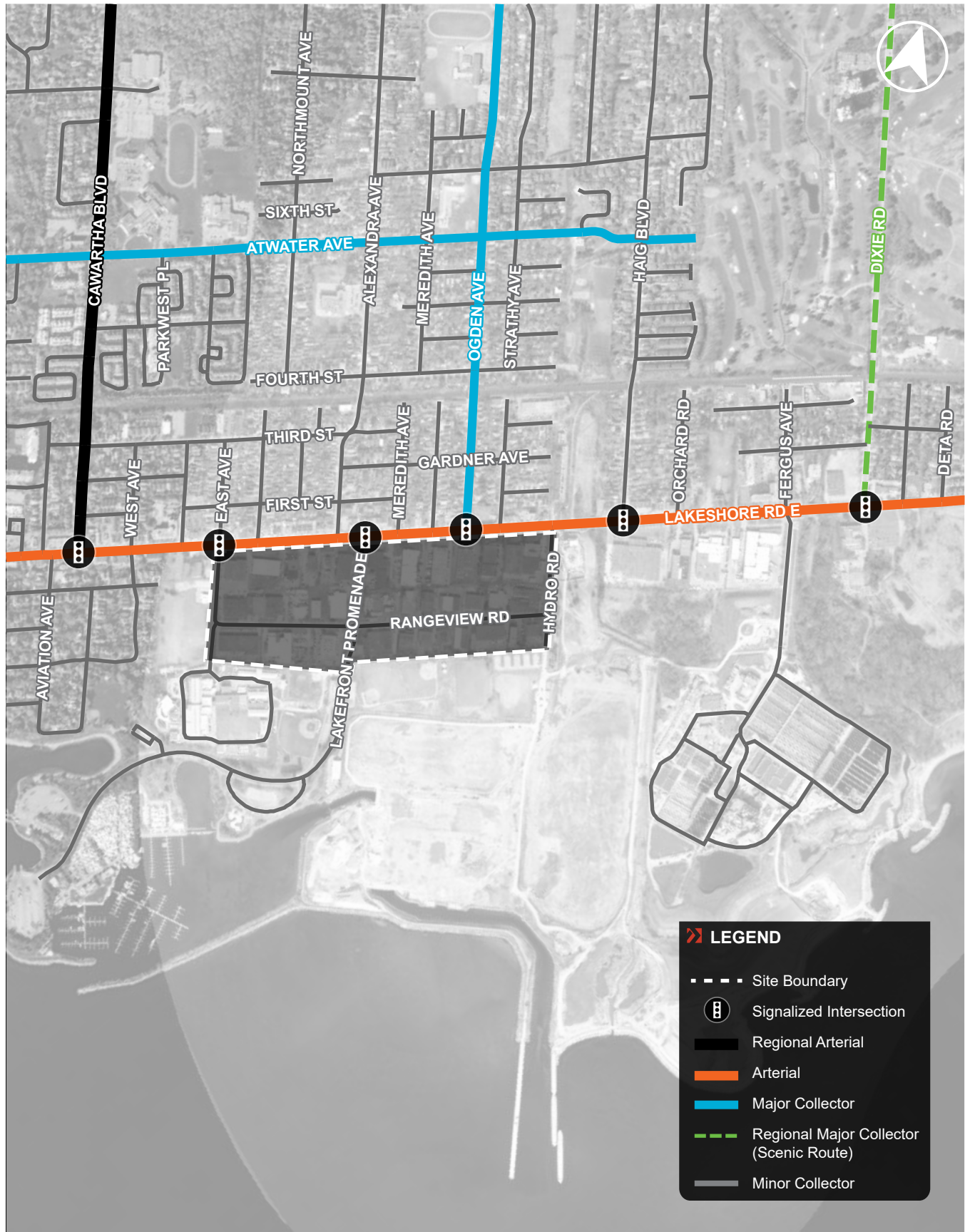


FIGURE 4 EXISTING AREA ROAD NETWORK

3.1.2 Ultimate Planned Street Network

As outlined in **Section 2.3**, the advancement of the Lakeview Village development has resulted in planned changes to the local street network, including within the Rangeview Site, that are reflected in OPA 125. As part of the proposed OPA, details pertaining to the street network within the Rangeview Site are being advanced. Further, the approved Lakeshore Connecting Communities TMP includes planned changes to Lakeshore Road East, including within the vicinity of the Site, which have been considered as part of the comprehensive traffic analysis for this report. **Figure 5** illustrates the planned street network, including planned and proposed changes derived from each of the three above-noted processes.

3.1.2.1 Lakeshore Connecting Communities Transportation Master Plan

As outlined in **Section 2.3**, the Lakeshore Connecting Communities TMP, a Bus Rapid Transit (BRT) facility with a dedicated right-of-way, is planned with a completion date of 2027 on Lakeshore Road East, in the vicinity of the Site. Exhibit 5 includes a roll plan excerpt for the right-of-way adjacent to the Site.

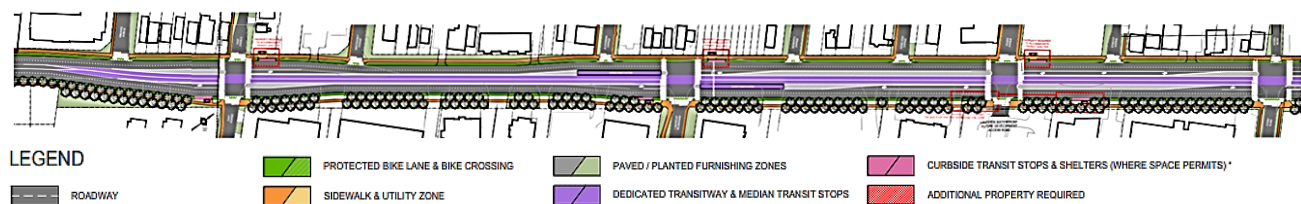


EXHIBIT 4: LAKESHORE ROAD EAST – ROLL PLAN EXCERPT (LAKESHORE CONNECTING COMMUNITIES TRANSPORTATION MASTER PLAN: CITY OF MISSISSAUGA / HDR)

Key elements of the planned changes to the Lakeshore Road East right-of-way include:

- Two vehicle travel lanes in each direction, including left-turn lanes at signalized intersections (East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road);
- Minor side streets to have right-in/ right-out access;
- Dedicated bus-only lanes in the centre of the right-of-way;
- Express bus stop located at Lakefront Promenade;
- Protected cycling lanes (both sides) & pedestrian crossings; and
- Sidewalks & paved/planted furnishing zones.

3.1.2.2 Planned Area Street Network: Inspiration Lakeview/ Lakeview Village

As outlined in **Section 2.3**, a new street network is planned for the entirety of the OPA 125 lands, which includes Rangeview and Lakeview Village. Within **Table 4**, details pertaining to the proposed new streets (within Lakeview Village) and adjustments to existing streets are outlined. The names of the proposed streets are listed in **Table 4** as referred to by the Inspiration Lakeview project materials.

Notably, some existing streets are planned to have modified classification. Lakefront Promenade, north of the planned Street L, is to be converted from a local road to a Major Collector Road. Hydro Road, north of the planned Street L, is to be converted from a local road to a Major Collector Road.



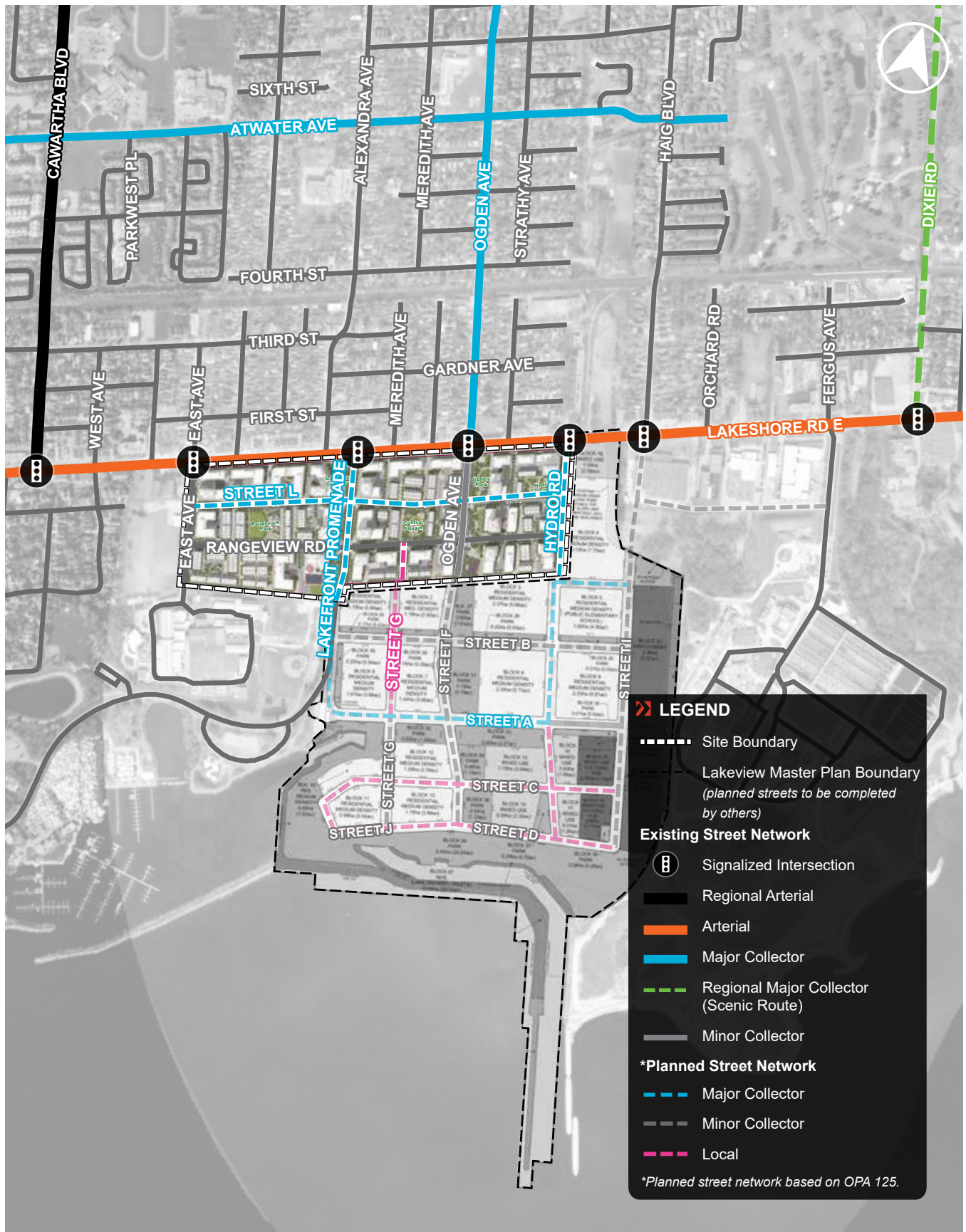


FIGURE 5 FUTURE AREA ROAD NETWORK

TABLE 4 OPA 125/ LAKEVIEW VILLAGE STREET NETWORK DETAILS

Street ¹	Right-of-Way Width (m) ²	Road Classification	Pavement Width (m)	Dual Cycle Tracks	Sidewalks (2.0m)	Layby Parking
Lakefront Promenade	26.0	Major Collector	6.7	West boulevard	Both sides	--
Street A	26.05	Major Collector (Hydro Road to Street K)	6.7	South boulevard	Both sides	South side
	23.15	Minor Collector (Street I to Hydro Road)	6.7	South boulevard	Both sides	North side
Street B	22.25	Minor Collector	6.6	North boulevard	South side	Both sides
Street C	19.05	Local Road	6.6	--	Both sides	South side
Street D	20.55	Local Road	6.6	South boulevard	North side	North side
Street E	19.05	Local Road	6.6	--	Both sides	South side
Street F (Ogden Avenue)	23.05	Minor Collector	6.6	East boulevard	Both sides	East side
Street G	23.05	Minor Collector (Street A to Street D)	6.6	West boulevard	Both sides	East side
	19.05	Local Road (Property Line to Street A)	6.6	--	Both sides	West side
Hydro Road (Street H)	25.4	Major Collector (Lakeshore Road East to Street A)	6.7	East boulevard	Both sides	East side
	18.05	Local Road (south of Street A)	6.6	--	Both sides	East side
Street I	23.15	Minor Collector	6.7	East boulevard	Both sides	West side
Street J	19.05	Local Road (west of Street G)	6.6	--	Both sides	Inside curve

Notes:

1. Refer to **Figure 5** for location of streets.
2. Source: Inspiration Lakeview Village draft plan of subdivision materials (The Municipal Infrastructure Group Ltd.)

3.1.3 Proposed New Street Network (Rangeview Lands)

Within Rangeview, it is proposed to advance upgrades to the local street network that reflect the planned road network contained within OPA 125. Within this section, greater detail is provided pertaining to proposed changes to the local street network within Rangeview. The names of the proposed streets are as identified in OPA 125. **Exhibit 6** illustrates how the planned Rangeview road network will connect to the planned Lakeview Village road network. The functional road plan is also provided in **Appendix C**.



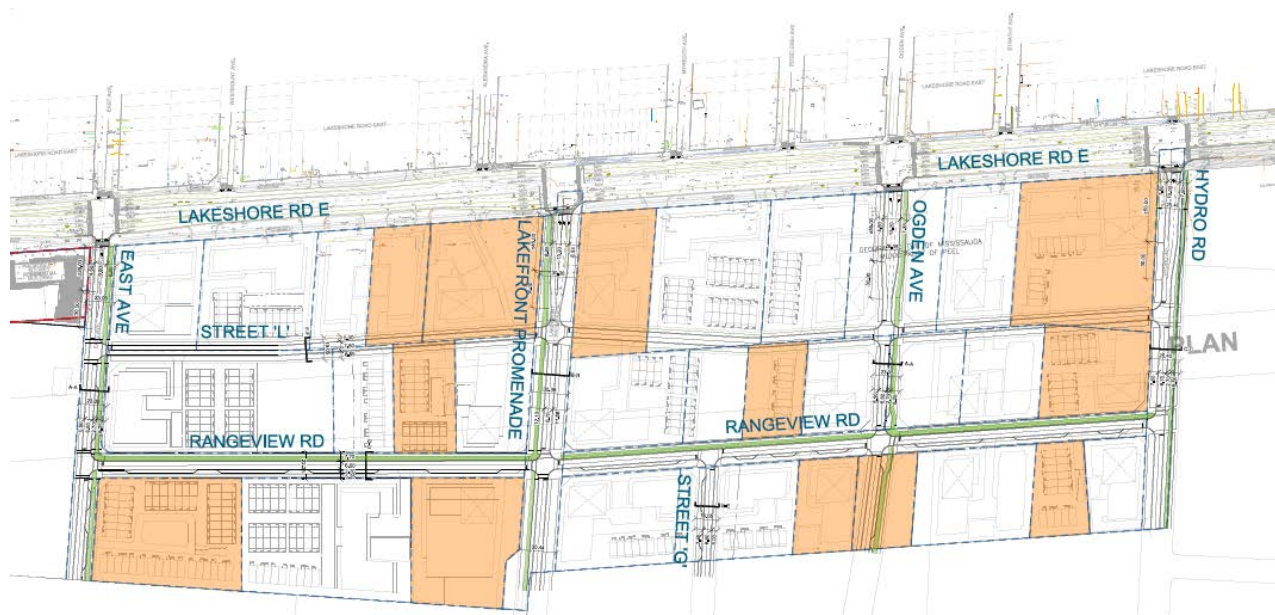


EXHIBIT 5: PLANNED RANGEVIEW ROAD NETWORK CONNECTING TO LAKEVIEW VILLAGE ROAD NETWORK

Key Street Design Objectives

Consideration for all road users:

Enhancements to the existing street network elements, will support the movement for all users (vehicles, pedestrians, cyclists) and be designed in a way to minimize road conflicts and encourage alternative modes of travel and active transportation.

Ease of access:

The new street network will facilitate convenient connections from the proposed development to / from the broader area network. The proposed street design is intended to service and support pedestrian and cycling permeability and maintain vehicle capacity at all times of the day.

Complete Streets:

The improved and proposed roads within the Site have been designed with the policies of “Complete Streets” at the forefront. The City of Mississauga is undertaking the “Changing Lanes” project (scheduled to be complete in 2023) which will update, develop, and implement new tools to ensure that streets are safe and convenient for all users. It will deliver a “Complete Streets” Guide for streets in Mississauga and representing an updated approach to street planning and design for the City.

Conformity with Lakeview Village street design:

Given that many of the streets in the local area located south of Lakeshore Road East are shared between Lakeview Village and the Rangeview, and that the approvals process is substantially advanced for the former,

the proposed street network for the latter is proposed to reflect many of the design conditions (e.g. rights-of-way, etc.) planned for Lakeview Village. The objective is for the streets to have a consistent design both in terms of transportation elements and ultimately, urban design.

Intersections south of Lakeshore Road East:

All intersections south of Lakeshore Road East (excluding driveways) are proposed to be unsignalized with all-way stop-control, with all vehicle movements permitted. All street descriptions below and the traffic analysis reflect this condition. As development progresses and updated traffic counts become available, the all-way stop control intersections could be reviewed to determine if any intersection warrants traffic signals. All intersections along the north-south streets between Lakeshore Road East and Rangeview Road, could be converted to signalized intersections.

East Avenue

East Avenue is an existing minor collector north-south public street running from Lakeshore Road East in the north to Lakeview Water Treatment Plant in the south. It is the western boundary of Rangeview. The functional plan and proposed cross-section for East Avenue are provided in **Figure 6**.

Cross Section:

East Avenue will have a 23.05 metre right-of-way (ROW) consisting of the following:

- One 3.3 metre travel lane in each direction (6.6 m roadway) and 2.2 metre lay-by on the east side.
- On the east side of the roadway, a 3.0 metre two-way, protected cycle track is provided.
- The boulevard on each side of the roadway will contain 2.0 metre sidewalks and 2.5 metre planting zones.
- Appropriate buffers are provided between ROW elements.

Intersections:

East Avenue will have intersections with Lakeshore Road East, the proposed Street L, and Rangeview Road.

- The intersection with Lakeshore Road East retains the existing traffic signal location and will continue to be a signalized intersection with all vehicle movements permitted. The proposed configuration of East Avenue at this intersection will remain similar (i.e. no turning lanes). All pedestrian movements will be facilitated with crosswalks and appropriate connections will be provided between the East Avenue and Lakeshore Road East cycling facilities, to be confirmed as part of the Lakeshore Connecting Communities TMP.
- The intersection with Street L will be unsignalized with all-way stop-control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks.
- The intersection with Rangeview Road will be unsignalized with all-way stop-control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks and appropriate connections will be provided between the East Avenue and Rangeview Road cycling facilities.



Lakefront Promenade

Lakefront Promenade is an existing north-south public street running from Lakeshore Road East in the north to the Lakefront Promenade Marina in the south. The functional plan and proposed cross-section for Lakefront Promenade are provided in **Figure 7**.

Cross-Section:

Lakefront Promenade will be a major collector with a 30.38 metre right-of-way (ROW) south of Lakefront Promenade consisting of the following:

- One 3.35 metre travel lane (6.7 metre roadway) in each direction.
- On the west side of the roadway, a 3.0 metre two-way, protected cycle track is provided.
- The boulevard on each side of the roadway will contain 2.0 metre sidewalks, planting zones ranging from 3.7 to 6.18 metres, and 2.9 metre bioswale plant zones.
- Appropriate buffers are provided between ROW elements.

Intersections:

Lakefront Promenade will have intersections with Lakeshore Road East, the proposed Street L, and Rangeview Road.

- The intersection with Lakeshore Road East retains the existing traffic signal location and will continue to be a signalized intersection with all vehicle movements permitted. The roadway will be expanded at this intersection with dedicated left and right-turn lanes. All pedestrian movements will be facilitated with crosswalks and appropriate connections will be provided between the Lakefront Promenade and Lakeshore Road East cycling facilities, to be confirmed as part of the Lakeshore Connecting Communities TMP.
- The intersection with Street L will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks.
- The intersection with Rangeview Road will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks and appropriate connection will be provided between the Lakefront Promenade and Rangeview Road cycling facilities.

Street F (Ogden Avenue Extension from Lakeshore Road East to Rangeview Road)

Street F is the proposed southerly minor collector extension of Ogden Avenue, from north of Lakeshore Road East, which will eventually connect to the property line, just south of Rangeview Road. The functional plan and proposed cross-section for Ogden Avenue are provided in **Figure 8**.

Cross Section:

Ogden Avenue will have a 23.05 metre right-of-way (ROW) south of Lakeshore Road East consisting of the following:

- One 3.3 metre travel lane in each direction and 2.2 metre layby on the east side. In total, where layby is provided, a 8.8 metre roadway will be provided.
- On the east side of the roadway, a 3.0 metre two-way, protected cycle track is provided.



- The boulevard on each side of the roadway will contain 2.0 metre sidewalks and 2.5 metre planting zones.
- Appropriate buffers are provided between ROW elements.

Intersections:

Ogden Avenue as a minor collector will have intersections with Lakeshore Road East, the proposed Street L, and Rangeview Road.

- The intersection with Lakeshore Road East retains the existing traffic signal location (currently a driveway for 1036 Lakeshore Road East on the south side) and will continue to be a signalized intersection with all vehicle movements permitted. The roadway will be expanded at this intersection with dedicated left-turn, through and right-turn lanes. All pedestrian movements will be facilitated with crosswalks and appropriate connections will be provided between the Ogden Avenue and Lakeshore Road East cycling facilities, to be confirmed as part of the Lakeshore Connecting Communities TMP.
- The intersection with Street L will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks.
- The intersection with Rangeview Road will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks and appropriate connection will be provided between the Ogden Avenue and Rangeview Road cycling facilities.

Hydro Road

Hydro Road is an existing north-south public street running from Lakeshore Road East in the north to the Waterfront Trail in the south. The functional plan and proposed cross-section for Hydro Road are provided in **Figure 9**.

Cross Section:

Hydro Road as a major collector will have a 25.4 metre right-of-way (ROW) consisting of the following:

- One 3.35 metre travel lane in each direction (6.7 metre roadway) and 2.2 metre layby (which will serve as a bio-retention area) on the east side.
- On the east side of the roadway, a 3.0 metre two-way, protected cycle track is provided.
- The boulevard on each side of the roadway will contain 2.0 metre sidewalks. On the west side, there will be a 5.0 metre bioswale planting zone and on the east side, there will be 2.5 metre planting zone.
- Appropriate buffers are provided between ROW elements.

Intersections:

Hydro Road will have intersections with Lakeshore Road East, the proposed Street L and Rangeview Road.

- The intersection with Lakeshore Road East is unsignalized but is proposed to be a signalized intersection with all vehicle movements permitted. The proposed configuration of Hydro Road at this intersection will remain similar (i.e. no turning lanes). All pedestrian movements will be facilitated with crosswalks and appropriate connections will be provided between the Hydro Road and Lakeshore Road East cycling facilities, to be confirmed as part of the Lakeshore Connecting Communities TMP.
- The intersection with Street L will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks.



- The intersection with Rangeview Road will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks and appropriate connection will be provided between the Hydro Road and Rangeview Road cycling facilities.

Street L

Street L is not an existing street. It is proposed to operate in an east-west direction from East Avenue in the west to Hydro Road to the east, to the north of, and parallel to Rangeview Road. The functional plan and proposed cross-section for Street L are provided in **Figure 10**.

Cross Section:

Street L will have a 19.05 metre right-of-way (ROW) consisting of the following:

- One 3.75 metre travel lane in each direction. In total, a 7.5 metre roadway will be provided.
- The boulevard on each side of the roadway will contain 2.0 metre sidewalks and tree planting zones ranging from 2.5 to 4.05 metres.
- Appropriate buffers are provided between ROW elements.

Intersections:

Street L will have intersections with East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road. All intersections with Street L will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks.

Rangeview Road

Rangeview Road is an existing east-west public street running from East Avenue in the west to Hydro Road to the east. The functional plan and proposed cross-section for Rangeview Road are provided in **Figure 11**.

Cross Section:

Rangeview Road as a minor collector will have a 22.25 metre right-of-way (ROW) consisting of the following:

- One 3.30 metre travel lane in each direction (6.6 metre roadway) and 2.2 metre layby on the south side (which will serve as a bio-retention area).
- On the north side of the roadway, a 3.0 metre two-way, protected cycle track is provided.
- The boulevard on each side of the roadway will contain 2.0 metre sidewalks and 2.5 metre planting zones.
- Appropriate buffers are provided between ROW elements.

Intersections:

Rangeview Road will have intersections with East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road. All intersections with Rangeview Road will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks and appropriate connection will be provided between the Rangeview Road and north-south street cycling facilities.



Street G

Street G is not an existing street. It is proposed to operate in a north-south direction from Rangeview Road in the north to the south (within Lakeview Village) near Lake Ontario. Notably, Street G is named Street H within OPA 125. The functional plan and proposed cross-section for Street G are provided in **Figure 12**.

Cross Section:

Street G as a local road will have a 19.05m right-of-way (ROW) consisting of the following:

- One 3.3 metre travel lane in each direction (6.6 metre roadway) and 2.2 metre layby on the west side.
- The boulevard on each side of the roadway will contain 2.0 metre sidewalks and 2.5 metre planting zones.
- Appropriate buffers are provided between ROW elements.

Intersection:

Street G will have an intersection within Rangeview at Rangeview Road (it has other intersections within Lakeview Village). The intersection with Rangeview Road will be unsignalized with all-way stop control, with all vehicle movements permitted. All pedestrian movements will be facilitated with crosswalks.

3.1.3.1 Summary of Rangeview Proposed Street Network

A summary of the proposed street network for Rangeview is provided in **Table 5**.

TABLE 5 PROPOSED RANGEVIEW STREET NETWORK – DESIGN SUMMARY

Street ¹	Right-of-Way Width (m)	Road Classification	Pavement Width (m)	Dual Cycle Tracks	Sidewalks (2.0m)	Layby Parking
East Avenue	23.05	Minor Collector	6.6	East boulevard	Both sides	East side
Lakefront Promenade	26.00	Major Collector	6.7	West boulevard	Both sides	--
Street F (Ogden Avenue Extension from Lakeshore Road East to property line, just south of Rangeview Road)	23.05	Minor Collector	6.6	East boulevard	Both sides	East side
Hydro Road	25.40	Major Collector	6.7	East boulevard	Both sides	East side
Street L	19.05	Local	7.5	--	Both sides	--
Rangeview Road	22.25	Minor Collector	6.6	North boulevard	Both sides	South side
Street G	19.05	Local	6.6	--	Both sides	West side

Notes:

1. Refer to **Figure 5** and **Appendix C** for location of streets.

3.1.3.2 Interim Phasing for Vehicle Access

As Rangeview Estates is comprised of several landowners, the phasing has been designed to allow each existing parcel to develop independently at different periods of the development approvals process. It is



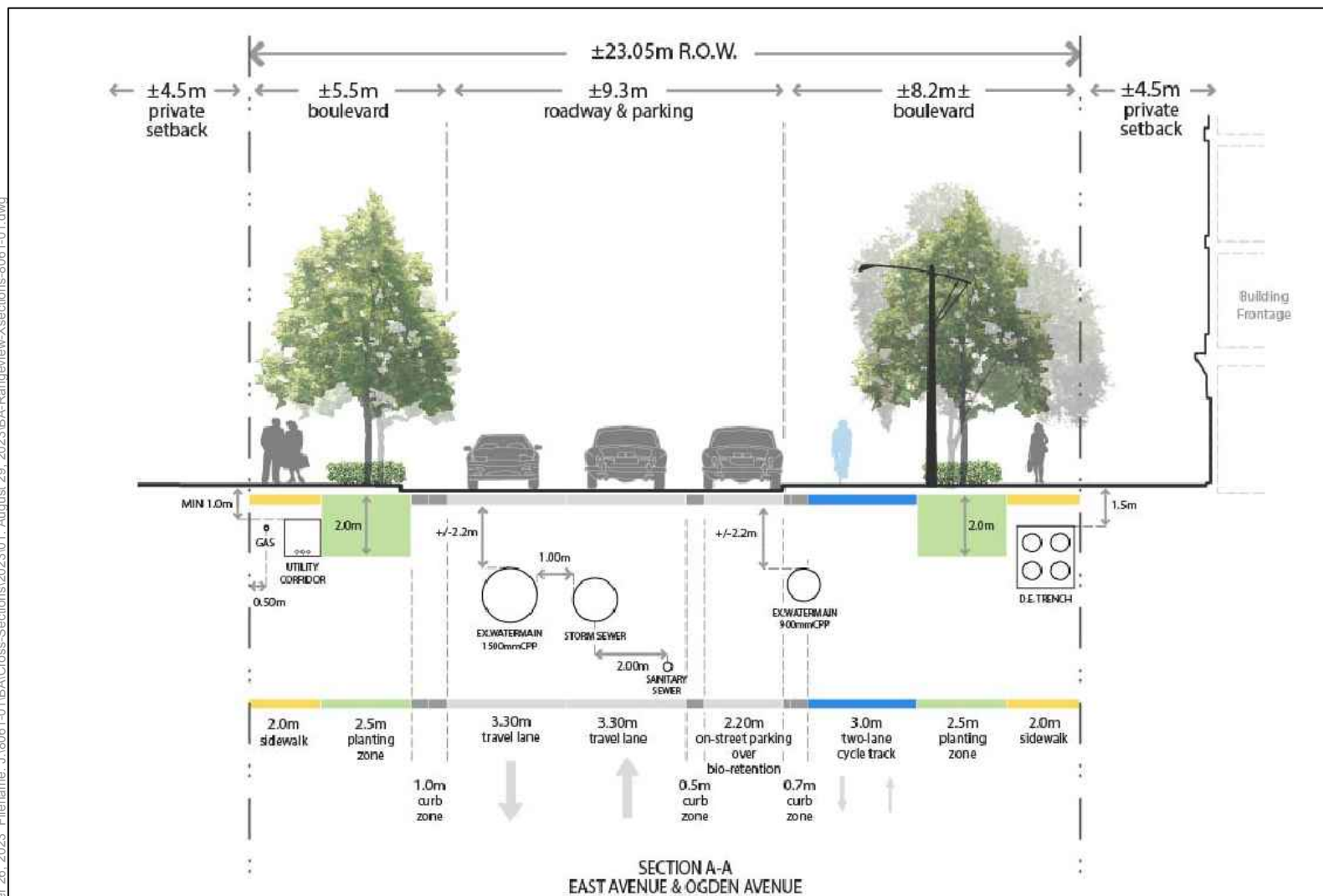
particularly important to establish a functional road network where the proposed interim phase creates a partial road network that provides each landowner with temporary access to their property so they can develop without affecting an adjacent parcel. This approach is particularly important for those parcels that are located mid-block along Lakeshore Road East.

For an interim phase, the approach considers a partially built Street 'L', that extends eastward from East Avenue and terminates in a temporary cul-de-sac centrally located between Lakefront Promenade and East Avenue. East of Lakefront Promenade, the phasing plan considers a partially built Ogden Avenue, north of Rangeview Road, with termination of temporary cul-de-sacs that would eventually be extended as Street 'L', between Lakefront Promenade and Hydro Road. When an individual parcel plans to develop, the public road and/or parkland associated with that parcel, as defined in the Rangeview DMP, will be conveyed to the City of Mississauga in order to ensure that the overall vision demonstrated in the Rangeview DMP can be achieved. Interim access configurations will be considered on a site-by-site basis where needed in cases where the full road network cannot be delivered as part of a project.

In addition, the existing roads within Rangeview Estates (East Avenue, Rangeview Road, Lakefront Promenade and Hydro Road) will be improved over time as part of servicing-related road reconstruction, with interim cross-sections considered in cases where the ultimate right-of-way has not yet been acquired. Interim cross-sections will include consideration for public realm, pedestrians, cycling facilities and traffic operations improvements.



Date Plotted: September 26, 2023. Filename: \\8061-01\\BA\\Cross-Sections\\2023\\01_August 29_2023\\BA-Rangeview-Xsections-8061-01.dwg



23.05m MINOR COLLECTOR

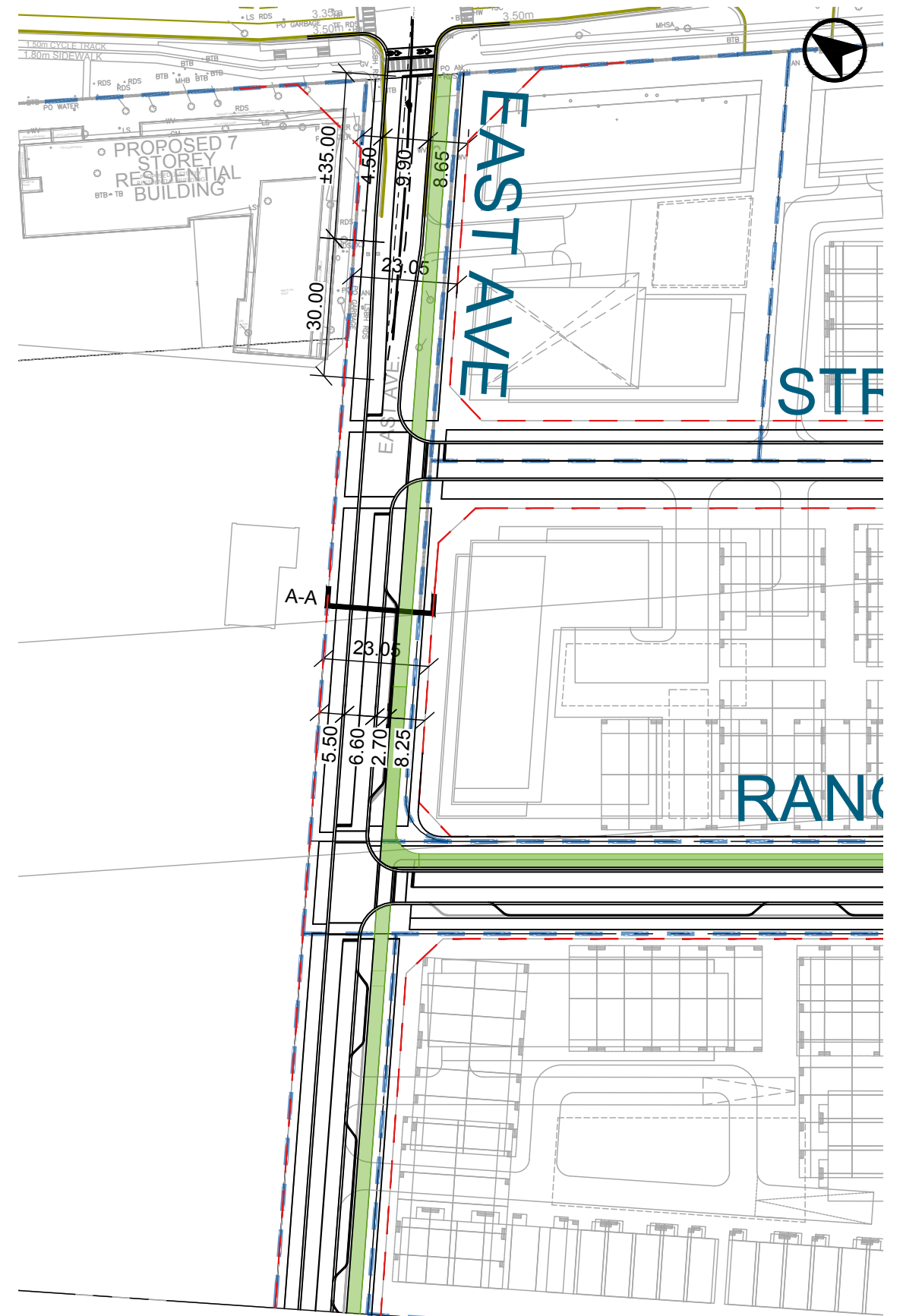
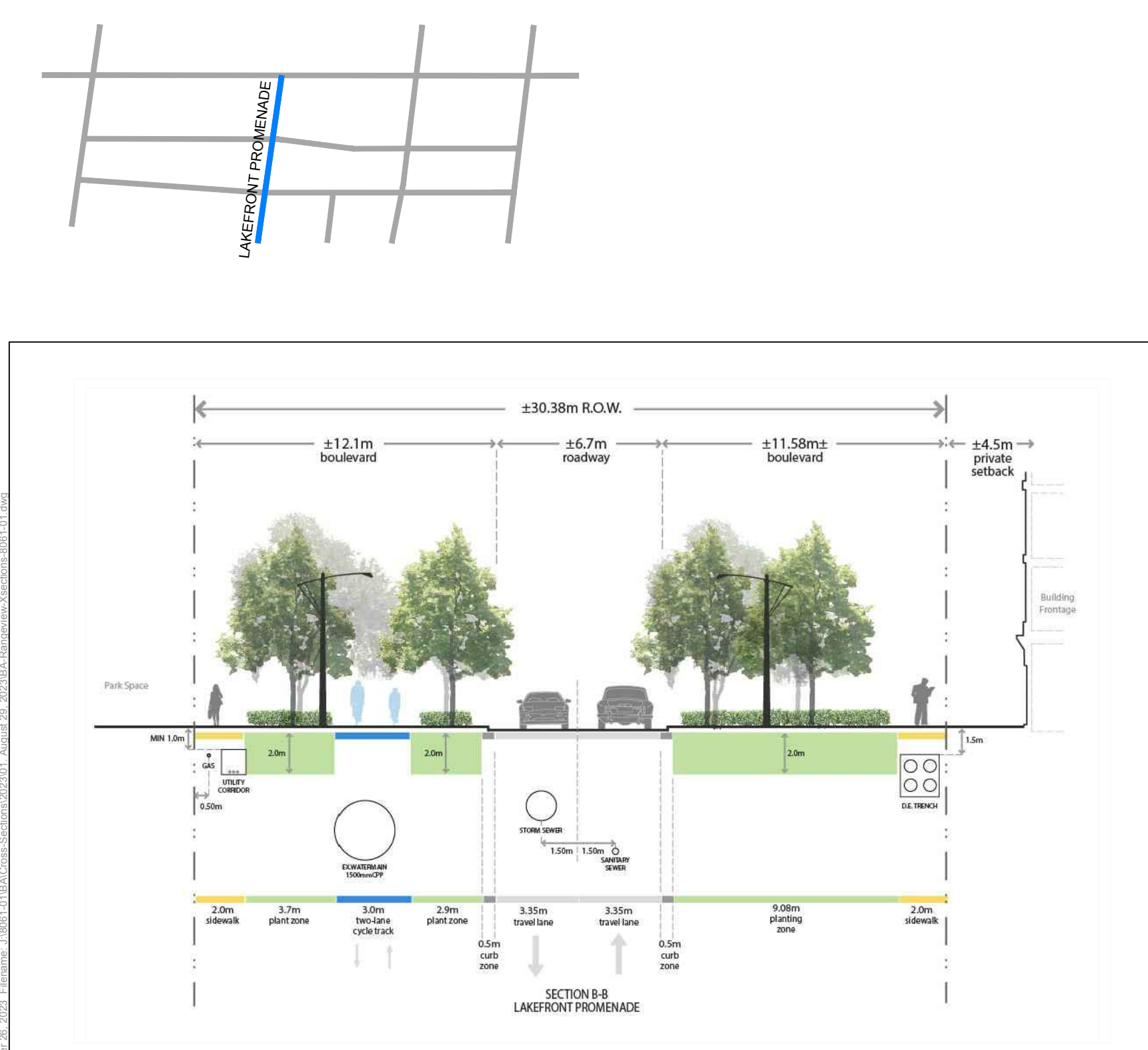


FIGURE 6 EAST AVENUE - FUNCTIONAL PLAN & CROSS-SECTIONS

Date Plotted: September 26, 2023. Filename: \\8061-01\BA\Cross-Sections\2023\01_August 29_2023\BA-Rangeview-Xsections-8061-01.dwg



30.38m MAJOR COLLECTOR

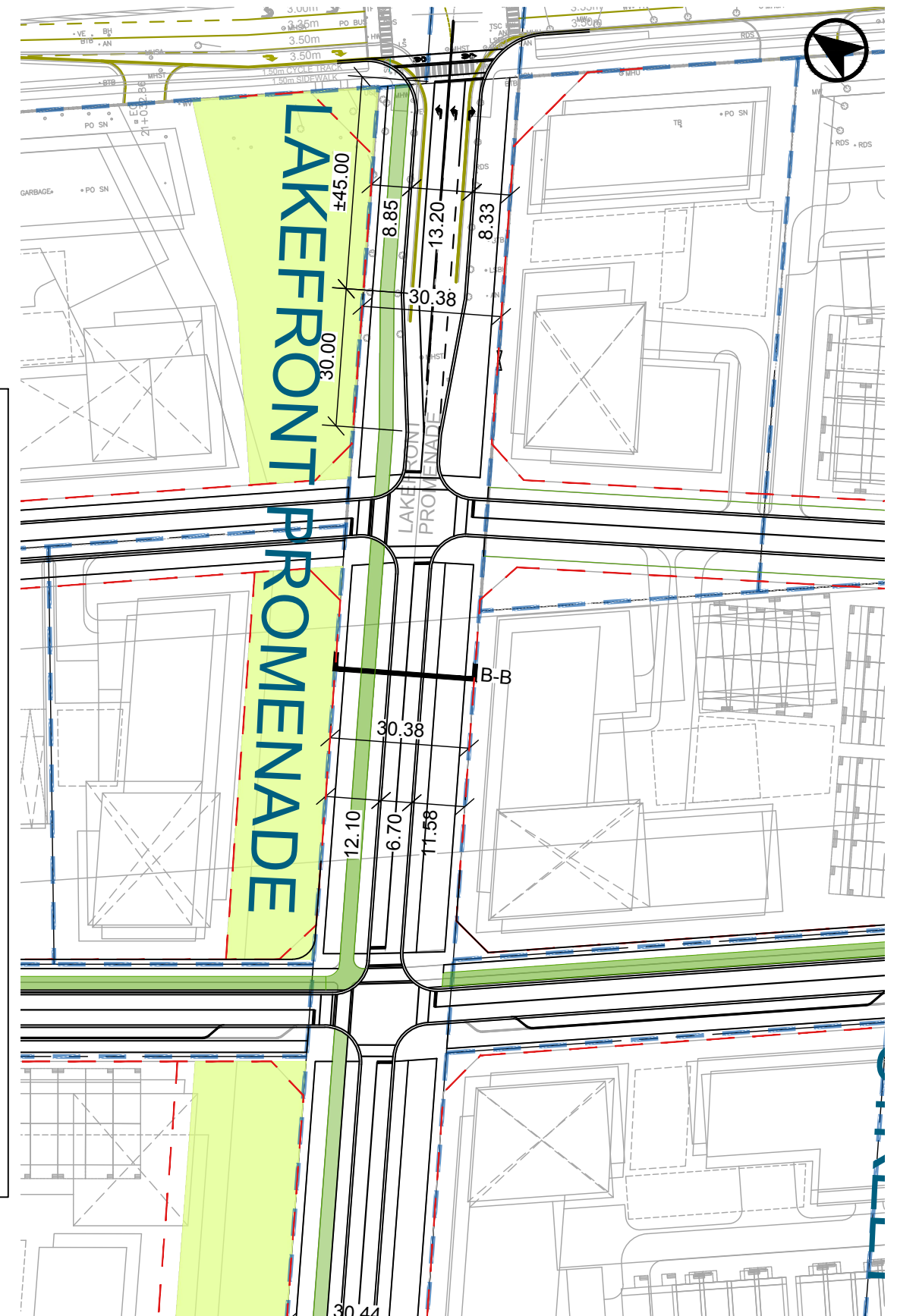
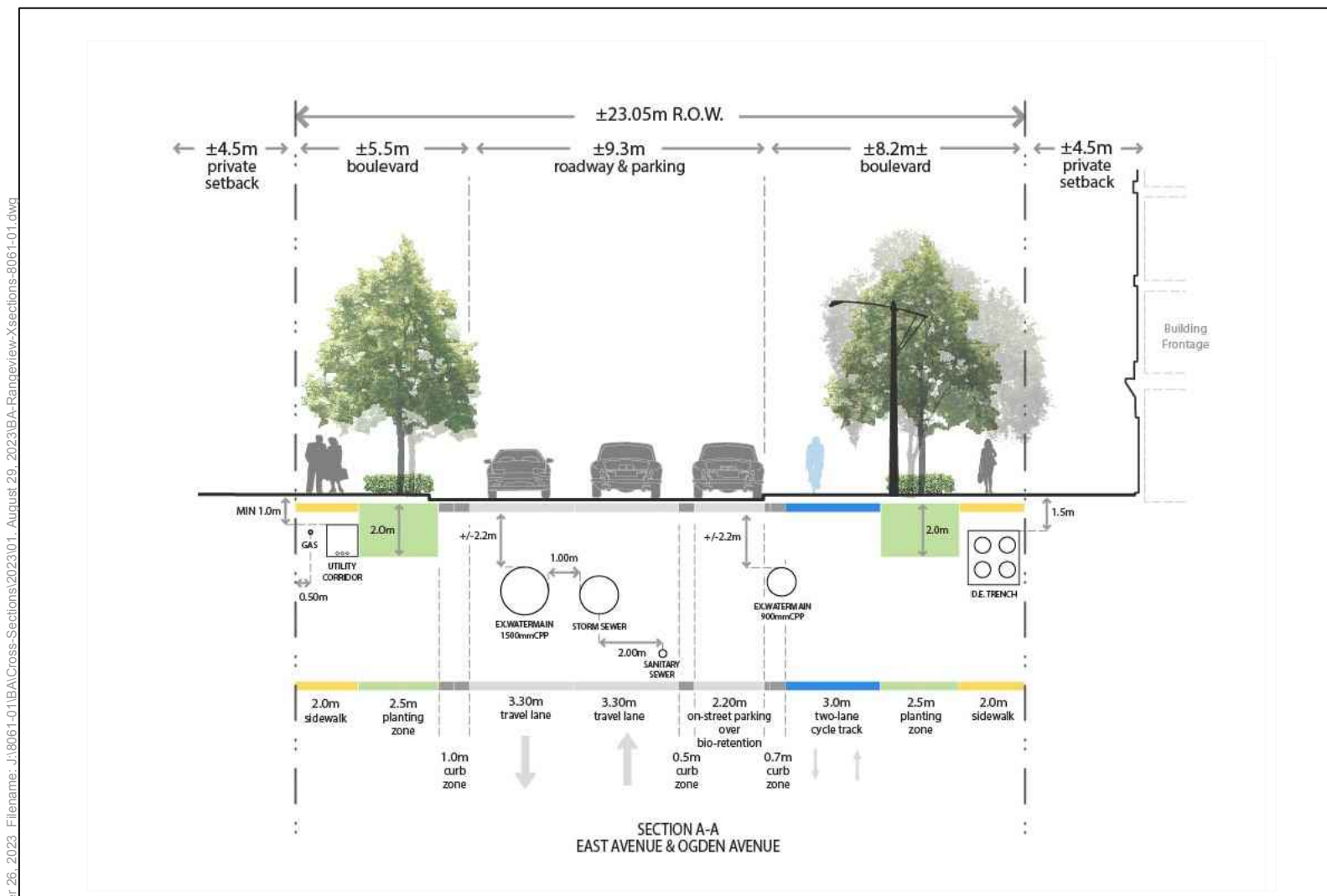


FIGURE 7 LAKEFRONT PROMENADE - FUNCTIONAL PLAN & CROSS-SECTIONS

Date Plotted: September 26, 2023. Filename: \\8061-01\BA\Cross-Sections\2023\01_August 29_2023\BA-Rangeview-Xsections-8061-01.dwg



23.05m MINOR COLLECTOR

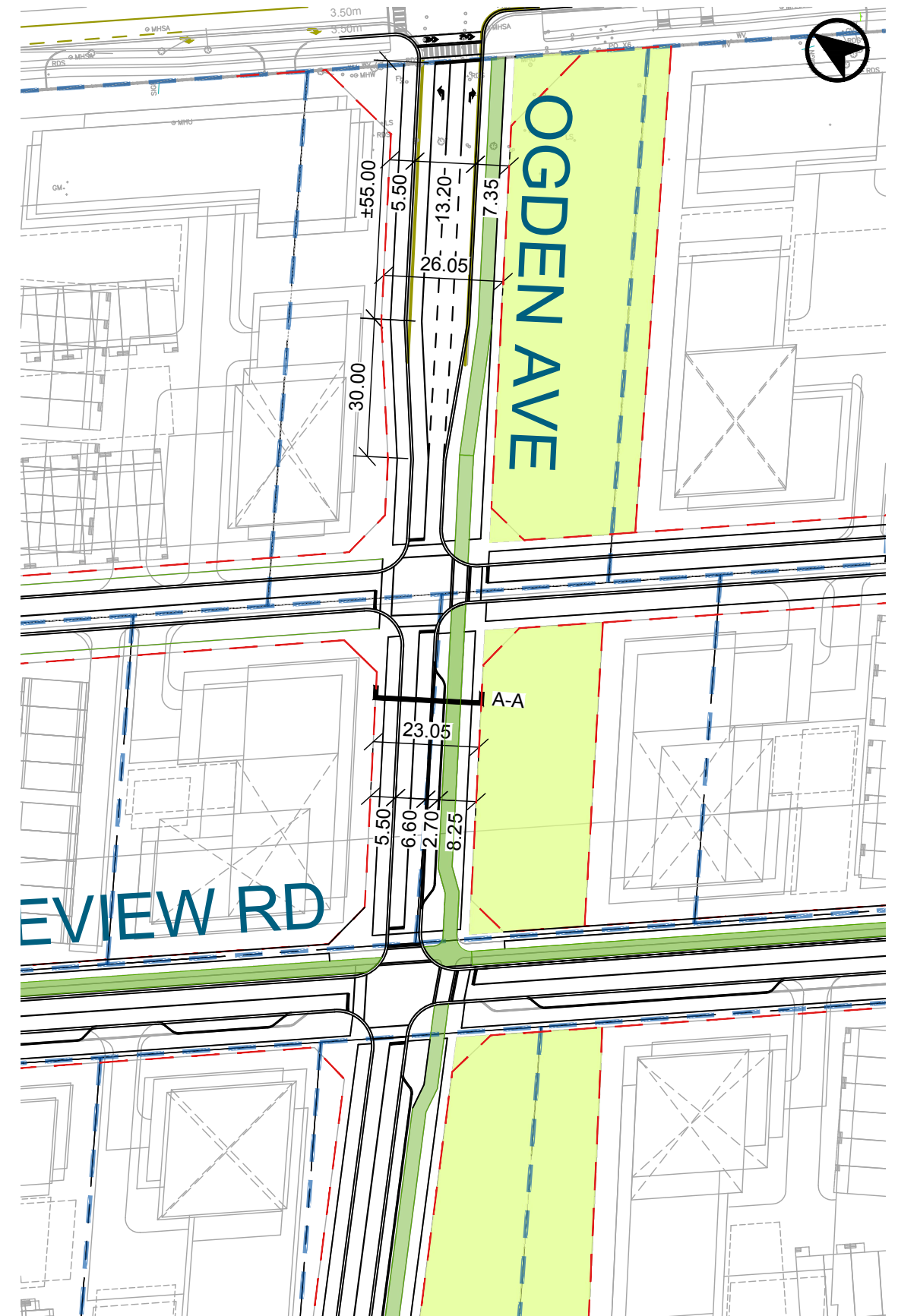


FIGURE 8 PROPOSED OGDEN AVENUE EXTENSION - FUNCTIONAL PLAN & CROSS-SECTIONS

Date Plotted: September 26, 2023. Filename: \\8061-01\BA\Cross-Sections\2023\01_August 29, 2023\BA-Rangeview-Xsections-8061-01.dwg

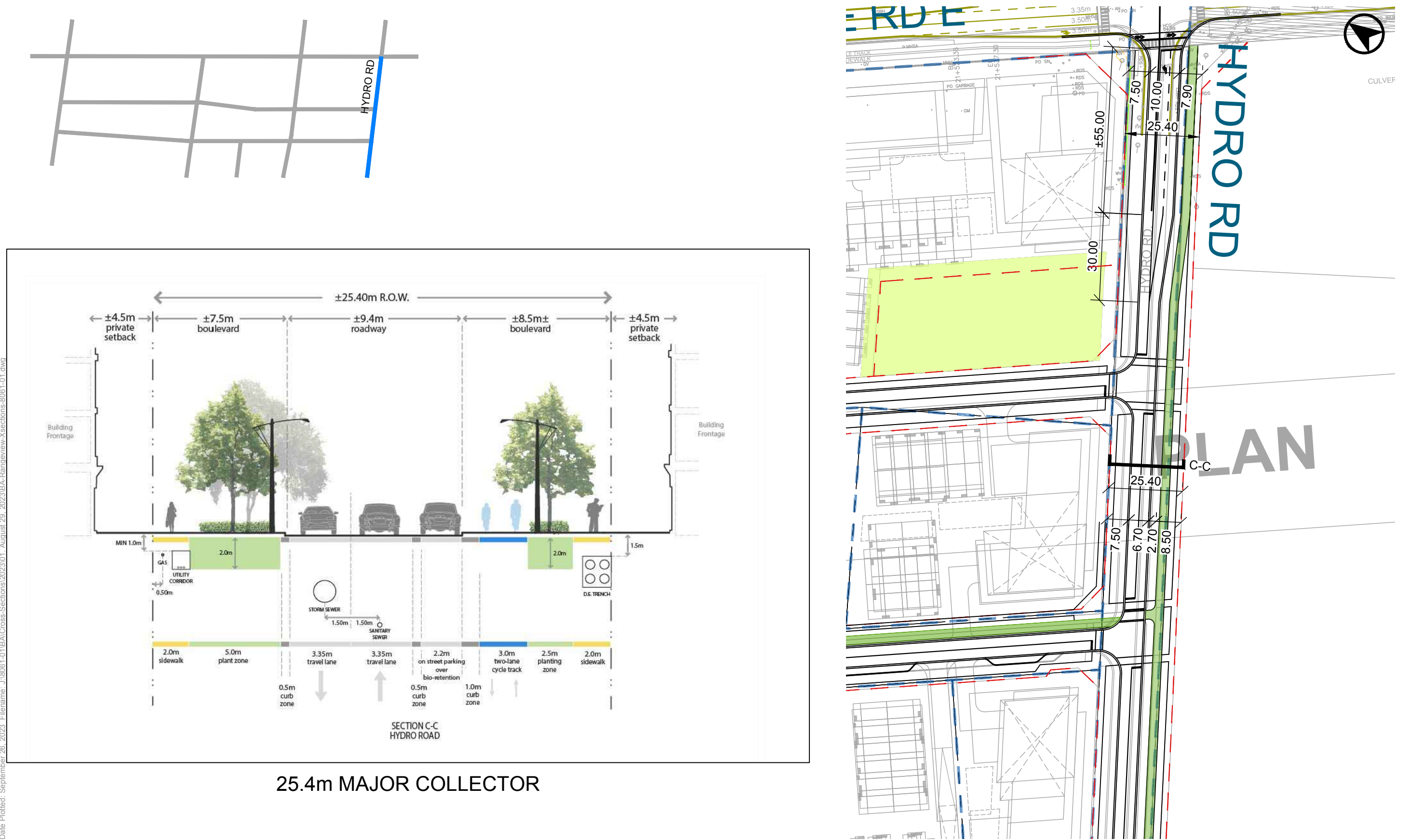
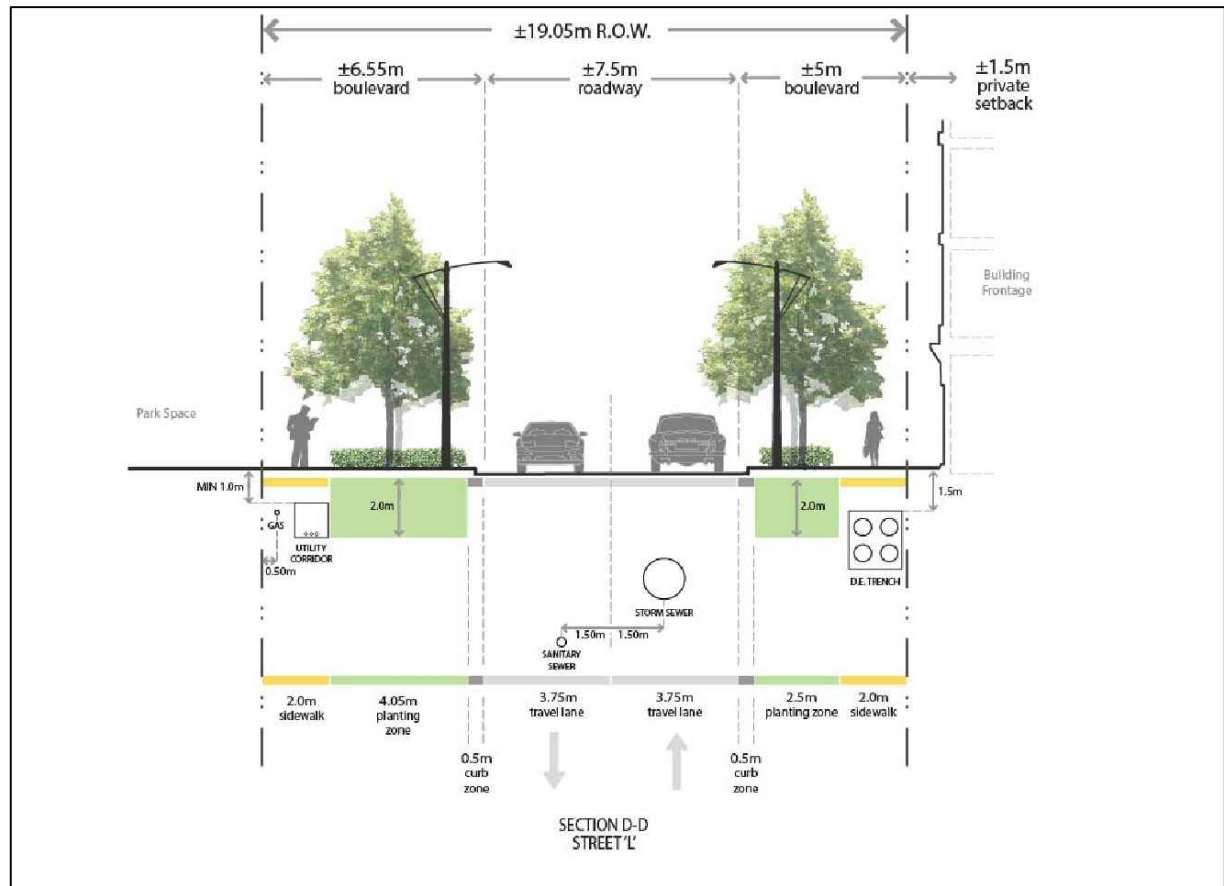
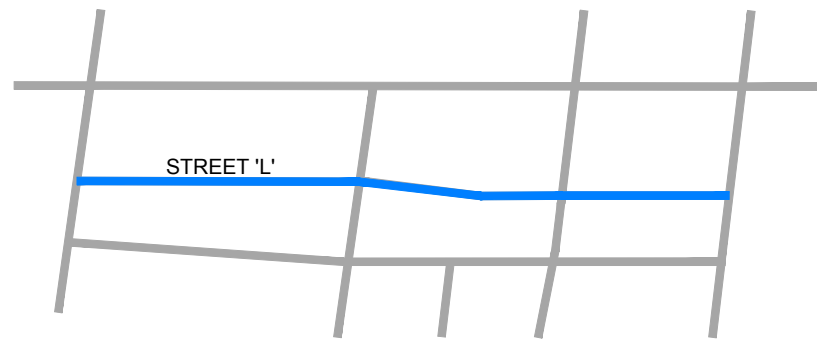


FIGURE 9 HYDRO ROAD - FUNCTIONAL PLAN & CROSS-SECTIONS

Date Plotted: September 26, 2023 File Name: J:\8061-01\BA\Cross-Sections\2023\01_August 29, 2023\BA-Rangeview-Xsections-8061-01.dwg



19.05m LOCAL ROAD

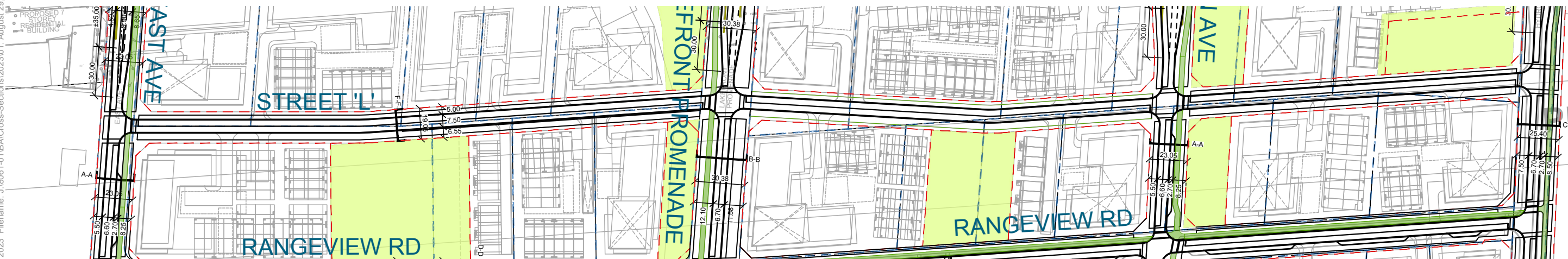
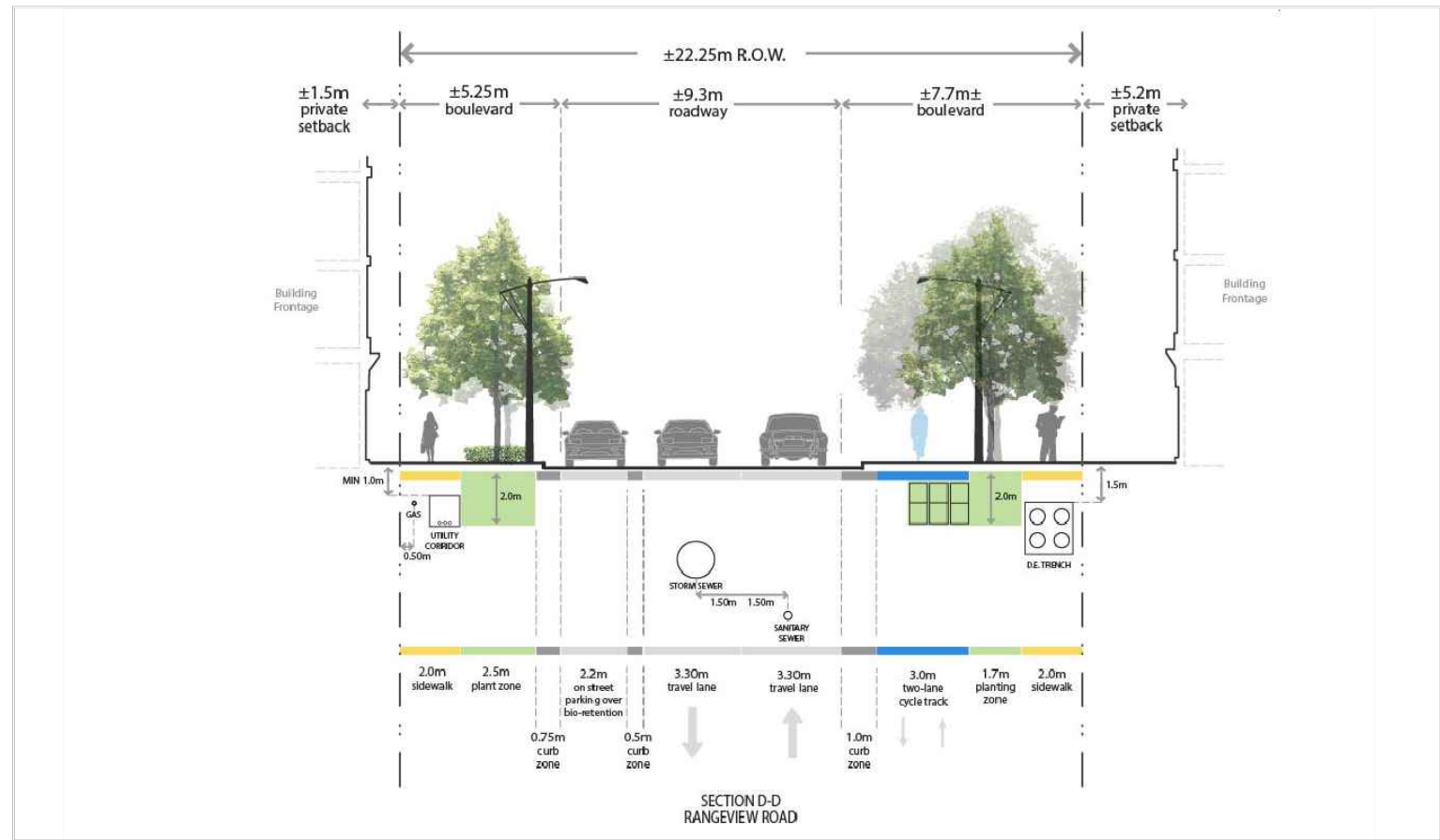


FIGURE 10 PROPOSED STREET 'L' - FUNCTIONAL PLAN & CROSS-SECTIONS

Date Plotted: September 26, 2023 Filename: J:\8061-01\BA\Cross-Sections\2023\01_August 29, 2023\BA-Rangeview-Xsections-8061-01.dwg



22.25m MINOR COLLECTOR

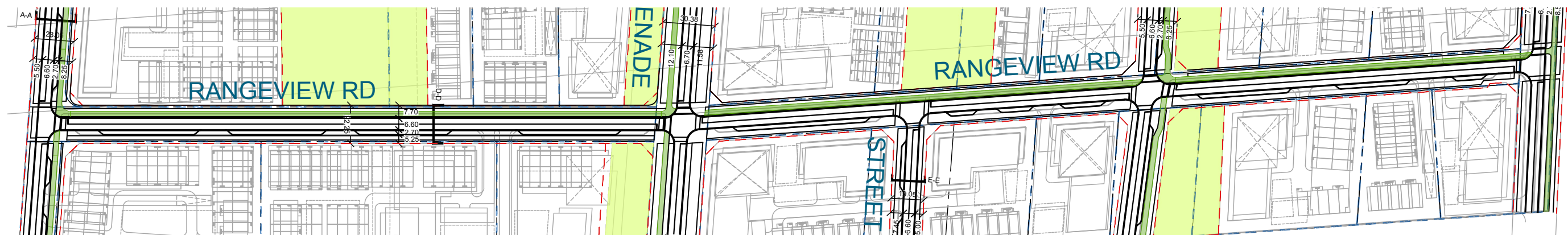


FIGURE 11 RANGEVIEW ROAD - FUNCTIONAL PLAN & CROSS-SECTIONS

Date Plotted: September 26, 2023. Filename: \\8061-01\BA\Cross-Sections\2023\01_August 29_2023\BA-Rangeview-Xsections-8061-01.dwg

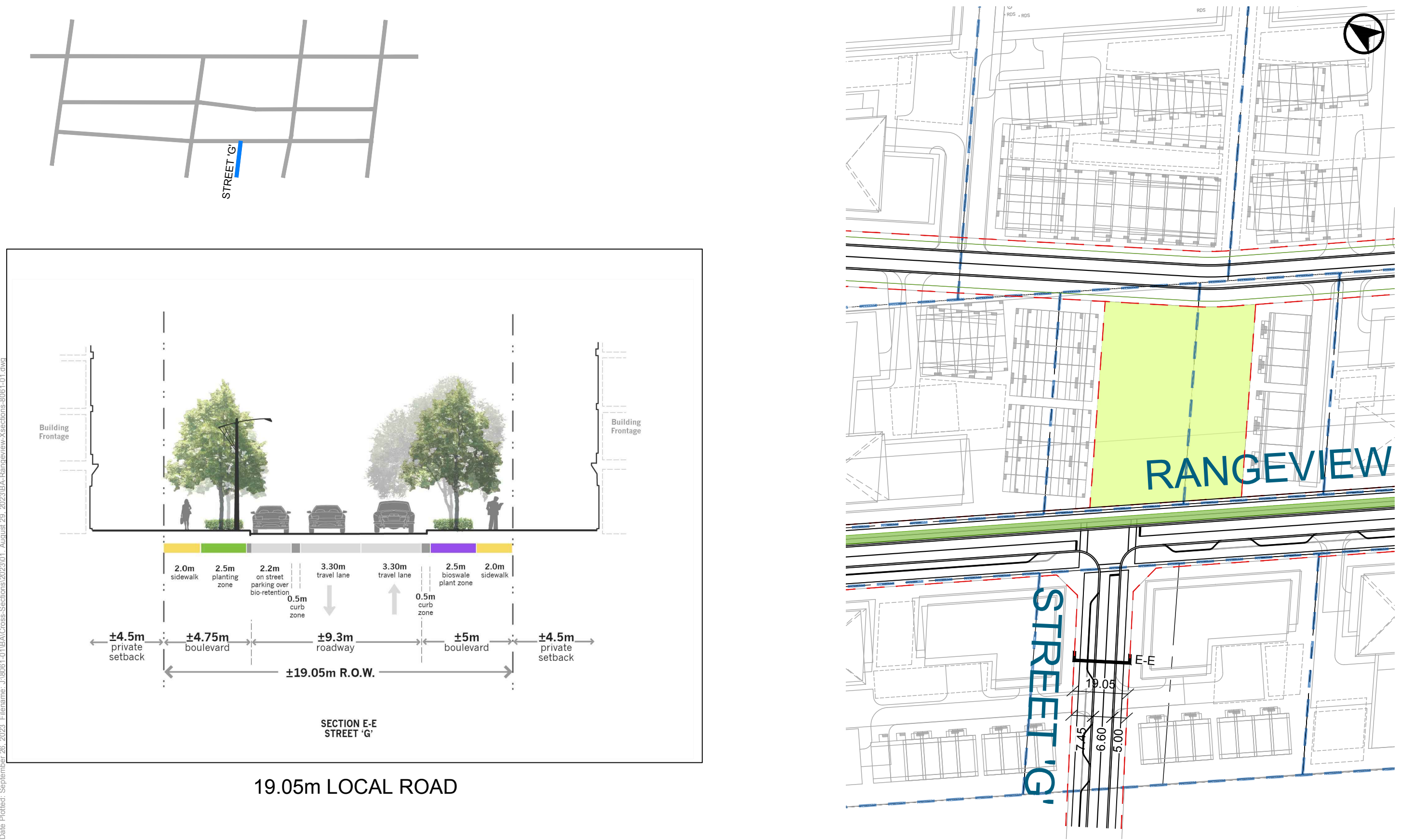


FIGURE 12 PROPOSED STREET 'G' EXTENSION - FUNCTIONAL PLAN & CROSS-SECTIONS

3.2 AREA PUBLIC TRANSIT NETWORK

3.2.1 Existing Public Transit Network

The Site's northern boundary is located immediately adjacent to the two MiWay surface transit routes which provide direct connections to area destinations including Dixie Outlet Mall, Port Credit, and Long Branch GO station. With a transfer at the Long Branch GO Station, the Site is connected to GO Transit (Lakeshore West Line) and TTC bus / streetcar service in the east.

Details regarding the area's existing transit options are provided in **Table 6** and illustrated in **Figure 13**.

TABLE 6 AREA TRANSIT NETWORK

Number / Name of Service Line		Closest Stop Location	Description
Bus	23 Lakeshore (MiWay)	Several stops along Lakeshore Road East	Route 23 Lakeshore is a local bus route operating primarily along Lakeshore Road East / West, on all days, between the Clarkson GO Station and Long Branch GO Station. Route 23 runs every 17-21 minutes during weekday peak periods. This route connects with numerous other GO Transit, MiWay, and TTC routes.
	5 Dixie (MiWay)		Route 5 Dixie is a local bus route operating primarily along Dixie Road, on all days, between Cardiff Boulevard / Khalsa Drive and the Long Branch GO Station. Route 5 runs every 7-12 minutes during weekday peak periods. This route connects with numerous other GO Transit, MiWay, and TTC routes.



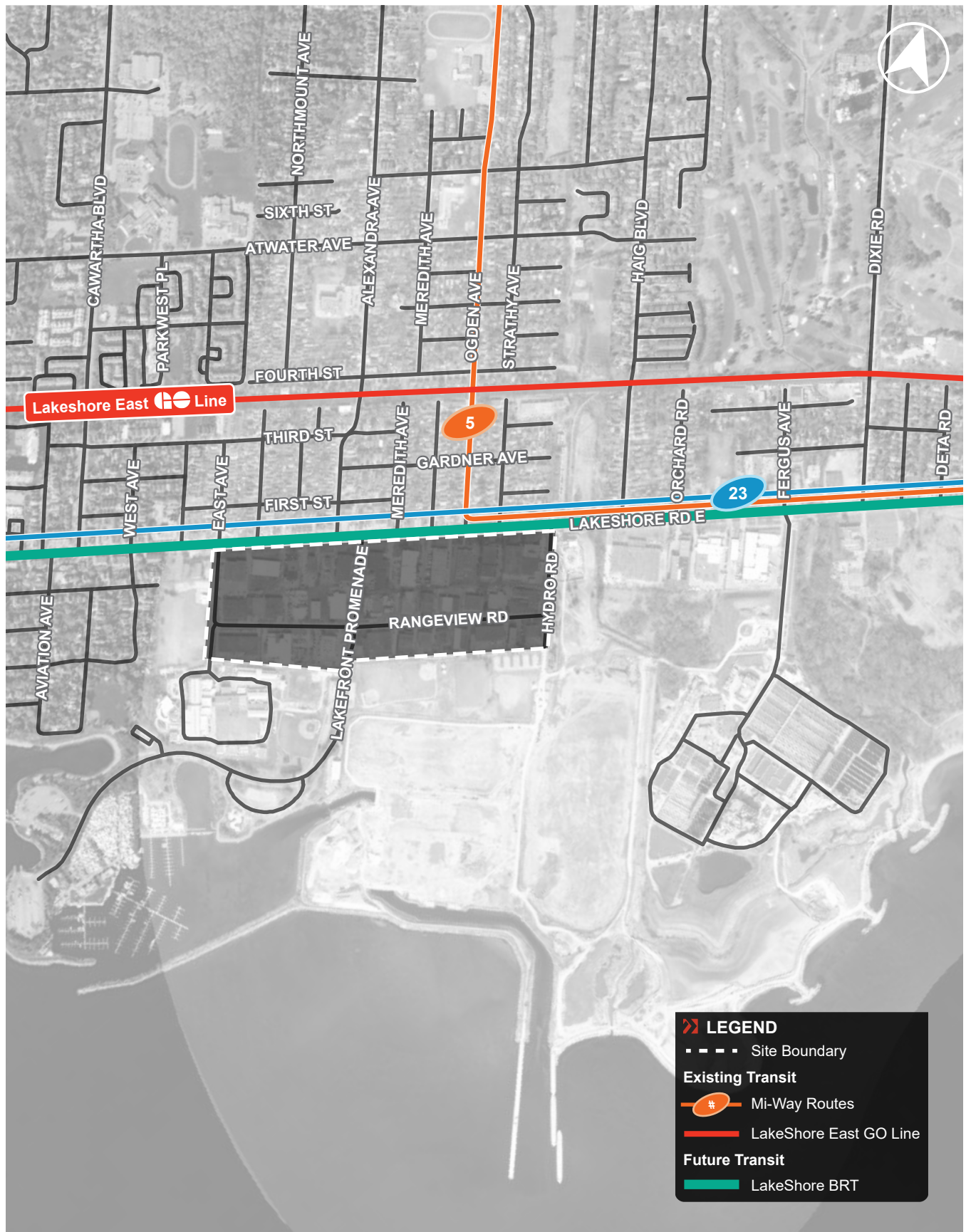


FIGURE 13 EXISTING AND FUTURE AREA TRANSIT NETWORK

3.2.2 Planned Public Transit Network

3.2.2.1 Lakeshore Connecting Communities Bus Rapid Transit (BRT)

As described in **Section 2.3**, The Lakeshore Connecting Communities TMP sets out a long-term vision for transit and corridor improvements along Lakeshore Road East from 2020 to 2041 that will support waterfront development.

Of the transit network alternatives considered in the TMP, the preferred transit solution for the 2041 horizon year is express bus / bus rapid transit (BRT) along the extent of Lakeshore Road East in Mississauga (illustrated in **Exhibit 5**). Between East Avenue and Etobicoke Creek (and thus adjacent to the Rangeview Lands), a dedicated right-of-way BRT service is planned within the centre of the Lakeshore Road East ROW. The Lakeshore BRT is planned to be completed in 2027.

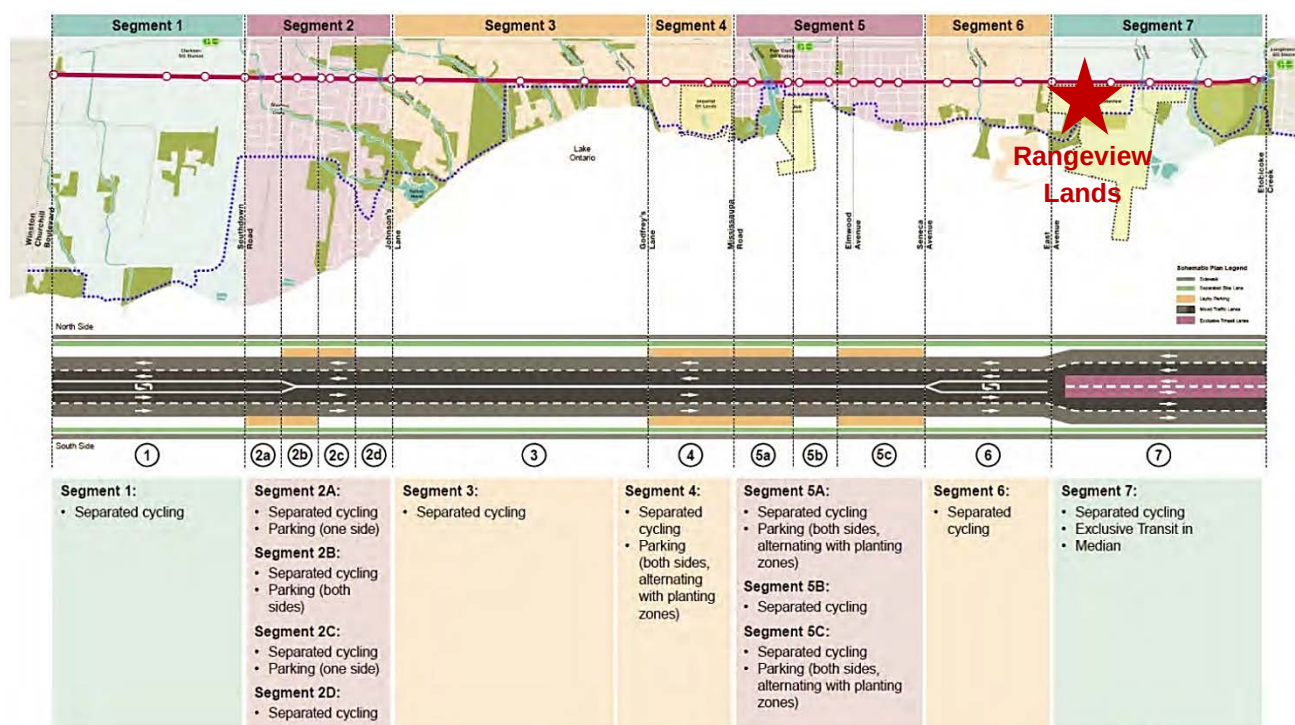


EXHIBIT 5: LAKESHORE BRT PREFERRED RIGHT-OF-WAY (LAKESHORE CONNECTING COMMUNITIES TRANSPORTATION MASTER PLAN: CITY OF MISSISSAUGA / HDR)

The preferred transit solution beyond the 2041 horizon year is an extension of the Toronto Transit Commission (TTC) Waterfront West LRT (or “streetcar”) this is the recommended “ultimate solution.” The streetcar would be extended from Long Branch GO Station to Mississauga Road following a similar alignment (i.e. dedicated ROW to East Avenue; operating in mixed traffic west of East Avenue).

3.2.2.2 Official Plan Transit Network

As part of OPA 89, transit provisions south of Lakeshore Road East were identified, as illustrated below in Exhibit 6.

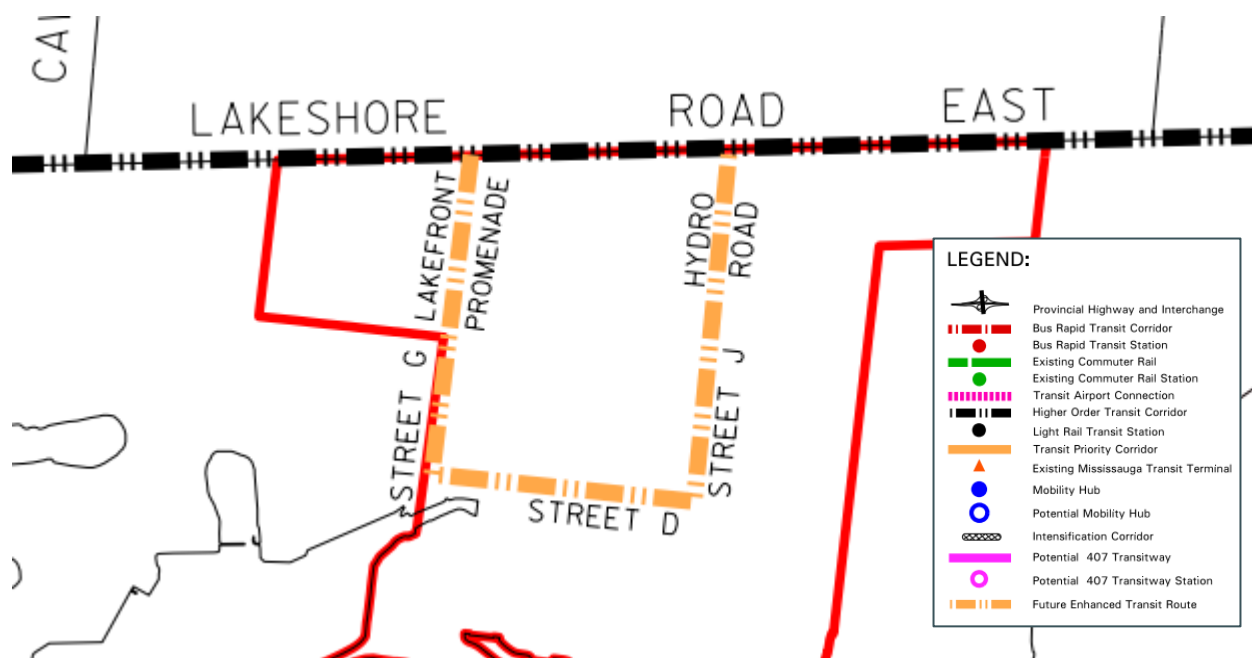


EXHIBIT 6: LAKEVIEW CHARACTER NODE LONG-TERM TRANSIT NETWORK (CITY OF MISSISSAUGA OFFICIAL PLAN: PART OF SCHEDULE 6 FROM OPA 89)

A route that passes through Rangeview, including Lakefront Promenade and Hydro Road, is identified as a "Future Enhanced Transit Route."

3.3 AREA CYCLING NETWORK

3.3.1 Existing Area Cycling Network

The existing cycling network within 500 metres of the Site area consists of multi-use trails, park trails, and signed bike routes along all sides of the Site perimeter. These cycling connections provide convenient travel opportunities for residents, employees and visitors of the surrounding area, specifically to travel using non-automobile means. The existing and future area cycling network is described in **Table 7** and is illustrated in **Figure 14**.

TABLE 7 AREA CYCLING INFRASTRUCTURE

	Route	Type of Cycling Infrastructure	Description
North-South	Ogden Avenue	Signed Bike Route	Signed bike route, shared between cyclists and motorists, that travels along Ogden Avenue from Lakeshore Road East to near South Service Road. Via the Ogden-Isley Pedestrian Bridge, the route continues north via Stanfield Road, accessing The Queensway, Dundas Street East, Bloor Street, Burnhamthorpe Road East, and Eastgate Parkway.
East-West	Waterfront Trail	Park Trail	Park trail that travels along the waterfront, generally south of Lakeshore Road East, providing an east-west connection from Winston Churchill Boulevard, near the City's west limits, to the City of Toronto, beyond the City's east limits.

3.3.2 Planned Area Cycling Network

3.3.2.1 Lakeshore Connecting Communities TMP

The Lakeshore Connecting Communities Transportation Master Plan (TMP), introduced in **Section 2.3**, proposes to incorporate uni-directional cycle tracks in each boulevard, separated from vehicle lanes, along the Lakeshore Road East corridor. The Site area is located in Segment 7 of the study corridor and the preferred ROW alternative is to construct separated 2.0 metre bike lanes along both sides of the Lakeshore corridor with a 0.5 metre buffer from the vehicle travel lane. It is noted that the City of Mississauga Cycling Master Plan 2018 also includes this route.

3.3.2.2 City of Mississauga OPA 125

As part of OPA 125, cycling route provisions south of Lakeshore Road East were identified, as illustrated in **Exhibit 7**. Within OPA 125, a series of 'Primary Off-Road Routes' and 'Primary On-Road / Boulevard Routes' (i.e. cycle tracks where cyclists are separated from vehicles by a curb and buffer) are illustrated primarily within Lakeview Village as part of the street network planned for the latter.

3.3.2.3 Rangeview Cycling Network

The proposed Rangeview street network will provide connectivity to the Lakeview Village cycling facilities, as well as to Lakeshore Road East, for travel beyond the Site. The proposed Rangeview cycling network includes two-way in-boulevard cycle tracks, where cyclists are separated from vehicles by a curb and buffer, on one side of the road along East Avenue, Lakefront Promenade, Ogden Avenue, Hydro Road and



Rangeview Road. Cyclists would be expected to share the road on lower volume streets such as Street L and Street G, where there are no planned designated cycling facilities.

A summary of the proposed cycling facilities in Rangeview is as follows:

- East Avenue: in-boulevard two-way cycle track (east side)
- Lakefront Promenade: in-boulevard two-way cycle track (west side)
- Ogden Avenue: in-boulevard two-way cycle track (east side)
- Hydro Road: in-boulevard two-way cycle track (east side)
- Rangeview Road: in-boulevard two-way cycle track (north side)
- Street L: shared on-road lanes (no designated cycling facility)
- Street G: shared on-road lanes (no designated cycling facility)



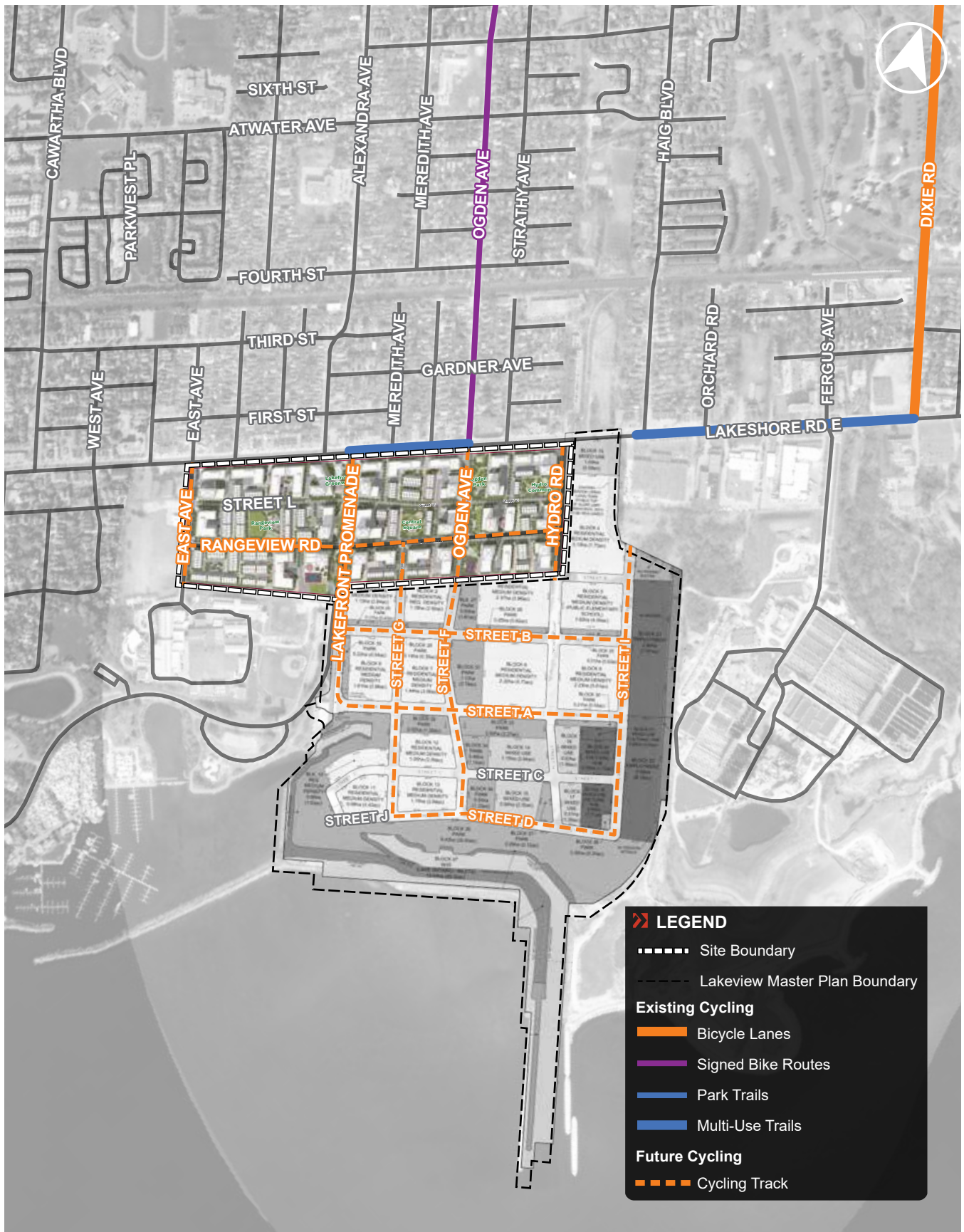


FIGURE 14 EXISTING AND FUTURE AREA CYCLING NETWORK

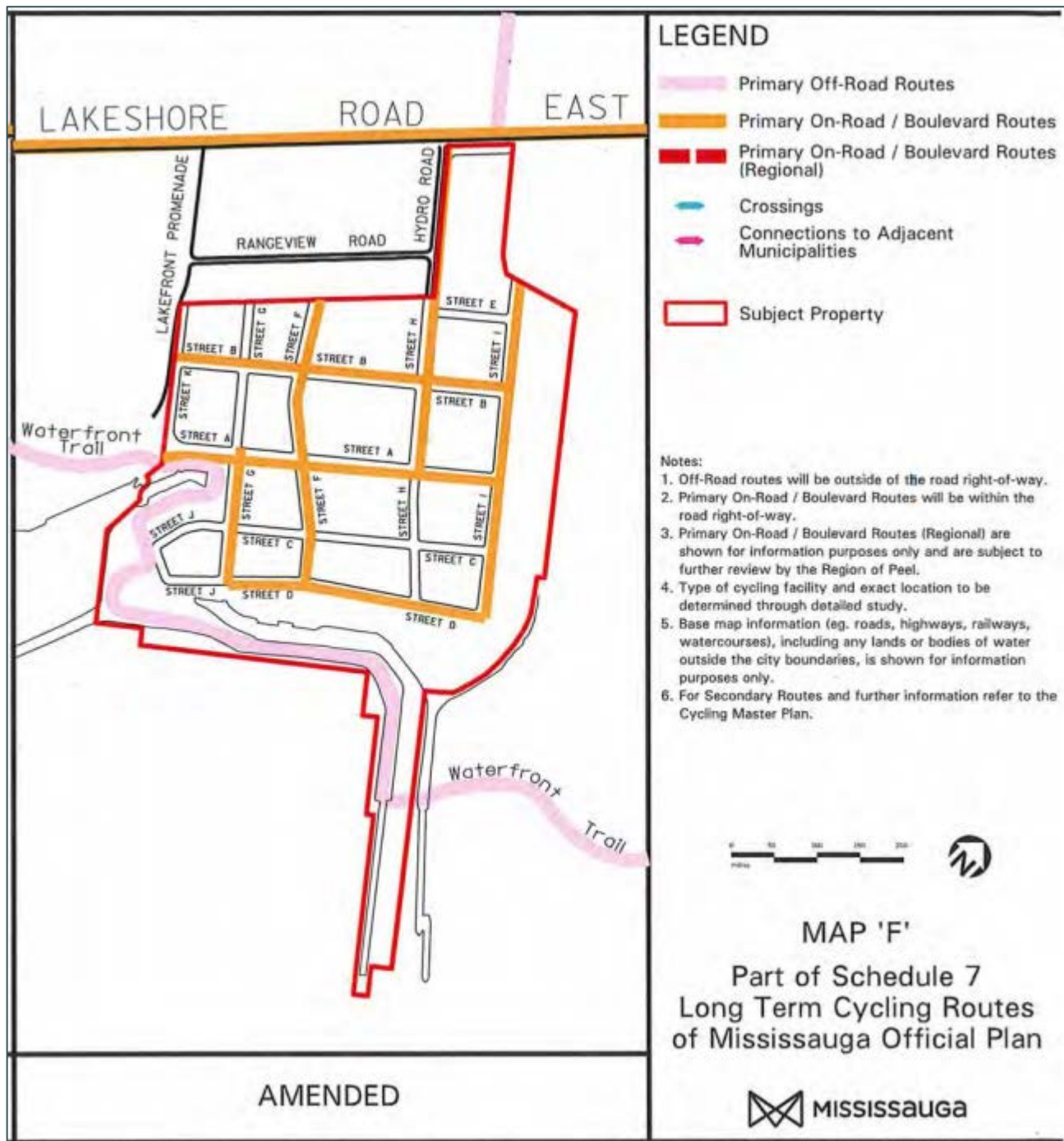


**EXHIBIT 7: LAKEVIEW VILLAGE CHARACTER NODE LONG-TERM CYCLING ROUTES
(CITY OF MISSISSAUGA OFFICIAL PLAN: PART OF SCHEDULE 7 FROM OPA 125)**

3.4 AREA PEDESTRIAN CONTEXT

3.4.1 Existing Pedestrian Context

Within a 500-metre radius of the Site, numerous parks, such as the Douglas Kennedy Park and volleyball courts, can be accessed as well as various amenities along the Lakeshore corridor such as a dentist, pharmacy, convenience store, health centre, fast food outlets and restaurants, among other retail services. The Site is also within walking distance of a plaza which includes a drug store, Canada Post outlet, and multiple eateries, the Lakeside Montessori School, and various places of worship. The remainder of the Site area includes commercial buildings and warehouses oriented towards automobile repair services, industrial manufacturing and self-storage.

In the vicinity of the Site, the existing pedestrian environment facilitates pedestrian movements with efficient connections. Lakeshore Road East has sidewalks on both sides of the roadway, although the sidewalks along the south side are directly adjacent to vehicle travel lanes. There is opportunity to improve the pedestrian facilities along the local roads within and bounding the Site, including Rangeview Road, Hydro Road, Lakefront Promenade, and East Avenue, as each of these roads only have sidewalk facilities on one side of the roadway. Moreover, signalized intersections and marked pedestrian crossings are provided along Lakeshore Road East at East Avenue and Lakefront Promenade, but not at Hydro Road. All sidewalks within and bounding the Site have curb cuts at intersections.

3.4.2 Planned Pedestrian Context

The Site includes a proposed street network that will develop an urban pedestrian environment with wider sidewalk widths on most of the proposed streets and pedestrian mews areas to generate pedestrian activity. Further detail pertaining to the planned street network including detailed design and cross-sections is included in **Section 3.1.3**.

Moreover, the planned Lakeview Village development, introduced in **Section 2.3**, will also provide a high quality, fine-grain pedestrian environment to the south of the Site.

The proposal for a new traffic signal on Lakeshore Road East at Hydro Road, will provide additional protected crossing opportunities for pedestrians. The pedestrian network proposed for Rangeview will connect to Lakeview Village's pedestrian network, with connectivity to Lake Ontario and beyond.



4.0 OPPORTUNITY: CAWTHRA GO TRANSIT STATION

Given the evolution and advancement of GO Transit in the Greater Toronto & Hamilton Area, there is potential to improve GO Transit in the vicinity of the Site with the addition of a new GO Station. Based on the proximity to local multi-modal connections and equidistance between nearby existing GO Stations on the Lakeshore West Line (approximately 2.5 km from Port Credit GO Station and approximately 2.5 km from Long Branch GO Station), a reasonable location for a new station would be east of Cawthra Road and north of Lakeshore Road East.

Within this section, a summary of ongoing GO Transit network and station planning is provided as context for the concept to introduce a GO Station to the local area which could be named Cawthra GO Station. The relevance of a potential Cawthra GO Station is that it would greatly enhance the multi-modal transportation options available to future residents and visitors to both Rangeview and Lakeview Village.

It is important to note however that as outlined in **Section 7.0**, the traffic analysis undertaken for this report confirms that the future transportation network, even **without** a new GO Station in the area, can acceptably accommodate the expected travel demands of the Rangeview Site with 5,300 residential units, along with the travel demand generated by Lakeview Village and Serson.

4.1 CAWTHRA GO STATION HISTORY

Between 2013 and 2015, Metrolinx undertook a study to identify new stations to add to the regional rail network. At this time, a “Cawthra Road GO Station” was on a list of approximately 120 “possible stations” that were analyzed. Possible Stations were scored based on three criteria: 1) transportation connectivity; 2) plans and land use; and 3) technical (construction & design). By March 2015, the list was reduced to 50 stations and Cawthra Road GO Station was no longer in consideration.

4.2 GO TRANSIT EXPANSION / ELECTRIFICATION UPDATE

Metrolinx is undertaking a “GO Expansion” project (formerly “Regional Express Rail”) to convert most existing rail lines (including Lakeshore West) to electric trains. The project will enable all-day, two-way service with 15-minute headways or better. A key benefit of electrification is quicker acceleration/deceleration which unlocks the potential to add more stations to electrified lines. In February 2022, Metrolinx and Infrastructure Ontario announced “Onxpress Transportation Partners” (consortium including Aecon, FCC Construcción S.A., (FCC), Deutsche Bahn, and Alstom) as the winning proponent of the program. Onxpress won the bid due to a proposal with service levels exceeding the 2018 Metrolinx Business Case Analysis, including:

- During weekday daytime periods, between 8-18 trains per hour (or 3-8 minute headways) on the busiest routes, like Lakeshore West; and
- During evenings and weekends, most stations will have 6-15 minute headways.

Construction is expected to begin in 2023, with incremental improvements to service beginning in 2025-2026.



4.3 EXISTING DEMAND FOR A CAWTHRA GO STATION

Of the three criteria utilized by Metrolinx to assess new stations from 2013-2015, a potential Cawthra GO Station merits new assessment based on two: “Transportation Connectivity” and “Plans and Land Use”.

4.3.1.1 Transportation Connectivity

As is outlined in this report in **Section 2.3** and Section **3.2.2**, a BRT in a dedicated right-of-way within Lakeshore Road East adjacent to the Site is expected to be substantially completed by 2027. There is potential for the BRT and the parallel GO Transit line to be complimentary and together, to influence travel behaviour and reduce vehicle trips.

4.3.1.2 Plans and Land Use

As is outlined in **Section 2.3**, the Lakeview Waterfront Major Node Character Area in the City of Mississauga Official Plan was recently amended in November 2021 (OPA 125). Current development provisions include 11,750 residential units, 750,000 SF office GFA, 750,000 SF research & development GFA, 165,000 SF retail GFA, 850 student elementary school, 39 student daycare, approved “as-of-right.” There is substantial ridership potential if a GO Station was located in close proximity to this area.



5.0 TRANSPORTATION DEMAND MANAGEMENT PLAN

The 2020 Ontario Provincial Policy Statement (PPS) and the City of Mississauga Official Plan encourage Transportation Demand Management (TDM) as a strategy and embrace a range of TDM measures. TDM strategies will be incorporated into the Site to align with operational and functional needs including consideration for broader area infrastructure requirements.

As per the Region of Peel Sustainable Transportation Strategy, 2018-2022, TDM is: “Transportation demand management (TDM) measures encourage people to take fewer and shorter vehicle trips to support transit and active transportation choices, enhance public health and reduce harmful environmental impacts.”

The City of Mississauga Official Plan includes the following policies regarding TDM:

- 8.1.8: “To better utilize existing infrastructure, Mississauga will encourage the application of transportation demand management (TDM) techniques, such as car-pooling, alternative work arrangements and shared parking.”
- 8.4.7(f): “coordinating parking initiatives with transportation demand management (TDM) programs in order to effectively link transit planning, parking and other related issues in a comprehensive manner”
- 8.5.2: “Mississauga will work with other levels of government, agencies and the private sector to encourage TDM measures.”
- 8.5.7: “Prior to approval of development applications, particularly those that will generate significant employment opportunities, a TDM plan may be required ...”

5.1 OBJECTIVE & GOALS

Transportation Demand Management (TDM) strategies have been developed for the proposed development to guide the provision of viable alternative personal transportation options beyond the single occupant, private automobile. The overarching goals of the TDM strategy are to:

- Significantly reduce the number of private automobile-based trips made to/from the Site;
- Promote the use of more active and sustainable modes of transportation;
- Increase travel efficiency and transit linkages;
- Emphasize internal trips by non-auto modes of travel; and
- Reduce climate change emissions, air quality and overall health.

To achieve the objective and goals, a series of mobility strategies and corresponding TDM measures are outlined and have been incorporated into the design and future operations of the proposed Site.



5.2 STRATEGIES

TDM strategies include the application of various site design elements and operational policies that have the goal of redistributing and reducing the travel demand of a project, specifically that of single occupancy private vehicles. The proposed TDM objectives can be achieved by influencing mobility choice and patterns through the following site plan strategies:

- Create a Complete Connected Community
- Enhance the Public Realm and Pedestrian Mobility
- Facilitate and Increase Transit Use
- Encourage Cycling Use
- Provide Last-Mile solutions (micro-mobility)
- Low Minimum Parking Requirements
- Encourage Reduced Auto Ownership and Use

Several of TDM strategies identified above (i.e. public transit fare integration and the implementation of a bike share and/or scooter share network) require additional support at the Municipal, Regional, and / or Provincial levels to truly enable a shift in travel behaviour for residents, visitors and employees of the Site.

This comprehensive framework has been developed to serve as a guideline for the implementation of effective TDM strategies at the master plan level and will continue to be refined through the site design stage and in its operations following the full redevelopment of the property.



5.3 PROPOSED TDM MEASURES

5.3.1 Create a Complete Connected Community

The proposed development incorporates a mix of mutually-supportive land uses, inclusive of residential and retail, located adjacent to significant employment land uses within Lakeview Village, that are integrated by a new street network that has been designed to facilitate and encourage transit and active modes of travel throughout the Site.

The provision of mutually-supportive land uses fosters a relationship across the Site that allows each use to serve and support one another. This represents a substantial shift from the existing building form to a more walkable, urban, mixed-use neighbourhood. This dynamic combination of uses encourages the “internalization” of site trips, both within the Site and within the neighbourhood; there will be many trips that could be made within walking / cycling distance. The need for residents, employees, and visitors to make trips outside of the Site and surrounding area to address daily needs will be reduced, thereby, reducing the need for trips to be made utilizing automobiles.

Furthermore, the design of the street network takes into account the needs of all modes of travel and ensures the development of a complete network. The proposed street network creates fine-grain street and block connections, creating a level of porosity across the Site that will enable efficient pedestrian and active travel.

Numerous park / open spaces are also proposed throughout the site which will improve the at-grade permeability of the area and integrate the Site with the local pedestrian system.

Finally, the proposed density, mix of uses, and enhanced street network provides opportunities to support micro mobility options that provide strong non-auto connections to the surrounding area.



TDM Considerations

- Complimentary mix of land uses will result in the internalization of daily trips within the Site and neighbourhood that can be made by foot / bike, reducing the need for a personal automobile;
- Design of a fine-grained, permeable street network that supports all modes of travel; and
- Proposed density and mix of land uses provide greater opportunities to support local area transit services and other micro-mobility options that encourage non-auto modes of travel to the surrounding area.

5.3.2 Enhance Public Realm and Pedestrian Mobility

The Site, in its current orientation, was designed to prioritize the movement of vehicles with an emphasis on large surface parking lots serving automobile-oriented retail and automotive uses. For the most part, the surrounding streets are less desirable places to walk with limited pedestrian crossing opportunities and sidewalks generally only on one side of the road.

The proposed plan contains elements that aim to emphasize the pedestrian realm. Enhanced pedestrian facilities (wide sidewalks, attractive boulevards) and off-street connections through the Site will make walking a more attractive option.

Streetscape improvements will improve pedestrian comfort; these could include (but are not limited to) expanding sidewalk widths, increasing crossing opportunities, and providing street furniture and landscaping.



Convenient and direct pedestrian connections to area transit stops will be prioritized in the development of the Master Plan to ensure that public transit remains the preferable mode for trips that are to be made outside the local neighbourhood.

As much as possible, access to loading and parking facilities will be strategically located and consolidated in the site plan to minimize interference with the vibrant pedestrian realm.

Ultimately, each of these measures that will be integrated into Site plan designs will increase and facilitate pedestrian activity emanating from the Site.

TDM Considerations

- Streetscape improvements will improve pedestrian comfort.
- The proposed street network and development blocks have been designed keeping in mind the need for direct and convenient pedestrian connections throughout the Site.
- Access to loading and parking facilities will be minimized and strategically located in the Site Plan to minimize interference with the vibrant pedestrian realm.

5.3.3 Facilitate and Increase Transit Use

The northern boundary of the Site is adjacent to the planned Lakeshore BRT which will facilitate access across the extent of Mississauga's waterfront and several GO Stations. Given the size of the Site, providing strong active linkages and other last-mile solutions are essential to connect residents and visitors across the site to the area transit network. The proposed street and active network for the Site was designed to facilitate transit access for all users by emphasizing the public realm and creating direct pedestrian connections.



The integration of local transit from the onset of development is a high priority for the Site in order to encourage residents and visitors to utilize transit as a primary mode of travel and build travel behaviours that are supportive of the TDM Plan.

To this end, transit incentives (i.e. pre-loaded PRESTO cards) will be offered to first-time occupants of residential units to persuade them to use public transit for a period of time and establish this modal choice as a habit.

Notwithstanding that the Site is located along the Lakeshore Road East corridor and therefore in proximity to the TTC at Long Branch Station, there is currently no fare integration between these transit agencies (i.e. MiWay and TTC). In order to encourage transit as a viable (and affordable) mode choice, Peel Region, the City of Mississauga and the City of Toronto should consider possible fare integration to promote transit use.

Lastly, as outline in **Section 4.0**, the opportunity to locate a new GO Station east of Cawthra Road along the Lakeshore West GO Transit rail line should be considered.

TDM Considerations

- Facilitate connections to and from public transit (along the Lakeshore Road East corridor) from the on-set of development to achieve desired modal shift.
- Provide a well-connected pedestrian network facilitating transit access for all users.
- Provide pre-loaded PRESTO cards to all first-time occupants of residential units.
- Encourage Peel Region, the City of Mississauga, and City of Toronto to consider possible fare integration opportunities to promote regional transit use.

5.3.4 Encourage Cycling Usage

To encourage cycling as a viable mode of travel for residents and visitors of the proposed development, significant infrastructure investments have been considered (cycling lanes, bicycle parking, bicycle repair facilities).

Most of the proposed street network will include two-way, in-boulevard cycle tracks (see **Section 3.1.3**) and connect to an external street (Lakeshore Road East) that is planned to be a cycling corridor as part of the Lakeshore Connecting Communities BRT (see **Section 3.3.2**).

Each development block is intended to include secure bicycle parking for residents and employees and at-grade or below grade bicycle parking for visitors. Bicycle parking provisions will be consistent with the minimum bicycle parking requirements of Zoning By-law 0225-2007 which were recently updated in 2022 as a result of the *Parking Regulations Study*.

Bicycle repair facilities may be provided within each development's bicycle parking facility. With cycling uptake expected to be high, providing infrastructure to assist with quick and easy bicycle repairs would add convenience for prospective cyclists.



TDM Considerations

- Two-way, in-boulevard cycle tracks are provided along internal streets that will connect to the planned regional cycling network.
- Secure bicycle parking will be provided for residents and at-grade bicycle parking for visitors throughout the Site.
- Bicycle repair facilities will also be integrated into each development block in order to facilitate quick and easy bicycle repairs.

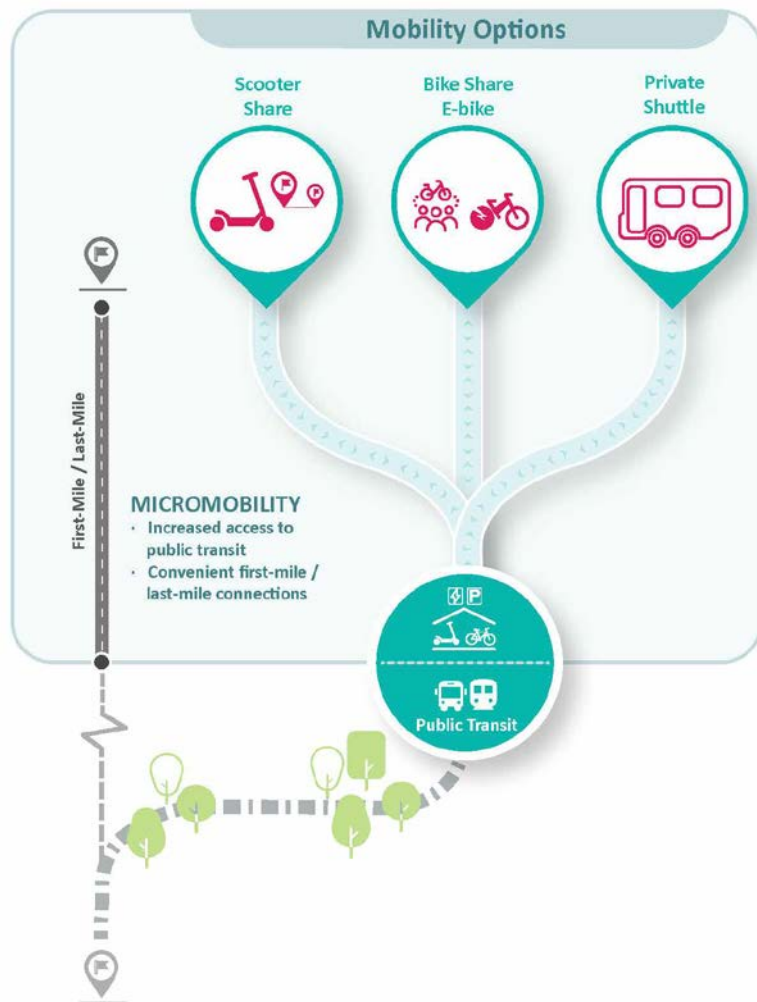
5.3.5 Micro-Mobility

In order to shift travel behaviour towards more sustainable modes of travel, the provision of convenient first-mile / last-mile trip connections to public transit or local amenities are required. These solutions help fill gaps in the area transportation network that otherwise would result in people opting for a private vehicle (i.e. needing to walk over a kilometre to a transit stop).

Bicycle and scooter sharing form part of the overall Mobility Strategy to maximize connections to transit and encourage sustainable local travel. This type of shared system, if deployed, would provide excellent opportunities to connect area residents to future rapid transit along Lakeshore Road East (and a potential Cawthra GO Station). Longer distance cycling trips to destinations like Long Branch GO station would be achievable with the planned implementation of a continuous cycling corridor on Lakeshore Road East connecting the site with the train station.

The City of Mississauga is currently undertaking an “E-Scooter Pilot” including “studying how a shared program of publically available bicycles, pedal-assist bicycles (e-bikes) or electric scooters (e-scooters) could be used for travel in Mississauga.” In December 2020, City Council approved the implementation of an interim e-scooter strategy intended to operate within the five-year e-scooter pilot program launched by the Province of Ontario. In Mississauga, e-scooters are permitted to operate on public roadways with a posted speed limit of 50km/h or less and on cycling infrastructure, but not within parks or off-road trails.

The provision of micro mobility solutions (including bike share, scooter share, bicycle parking) should be strategically located throughout the Site within smaller hub areas to ensure proximate access for residents and visitors.



TDM Considerations

- Reduced resident parking ratios that are reflective of contemporary parking policy in Canada, good transportation planning, and the good transit afforded to the Site (planned Lakeshore BRT).
- Provision of a shared pool of visitor parking will help maximize efficiency of parking across the Site.

5.3.6 Reduced Parking Provisions

An effective TDM measure that can be applied to the proposed development is the constraint of on-site vehicular parking supply. Appropriate vehicle parking management and the provision of an extensive suite of TDM measures are mutually supportive. If vehicle parking is oversupplied across the Site, residents and visitors would have less incentive to utilize the alternative, non-auto options that are available to them due to the site's favourable location and that are enhanced as part of this project. Likewise, a modest parking supply without appropriate TDM measures would negatively affect local traffic and place undue parking demand on the surrounding area.

Culminating in 2022, the City of Mississauga reviewed and updated the off-street parking regulations of Zoning By-law 0225-2007. Notably, precinct areas were introduced to stipulate different minimum parking requirements based on location within the City, influenced by proximity to higher order transit service and other factors.

The Site was identified as Precinct Area 3 and therefore, some of the following minimum parking requirements are relevant:

- Condominium Apartment, residents: 1.0 parking space per unit
- Rental Apartment, residents: 0.90 parking spaces per unit
- Apartments, visitors: 0.2 parking spaces per unit

Notably, other cities in Canada have updated minimum parking requirements in their Zoning By-laws resulting in the following:

- London (2008): Zero parking minimum downtown
- Ottawa (2016 & 2018): Zero parking minimum downtown & at LRT Stations; minimum 0.5 spaces per unit in "urban" & "inner suburban" areas
- Edmonton (2020): Zero parking minimum city-wide
- Brampton (2021): Zero parking minimum downtown and rapid transit corridors
- Vaughan (2021): Zero resident parking in Yonge Steeles Corridor Secondary Plan
- Toronto (2021): Zero parking minimum city-wide

A reduced parking supply compared to the new requirements of Zoning By-law 0225-2007 will be pursued as part of future applications reflecting contemporary advancements in parking policy across Canada and reflecting good transportation planning as part of this TDM Plan.

The adoption of shared parking spaces between non-residential uses (residential visitors, commercial, retail, etc.) to maximize efficiency based on typical parking utilization patterns will also be advanced.

TDM Consideration

- Support the provision of bicycle and/or scooter sharing on-site to connect residents / visitors to local transit or area amenities.



5.3.7 Encourage Reduced Auto Ownership & Use

The provision of car-sharing programs is an important TDM measure because it allows residents to use automobiles as needed without requiring them to own a vehicle. By nature, this means that they make less vehicular trips, directly reducing the amount of vehicular travel emanating from the Site.

While there are currently minimal car-sharing services provided in Mississauga, should these services become available, the Site would be an excellent candidate for these services.

Car-share vehicles on-site will be supported, affording an attractive alternative to vehicle ownership for future residents.



TDM Considerations

- Supporting the provision of car-share vehicles on-site to facilitate vehicle trips, as needed, as an alternative to car ownership.

6.0 MULTI-MODAL TRAVEL DEMAND FORECASTING

6.1 TRAFFIC ANALYSIS SCENARIOS

6.1.1 Summary of Traffic Analysis Scenarios

To develop the traffic analysis scenarios for this study, a number of development thresholds were tested for Rangeview to better understand the traffic-related impacts on the overall area road network. Each scenario tested was based on BA Group's understanding of the approvals for the Lakeview Village site and reflected the timing of the construction of key north-south roadway links (i.e. the extension of Ogden Avenue from Lakeshore Road East to the property line, just south of Rangeview Road and the connection of Haig Boulevard to Lakeshore Road East), along with new internal roads.

As summarized in **Table 8**, each scenario considered the total number of residential units for both Rangeview and Lakeview Village, the total non-residential GFA for Rangeview and Lakeview Village, and the road network and intersection improvements that would be in place at the time of development. The development of the Serson lands was only considered as part of Scenario 3A, with the connection of Haig Boulevard. The details of the multi-modal travel demand assessment for each scenario are provided in the following sections. The details of the traffic capacity analysis are provided in **Section 7.0**.

TABLE 8 TRAFFIC ANALYSIS SCENARIOS

Development	Existing	Scenario 1 (2031): No Ogden No Haig (with road improvements) ¹	Scenario 2 (2041): Phase 1 + Ogden connected to Lakeshore Road East	Scenario 3A (2041): Phase 2 + Haig connected to Lakeshore Road East	Scenario 3B (2041): Phase 2 + Dual NBL turns at Lakefront Promenade / Lakeshore Road East (Haig not connected)
Rangeview	--	2,500 units + 0% non-residential	3,700 units + 100% non- residential	5,300 units + 100% non- residential	5,300 units + 100% non- residential
Lakeview Village	--	7,500 units + 1.4M ft ² non- residential	8,050 units + 2.1M ft ² non- residential	8,050 units + 2.1M ft ² non- residential	8,050 units + 2.1M ft ² non- residential
Serson	--	0%	0%	100%	0%
Total	Existing Traffic Only	10,000 units	11,750 units	13,350 units	13,350 units



6.1.2 Proposed Road Improvements

A summary of the road improvements considered for each scenario is outlined below. It is important to note that in consideration of the traffic capacity analysis, in addition to the road improvements planned for Phase 1 and 2 (extension of Ogden Avenue from Lakeshore Road East to Rangeview Road), **either** the connection of Haig Boulevard (Scenario 3A) **or** the dual northbound left-turn phase at Lakeshore Road East at Lakefront Promenade (Scenario 3B), would be required to accommodate 13,350 residential units.

Scenario 1

The road improvements considered to be complete as part of Scenario 1 are as follows:

- BRT on Lakeshore Road East;
- Construction of westbound right-turn lane at Cawthra Road and Lakeshore Road East;
- Construction of westbound right-turn lane at Dixie Road and Lakeshore Road East;
- Construction of eastbound right-turn lane at Lakefront Promenade and Lakeshore Road East;
- Northbound lanes reconfigured at Lakefront Promenade and Lakeshore Road East to include a dedicated left-turn lane and share through/right lane;
- Construction of eastbound right-turn lane at Hydro Road and Lakeshore Road East;
- Northbound lanes reconfigured at Hydro Road and Lakeshore Road East to include a dedicated left-turn lane and a shared left/through/right lane;
- Signalization of Hydro Road and Lakeshore Road East intersection, as per Lakeshore Connecting Communities BRT roll plan drawings.

Scenario 2

The road improvements considered to be complete as part of Scenario 2 include the road improvements proposed as part of Scenario 1, in addition to the completion of the extension of Ogden Avenue from Lakeshore Road East to Rangeview Road.

Scenario 3A

The road improvements considered to be complete as part of Scenario 3A include the road improvements proposed a part of Scenario 1 & 2, in addition to the completion of the connection of Haig Boulevard to Lakeshore Road East.

Scenario 3B

The road improvements considered to be complete as part of Scenario 3A include the road improvements proposed a part of Scenario 1 & 2, in addition to the implementation of a dual northbound left-turn phase on Lakeshore Road East at Lakefront Promenade.



6.2 APPROACH & METHODOLOGY

6.2.1 Study Horizons

The traffic analysis methodology for this study generally aligns with the methodology within The Municipal Infrastructure Group's (TMIG) April 2021 Traffic Considerations Report Addendum ("the 2021 April TMIG report"). The 2031 and 2041 horizons were used for the traffic analysis in order to be consistent with the 2021 April TMIG report. As the actual timing of the developments is expected to vary, the roadway improvements, along with the overall number of residential units to be developed, are the key components of the analysis.

6.2.2 Area Travel Mode Share

The existing area travel mode share does not consider the implementation of the BRT along Lakeshore Road East while the future area travel mode share includes the implementation of the BRT as summarized in **Table 9** and **Table 10**, respectively. It is noted that with the implementation of the BRT, the auto driver mode share is expected to decrease from 60% (AM peak)/ 61% (PM peak) to 50% during both peak periods of the day. Although the future travel mode share for cycling is stated as 0% in **Table 10**, for the purpose of this travel demand assessment, the future cycling travel mode share has been adjusted to 2% to account for cycling trips that would likely be generated by the sites being considered. As part of this adjustment, the auto passenger travel mode share has been reduced by 2% for each time period. The cycling travel mode share can be updated in the future when more accurate travel mode information is available. The updated future area travel mode share that includes the BA Group adjustments is provided in **Table 11**.

TABLE 9 AREA TRAVEL MODE SHARE (BEFORE BRT)

Mode of Travel	Lakeview		Port Credit		Average	
	AM	PM	AM	PM	AM	PM
Transit	11%	21%	28%	33%	20%	27%
Auto Driver	59%	61%	61%	61%	60%	61%
Auto Passenger	27%	14%	6%	4%	16%	9%
Walk	3%	4%	5%	2%	4%	3%
Cycle	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%

Note:

1. Source: TMIG April 2021 report, Table 3.1, Page 17.

TABLE 10 AREA TRAVEL MODE SHARE (WITH BRT)

Mode of Travel	2016 TTS Average		50% Auto Driver		Difference	
	AM	PM	AM	PM	AM	PM
Transit	20%	27%	25%	35%	5%	8%
Auto Driver	60%	61%	50%	50%	-10%	-11%
Auto Passenger	16%	9%	20%	11%	4%	2%
Walk	4%	3%	5%	4%	1%	1%
Cycle	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	0%	0%

Note:

1. Source: TMIG April 2021 report, Table 2.3, Page 87.



TABLE 11 ADJUSTED AREA TRAVEL MODE SHARE¹ (WITH BRT)

Mode of Travel	2016 TTS Average		50% Auto Driver		Difference	
	AM	PM	AM	PM	AM	PM
Transit	20%	27%	25%	35%	5%	8%
Auto Driver	60%	61%	50%	50%	-10%	-11%
Auto Passenger	14%	7%	18%	9%	4%	2%
Walk	4%	3%	5%	4%	1%	1%
Cycle	2%	2%	2%	2%	2%	2%
Total	100%	100%	100%	100%	0%	0%

Note:

1. BA Group adjusted Table 2.3 in the TMIG April 2021 report and increased the cycling mode share to 2% for all time periods and decreased the auto passenger share by 2% for all time periods.

6.2.3 Existing Traffic Volumes

In addition to the analysis scenarios previously described, the updated traffic analysis includes an assessment of existing conditions. The existing lane configuration and traffic control is provided in **Figure 15**. The traffic volumes used within the analysis for existing conditions were taken directly from the 2019 TMIG report and are illustrated in **Figure 16**.

6.2.4 Background Traffic Volumes

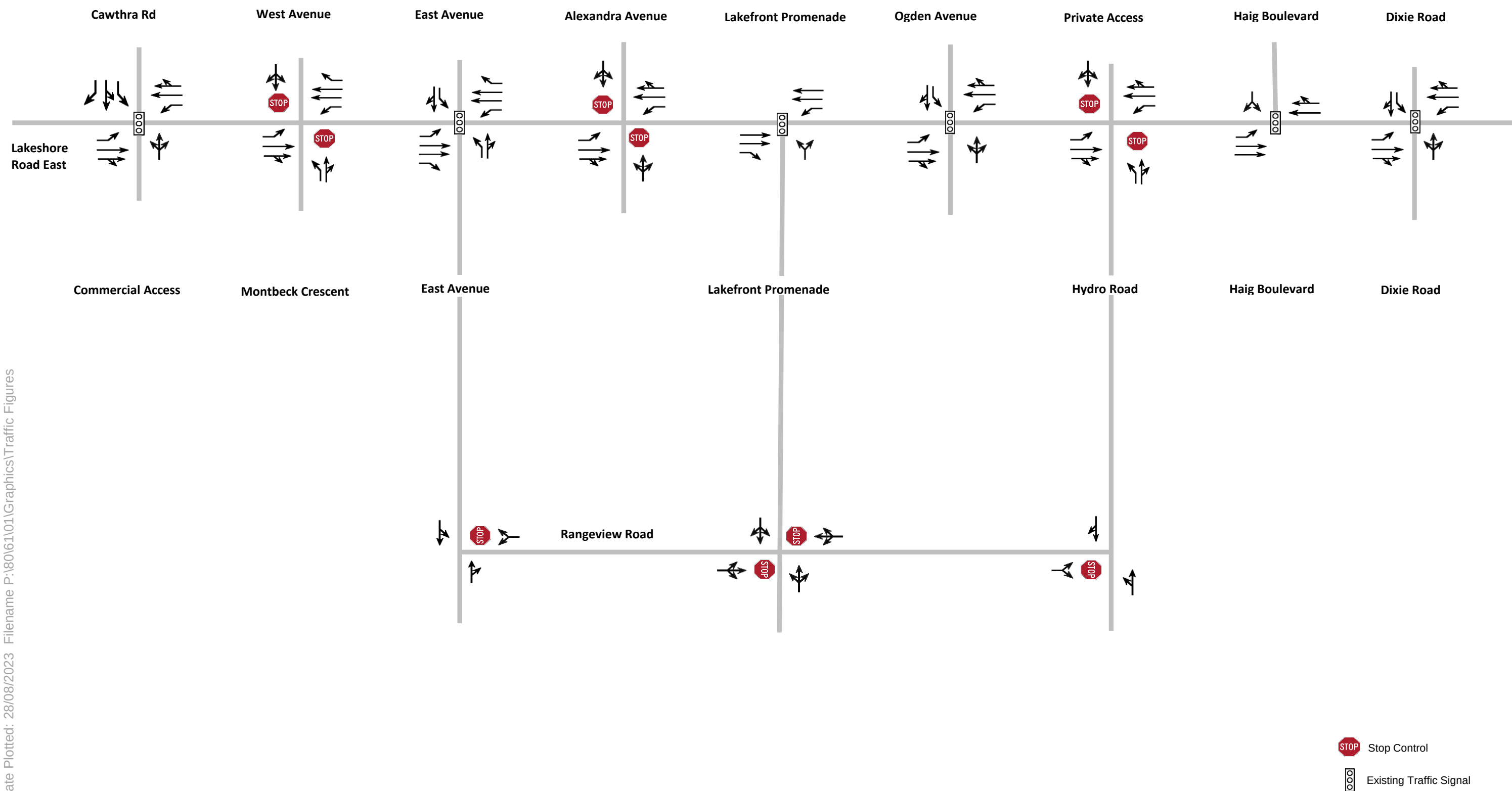
To determine the background traffic volumes for this study, traffic volume layers, inclusive of Site traffic volumes and background traffic volumes, were taken from the April 2021 TMIG Report. These traffic volume layers were then adjusted based upon the following:

- Development statistics considered by scenario;
- Driveway removals; and
- Proposed road network/ access points.

Traffic volume layers were then created for both the Rangeview and Lakeview Village sites that could be added to the future background layers.

A key component of the background travel demand assessment included a corridor reduction exercise that estimated how the planned BRT along Lakeshore Road East could be expected to reduce traffic volumes. As part of this exercise, a total of 200 vehicles per hour were removed from through traffic volumes along Lakeshore Road East, in the peak direction only, for both the morning and afternoon peak hour. The traffic volumes were then balanced and diverted as appropriate, depending on the road network being included for each scenario, thus the diversion and balancing undertaken differs by scenario.





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FIGURE 15 EXISTING LANE CONFIGURATION (2021)

RANGEVIEW ESTATES

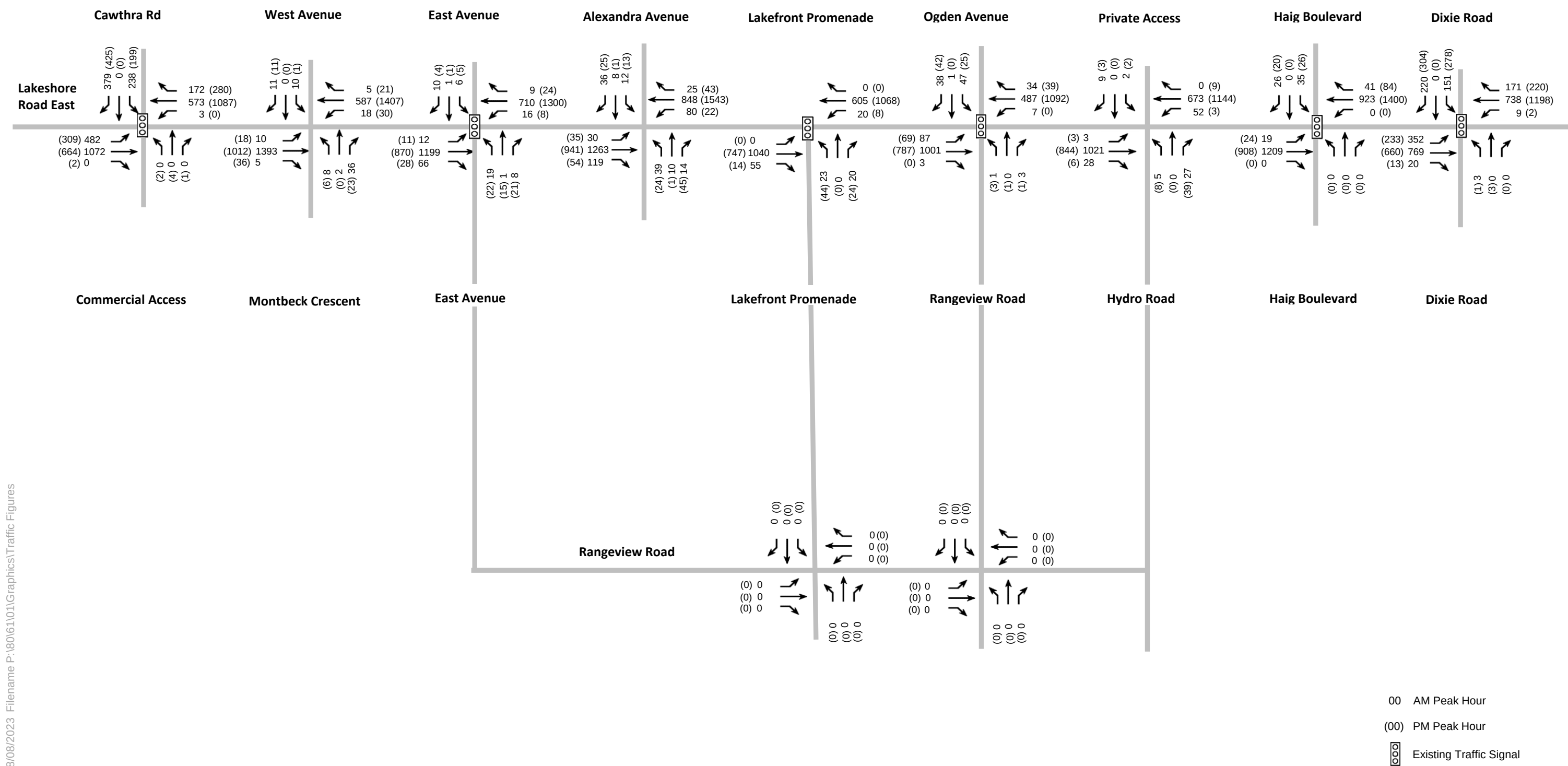


FIGURE 16 EXISTING TRAFFIC VOLUMES (2021)

6.3 MULTI-MODAL TRAVEL DEMAND

In order to determine the travel demand for each scenario, trip rates were established from the April 2021 TMIG report. Relevant excerpts from the April 2021 TMIG report are provided in **Appendix D**. Once the number of vehicle trips was determined, the future travel mode shares (with BRT) from **Table 11**, were applied to each scenario to establish the multi-modal travel demand. It is noted that the travel demand for the BA Group traffic analysis includes a total non-residential GFA of 2.1 million ft², inclusive of the proposed office, recreational community centre, retail, school, daycare and hotel, in order to align with the traffic volume layers included with the April 2021 TMIG study. Since completion of the April 2021 TMIG report, as per TMIG's discussions with City Staff, it was agreed that the recreational community centre would likely be an off-peak generator, hence the traffic analysis is conservative as the travel demand for all proposed non-residential uses has been considered.

6.3.1 Multi-Modal Travel Demand: Scenario 1 – 2,500 Rangeview Residential Units

As summarized in **Table 12**, in consideration of Rangeview with 2,500 residential units and Lakeview Village with 7,500 residential units + 67% development of the non-residential, the combined sites are expected to generate a total of 2,890 and 3,054 two-way vehicle trips during the morning and afternoon peak period, respectively.

TABLE 12 VEHICLE TRIPS: SCENARIO 1 – 2,500 RANGEVIEW UNITS

Land Use	Number of Units / % Non-residential	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Rangeview							
Residential	2,500 units	56	413	469	293	112	405
Office	0%	0	0	0	0	0	0
Retail	0%	0	0	0	0	0	0
Total		56	413	469	293	112	405
Lakeview Village							
Residential	7,500 units	185	1,283	1,468	938	379	1,317
Non-Residential ¹	67% (1.4M ft²)	669	285	953	496	835	1,331
Total		854	1,568	2,422	1,434	1,215	2,649
Serson							
Office	0%	0	0	0	0	0	0
Research	0%	0	0	0	0	0	0
Total		0	0	0	0	0	0
All Sites Combined							
Total		910	1,980	2,890	1,728	1,326	3,054

Notes:

- 67% of the total Lakeview Village non-residential development of 2.1 million ft² is 1.4 million ft².



The Scenario 1 lane configuration and traffic control is provided in **Figure 17**. Figures that illustrate the Scenario 1 traffic volumes are provided as follows:

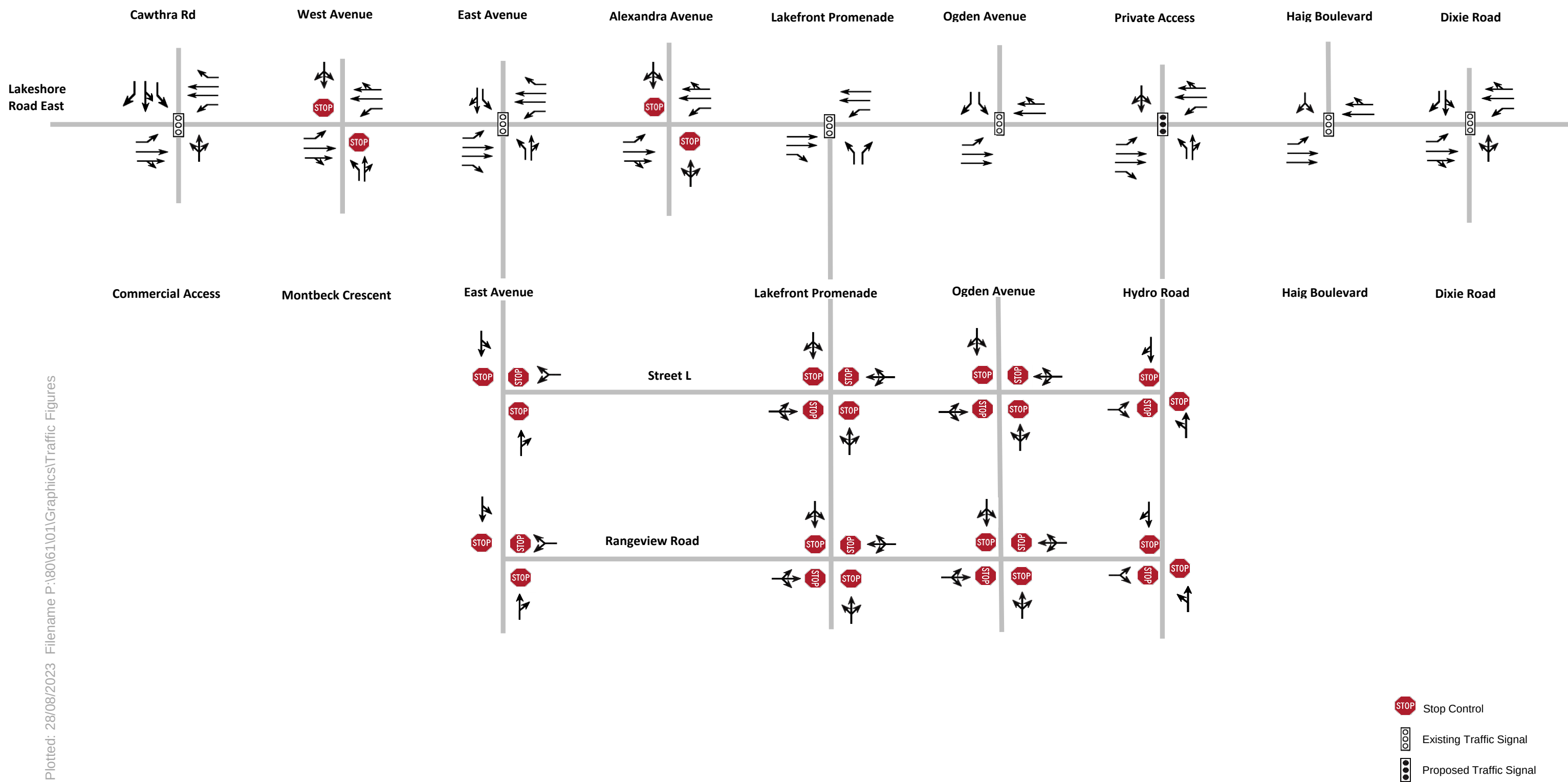
- **Figure 18:** Scenario 1: 2031 Rangeview Site Traffic Volumes (2,500 units)
- **Figure 19:** Scenario 1: 2031 Lakeview Village Site Traffic Volumes (7,500 units)
- **Figure 20:** Scenario 1: 2031 Rangeview + Lakeview Village Site Traffic Volumes (10,000 units)
- **Figure 21:** Scenario 1: 2031 Future Total Traffic Volumes (10,000 units)

As summarized in **Table 13**, Scenario 1 (2,500 Rangeview units) is expected to generate 1,445 and 2,138 two-way transit trips, during the morning and afternoon peak period respectively. There are expected to be 1,040 and 550 two-way auto passenger trips, during the morning and afternoon peak period respectively and 289 and 244 two-way walking trips, during the morning and afternoon peak period respectively. With the adjusted travel mode shares for cycling trips, there are expected to be 116 and 122 two-way cycling trips, during the morning and afternoon peak period respectively.

TABLE 13 MULTI-MODAL TRAVEL DEMAND: SCENARIO 1 – 2,500 RANGEVIEW UNITS

Mode of Travel	Morning			Afternoon		
	In	Out	2-Way	In	Out	2-Way
Transit	455	990	1,445	1,209	928	2,138
Auto Driver	910	1,980	2,890	1,728	1,326	3,054
Auto Passenger	328	713	1,040	311	239	550
Walk	91	198	289	138	106	244
Cycle	36	79	116	69	53	122
Total	1,820	3,961	5,781	3,455	2,653	6,108





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FIGURE 17 FUTURE LANE CONFIGURATION SCENARIO 1 (2031)

RANGEVIEW ESTATES

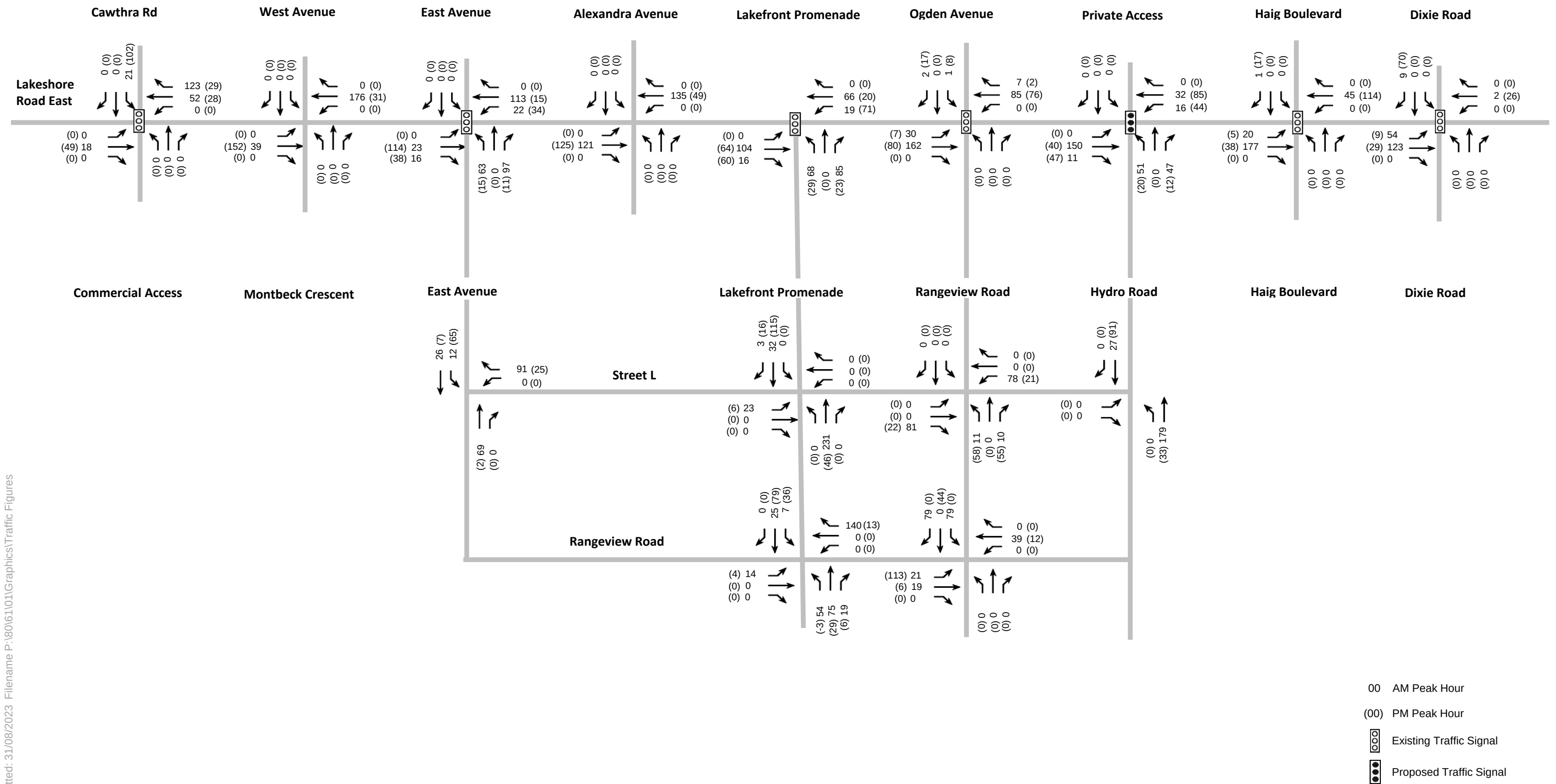


FIGURE 18 - SCENARIO 1 2031 RANGEVIEW SITE TRAFFIC VOLUMES (2,500 UNITS)

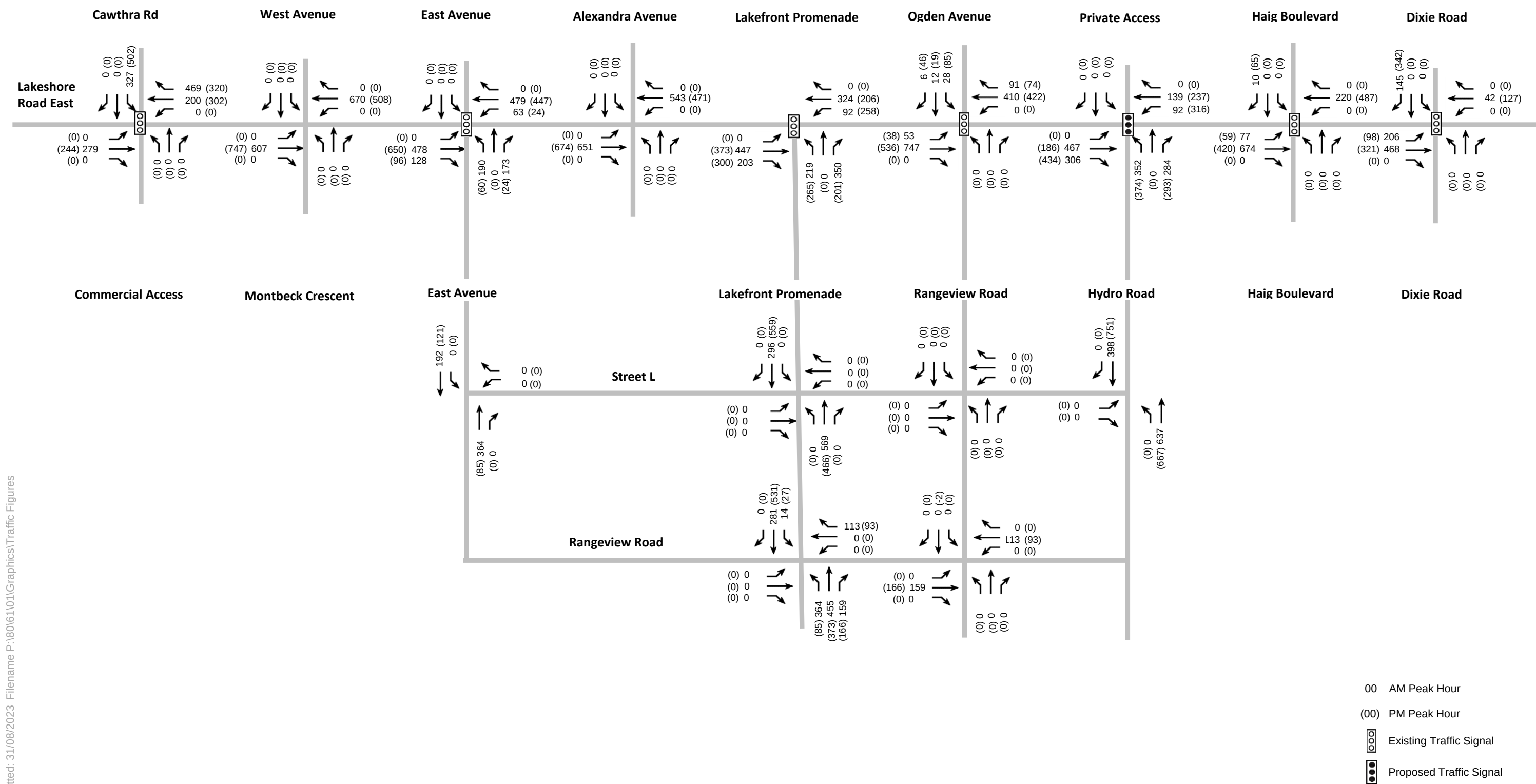


FIGURE 19 - SCENARIO 1 2031 LAKEVIEW VILLAGE SITE TRAFFIC VOLUMES (7,500 UNITS)

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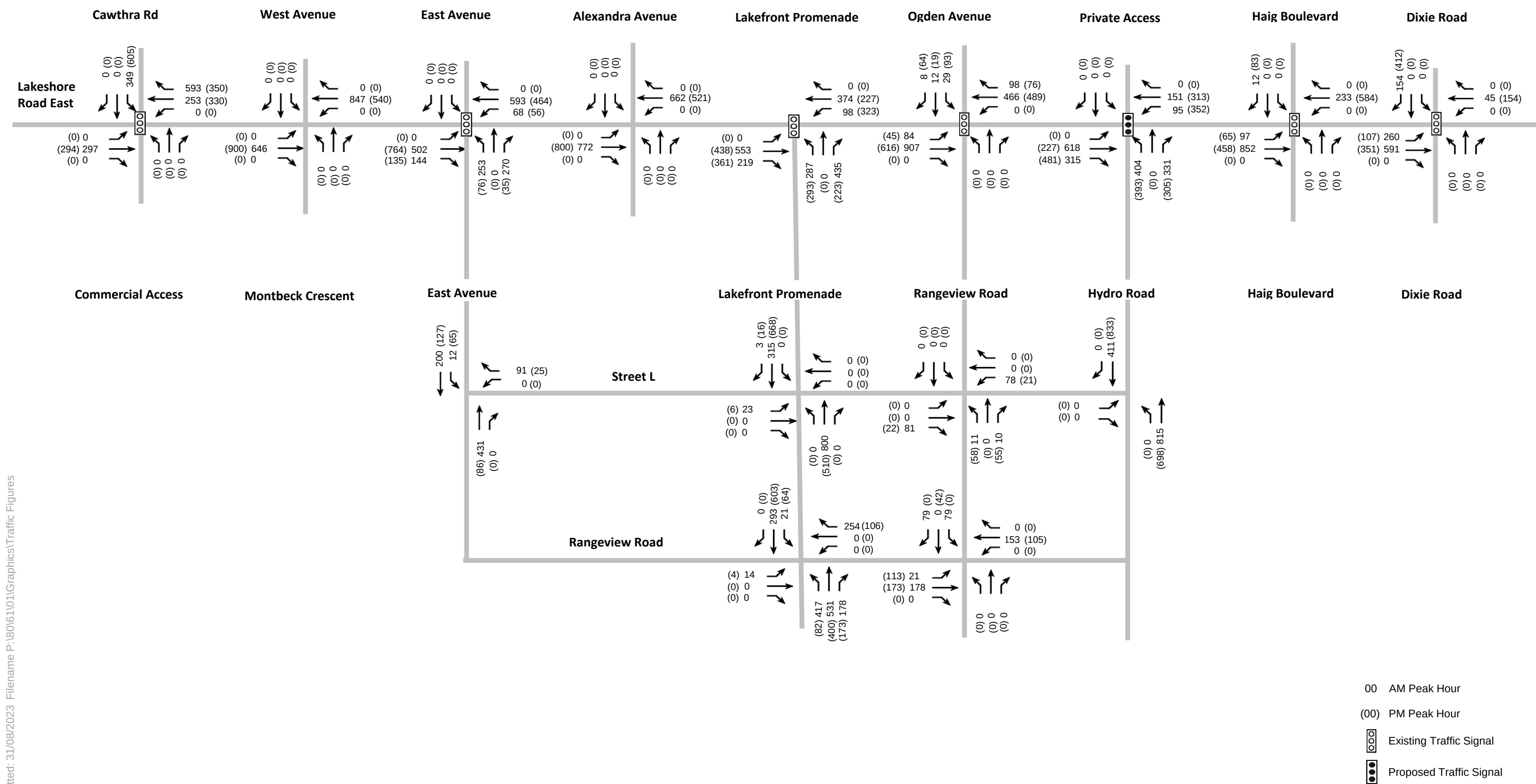


FIGURE 20 - SCENARIO 1 2031 RANGEVIEW + LAKEVIEW VILLAGE SITE TRAFFIC VOLUMES (10,000 UNITS)

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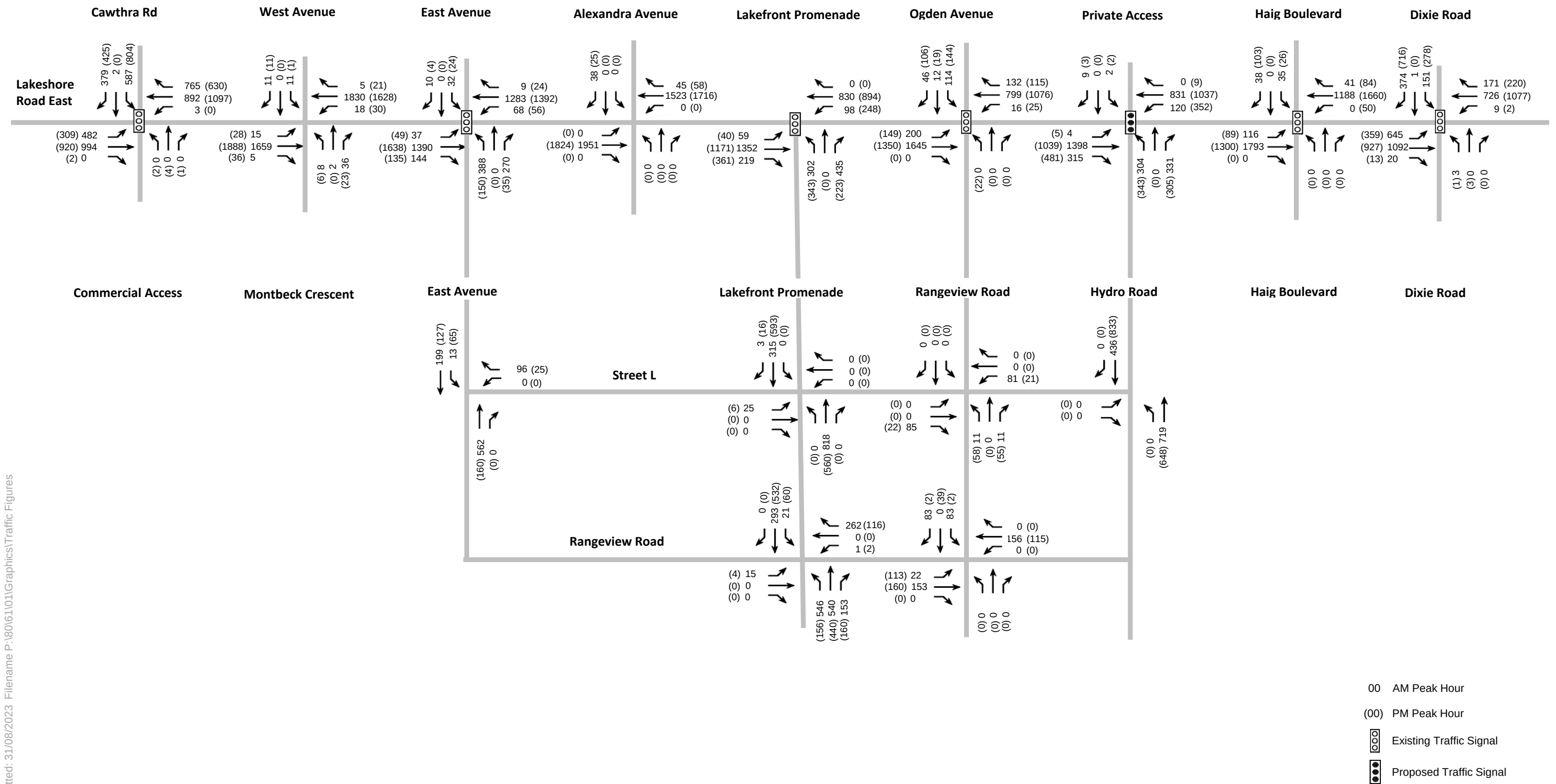


FIGURE 21 - SCENARIO 1 2031 FUTURE TOTAL TRAFFIC VOLUMES (10,000 UNITS)

6.3.2 Travel Demand: Scenario 2 – 3,700 Rangeview Residential Units (with Ogden)

As summarized in **Table 14**, in consideration of Rangeview with 3,700 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential, the combined sites are expected to generate a total of 3,841 and 4,229 two-way vehicle trips during the morning and afternoon peak period, respectively.

TABLE 14 VEHICLE TRIPS: SCENARIO 2 – 3,700 RANGEVIEW UNITS (WITH OGDEN)

Land Use	Number of Units / % Non-residential	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Rangeview							
Residential	3,700 units	83	611	694	449	172	621
Office	100% (47,500 ft²)	33	4	37	1	22	23
Retail	100% (47,500 ft²)	64	40	104	91	84	174
Total		179	656	835	540	278	818
Lakeview Village							
Residential	8,050 units	199	1,377	1,576	1,007	407	1,414
Non-Residential	100% (2.1M ft²)	1,003	427	1,430	744	1,253	1,997
Total		1,202	1,804	3,006	1,751	1,660	3,411
Serson							
Office	0%	0	0	0	0	0	0
Research	0%	0	0	0	0	0	0
Total		0	0	0	0	0	0
All Sites Combined							
Total		1,381	2,460	3,841	2,291	1,938	4,229

The Scenario 2 lane configuration and traffic control is provided in **Figure 22**. Figures that illustrate the Scenario 2 traffic volumes are provided as follows:

- **Figure 23:** Scenario 1: 2041 Rangeview Site Traffic Volumes (3,700 units)
- **Figure 24:** Scenario 1: 2041 Lakeview Village Site Traffic Volumes (8,050 units)
- **Figure 25:** Scenario 1: 2041 Rangeview + Lakeview Village Site Traffic Volumes (11,750 units)
- **Figure 26:** Scenario 1: 2041 Future Total Traffic Volumes (11,750 units)

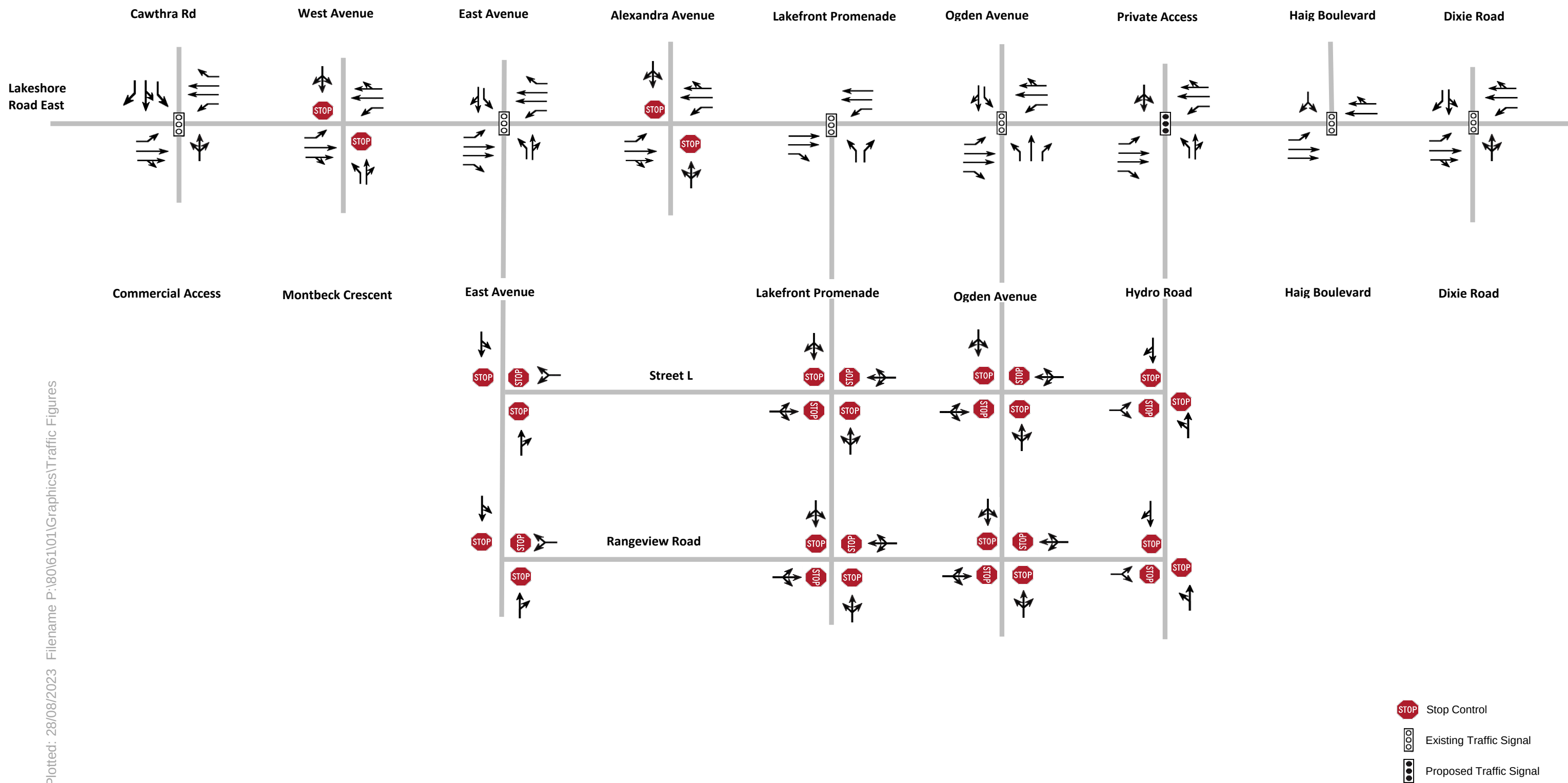


As summarized in **Table 15**, Scenario 2 (3,700 Rangeview units) is expected to generate 1,921 and 2,961 two-way transit trips, during the morning and afternoon peak period respectively. There are expected to be 1,383 and 761 two-way auto passenger trips, during the morning and afternoon peak period respectively and 384 and 338 two-way walking trips, during the morning and afternoon peak period respectively. With the adjusted travel mode shares for cycling trips, there are expected to be 154 and 169 two-way cycling trips, during the morning and afternoon peak period respectively.

TABLE 15 MULTI-MODAL TRAVEL DEMAND: SCENARIO 2 – 3,700 RANGEVIEW UNITS (WITH OGDEN)

Mode of Travel	Morning			Afternoon		
	In	Out	2-Way	In	Out	2-Way
Transit	691	1,230	1,921	1,604	1,357	2,961
Auto Driver	1,381	2,460	3,841	2,291	1,938	4,229
Auto Passenger	497	886	1,383	412	349	761
Walk	138	246	384	183	155	338
Cycle	55	98	154	92	78	169
Total	2,763	4,919	7,682	4,582	3,876	8,459

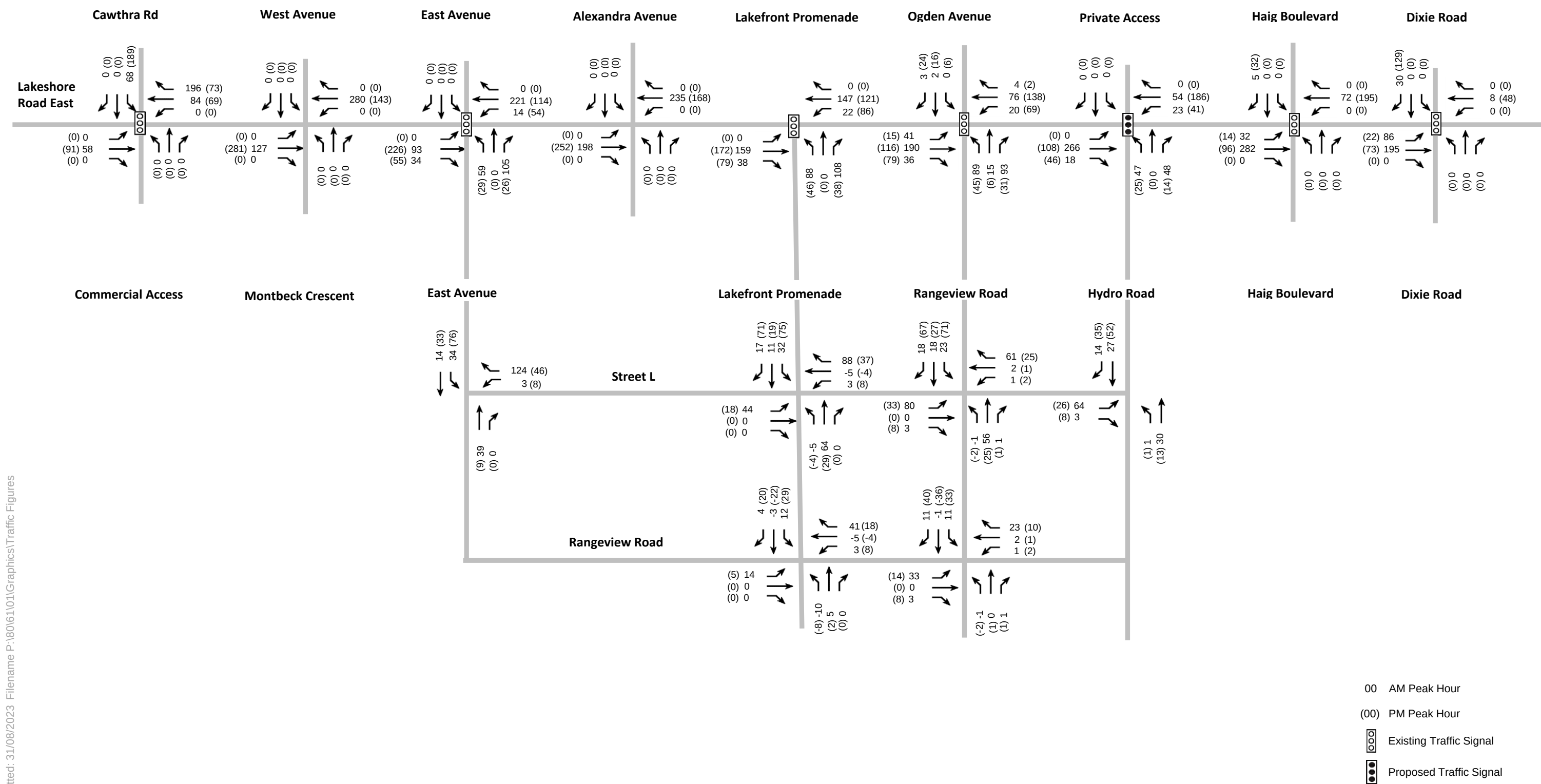




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FIGURE 22 FUTURE LANE CONFIGURATION SCENARIO 2 (2041)

RANGEVIEW ESTATES



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FIGURE 23 - SCENARIO 2 2041 RANGEVIEW SITE TRAFFIC VOLUMES (3,700 UNITS)

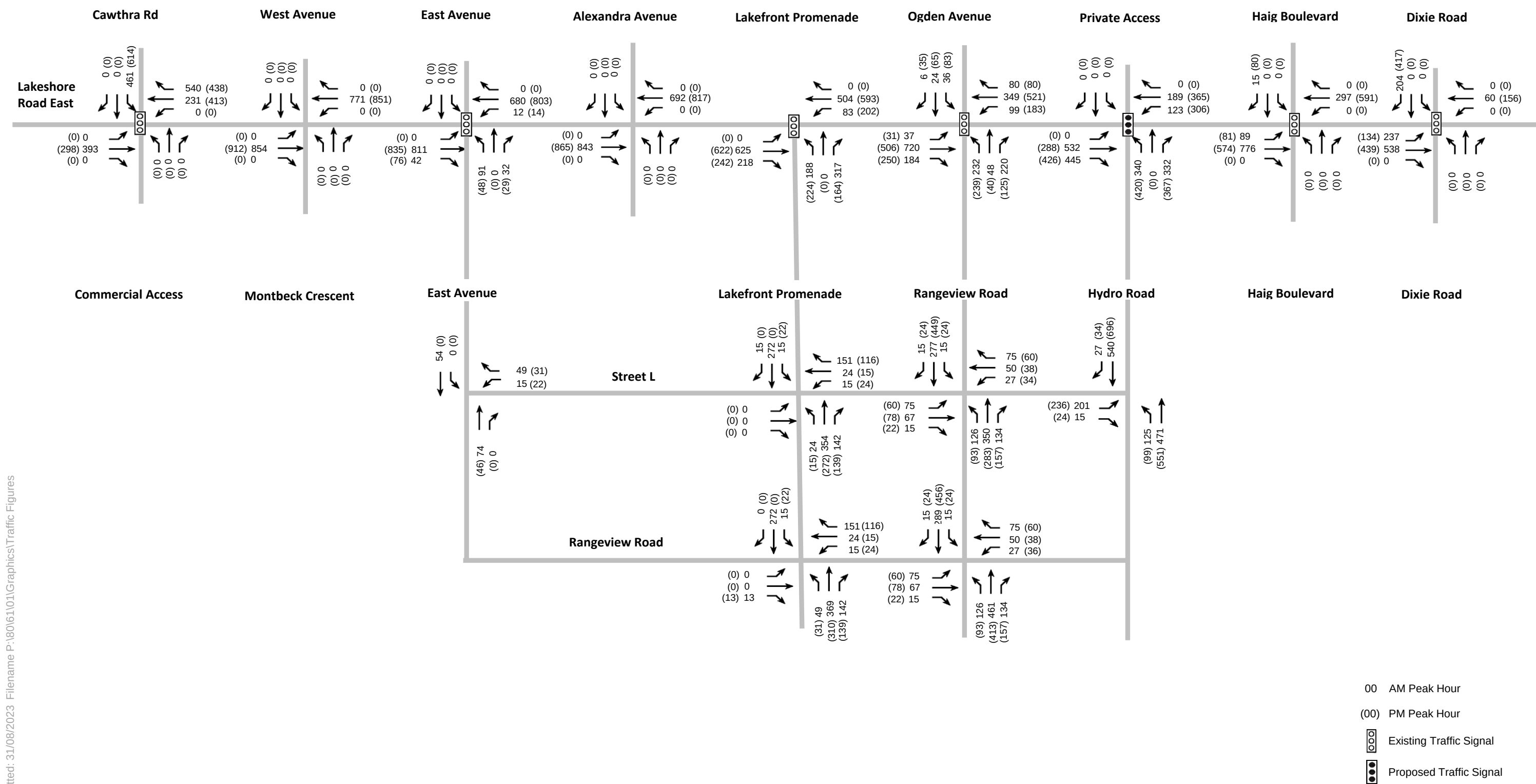


FIGURE 24 - SCENARIO 2 2041 LAKEVIEW VILLAGE SITE TRAFFIC VOLUMES (8,050 UNITS)

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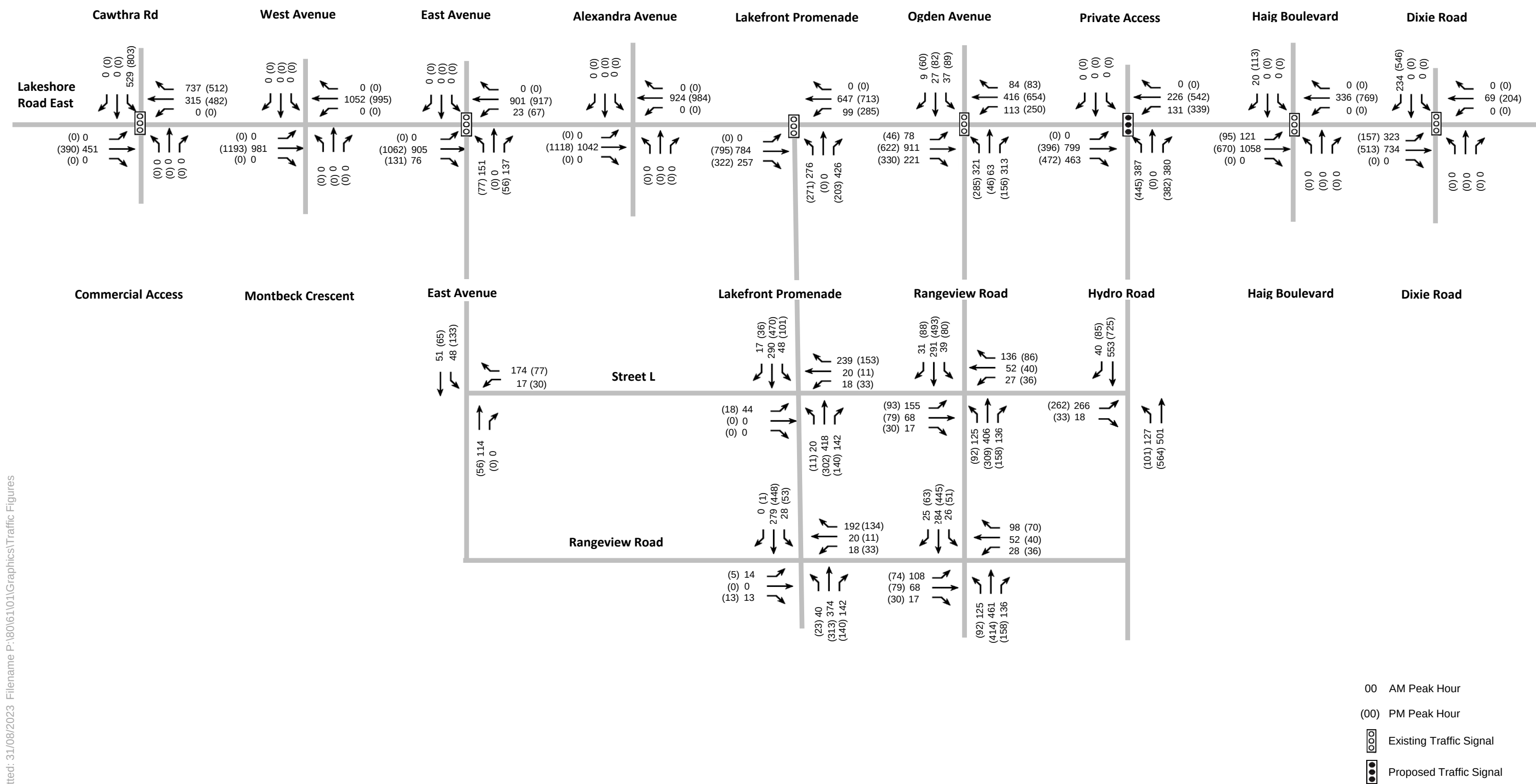


FIGURE 25 - SCENARIO 2 2041 RANGEVIEW + LAKEVIEW VILLAGE SITE TRAFFIC VOLUMES (11,750 UNITS)

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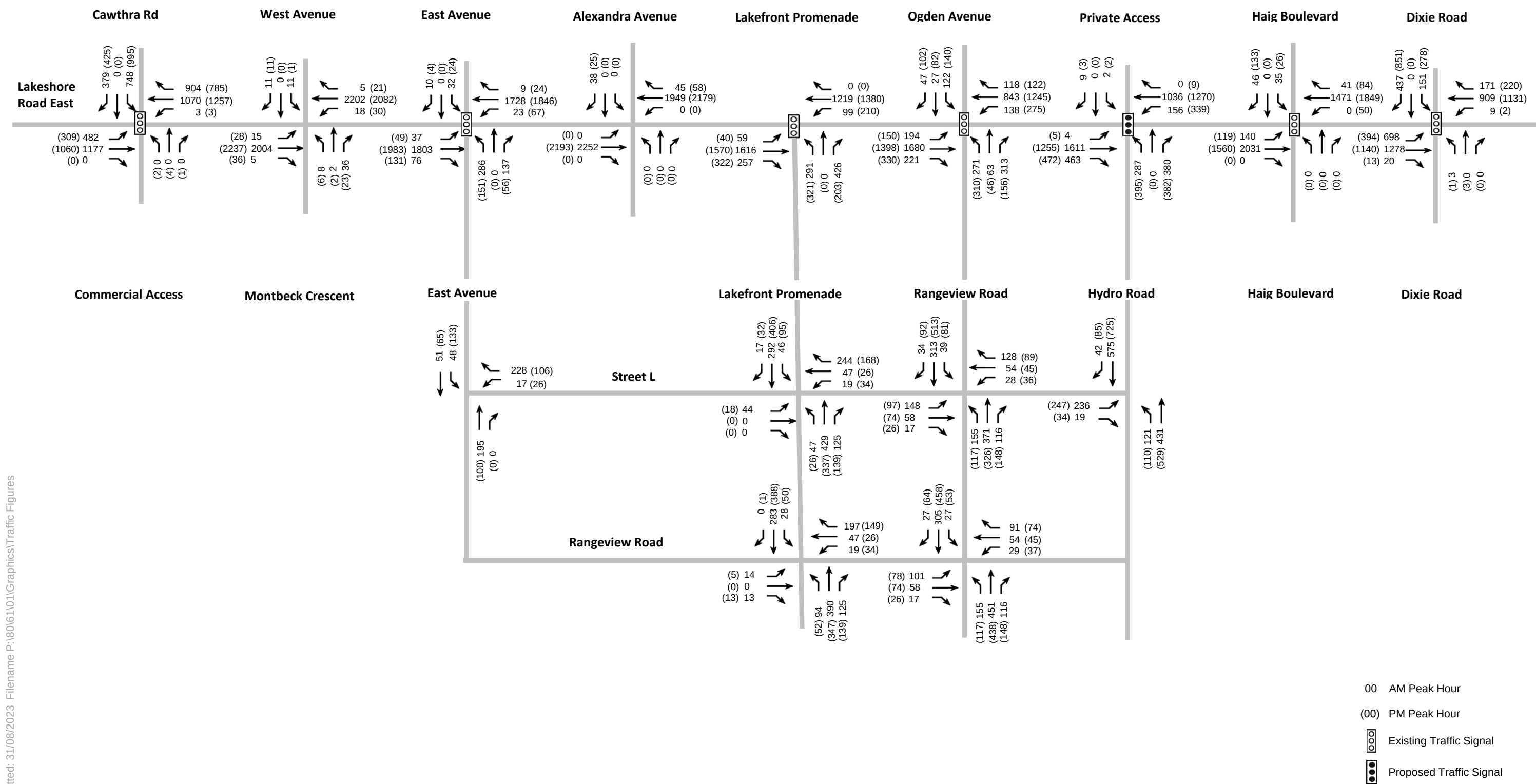


FIGURE 26 - SCENARIO 2 2041 FUTURE TOTAL TRAFFIC VOLUMES (11,750 UNITS)

6.3.3 Travel Demand: Scenario 3A – 5,300 Rangeview Residential Units (with Haig)

As summarized in **Table 16**, with the connection of Haig Boulevard, in consideration of Rangeview with 5,300 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential and 100% of the Serson lands developed, the combined sites are expected to generate a total of 4,337 and 4,739 two-way vehicle trips, during the morning and afternoon peak period, respectively.

TABLE 16 VEHICLE TRIPS: SCENARIO 3A – 5,300 RANGEVIEW UNITS (WITH HAIG)

Land Use	Number of Units / % Non-residential	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Rangeview							
Residential	5,300 units	118	876	995	656	253	909
Office	100% (47,500 ft²)	33	4	37	1	22	23
Retail	100% (47,500 ft²)	61	40	101	91	84	174
Total		213	920	1,132	748	359	1,106
Lakeview Village							
Residential	8,050 units	199	1,377	1576	1,007	407	1,414
Non-Residential	100% (2.1M ft²)	1,003	427	1,430	744	1,253	1,997
Total		1,202	1,804	3,006	1,751	1,660	3,411
Serson							
Office	100% (224,500 ft²)	116	19	135	24	118	142
Research	100% (224,500 ft²)	48	16	64	12	68	80
Total		164	35	199	36	186	222
All Sites Combined							
Total		1,579	2,759	4,337	2,535	2,205	4,739

The Scenario 3A lane configuration and traffic control is provided in **Figure 27**. Figures that illustrate the Scenario 3A traffic volumes are provided as follows:

- **Figure 28:** Scenario 3A: 2041 Rangeview Site Traffic Volumes (5,300 units + Haig)
- **Figure 29:** Scenario 3A: 2041 Lakeview Village Site Traffic Volumes (8,050 units + Haig)
- **Figure 25:** Scenario 3A: 2041 Serson Site Traffic Volumes (8,050 units + Haig)
-
- **Figure 31:** Scenario 3A: 2041 Rangeview + Lakeview Village Site Traffic Volumes (13,350 units + Haig)
- **Figure 32:** Scenario 3A: 2041 Future Total Traffic Volumes (13,350 units + Haig)

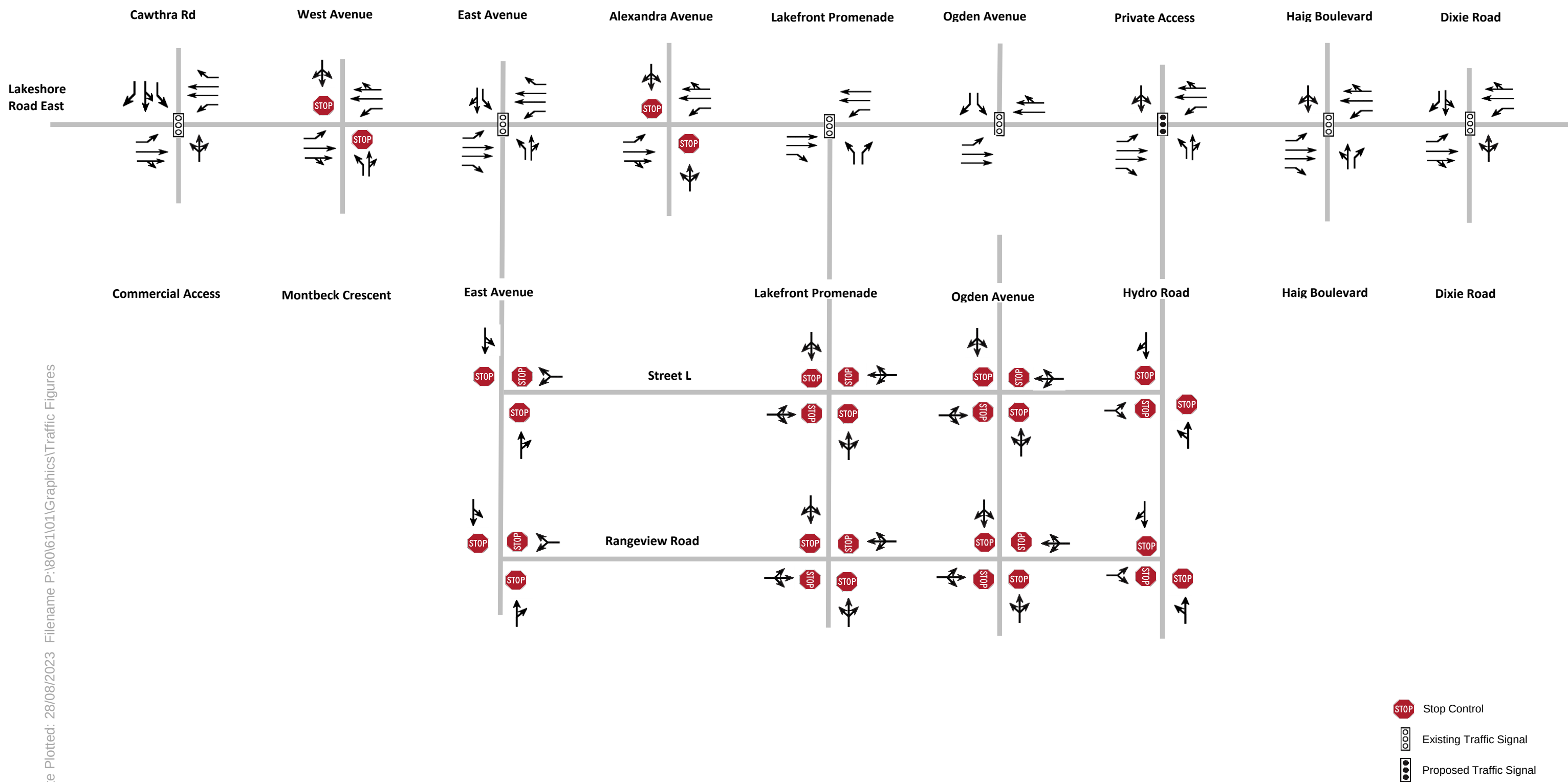


As summarized in **Table 17**, Scenario 3A (5,300 Rangeview units with Haig) is expected to generate 2,169 and 3,318 two-way transit trips, during the morning and afternoon peak period respectively. There are expected to be 1,561 and 853 two-way auto passenger trips, during the morning and afternoon peak period respectively and 434 and 379 two-way walking trips, during the morning and afternoon peak period respectively. With the adjusted travel mode shares for cycling trips, there are expected to be 173 and 190 two-way cycling trips, during the morning and afternoon peak period respectively.

TABLE 17 MULTI-MODAL TRAVEL DEMAND: SCENARIO 3A – 5,300 RANGEVIEW UNITS (WITH HAIG)

Mode of Travel	Morning			Afternoon		
	In	Out	2-Way	In	Out	2-Way
Transit	789	1,379	2,169	1,774	1,543	3,318
Auto Driver	1,579	2,759	4,337	2,535	2,205	4,739
Auto Passenger	568	993	1,561	456	397	853
Walk	158	276	434	203	176	379
Cycle	63	110	173	101	88	190
Total	3,157	5,518	8,675	5,069	4,410	9,479





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FIGURE 27 FUTURE LANE CONFIGURATION SCENARIO 3A (2041)

RANGEVIEW ESTATES

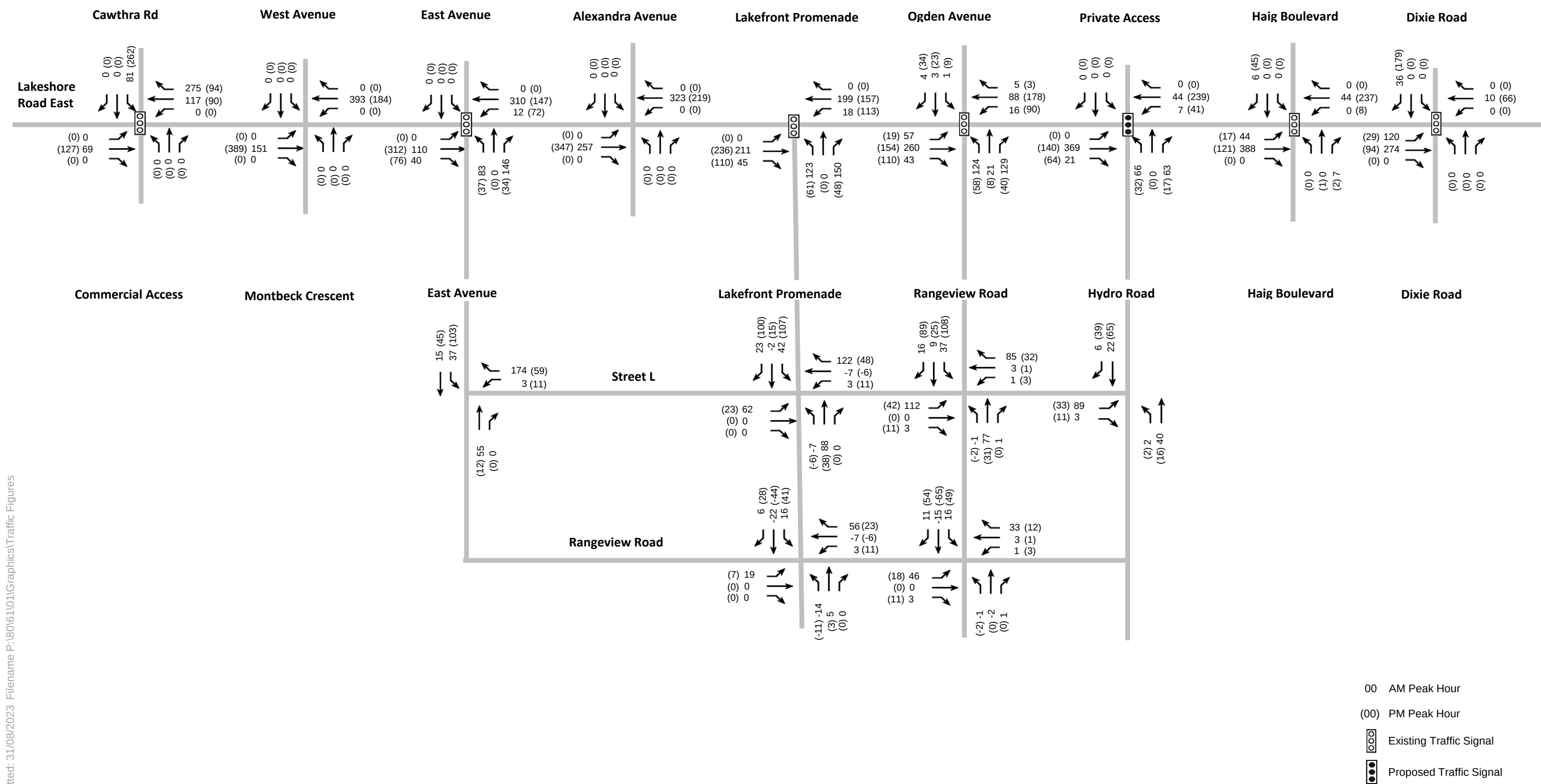


FIGURE 28 - SCENARIO 3A 2041 RANGEVIEW SITE TRAFFIC VOLUMES (5,300 UNITS + HAIG)

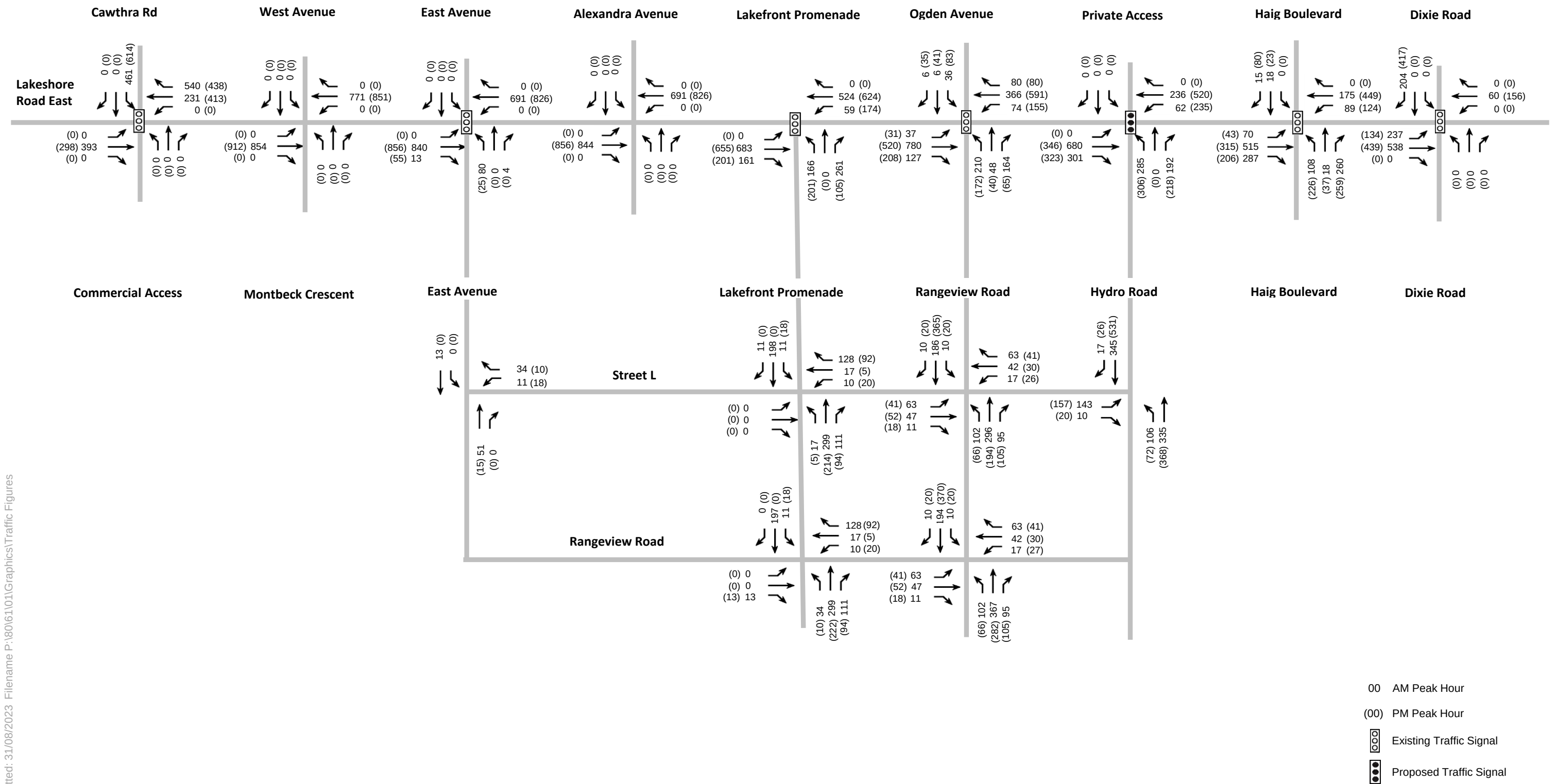


FIGURE 29 - SCENARIO 3A 2041 LAKEVIEW VILLAGE SITE TRAFFIC VOLUMES (8,050 UNITS + HAIG)

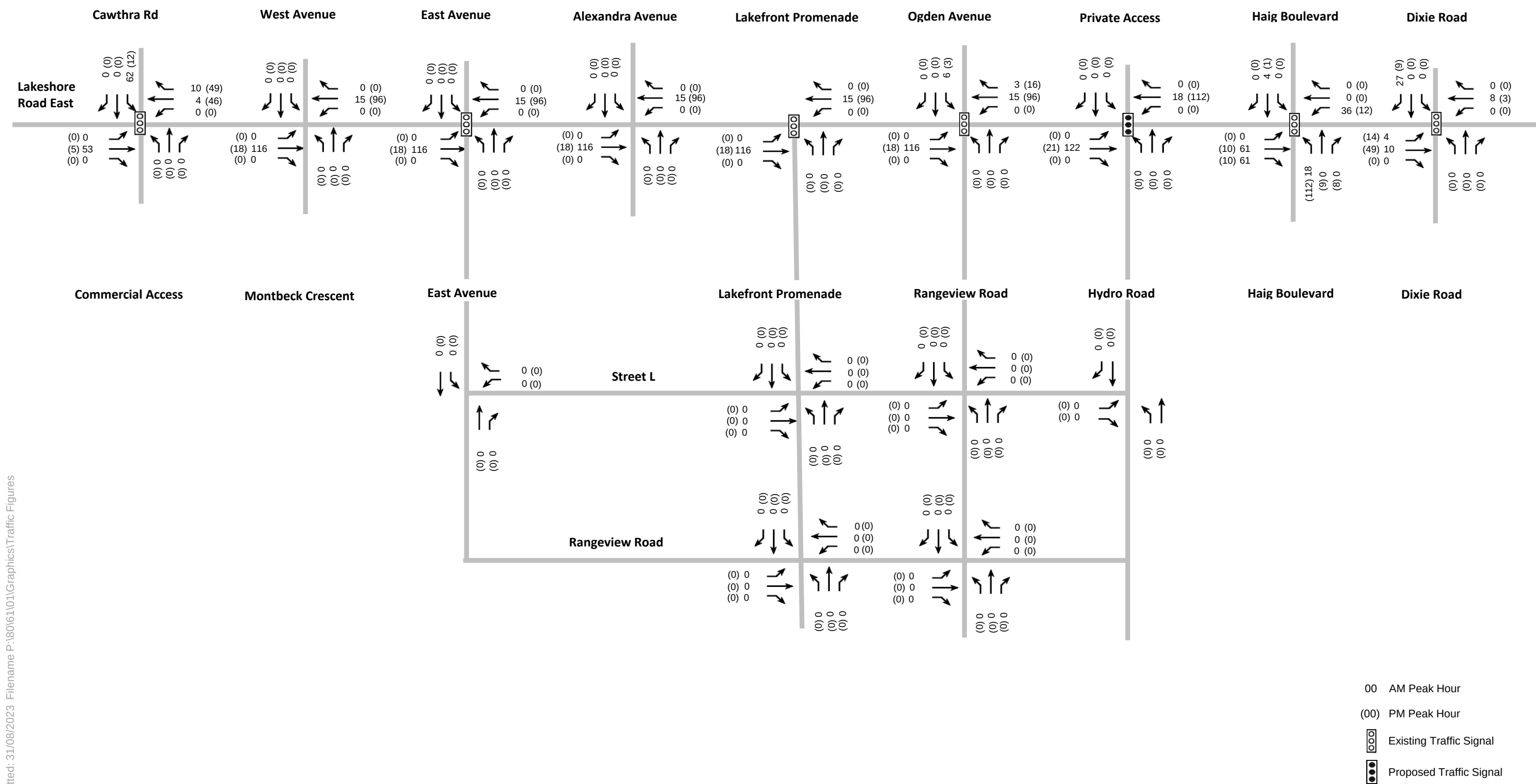


FIGURE 30 - SCENARIO 3A 2041 SERON SITE TRAFFIC VOLUMES (+ HAIG)

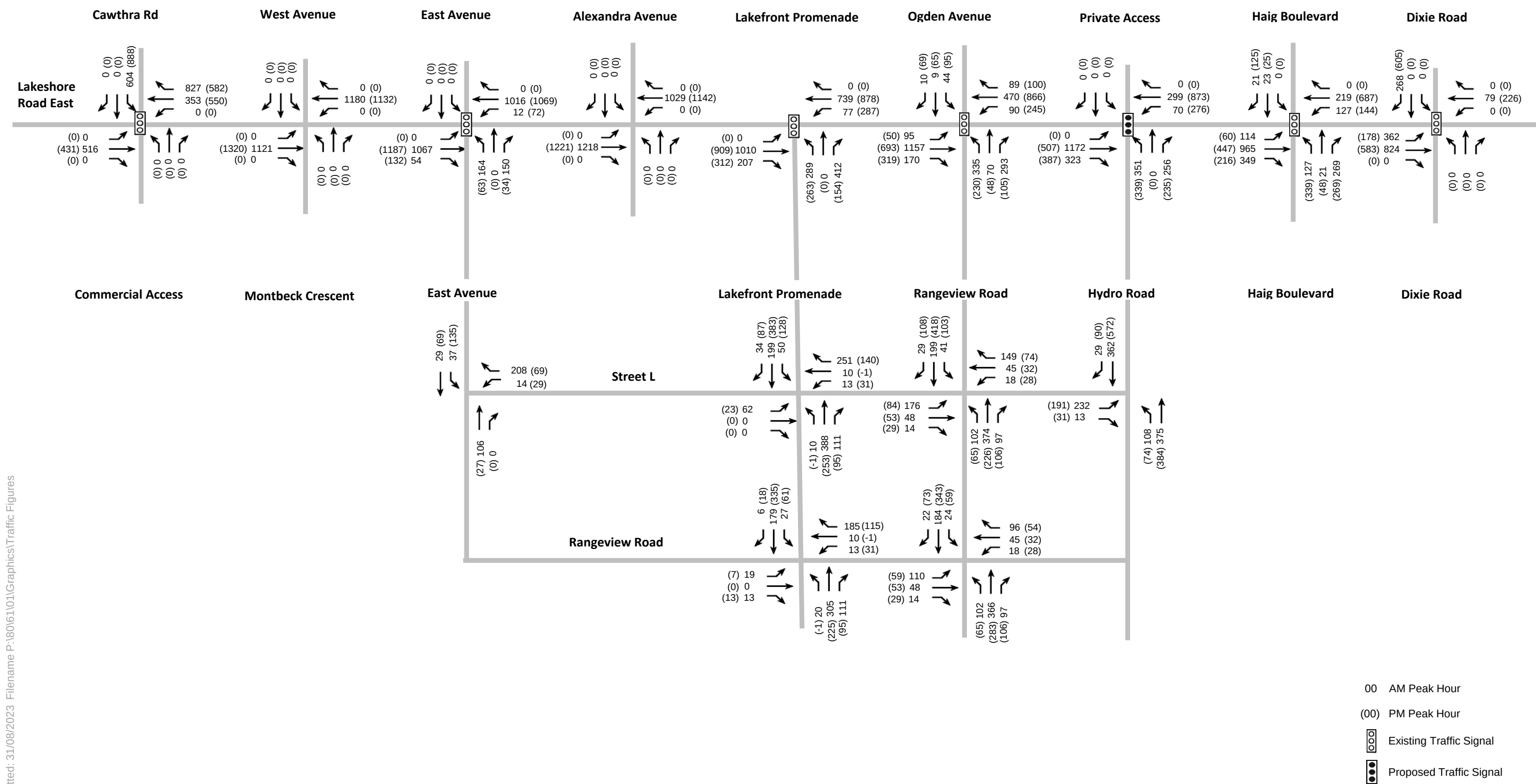


FIGURE 31 - SCENARIO 3A 2041 RANGEVIEW + LAKEVIEW VILLAGE + SERSON SITE TRAFFIC VOLUMES (13,350 UNITS + HAIG)

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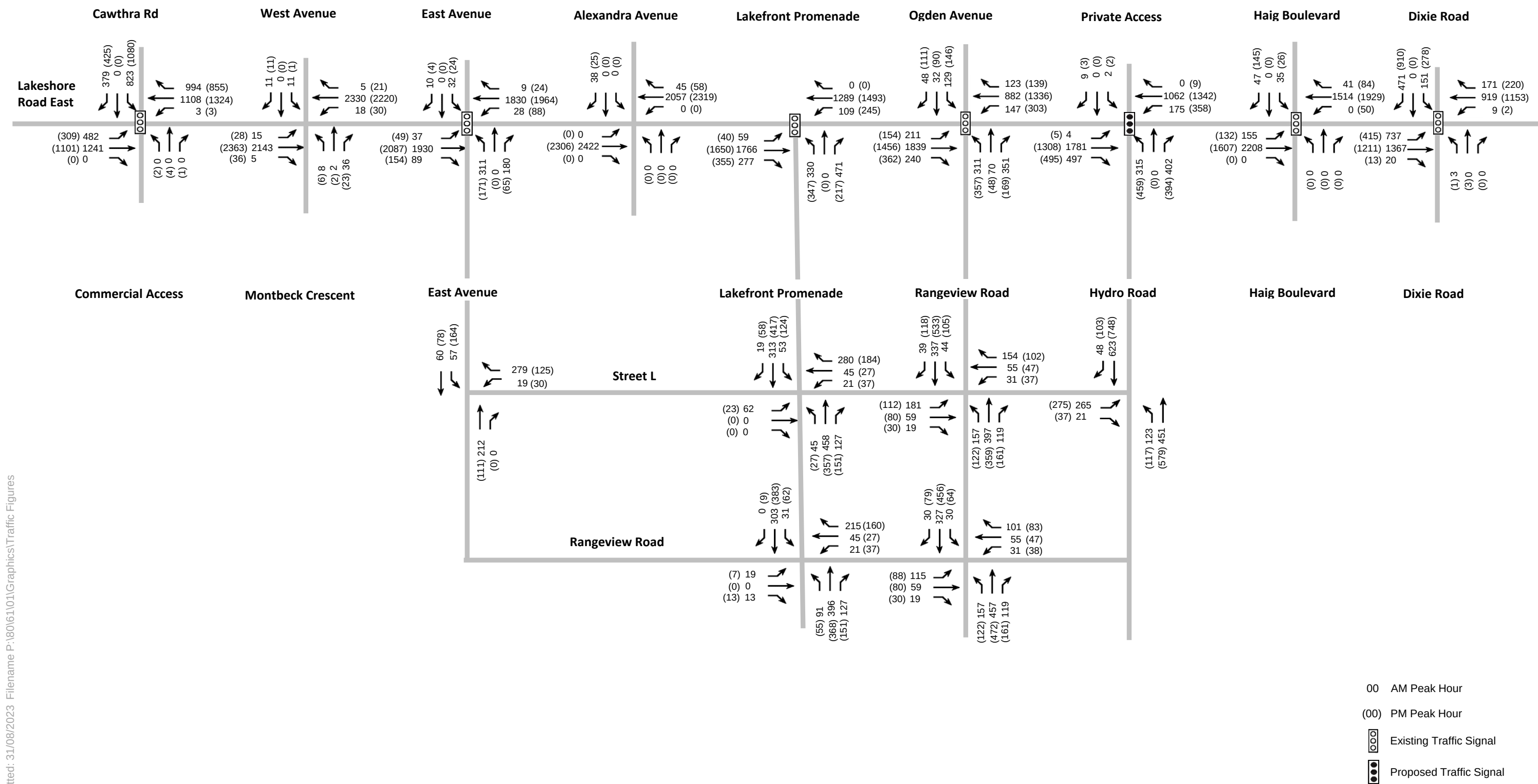


FIGURE 32 - SCENARIO 3A 2041 FUTURE TOTAL TRAFFIC VOLUMES (13,350 UNITS + HAIG)

6.3.4 Travel Demand: Scenario 3B – 5,300 Rangeview Residential Units (Dual left turns but no Haig)

Scenario 3B includes the implementation of a dual northbound left-turn on Lakefront Promenade at Lakeshore Road East. As the traffic analysis determined that additional capacity would be required for northbound left-turning vehicles leaving both the Rangeview and Lakeview Village sites, to travel westbound along Lakeshore Road East, the dual left-turn lane option, without the connection of Haig Boulevard, was deemed to be beneficial from a phasing and traffic operations perspective.

As summarized in **Table 18**, with the implementation of the northbound dual left-turn on Lakefront Promenade at Lakeshore Road East, in consideration of Rangeview with 5,300 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential, the combined sites are expected to generate a total of 4,138 and 4,517 two-way vehicle trips, during the morning and afternoon peak period, respectively.

TABLE 18 VEHICLE TRIPS: SCENARIO 3B – 5,300 RANGEVIEW UNITS (DUAL LEFT)

Land Use	Number of Units / % Non-residential	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Rangeview							
Residential	5,300	118	876	995	656	253	909
Office	100% (47,500 ft²)	33	4	37	1	22	23
Retail	100% (47,500 ft²)	61	40	101	91	84	174
Total		213	920	1,132	748	359	1,106
Lakeview Village							
Residential	8,050	199	1,377	1,576	1,007	407	1,414
Non-Residential	100% (2.1M ft²)	1,003	427	1,430	744	1,253	1,997
Total		1,202	1,804	3,006	1,751	1,660	3,411
Serson							
Office	0%	0	0	0	0	0	0
Research	0%	0	0	0	0	0	0
Total		0	0	0	0	0	0
All Sites Combined							
Total		1,415	2,724	4,138	2,499	2,019	4,517



The Scenario 3B lane configuration and traffic control is provided in **Figure 33**. Figures that illustrate the Scenario 3B traffic volumes are provided as follows:

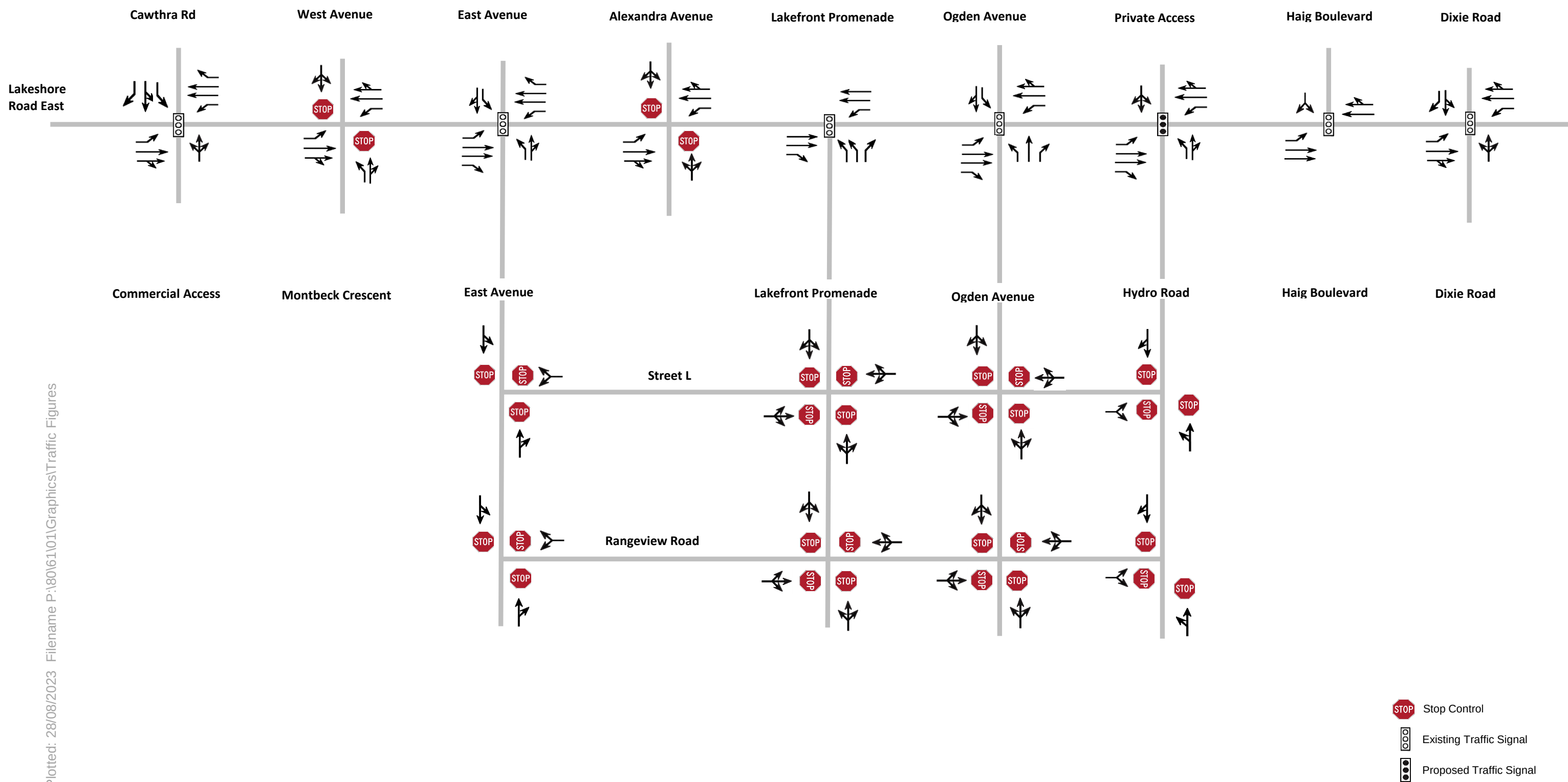
- **Figure 34:** Scenario 3B: 2041 Rangeview Site Traffic Volumes (5,300 units + Dual Left)
- **Figure 35:** Scenario 3B: 2041 Lakeview Village Site Traffic Volumes (8,050 units + Dual Left)
- **Figure 36:** Scenario 3B: 2041 Rangeview + Lakeview Village Site Traffic Volumes (13,350 units + Dual Left)
- **Figure 37:** Scenario 3B: 2041 Future Total Traffic Volumes (13,350 units + Dual Left)

As summarized in **Table 19**, Scenario 3B (5,300 Rangeview units with dual left) is expected to generate 2,069 and 3,162 two-way transit trips, during the morning and afternoon peak period respectively. There are expected to be 1,490 and 813 two-way auto passenger trips, during the morning and afternoon peak period respectively and 414 and 361 two-way walking trips, during the morning and afternoon peak period respectively. With the adjusted travel mode shares for cycling trips, there are expected to be 166 and 181 two-way cycling trips, during the morning and afternoon peak period respectively.

TABLE 19 MULTI-MODAL TRAVEL DEMAND: SCENARIO 3B – 5,300 RANGEVIEW UNITS (WITH DUAL LEFT)

Mode of Travel	Morning			Afternoon		
	In	Out	2-Way	In	Out	2-Way
Transit	707	1,362	2,069	1,749	1,413	3,162
Auto Driver	1,415	2,724	4,138	2,499	2,019	4,517
Auto Passenger	509	981	1,490	450	363	813
Walk	141	272	414	200	162	361
Cycle	57	109	166	100	81	181
Total	2,829	5,448	8,277	4,997	4,038	9,035





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FIGURE 33 FUTURE LANE CONFIGURATION SCENARIO 3B (2041)

RANGEVIEW ESTATES

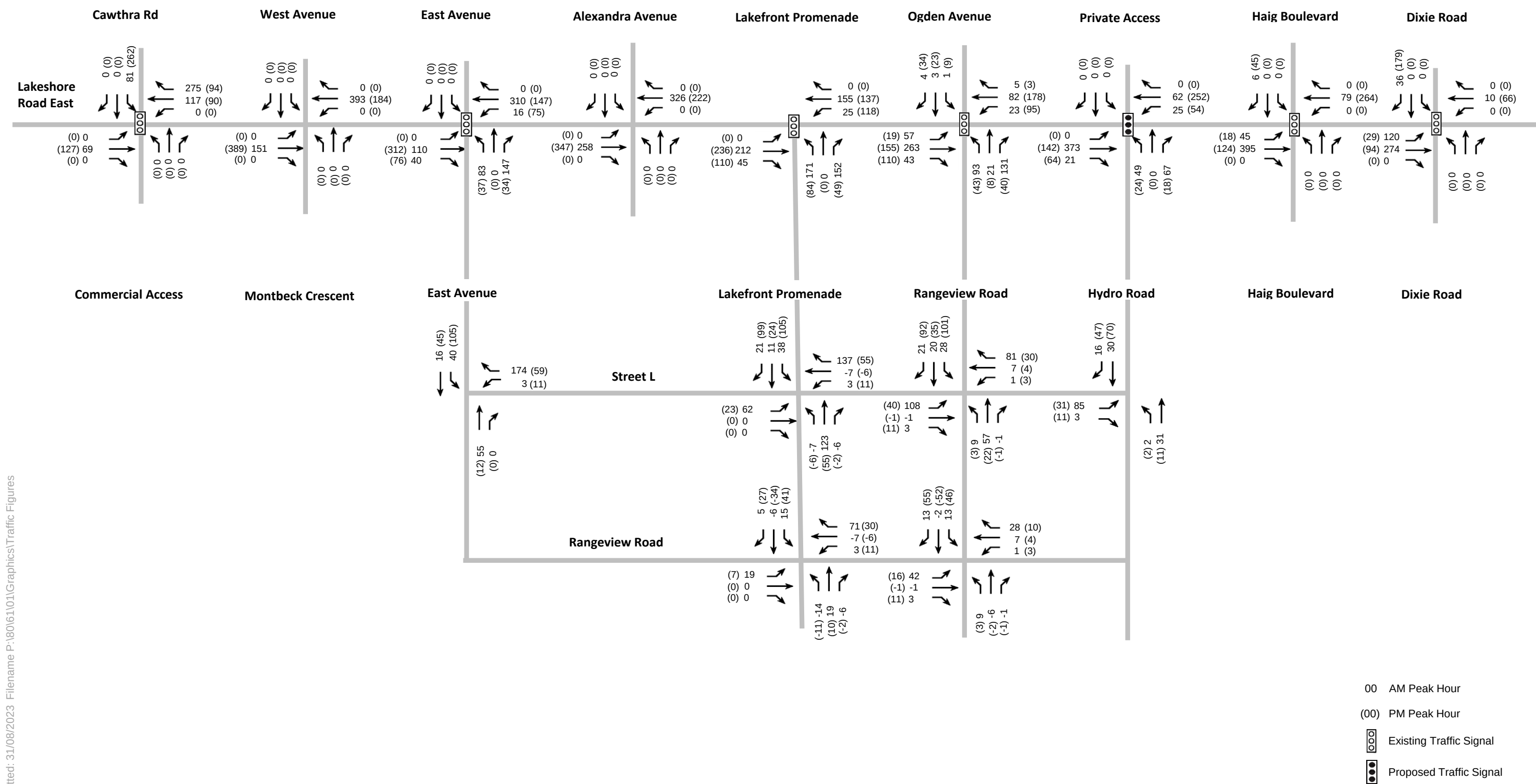


FIGURE 34 - SCENARIO 3B 2041 RANGEVIEW SITE TRAFFIC VOLUMES (5,300 UNITS + DUAL LEFT)

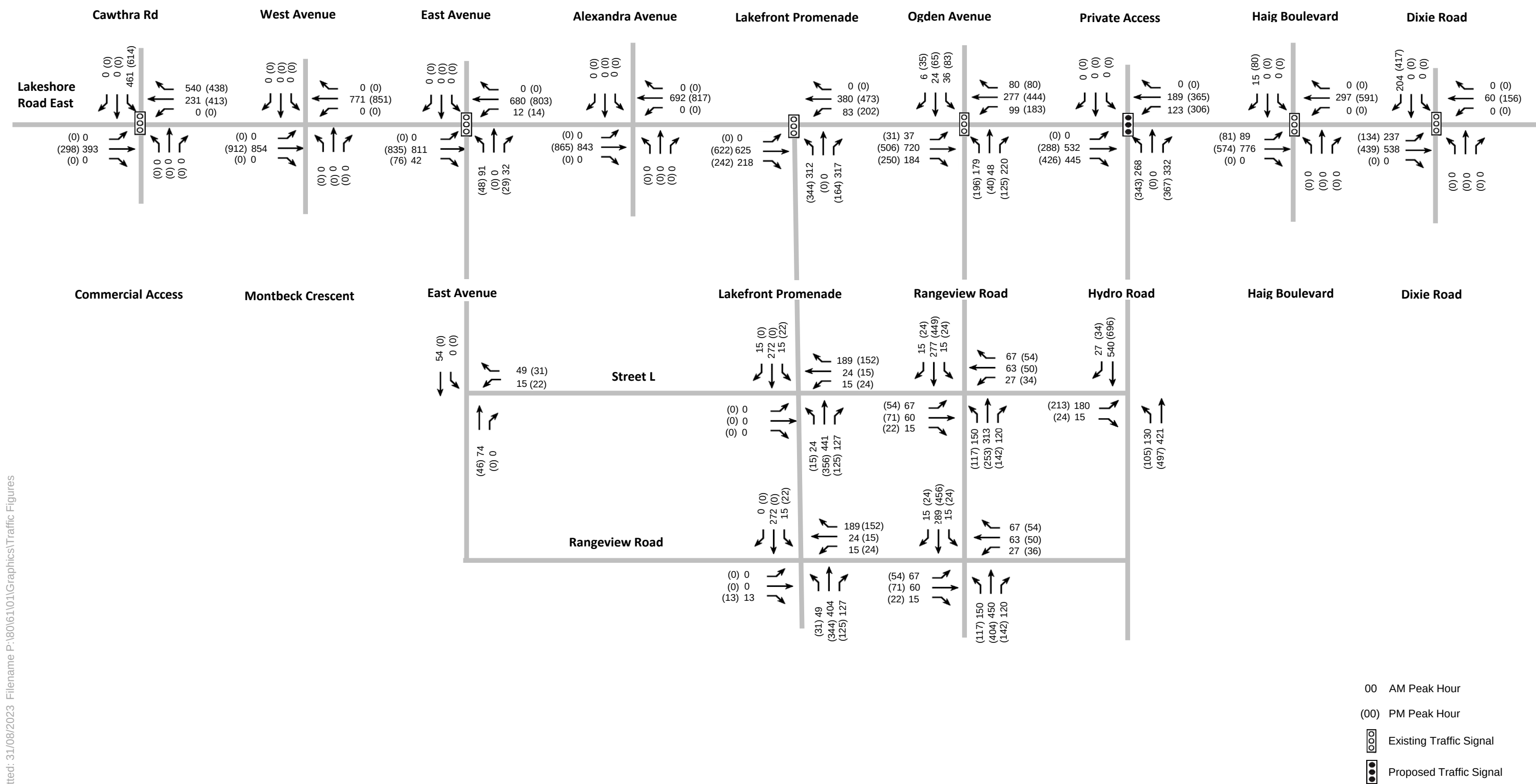


FIGURE 35 - SCENARIO 3B 2041 LAKEVIEW VILLAGE SITE TRAFFIC VOLUMES (8,050 UNITS + DUAL LEFT)

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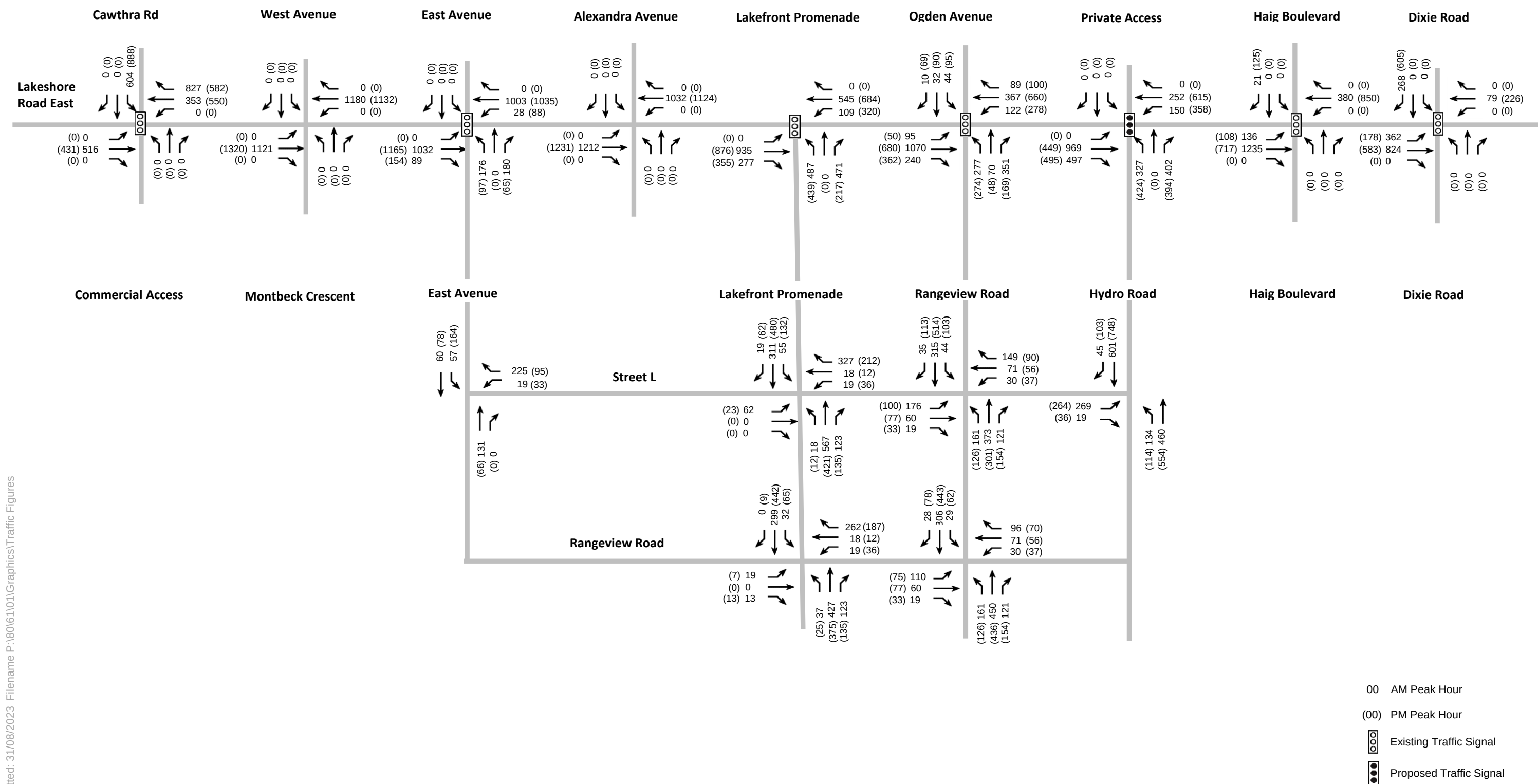


FIGURE 36 - SCENARIO 3B 2041 RANGEVIEW + LAKEVIEW VILLAGE SITE TRAFFIC VOLUMES (13,350 UNITS + DUAL LEFT)

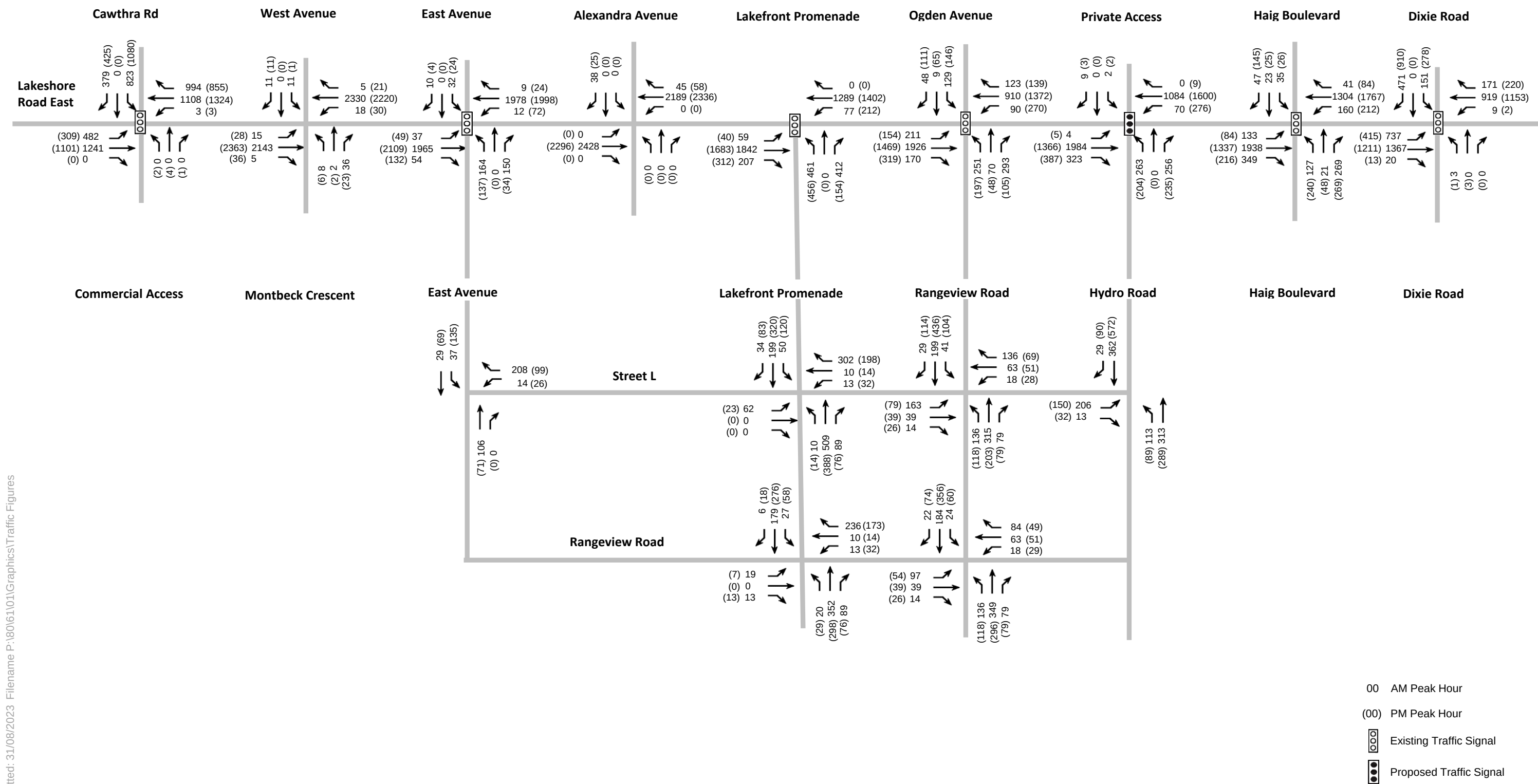


FIGURE 37 - SCENARIO 3B 2041 FUTURE TOTAL TRAFFIC VOLUMES (13,350 UNITS + DUAL LEFT)

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7.0 TRAFFIC ANALYSIS

7.1 TRAFFIC ANALYSIS APPROACH AND ASSUMPTIONS

The approach and methodology utilized for the traffic analysis for this study generally aligns with the April 2021 TMIG report and are outlined as follows.

7.1.1 Study Area Intersections

Signalized Intersections

- Lakeshore Road East & East Avenue
- Lakeshore Road East & Lakefront Promenade
- Lakeshore Road East & Ogden Avenue
- Lakeshore Road East & Hydro Road
- Lakeshore Road East & Haig Boulevard
- Lakeshore Road East & Cawthra Road
- Lakeshore Road East & Dixie Road

Unsignalized Intersections

- Street L & East Avenue
- Street L & Lakefront Promenade
- Street L & Ogden Avenue
- Street L & Hydro Road
- Rangeview Road & East Avenue
- Rangeview Road & Lakefront Promenade
- Rangeview Road & Ogden Avenue
- Rangeview Road & Hydro Road

7.1.2 Time Periods Assessed

The traffic analysis evaluated both the morning peak and afternoon peak hours and aligned with the time periods assessed within the April 2021 TMIG report.

7.1.3 Signalized Intersections

The traffic operations analysis was undertaken at the area intersections using standard capacity analysis procedures. The analysis undertaken at intersections operating under traffic signal control was completed using the methodologies and procedures outlined in the Highway Capacity Manual (HCM) 2000 and using Synchro 11.0 software. The product of the signalized intersection evaluation is an intersection performance index (volume to capacity ratio or v/c), where a v/c index of 1.00 indicates 'at or near capacity' conditions.



HCM level of service (LOS) criteria for signalized intersections is as follow:

- LOS A: Control Delay $\leq 10s$
- LOS B: $10s < \text{Control Delay} \leq 20s$
- LOS C: $20s < \text{Control Delay} \leq 35s$
- LOS D: $35s < \text{Control Delay} \leq 55s$
- LOS E: $55s < \text{Control Delay} \leq 80s$
- LOS F: Control Delay $> 80s$

7.1.4 Unsignalized Intersections

The unsignalized intersection analysis was completed using standard capacity procedures for intersections operating under “two-way” and “all-way” stop control and in accordance with the methodologies outlined in the Highway Capacity Manual 2000 (HCM2000).

The product of this analysis is a level of service (LOS) designation, ranging from LOS of A to F; which provides a relative indication of the level of delay experienced by motorists completing a turning manoeuvre at an intersection. LOS A represents conditions under which motorists would experience little delay and LOS F reflects conditions where more extended delays can be expected.

HCM level of service (LOS) criteria for unsignalized intersections is as follows:

- LOS A: Control Delay $\leq 10s$
- LOS B: $10s < \text{Control Delay} \leq 15s$
- LOS C: $15s < \text{Control Delay} \leq 25s$
- LOS D: $25s < \text{Control Delay} \leq 35s$
- LOS E: $35s < \text{Control Delay} \leq 50s$
- LOS F: Control Delay $> 50s$

7.1.5 Network-Wide Parameters

Key analysis parameters were assumed based on default parameters summarized as follows:

Lane Widths

In order to align with the April 2021 TMIG report, the analysis for this study included 3.7 metre wide through lanes and 3.5 metre wide turning lanes.

Traffic Signal Timings

Traffic signal timings incorporated into the analysis were based upon information provided within the 2021 TMIG Synchro model. Although the traffic signal timings were optimized for each scenario analyzed for this study, cycle lengths were maintained at 130 seconds and 140 seconds, for the AM Peak and PM Peak period, respectively.



Base Saturation Flow Rates

The Synchro default saturation flow rate of 1,900 vehicles per hour was adopted for the analysis for this study.

Heavy Vehicle Assumptions

Heavy and medium truck percentages incorporated into the analysis were based upon information provided within the 2021 TMIG Synchro model.

Lost Time Adjustments

The lost time adjustment factor of -1.0 seconds (i.e. a total loss time per phase equal to the amber plus all-red time minus 1 second) was adopted by BA Group for the traffic analysis in this study. This differs slightly from the TMIG approach where a lost time adjustment was set to 0.

Peak Hour Factors

A peak hour factor (phf) of 1.0 was adopted by BA Group for the traffic analysis in this study. This differs slightly from the TMIG approach where a peak hour factor (PHF) was determined by the turning movement count for each individual intersection.

7.2 CAPACITY ANALYSIS AT SIGNALIZED INTERSECTIONS

7.2.1 Traffic Analysis: Existing Conditions

For the purpose of providing a summary of existing conditions in this report, an analysis of existing conditions that replicates the TMIG report Transportation Considerations Report Addendum from April 2021, has been included. This analysis evaluated the current road network using the 2018 turning movement counts. All parameters adopted for the analysis are as follows:

- Lost time adjustment set to 0
- Peak hour factor (PHF) determined by the turning movement count for each individual intersection
- Traffic signal timings align with the TMIG report
- Pedestrian volumes align with the TMIG report
- Heavy vehicle percentages align with the TMIG report

It is noted that BA Group did not change the saturation flow, which remained at 1,900 vehicles per hour, as no studies to support TMIG's adoption of 2,000 vehicles per hour along Lakeshore Road East were found. A summary of the results of the detailed capacity analysis for existing conditions at the signalized intersections is provided in **Table 20**. All existing signalized intersection movements within the study area are operating at v/c equal to or less than 1.0. All queues are lower than the available queueing spacing in the network, with the exception of:

- Eastbound left turn at Lakeshore Road East & Cawthra Road, under 95th percentile conditions during the PM peak hour, slightly exceeds the available storage space.
- Southbound left turn at Lakeshore Road East & Dixie Road, under 95th percentile conditions during the PM peak hour, slightly exceeds the available storage space.

TABLE 20 CAPACITY ANALYSIS SUMMARY: EXISTING CONDITIONS

Movement	Existing Conditions (as per 2018 TMIG Study)					Available Queuing Space (metres)
	V/C	Delay (seconds)	LOS	50 th Queue (metres)	95 th Queue (metres)	
Lakeshore Road East & East Avenue						
EBL	0.02 (0.05)	1.7 (1.6)	A (A)	0.5 (0.4)	1.7 (0.7)	80
EBT	0.45 (0.32)	3 (2.4)	A (A)	38.9 (35.3)	53.3 (11)	330
EBR	0.05 (0.02)	1.7 (1.3)	A (A)	1 (0.1)	3.8 (0.2)	45
NBL	0.34 (0.3)	59 (56.2)	E (E)	5 (5.8)	13.5 (14.7)	20
NBT	0.02 (0.18)	55 (54.6)	D (D)	0.2 (4.1)	5.9 (15.3)	175
SBL	0.11 (0.08)	55.9 (53.9)	E (D)	1.7 (1.4)	6.6 (5.9)	50
SBT	0.02 (0.01)	55 (53.3)	D (D)	0.2 (0.2)	6.6 (4.4)	80
WBL	0.05 (0.02)	2.1 (3)	A (A)	0.6 (0.5)	2.3 (m1.7)	50
WBT	0.27 (0.48)	2.3 (5)	A (A)	16.5 (51.7)	24.2 (81.2)	340
WBR	0.01 (0.02)	1.6 (7.5)	A (A)	0 (0.1)	0.2 (2.4)	30
OVERALL	0.44 (0.47)	3.9 (5.4)	A (A)	--	--	--
Lakeshore Road East & Lakefront Promenade						
EBT	0.41 (0.27)	1.7 (1.3)	A (A)	11.7 (7.1)	14.6 (9.7)	340
EBR	0.04 (0.01)	0.3 (0.4)	A (A)	0 (0)	0.1 (0.2)	20
NBL	0.34 (0.41)	56.8 (55)	E (D)	6.3 (12)	18.2 (26.7)	205
NBR	- (-)	- (-)	- (-)	- (-)	- (-)	205
WBL	0.06 (0.01)	2.3 (1.2)	A (A)	1.6 (0.2)	3 (m0.7)	45
WBT	0.24 (0.39)	3.3 (2)	A (A)	35.6 (26.2)	22.9 (26.7)	240
OVERALL	0.4 (0.39)	3.5 (3.6)	A (A)	--	--	--
Lakeshore Road East & Ogden Avenue						
EBL	0.14 (0.22)	2.2 (2.8)	A (A)	3.6 (2.4)	6.4 (4.6)	35
EBT	0.38 (0.28)	2.4 (1.7)	A (A)	21.8 (14.5)	26.4 (17.5)	240
NBT	0 (0.05)	51.7 (53.8)	D (D)	0 (1)	0 (5.1)	15
SBL	0.5 (0.34)	57.5 (57)	E (E)	12 (6.5)	24.7 (16.2)	60
SBT	0.03 (0.03)	52 (53.6)	D (D)	0.2 (0)	11.2 (0)	160
WBL	0.02 (-)	4.8 (-)	A (-)	0.4 (-)	m2.5 (-)	25
WBT	0.2 (0.41)	5.3 (6.6)	A (A)	17 (82.2)	50.2 (83.4)	200
OVERALL	0.39 (0.4)	6.1 (6.3)	A (A)	--	--	--
Lakeshore Road East & Haig Boulevard						
EBL	0.05 (0.1)	1.9 (2.4)	A (A)	0.7 (0.7)	2.4 (2.8)	110
EBT	0.46 (0.31)	2.8 (2)	A (A)	32.8 (16)	50 (28.2)	165
SBL	0.37 (0.28)	56.1 (55.5)	E (E)	9.2 (6.5)	23.3 (18.8)	320
WBT	0.37 (0.51)	2 (4.1)	A (A)	18.4 (44.1)	24 (77.3)	600
OVERALL	0.45 (0.49)	3.9 (4.3)	A (A)	--	--	--
Lakeshore Road East & Cawthra Road						
EBL	0.66 (0.73)	14.6 (39.1)	B (D)	45.8 (53.1)	97.5 (91.5)	75
EBT	0.41 (0.27)	5.3 (6.7)	A (A)	47 (20.7)	70.8 (50.6)	260
NBT	- (0.29)	- (66.2)	- (E)	- (1.4)	- (6.5)	10

Movement	Existing Conditions (as per 2018 TMIG Study)					Available Queuing Space (metres)
	V/C	Delay (seconds)	LOS	50 th Queue (metres)	95 th Queue (metres)	
SBL	0.67 (0.58)	67 (55.9)	E (E)	36.7 (25.7)	57.5 (43.7)	115
SBT	0.67 (0.58)	67.5 (55.4)	E (E)	37 (26)	57.8 (43.8)	250
SBR	0.36 (0.28)	25.9 (39.5)	C (D)	19.2 (0)	40.5 (28.3)	75
WBL	0.01 (0.01)	22.3 (18.2)	C (B)	0.5 (0.3)	2.8 (0.7)	105
WBT	0.54 (0.87)	30.2 (31.3)	C (C)	77.2 (66.4)	107.6 (#242.7)	325
OVERALL	0.72 (0.79)	21 (29.5)	C (C)	--	--	--
Lakeshore Road East & Dixie Road						
EBL	0.72 (0.83)	19.3 (48.9)	B (D)	35.1 (44.4)	89 (#105.8)	75
EBT	0.33 (0.31)	5.9 (12.9)	A (B)	32 (53.7)	62.1 (73.7)	600
NBT	0.03 (0.01)	43 (34.4)	D (C)	0.7 (0.8)	3.4 (3.6)	95
SBL	0.71 (0.86)	58.5 (62.3)	E (E)	37.4 (68.9)	57.3 (98.9)	95
SBT	0.16 (0.45)	44.1 (39.4)	D (D)	0 (24.4)	0.6 (52.8)	310
WBL	0.03 (0.01)	14.4 (16.4)	B (B)	1.1 (0.3)	4.6 (1.8)	25
WBT	0.53 (0.89)	20.5 (35.6)	C (D)	76.8 (170.8)	113.2 (207)	460
OVERALL	0.74 (0.87)	20.1 (34.4)	C (C)	- (-)	- (-)	--

Notes:

1. Pink-shades cells represent a queue that exceeds available storage space.

7.2.2 Traffic Analysis: Scenario 1 – 2,500 Rangeview Residential Units

All signalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0.

A summary of the results of the detailed capacity analysis for Scenarios 1, 2, 3A & 3B is provided in **Table 21**.

7.2.3 Traffic Analysis: Scenario 2 – 3,700 Rangeview Residential Units (with Ogden)

All signalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0.

7.2.4 Traffic Analysis: Scenario 3A – 5,300 Rangeview Residential Units (with Haig)

All signalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0 with the exception of the following movements:

- **Dixie Road & Lakeshore Road East:** the southbound right-turn movement operates with a v/c of 1.05 during the afternoon peak hour. In a busy urban environment, it is typical that particular movements will operate at, or slightly over capacity, during the peak periods of the day. It is also likely

that traffic will divert and rebalance in the future as traffic patterns evolve. For these reasons, the intersection is expected to operate acceptably for all movements in relation to Scenario 3A.

- **Lakeshore Road East & Haig Boulevard:** the northbound through/left movement operates with a v/c of 1.35 during the afternoon peak hour. It is likely that traffic will divert and rebalance in the future as traffic patterns evolve. This movement could also be improved with minor upgrades to the north approach, such as a southbound right-turn pocket. This intersection can also be monitored in the future when more accurate traffic data is available. For these reasons, the intersection is expected to operate acceptably for all movements in relation to Scenario 3A. It is however important to note that as no Rangeview-related volumes have been assigned to the intersection of Lakeshore Road East & Haig Boulevard, the traffic concerns at this intersection are related only to the traffic generated by Lakeview Village and Serson.

7.2.5 Traffic Analysis: Scenario 3B – 5,300 Rangeview Residential Units (Dual left turns but no Haig)

All signalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0 with the exception of the following movements:

- **Dixie Road & Lakeshore Road East:** the southbound right-turn movement operates with a v/c of 1.04 during the afternoon peak hour. In a busy urban environment, it is typical that particular movements will operate at, or slightly over capacity, during the peak periods of the day. It is also likely that traffic will divert and rebalance in the future as traffic patterns evolve. For these reasons, the intersection is expected to operate acceptably for all movements in relation to Scenario 3B.

TABLE 21 CAPACITY ANALYSIS SUMMARY AT SIGNALIZED INTERSECTIONS

Movement	Scenario 1: Rangeview with 2,500 units Lakeview Village with 7,500 units No Ogden No Haig (with road improvements)			Scenario 2: Rangeview with 3,700 units Lakeview Village with 8,050 units Ogden connected			Scenario 3A: Rangeview with 5,300 units Lakeview Village with 8,050 units Haig connected			Scenario 3B: Rangeview with 5,300 units Lakeview Village with 8,050 units Dual left at Lakefront Promenade/No Haig		
	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS
Lakeshore Road East & East Avenue												
EBL	0.69 (0.5)	94.6 (68.3)	F (E)	0.69 (0.45)	91.5 (66.5)	F (E)	0.54 (0.53)	71.2 (70)	E (E)	0.61 (0.45)	78.2 (66.3)	E (E)
EBT	0.85 (0.79)	36.3 (21.8)	D (C)	0.87 (0.96)	32.5 (36)	C (D)	0.95 (0.95)	42.5 (32.3)	D (C)	0.81 (0.91)	22.4 (24.8)	C (C)
NBL	0.91 (0.7)	67.9 (68.5)	E (E)	0.9 (0.69)	76 (66.4)	E (E)	0.89 (0.66)	71.6 (66.6)	E (E)	0.78 (0.57)	67.6 (64.8)	E (E)
NBT	0.42 (0.02)	36.9 (52.2)	D (D)	0.2 (0.04)	41.3 (51.8)	D (D)	0.24 (0.02)	40.4 (53)	D (D)	0.43 (0.04)	50.1 (56.3)	D (E)
SBL	0.13 (0.13)	33.2 (53.3)	C (D)	0.12 (0.13)	40.5 (52.7)	D (D)	0.12 (0.13)	39.1 (54.1)	D (D)	0.23 (0.17)	48.1 (57.6)	D (E)
SBT	0.01 (0)	31.8 (52.1)	C (D)	0.01 (0)	39.2 (51.5)	D (D)	0.01 (0)	37.8 (52.8)	D (D)	0.01 (0)	45.6 (56)	D (E)
WBL	0.78 (0.48)	96.5 (60.4)	F (E)	0.43 (0.5)	68.9 (61.8)	E (E)	0.29 (0.68)	68.3 (73.7)	E (E)	0.42 (0.52)	60.7 (58)	E (E)
WBT	0.7 (0.56)	23 (9.9)	C (A)	0.83 (0.75)	17.1 (14.9)	B (B)	0.91 (0.79)	26.8 (12.2)	C (B)	0.85 (0.75)	14.2 (9.8)	B (A)
WBR	0.01 (0.02)	13.5 (6.7)	B (A)	0.01 (0.02)	9.3 (7.1)	A (A)	0.01 (0.02)	10.4 (6.3)	B (A)	0.01 (0.02)	6.7 (5.6)	A (A)
OVERALL	0.87 (0.74)	36.5 (21)	D (C)	0.87 (0.86)	30 (29.1)	C (C)	0.93 (0.88)	38 (26.1)	D (C)	0.83 (0.83)	22.6 (20.7)	C (C)
Lakeshore Road East & Lakefront Promenade												
EBT	0.71 (0.78)	25.9 (32)	C (C)	0.8 (0.89)	18.8 (37.4)	B (D)	0.91 (0.93)	23.5 (39)	C (D)	0.93 (0.89)	36.3 (33.6)	D (C)
EBR	0.23 (0.46)	21.9 (27.8)	C (C)	0.25 (0.38)	14.8 (30.4)	B (C)	0.21 (0.36)	14.7 (29.2)	B (C)	0.3 (0.41)	22.5 (26.4)	C (C)
NBL	0.83 (0.79)	63.6 (57.5)	E (E)	0.84 (0.94)	67 (86.2)	E (F)	0.87 (0.94)	69.7 (88)	E (F)	0.75 (0.75)	54.3 (60.7)	D (E)
NBR	0.75 (0.15)	45 (40.3)	D (D)	0.8 (0.13)	51.8 (45.8)	D (D)	0.79 (0.1)	50.6 (46.1)	D (D)	0.61 (0.14)	52 (49.8)	D (D)
WBL	0.51 (0.9)	69.4 (87.8)	E (F)	0.65 (0.89)	70.2 (74.9)	E (E)	0.53 (0.94)	63.3 (87.3)	E (F)	0.36 (0.86)	50 (72.1)	D (E)
WBT	0.34 (0.4)	1.6 (5.3)	A (A)	0.49 (0.56)	6.6 (8.1)	A (A)	0.53 (0.61)	6.6 (7.6)	A (A)	0.7 (0.77)	15.9 (17.4)	B (B)
OVERALL	0.77 (0.82)	26.7 (32.9)	C (C)	0.85 (0.91)	23.2 (33.8)	C (C)	0.92 (0.94)	24.5 (34.1)	C (C)	0.78 (0.86)	33.5 (34.1)	C (C)
Lakeshore Road East & Ogden Avenue												
EBL	0.7 (0.63)	47.9 (49.8)	D (D)	0.75 (0.68)	57.8 (72.1)	E (E)	0.76 (0.68)	55.3 (62)	E (E)	0.79 (0.68)	68.5 (67.8)	E (E)
EBT	0.57 (0.44)	6.3 (3.8)	A (A)	0.95 (0.92)	36.9 (36.5)	D (D)	1 (0.85)	41.3 (31.4)	D (C)	0.96 (0.94)	31 (39.1)	C (D)
EBR	- (-)	- (-)	- (-)	0.21 (0.38)	23.3 (27.5)	C (C)	0.14 (0.32)	22.4 (27.2)	C (C)	0.22 (0.39)	21 (28.9)	C (C)
NBL	- (-)	- (-)	- (-)	0.85 (0.87)	64.3 (65)	E (E)	1 (1)	102.3 (112.2)	F (F)	0.79 (0.88)	55.1 (70.3)	E (E)
NBT	- (-)	- (-)	- (-)	0.2 (0.12)	46.8 (44.9)	D (D)	0.24 (0.17)	48.7 (52.5)	D (D)	0.2 (0.13)	45.1 (47.4)	D (D)
NBR	- (-)	- (-)	- (-)	0.7 (0.1)	58.7 (44.8)	E (D)	0.67 (0.07)	58.7 (51.5)	E (D)	0.77 (0.11)	62.7 (47.1)	E (D)
SBL	0.61 (0.93)	60.8 (114.4)	E (F)	0.47 (0.51)	48.6 (51.6)	D (D)	0.51 (0.57)	49.3 (54.7)	D (D)	0.42 (0.5)	44.8 (50.7)	D (D)
SBT	0.12 (0.24)	55.4 (63.1)	E (E)	0.15 (0.67)	51 (65.2)	D (E)	0.07 (0.64)	49.6 (65.3)	D (E)	0.13 (0.69)	47.5 (65.8)	D (E)
WBL	- (-)	- (-)	- (-)	0.55 (0.81)	64.2 (78.6)	E (E)	0.56 (0.76)	60.2 (70)	E (E)	0.75 (0.8)	75.9 (69.8)	E (E)
WBT	0.45 (0.56)	5.4 (6.3)	A (A)	0.6 (0.92)	16.5 (31.4)	B (C)	0.62 (0.94)	20.8 (30.5)	C (C)	0.65 (0.9)	22 (29.4)	C (C)
OVERALL	0.65 (0.64)	11.9 (14.5)	B (B)	0.93 (0.93)	37.4 (41.5)	D (D)	1.01 (0.97)	42.6 (40.5)	D (D)	0.94 (0.92)	36.6 (41.4)	D (D)



Movement	Scenario 1: Rangeview with 2,500 units Lakeview Village with 7,500 units No Ogden No Haig (with road improvements)			Scenario 2: Rangeview with 3,700 units Lakeview Village with 8,050 units Ogden connected			Scenario 3A: Rangeview with 5,300 units Lakeview Village with 8,050 units Haig connected			Scenario 3B: Rangeview with 5,300 units Lakeview Village with 8,050 units Dual left at Lakefront Promenade/No Haig		
	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS
Lakeshore Road East & Hydro Road												
EBL	0.15 (0.2)	57.9 (65.4)	E (E)	0.15 (0.17)	74.7 (67.7)	E (E)	0.15 (0.17)	82.8 (65.3)	F (E)	0.15 (0.2)	76.4 (65.9)	E (E)
EBT	0.78 (0.66)	31.2 (46.3)	C (D)	0.88 (0.79)	16.5 (29)	B (C)	0.97 (0.74)	18.7 (20.5)	B (C)	0.91 (0.94)	15.7 (42.5)	B (D)
EBR	0.3 (0.51)	26.2 (56)	C (E)	0.44 (0.51)	5.9 (25.2)	A (C)	0.29 (0.38)	2.2 (17.2)	A (B)	0.44 (0.61)	3.3 (32.7)	A (C)
NBL	0.83 (0.81)	59.1 (63.9)	E (E)	0.86 (0.91)	65.9 (77.4)	E (E)	0.83 (0.78)	66.2 (66.1)	E (E)	0.97 (0.92)	89.3 (74.8)	F (E)
NBT	0.6 (0.19)	44.1 (42.4)	D (D)	0.8 (0.41)	57.2 (43.8)	E (D)	0.56 (0.15)	47.2 (46.1)	D (D)	0.88 (0.32)	67.5 (39.4)	E (D)
SBT	0.01 (0)	35.1 (40.2)	D (D)	0.01 (0)	37.3 (38.7)	D (D)	0.01 (0)	39.8 (44.5)	D (D)	0.01 (0)	37.8 (35.5)	D (D)
WBL	0.61 (0.83)	53.4 (72.4)	D (E)	0.75 (0.88)	86.7 (85.2)	F (F)	0.62 (0.77)	76.5 (66.9)	E (E)	0.82 (0.94)	98.9 (92.8)	F (F)
WBT	0.4 (0.56)	12.8 (6.2)	B (A)	0.48 (0.68)	9.8 (11.5)	A (B)	0.5 (0.76)	9.3 (12.6)	A (B)	0.48 (0.72)	10.9 (21.7)	B (C)
OVERALL	0.78 (0.74)	30.8 (37)	C (D)	0.86 (0.84)	23.6 (31.3)	C (C)	0.91 (0.78)	20.8 (23)	C (C)	0.92 (0.93)	26.7 (40.8)	C (D)
Lakeshore Road East & Haig Boulevard												
EBL	0.58 (0.45)	43.4 (49.4)	D (D)	0.63 (0.44)	50.4 (47.6)	D (D)	0.64 (0.97)	57.7 (146.1)	E (F)	0.65 (0.53)	51.2 (62.8)	D (E)
EBT	0.6 (0.43)	7.7 (3.2)	A (A)	0.68 (0.52)	4.9 (3.9)	A (A)	0.95 (0.81)	24 (21.2)	C (C)	0.73 (0.53)	5.1 (2.2)	A (A)
EBR	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	0.31 (0.18)	13.8 (11.3)	B (B)	- (-)	- (-)	- (-)
NBT	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	0.75 (1.35)	66.1 (228.2)	E (F)	- (-)	- (-)	- (-)
NBR	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	0.53 (0.18)	51.8 (37.8)	D (D)	- (-)	- (-)	- (-)
SBT	0.05 (0.08)	57.7 (61.4)	E (E)	0.11 (0.19)	58 (61.4)	E (E)	0.38 (0.41)	49.6 (41.3)	D (D)	0.11 (0.3)	56.5 (62)	E (E)
WBL	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	0.72 (0.68)	52.7 (58.1)	D (E)	- (-)	- (-)	- (-)
WBT	0.49 (0.72)	23.2 (23)	C (C)	0.61 (0.85)	20.8 (27.4)	C (C)	0.65 (0.97)	19.8 (39.4)	B (D)	0.63 (0.86)	17.8 (17.3)	B (B)
OVERALL	0.59 (0.66)	15.9 (17.4)	B (B)	0.67 (0.77)	14 (19.8)	B (B)	0.88 (1.12)	27.6 (51.4)	C (D)	0.71 (0.79)	12.9 (14.6)	B (B)
Lakeshore Road East & Cawthra Road												
EBL	0.91 (0.9)	54.8 (65.1)	D (E)	0.96 (1)	69.2 (93.4)	E (F)	0.76 (0.68)	69.3 (93.6)	E (F)	0.96 (1)	69.3 (93.5)	E (F)
EBT	0.46 (0.5)	14.5 (21.5)	B (C)	0.54 (0.56)	15.9 (21.5)	B (C)	1.00 (0.85)	16.4 (22)	B (C)	0.55 (0.58)	16 (21.9)	B (C)
EBR	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	0.14 (0.32)	- (-)	- (-)	- (-)	- (-)	- (-)
NBL	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	0.95 (1)	- (-)	- (-)	- (-)	- (-)	- (-)
NBT	- (0.21)	- (67.1)	- (E)	- (0.21)	- (67.1)	- (E)	0.24 (0.17)	- (67.1)	- (E)	- (0.21)	- (67.1)	- (E)
NBR	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	0.66 (0.07)	- (-)	- (-)	- (-)	- (-)	- (-)
SBL	0.59 (0.69)	39.4 (39.7)	D (D)	0.76 (0.9)	46.5 (58)	D (E)	0.52 (0.57)	52.6 (74.1)	D (E)	0.77 (0.96)	47.2 (71.4)	D (E)
SBT	0.58 (0.61)	39 (32)	D (C)	0.74 (0.78)	45.3 (40.9)	D (D)	0.07 (0.64)	50.7 (46.1)	D (D)	0.75 (0.84)	46.2 (45.2)	D (D)
SBR	0.43 (0.47)	15.6 (16.7)	B (B)	0.43 (0.5)	15.9 (19.6)	B (B)	- (-)	15.9 (19.6)	B (B)	0.43 (0.5)	15.9 (19.6)	B (B)
WBL	0.02 (-)	40.1 (-)	D (-)	0.02 (0.02)	39.1 (26.1)	D (C)	0.56 (0.76)	39.4 (26.1)	D (C)	0.02 (0.02)	41.5 (26.1)	D (C)
WBT	0.78 (0.9)	46.7 (52.2)	D (D)	0.93 (0.94)	57.1 (53.2)	E (D)	0.62 (0.94)	64.8 (62.7)	E (E)	0.96 (0.95)	62.8 (55.6)	E (E)
WBR	0.67 (0.52)	10.2 (10.2)	B (B)	0.81 (0.66)	13.1 (11.9)	B (B)	- (-)	20.5 (13.9)	C (B)	0.89 (0.68)	22.5 (12.4)	C (B)
OVERALL	0.83 (0.82)	29.1 (33.4)	C (C)	0.95 (0.94)	34.7 (38.4)	C (D)	1.00 (0.97)	38.7 (43.5)	D (D)	0.99 (0.98)	37.9 (41.1)	D (D)



Movement	Scenario 1: Rangeview with 2,500 units Lakeview Village with 7,500 units No Ogden No Haig (with road improvements)			Scenario 2: Rangeview with 3,700 units Lakeview Village with 8,050 units Ogden connected			Scenario 3A: Rangeview with 5,300 units Lakeview Village with 8,050 units Haig connected			Scenario 3B: Rangeview with 5,300 units Lakeview Village with 8,050 units Dual left at Lakefront Promenade/No Haig		
	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS
Lakeshore Road East & Dixie Road												
EBL	0.91 (0.71)	44.4 (37.1)	D (D)	0.93 (0.65)	49.4 (35)	D (D)	0.98 (0.67)	38.3 (35)	D (D)	0.98 (0.65)	52.5 (26.8)	D (C)
EBT	0.46 (0.4)	5.7 (25.8)	A (C)	0.53 (0.48)	6.4 (19.8)	A (B)	0.56 (0.51)	18.9 (32.9)	B (C)	0.56 (0.49)	6.5 (23.7)	A (C)
NBT	0.02 (0.01)	46.2 (43.7)	D (D)	0.02 (0.01)	46.8 (44.6)	D (D)	0.02 (0.01)	46.8 (44.9)	D (D)	0.02 (0.01)	46.8 (44.9)	D (D)
SBT	0.7 (0.92)	61.5 (85.9)	E (F)	0.69 (0.96)	61.3 (95.6)	E (F)	0.69 (0.97)	61.3 (99.6)	E (F)	0.69 (0.97)	61.3 (99.6)	E (F)
SBR	0.42 (0.91)	15.2 (46.1)	B (D)	0.48 (0.99)	14.6 (58.5)	B (E)	0.52 (1.05)	15.2 (74.5)	B (E)	0.49 (1.04)	14.7 (71.3)	B (E)
WBT	0.72 (0.79)	45.7 (42.9)	D (D)	0.97 (0.95)	70.4 (61.2)	E (E)	0.98 (0.98)	72.8 (68.7)	E (E)	0.97 (0.98)	70.9 (68)	E (E)
WBR	0.18 (0.24)	35.4 (30.4)	D (C)	0.18 (0.27)	37.5 (35.3)	D (D)	0.18 (0.27)	37.5 (35.9)	D (D)	0.18 (0.27)	37.5 (35.9)	D (D)
OVERALL	0.81 (0.86)	28.2 (41.1)	C (D)	0.9 (0.97)	35.3 (47.2)	D (D)	0.93 (1.02)	37.7 (56.5)	D (E)	0.93 (1.01)	35.5 (52.5)	D (D)



7.3 QUEUING ASSESSMENT AT SIGNALIZED INTERSECTIONS

A summary of the queuing assessment for key movements at the signalized intersections along Lakeshore Road East for Scenario 3A and 3B, is provided in **Table 22**. The details of this queuing assessment can be used to inform the future design of area intersections.

A number of movements are highlighted in pink below where the queue could extend beyond the available storage space. An updated queuing assessment is recommended to be undertaken in the future as development progresses and as more accurate traffic data becomes available.

TABLE 22 QUEUING SUMMARY AT SIGNALIZED INTERSECTIONS (KEY MOVEMENTS)

Movement	Available Queuing Space (metres)	Scenario 3A: Rangeview with 5,300 units Lakeview Village with 8,050 units Haig connected		Scenario 3B: Rangeview with 5,300 units Lakeview Village with 8,050 units Dual left at Lakefront Promenade/No Haig	
		50 th Percentile Queue (metres)	95 th Percentile Queue (metres)	50 th Percentile Queue (metres)	95 th Percentile Queue (metres)
	Lakeshore Road East & East Avenue				
NBL	65	77 (35)	153 (55)	45 (24)	70 (41)
NBT	130	16 (0)	38 (1)	23 (0)	47 (13)
WBL	105	3 (35)	7 (86)	7 (26)	12 (39)
WBT	340	258 (141)	180 (165)	100 (95)	109 (106)
	Lakeshore Road East & Lakefront Promenade				
NBL	50	79 (94)	125 (152)	64 (62)	81 (78)
NBR	130	95 (0)	162 (19)	28 (0)	73 (22)
WBL	80	22 (94)	22 (101)	25 (98)	39 (111)
WBT	240	53 (60)	63 (74)	63 (66)	98 (106)
	Lakeshore Road East & Ogden Avenue				
NBL	20	71 (59)	98 (99)	63 (58)	97 (84)
NBT	130	17 (12)	29 (24)	16 (12)	29 (22)
NBR	130	36 (0)	65 (6)	52 (0)	91 (19)
WBL	135	23 (62)	58 (110)	31 (70)	74 (145)
WBT	200	94 (158)	93 (283)	90 (123)	74 (82)
	Lakeshore Road East & Hydro Road				
NBL	35	64 (61)	95 (85)	85 (101)	146 (159)
NBT	135	43 (0)	71 (13)	85 (11)	146 (40)
WBL	95	20 (65)	40 (68)	38 (106)	74 (144)
WBT	170	38 (96)	41 (137)	32 (97)	33 (123)
	Lakeshore Road East & Haig Boulevard				
NBT	130	38 (147)	60 (213)	- (-)	- (-)
NBR	130	27 (0)	55 (22)	- (-)	- (-)
WBL	100	44 (48)	65(46)	- (-)	- (-)
WBT	600	97 (250)	112 (251)	102 (154)	124 (195)

7.4 CAPACITY ANALYSIS AT UNSIGNALIZED INTERSECTIONS

A summary of results of the detailed capacity analysis for the unsignalized intersections is provided in **Table 23**.

7.4.1 Traffic Analysis: Scenario 1 – 2,500 Rangeview Residential Units

All unsignalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0 with the exception of the following movements:

- **Lakefront Promenade & Rangeview Road:** with all-way stop control, the southbound left/through/right movement operates with a v/c of 1.01 during the afternoon peak hour. As this represents the interim road network condition, it is expected that when Ogden Avenue is connected and the road network is built-out as development progresses, the operations at this intersection would improve.
- **Hydro Road & Rangeview Road:** with all-way stop control, the southbound through/right movement operates with a v/c of 1.14 during the afternoon peak hour. As this represents the interim road network condition, it is expected that when Ogden Avenue is connected and the road network is built-out as development progresses, the operations at this intersection would improve.

7.4.2 Traffic Analysis: Scenario 2 – 3,700 Rangeview Residential Units (with Ogden)

All unsignalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0 with the exception of the following movements:

- **Ogden Avenue & Street L:** with all-way stop control, the northbound left/through/right movement operates with a v/c of 1.16 and 1.01, during the morning and afternoon peak hour, respectively.
- **Ogden Avenue & Rangeview Road:** with all-way stop control, the northbound left/through/right movement operates with a v/c of 1.18 and 1.17, during the morning and afternoon peak hour, respectively.
- **Hydro Road & Street L:** with all-way stop control, the southbound through/right during the afternoon peak period.
- **Hydro Road & Rangeview Road:** with all-way stop control, the southbound through/right movement at Hydro Road & Rangeview Road, during the afternoon peak period.

As development progresses and updated traffic counts become available, the all-way stop control intersections could be reviewed to determine if any intersection warrants traffic signals.

7.4.3 Traffic Analysis: Scenario 3A – 5,300 Rangeview Residential Units (with Haig)

All unsignalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0.

7.4.4 Traffic Analysis: Scenario 3B – 5,300 Rangeview Residential Units (Dual left turns but no Haig)

All unsignalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0, with the exception of a number of intersections along Street L, as well as at Ogden Avenue & Rangeview Road and at Hydro Road & Rangeview Road.

As development progresses and updated traffic counts become available, the all-way stop control intersections could be reviewed to determine if any intersection warrants traffic signals. All intersections along the north-south streets between Lakeshore Road East and Rangeview Road, could be converted to signalized intersections.

TABLE 23 UNSIGNALIZED INTERSECTION CAPACITY SUMMARY

Movement	Scenario 1: Rangeview with 2,500 units Lakeview Village with 7,500 units No Ogden No Haig (with road improvements)			Scenario 2: Rangeview with 3,700 units Lakeview Village with 8,050 units Ogden connected			Scenario 3A: Rangeview with 5,300 units Lakeview Village with 8,050 units Haig connected			Scenario 3B: Rangeview with 5,300 units Lakeview Village with 8,050 units Dual left at Lakefront Promenade/No Haig		
	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS
East Avenue & Street L												
WBLR	0.13 (0.03)	8.8 (7.3)	A (A)	0.27 (0.16)	8.6 (8.1)	A (A)	0.3 (0.14)	8.7 (8)	A (A)	0.27 (0.14)	8.4 (8)	A (A)
NBTR	0.68 (0.17)	16.4 (8.1)	C (A)	0.24 (0.12)	9 (8.1)	A (A)	0.23 (0.08)	9 (7.9)	A (A)	0.17 (0.07)	8.5 (7.8)	A (A)
SBTL	0.28 (0.27)	9.7 (8.8)	A (A)	0.13 (0.3)	8.5 (9.3)	A (A)	0.09 (0.3)	8.3 (9.3)	A (A)	0.14 (0.29)	8.5 (9.2)	A (A)
Lakefront Promenade & Street L												
EBLTR	0.05 (0.01)	9.9 (9.9)	A (A)	0.1 (0.04)	11.7 (11.3)	B (B)	0.12 (0.05)	11.3 (10.7)	B (B)	0.14 (0.05)	12.5 (11.6)	B (B)
WBLTR	0 (0)	0 (0)	A (A)	0.54 (0.41)	16.3 (13.9)	C (B)	0.49 (0.34)	14.5 (12.2)	B (B)	0.64 (0.46)	20 (14.9)	C (B)
NBLTR	0.99 (0.75)	50.4 (20.2)	F (C)	0.95 (0.78)	48 (25.7)	E (D)	0.81 (0.59)	27.9 (15.9)	D (C)	1.19 (0.87)	124.5 (35.5)	F (E)
SBLTR	0.43 (0.88)	11.4 (31.5)	B (D)	0.61 (0.97)	18.5 (51.3)	C (F)	0.47 (0.89)	14.2 (36.2)	B (E)	0.66 (1.08)	21.5 (83.7)	C (F)
Ogden Avenue & Street L												
EBLTR	0.08 (0.02)	6.8 (6.7)	A (A)	0.48 (0.42)	17.4 (16.7)	C (C)	0.45 (0.31)	15.9 (13.6)	C (B)	0.56 (0.43)	20.5 (16.9)	C (C)
WBLTR	0.1 (0.03)	7.7 (7.5)	A (A)	0.43 (0.36)	15.7 (15.2)	C (C)	0.39 (0.27)	14.1 (12.7)	B (B)	0.52 (0.38)	18.5 (15.6)	C (C)
NBLTR	0.02 (0.12)	7.2 (7.4)	A (A)	1.16 (1.01)	113.8 (65.3)	F (F)	0.93 (0.67)	46.2 (20.6)	E (C)	1.25 (0.97)	149.7 (57.3)	F (F)
SBLTR	- (-)	- (-)	- (-)	0.68 (1.2)	23.4 (128.1)	C (F)	0.5 (1)	16 (58.5)	C (F)	0.74 (1.34)	28.5 (184)	D (F)
Hydro Road & Street L												
EBLR	- (-)	- (-)	- (-)	0.5 (0.51)	17.1 (17.3)	C (C)	0.36 (0.33)	12.5 (12.6)	B (B)	0.56 (0.56)	19 (18.6)	C (C)
NBLT	0.87 (0.77)	29.1 (21.5)	D (C)	0.92 (0.97)	43.5 (54.5)	E (F)	0.59 (0.57)	15.7 (15.5)	C (C)	0.99 (1.03)	58.7 (70.5)	F (F)
SBTR	0.53 (0.98)	12.8 (48.8)	B (E)	0.96 (1.23)	51.1 (139.1)	F (F)	0.56 (0.85)	14.6 (29.7)	B (D)	1.01 (1.38)	64.1 (201.2)	F (F)
East Avenue & Rangeview Road												
WBLR	0.6 (0.15)	12.4 (7.4)	B (A)	0.17 (0.09)	7.3 (7)	A (A)	0.16 (0.06)	7.1 (6.8)	A (A)	0.11 (0.05)	7 (6.8)	A (A)
NBTR	- (-)	- (-)	- (-)	0.01 (0)	7.4 (7.3)	A (A)	0.02 (0.01)	7.4 (7.2)	A (A)	0.02 (0.01)	7.3 (7.2)	A (A)
SBTL	0.28 (0.2)	10.1 (8.3)	B (A)	0.08 (0.15)	7.8 (8)	A (A)	0.05 (0.13)	7.6 (7.8)	A (A)	0.08 (0.13)	7.6 (7.8)	A (A)
Lakefront Promenade & Rangeview Road												
EBLTR	0.03 (0.01)	10.7 (10.8)	B (B)	0.05 (0.03)	10.1 (10.2)	B (B)	0.05 (0.03)	9.4 (9.3)	A (A)	0.06 (0.04)	10.6 (10.3)	B (B)
WBLTR	0.43 (0.21)	13.2 (11.1)	B (B)	0.42 (0.36)	13 (12.6)	B (B)	0.35 (0.27)	11 (10.6)	B (B)	0.49 (0.39)	14.5 (13.1)	B (B)
NBLTR	0.95 (0.24)	71.3 (32.4)	F (D)	0.16 (0.08)	24.9 (21.5)	C (C)	0.12 (0.04)	14.7 (12.3)	B (B)	0.07 (0.04)	36.8 (24.4)	E (C)
SBLTR	0.51 (1.01)	14.9 (58.5)	B (F)	0.5 (0.81)	14.4 (27.9)	B (D)	0.32 (0.65)	11.1 (17.3)	B (C)	0.53 (0.8)	15.7 (27.6)	C (D)
Ogden Avenue & Rangeview Road												
EBLTR	0.22 (0.3)	8.8 (9.1)	A (A)	0.36 (0.37)	14.2 (15.3)	B (C)	0.28 (0.24)	12.2 (11.8)	B (B)	0.38 (0.38)	14.8 (15.6)	B (C)
WBLTR	0.2 (0.14)	8.7 (8)	A (A)	0.34 (0.32)	13.4 (14.3)	B (B)	0.27 (0.21)	11.4 (11.3)	B (B)	0.38 (0.34)	14.3 (14.7)	B (B)



Movement	Scenario 1: Rangeview with 2,500 units Lakeview Village with 7,500 units No Ogden No Haig (with road improvements)			Scenario 2: Rangeview with 3,700 units Lakeview Village with 8,050 units Ogden connected			Scenario 3A: Rangeview with 5,300 units Lakeview Village with 8,050 units Haig connected			Scenario 3B: Rangeview with 5,300 units Lakeview Village with 8,050 units Dual left at Lakefront Promenade/No Haig		
	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS	V/C	Delay (seconds)	LOS
NBLTR	- (-)	- (-)	- (-)	1.18 (1.17)	116.6 (117)	F (F)	0.84 (0.69)	29.3 (19.7)	D (C)	1.21 (1.16)	131.8 (114.9)	F (F)
SBLTR	0.21 (0.06)	8.7 (8)	A (A)	0.59 (0.97)	17.9 (54.9)	C (F)	0.37 (0.71)	12.3 (20.5)	B (C)	0.61 (1.02)	19 (67.7)	C (F)
Hydro Road & Rangeview Road												
EBLR	0.49 (0.29)	16 (12.8)	C (B)	0.4 (0.47)	14.2 (15.7)	B (C)	0.26 (0.28)	10.9 (11.5)	B (B)	0.44 (0.5)	15.1 (16.6)	C (C)
NBLT	0.93 (0.82)	43.2 (28.4)	E (D)	0.75 (0.79)	23.3 (27.1)	C (D)	0.5 (0.47)	12.9 (12.9)	B (B)	0.8 (0.82)	27.9 (30.2)	D (D)
SBTR	0.66 (1.14)	19.5 (98.8)	C (F)	0.86 (1.1)	32.5 (90)	D (F)	0.51 (0.75)	12.9 (21.2)	B (C)	0.89 (1.23)	36.6 (136.3)	E (F)



7.5 TRAFFIC ANALYSIS SUMMARY

A summary of the traffic analysis undertaken for the four scenarios is described below.

Scenario 1: Rangeview with 2,500 units

In consideration of Rangeview with 2,500 residential units and Lakeview Village with 7,500 residential units + 67% development of the non-residential, the combined sites are expected to generate a total of 2,890 and 3,054 two-way vehicle trips, during the morning and afternoon peak period, respectively.

The Scenario 1 road network includes only the list of minor road improvements to be undertaken along Lakeshore Road East.

All signalized intersection movements within the study area are expected to operate at v/c equal to, or less than 1.0.

All unsignalized intersection movements within the study area are expected to operate at v/c equal to, or less than 1.0, with the exception of the following:

- the southbound left/through/right movement at Lakefront Promenade & Rangeview Road in the afternoon peak hour; and
- the southbound through/right movement at Rangeview Road & Hydro Road, during the afternoon peak hour.

As the concerns noted at the unsignalized intersections occur as part of the interim road network condition, it is expected that when Ogden Avenue is connected, and the road network is built-out as development progresses, operations at the unsignalized intersections noted above would improve.

Based on the foregoing, the traffic related to the Scenario 1 development proposal can be acceptably accommodated on the future transportation network.

Scenario 2: Rangeview with 3,700 units + Ogden connected

In consideration of Rangeview with 3,700 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential, the combined sites are expected to generate a total of 3,841 and 4,229 two-way vehicle trips during the morning and afternoon peak period, respectively.

The Scenario 2 road network includes the improvements along Lakeshore Road East related to Scenario 1, in addition to the connection of Ogden Avenue to Lakeshore Road East.

All signalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0.

All unsignalized intersection movements within the study area are expected to operate at v/c equal, to or less than 1.0, with the exception of the following:

- the northbound left/through/right movement at Ogden Avenue & Street L during both peak periods and the southbound left/through/right movement during the afternoon peak period;
- the northbound left-through/right movements at Ogden Avenue & Rangeview Road during both peak periods;
- the southbound through/right at Hydro Road & Street L during the afternoon peak period; and
- the southbound through/right movement at Hydro Road & Rangeview Road, during the afternoon peak hour.

As development progresses and updated traffic counts become available, the all-way stop control intersections could be reviewed to determine if any intersection warrants traffic signals. All intersections along the north-south streets between Lakeshore Road East and Rangeview Road, could be converted to signalized intersections.

Based on the foregoing, the traffic related to the Scenario 2 development proposal can be acceptably accommodated on the future transportation network.

Scenario 3A: Rangeview with 5,300 units + Ogden + Haig

In consideration of Rangeview with 5,300 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential and 100% of the Serson lands developed, the combined sites are expected to generate a total of 4,337 and 4,739 two-way vehicle trips, during the morning and afternoon peak period, respectively.

The Scenario 3A road network includes the improvements along Lakeshore Road East related to Scenario 1, in addition to the connection of Ogden Avenue to Lakeshore Road and the connection of Haig Boulevard to Lakeshore Road East.

All signalized intersection movements within the study area are expected to operate at v/c equal to, or less than 1.0, with the exception of the following:

- The southbound right-turn movement at Dixie Road & Lakeshore Road East; and
- the northbound through/left movement at Lakeshore Road East & Haig Boulevard, during the afternoon peak hour.

In a busy urban environment, it is typical that particular movements will operate at, or slightly over capacity, during the peak periods of the day. It is also likely that traffic will divert and rebalance in the future as traffic patterns evolve. Minor improvements on the north leg of Haig Boulevard at Lakeshore Road East could also improve traffic operations, hence this location should be monitored in the future as development progresses. It is however important to note that as no Rangeview-related volumes have been assigned to the intersection of Lakeshore Road East & Haig Boulevard, the traffic concerns at this intersection are related only to the traffic generated by Lakeview Village and Serson.

All unsignalized intersection movements within the study area are expected to operate at v/c equal to, or less than 1.0.

Based on the foregoing, the traffic related to the Scenario 3A development proposal can be acceptably accommodated on the future transportation network.

Scenario 3B: Rangeview with 5,300 units + Ogden + Northbound Dual Left-Turn (no Haig)

In consideration of Rangeview with 5,300 residential units + 100% development of the non-residential and Lakeview Village with 8,050 residential units + 100% development of the non-residential, the combined sites are expected to generate a total of 4,138 and 4,517 two-way vehicle trips, during the morning and afternoon peak period, respectively.

The Scenario 3B road network includes the improvements along Lakeshore Road East related to Scenario 1, in addition to the connection of Ogden Avenue to Lakeshore Road East, and the northbound dual left-turn implemented on Lakeshore Road East at Lakefront Promenade. The connection of Haig Boulevard to Lakeshore Road East is not included as part of Scenario 3B.

All signalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0, with the exception of the southbound right-turn movement at Dixie Road and Lakeshore Road East during the afternoon peak hour. In a busy urban environment, it is typical that particular movements will operate at, or slightly over capacity, during the peak periods of the day. It is also likely that traffic will divert and rebalance in the future as traffic patterns evolve.

All unsignalized intersection movements within the study area are expected to operate at v/c equal to or less than 1.0, with the exception of a number of intersections along Street L, as well as at Ogden Avenue & Rangeview Road and at Hydro Road & Rangeview Road. As development progresses and updated traffic counts become available, the all-way stop control intersections could be reviewed to determine if any intersection warrants traffic signals. All intersections along the north-south streets between Lakeshore Road East and Rangeview Road, could be converted to signalized intersections.

Based on the foregoing, the traffic related to the Scenario 3B development proposal can be acceptably accommodated on the future transportation network.

Conclusions

The traffic analysis indicated that the future transportation network, with BRT along Lakeshore Road East, can acceptably accommodate the travel demands of the Rangeview Site with 5,300 residential units and 95,000 ft² GFA of non-residential uses, if the road network includes the planned upgrades along Lakeshore Road East, in addition to the extension of Ogden Avenue from Lakeshore Road East to Rangeview Road, and **either** the connection of Haig Boulevard to Lakeshore Road East **or** a dual northbound left-turn on Lakefront Promenade at Lakeshore Road East.

8.0 VISSIM ANALYSIS (2041 SCENARIOS)

8.1 VISSIM MODEL

A VISSIM analysis was recently completed by BA Group, that confirms the results of the traffic analysis undertaken with Synchro by both TMIG and BA Group.

It is noted that the Synchro results represent the analysis undertaken by BA Group, but as Synchro largely evaluates intersections in isolation, the VISSIM results may differ slightly as offsets and traffic flow between intersections are considered.

8.1.1 Overview of Study Area

A VISSIM microsimulation analysis was undertaken for the study area, consistent with the 2019 TMIG Report and the November 2022 BA Group Report. The study area includes a portion of the Lakeshore Road East corridor from Cawthra Road in the west to Dixie Road in the east. Along the Lakeshore Road East corridor, the following 7 intersections were included in the VISSIM analysis:

1. Lakeshore Road East & Cawthra Road
2. Lakeshore Road East & East Avenue
3. Lakeshore Road East & Lakefront Promenade
4. Lakeshore Road East & Hydro Road
5. Lakeshore Road East & Ogden Avenue
6. Lakeshore Road East & Haig Boulevard
7. Lakeshore Road East & Dixie Road

8.1.2 Model Development

8.1.2.1 Scope and Parameters

A list of assumptions considered for the VISSIM model is as follows:

- The VISSIM analysis scenarios are outlined below and summarized in **Table 24**. These are the same scenarios that were analysed within Synchro as described in **Section 6.0**.
 - o **Scenario 3A (2041):** Scenario 2 + Haig Boulevard connected to Lakeshore Road East.
 - o **Scenario 3B (2041):** Scenario 2 + Dual NBL at Lakefront Promenade/Lakeshore Road East (Haig not connected).

TABLE 24 VISSIM ANALYSIS SCENARIOS

Development	Scenario 1 (2031): No Ogden No Haig (with road improvements) ¹	Scenario 2 (2041): Phase 1 + Ogden connected to Lakeshore Road East	MODELLED WTH VISSIM	
			Scenario 3A (2041): Phase 2 + Haig connected to Lakeshore Road East	Scenario 3B (2041): Phase 2 + Dual NBL turns at Lakefront Promenade / Lakeshore Road East (Haig not connected)
Rangeview	2,500 units + 0% non-residential	3,700 units + 100% non-residential	5,300 units + 100% non-residential	5,300 units + 100% non-residential
Lakeview Village	7,500 units + 1.4M ft ² non-residential	8,050 units + 2.1M ft ² non-residential	8,050 units + 2.1M ft ² non-residential	8,050 units + 2.1M ft ² non-residential
Serson	0%	0%	100%	0%
Total	10,000 units	11,750 units	13,350 units	13,350 units

- **Study Periods:** AM and PM peak hour.
- **Traffic Volumes:** converted into static traffic volumes (same traffic volumes as used for the scenarios above in the Synchro model).
- **Traffic Signal Timings:**
 - o Same traffic signal timing phases as used in Synchro for the scenarios above and optimized accordingly to mitigate corridor congestion due to queues spilling back along the corridor.

8.1.2.2 Unbalanced Traffic Volumes

As part of the traffic analysis completed to date, BA Group references the TMIG 2019 report as the basis for existing, future background 2031 and future background 2041 traffic volumes. A concern has however been noted by BA Group that these traffic volumes have not been balanced between intersections. Although this volume balancing concern does not create issues within the static Synchro model used for the traffic analysis, this unbalancing can create inconsistencies along the corridor within the dynamic VISSIM model.

In order to address the volume balancing issue and to replicate the VISSIM model as close as possible to the Synchro analysis model, the BA Group VISSIM model placed midblock driveways (“dummy intersections”) that subtract or add vehicles as required within the midblock to maintain the projected volumes at each intersection. This balancing approach was necessary to allow a comparison between the VISSIM analysis with the Synchro results at the intersection level.

8.1.2.3 Coding

The specific parameters and the range of values assigned within the VISSIM traffic simulation model are as follows:

- Desired and Reduced Speeds
 - o Right-Turns: 15 to 20 km/h
 - o Left-Turns: 20 to 25 km/h
- Maximum and Desired Acceleration
 - o Maximum auto acceleration: 3.5 m/s²
 - o Desired auto acceleration: 3.5 m/s²
 - o Maximum auto deceleration: -4 m/s²
 - o Desired auto deceleration: -2.75 m/s²
- Wiedemann 74 Driving Behaviour Parameters
 - o Average Standstill Distance: 2 m
 - o Additive Safety Distance Parameter: 2.33 m
 - o Multiplicative Safety Distance Parameter: 3.33 m

8.1.3 Outputs and Assessment Measures

8.1.3.1 Delay

Within VISSIM, delay is measured as the difference in travel time between a vehicle completing a movement through an intersection unimpeded (aside from a reduced turning speed) versus the average travel time experienced by a vehicle completing the same movement within the simulation.

Simulated vehicle travel times were obtained by including vehicle detectors within the model, upstream and downstream of all intersections on all approaches. Simulation travel time per movement is the time elapsed between when a vehicle crosses the upstream detector on the approach leg and the downstream detector on the departure leg. The reported delay time per movement is calculated as the difference between the unimpeded travel time and the average travel time of all vehicles making the specified movement within the simulated hour, across all simulations runs.

8.1.3.2 Vehicle Queue Lengths

Queue lengths are calculated in VISSIM based on sample measurements taken at each intersection approach in 15-second intervals. Queue definition parameters within the model is set as follows:

- Queue start speed threshold = < 5 km/h
- Queue end speed threshold = > 10 km/h
- Maximum queue headway = 20 m
- Maximum queue length = 500 m

The reporting of the queue lengths provides the 50th, 85th, and 95th percentile maximum queues. It is important to note that these percentile queues are not equivalent to Synchro, but rather represent the percentile of the maximum queue of the 15 seconds interval **within** the 10 simulation runs. It should be noted that the method in which VISSIM defines the queue, allows for the full impact of shockwaves to be captured in the queuing analysis, such that queues may be longer than the values presented in Synchro analysis.

8.1.3.3 GEH

The GEH measure is a tool used to evaluate the fit between the simulated and observed flows within the VISSIM model. As outlined in the Ministry Transportation Ontario (MTO) simulation guidelines, a GEH value of less than 5.0 is desirable.

As such, GEH values were calculated by comparing turning movements as produced from the VISSIM model with the projected traffic volumes for each scenario. All GEH values are lower than 5.0 for all movements within the study area, indicating that the VISSIM model accurately reflects the data collected in the field. The detailed VISSIM outputs are available upon request.

8.2 VISSIM RESULTS

Results were generated for all two analysis scenarios from the models that reflect the outputs and assessment measures mentioned in the previous section of this report.

8.2.1 Scenario 3A (2041): Phase 2 + Haig connected to Lakeshore Road East

8.2.1.1 Scenario 3A: GEH Values

A comparison of projected traffic volumes for each future scenario versus the VISSIM modelled volumes were used to calculate the GEH values. As shown in in **Table 25**, as none of the GEH values are greater than the recommended maximum of 5.0, the fit between the simulated and observed flows within the VISSIM model is appropriate.

TABLE 25 SCENARIO 3A: VOLUME COMPARISON INPUT VS. MODELLED 2041

Movement	Future Total Morning Peak Hour			Future Total Afternoon Peak Hour		
	Modelled Volume	Input Volume (projected)	GEH	Modelled Volume	Input Volume (projected)	GEH
Lakeshore Road East & Cawthra Road						
NBL	0	0	0	1	2	0.2
NBT	0	0	0.0	3	4	0.3
NBR	0	0	0.0	1	1	0.3
WBL	7	3	1.8	5	3	1.4
WBT	1067	1108	1.2	1179	1324	4.1
WBR	971	994	0.7	788	855	2.4
SBL	802	823	0.7	938	1080	4.5

Movement	Future Total Morning Peak Hour			Future Total Afternoon Peak Hour		
	Modelled Volume	Input Volume (projected)	GEH	Modelled Volume	Input Volume (projected)	GEH
SBT	0	0	0.0	0	0	0.0
SBR	377	379	0.1	370	425	2.7
EBL	460	482	1.0	316	309	0.4
EBT	1126	1205	2.3	1123	1101	0.6
EBR	0	0	0	0	0	0
Lakeshore Road East & East Avenue						
NBL	267	299	1.9	134	137	0.2
NBT	0	0	0.0	0	0	0.0
NBR	140	150	0.9	34	34	0.1
WBL	12	12	0.1	61	72	1.4
WBT	1801	1843	1.0	1802	1998	4.5
WBR	8	9	0.1	23	24	0.2
SBL	33	32	0.3	25	24	0.4
SBT	0	0	0.0	0	0	0.0
SBR	7	10	1.0	3	4	0.5
EBL	35	37	0.3	46	49	0.4
EBT	1820	1965	3.3	1840	1937	2.2
EBR	55	54	0.2	131	132	0.1
Lakeshore Road East & Lakefront Promenade						
NBL	289	304	0.9	299	313	0.8
NBR	398	412	0.7	152	154	0.1
WBL	71	77	0.7	188	212	1.7
WBT	1125	1154	0.9	1452	1545	2.4
EBT	1683	1842	3.8	1584	1683	2.4
EBR	208	207	0.1	312	312	0.0
Lakeshore Road East & Ogden Avenue						
NBL	280	285	0.3	246	255	0.5
NBT	69	70	0.1	51	48	0.3
NBR	282	293	0.6	106	105	0.1
WBL	102	115	1.3	254	270	1.0
WBT	874	898	0.8	1295	1391	2.6
WBR	119	123	0.4	126	139	1.2
SBL	127	129	0.2	151	146	0.4
SBT	9	9	0.2	64	65	0.1
SBR	51	48	0.5	114	111	0.3
EBL	187	211	1.7	141	154	1.1
EBT	1732	1888	3.7	1423	1505	2.1
EBR	154	170	1.2	300	319	1.1
Lakeshore Road East & Hydro Road						



Movement	Future Total Morning Peak Hour			Future Total Afternoon Peak Hour		
	Modelled Volume	Input Volume (projected)	GEH	Modelled Volume	Input Volume (projected)	GEH
NBL	245	251	0.4	283	289	0.4
NBR	249	256	0.4	229	235	0.4
WBL	82	95	1.4	243	276	2.0
WBT	853	877	0.8	1420	1508	2.3
WBR	0	0	0.0	8	9	0.2
SBL	1	2	0.2	2	2	0.2
SBR	10	9	0.6	4	3	0.7
EBL	3	4	0.2	3	5	0.5
EBT	1830	1984	3.5	1317	1366	1.3
EBR	299	323	1.3	363	387	1.2
Lakeshore Road East & Haig Boulevard						
NBL	135	127	0.7	249	240	0.6
NBT	21	21	0.0	48	48	0.0
NBR	274	269	0.3	269	269	0.0
WBL	92	110	1.8	175	212	2.7
WBT	1189	1242	1.5	1621	1768	3.6
WBR	38	41	0.4	74	84	1.0
SBL	36	35	0.0	29	26	0.6
SBT	25	23	0.5	25	25	0.0
SBR	46	47	0.2	149	145	0.3
EBL	121	133	1.0	79	84	0.6
EBT	1680	1819	3.3	1287	1343	1.6
EBR	328	349	1.1	213	216	0.2
Lakeshore Road East & Dixie Road						
NBL	4	3	1.0	1	1	0.4
NBT	0	0	0.0	4	3	0.6
NBR	0	0	0.0	0	0	0.0
WBL	8	9	0.2	1	2	0.6
WBT	880	919	1.3	1151	1153	0.1
WBR	159	171	0.9	215	220	0.3
SBL	156	151	0.5	255	278	1.4
SBT	0	0	0.0	0	0	0.0
SBR	462	471	0.4	761	910	5.1
EBL	649	737	3.3	374	415	2.1
EBT	1274	1367	2.6	1165	1211	1.3
EBR	17	20	0.6	11	13	0.4

8.2.1.2 Scenario 3A: Intersection Capacity Summary

A summary of the VISSIM model results for delay and LOS at each intersection is provided in **Table 26**. The VISSIM results are as expected and align very well with the results of the Synchro analysis.

The VISSIM analysis shows that the intersections work acceptably with the following exceptions:

- The northbound left-turn/ northbound through movements at Lakeshore Road East & Cawthra Road operate with a LOS F during the afternoon peak hour. This is expected as both of these movements include very low traffic volumes (south approach at this time serves a driveway to only a small office).
- The southbound left-turn movement at Lakeshore Road East & Cawthra Road operates with a LOS F in both the morning and afternoon peak hours due to heavy southbound left-turning volumes. It is noted that this movement already experiences a LOS E during the peak periods under existing conditions.
- All eastbound left-turn/westbound left-turn movements at intersections along Lakeshore Road East are expected to experience poor levels of service with increased delays as a direct result of the implementation of the fully protected left-turn phasing required to accommodate the BRT.

TABLE 26 SCENARIO 3A: SIGNALIZED INTERSECTION DELAY AND LOS

Movement	Future Total Morning Peak Hour		Future Total Afternoon Peak Hour	
	Delay (seconds)	LOS	Delay (seconds)	LOS
Lakeshore Road East & Cawthra Road				
NBL	-	-	87	F
NBT	-	-	82	F
NBR	-	-	18	B
WBL	45	D	39	D
WBT	34	C	34	C
WBR	18	B	9	A
SBL	81	F	124	F
SBT	-	-	-	-
SBR	29	C	67	E
EBL	81	F	42	D
EBT	61	E	18	B
EBR	-	-	-	-
Lakeshore Road East & East Avenue				
NBL	113	F	52	D
NBT	-	-	-	-
NBR	60	E	14	B
WBL	80	F	84	F

Movement	Future Total Morning Peak Hour		Future Total Afternoon Peak Hour	
	Delay (seconds)	LOS	Delay (seconds)	LOS
WBT	43	D	32	C
WBR	20	C	10	B
SBL	48	D	49	D
SBR	31	C	30	C
EBL	112	F	93	F
EBT	41	D	29	C
EBR	37	D	28	C
Lakeshore Road East & Lakefront Promenade				
NBL	62	E	50	D
NBT	-	-	-	-
NBR	41	D	18	B
WBL	73	E	171	F
WBT	13	B	10	B
EBT	20	C	19	B
EBR	4	A	5	A
Lakeshore Road East & Ogden Avenue				
NBL	48	D	57	E
NBT	36	D	34	C
NBR	37	D	14	B
WBL	212	F	130	F
WBT	15	B	27	C
WBR	13	B	23	C
SBL	45	D	46	D
SBT	40	D	42	D
SBR	9	A	25	C
EBL	70	E	63	E
EBT	39	D	47	D
EBR	23	C	30	C
Lakeshore Road East & Hydro Road				
NBL	47	D	51	D
NBR	37	D	22	C
WBL	117	F	96	F
WBT	3	A	10	B
WBR	-	-	6	A
SBL	34	C	50	D
SBR	4	A	7	A
EBL	82	F	71	E
EBT	23	C	17	B
EBR	10	B	5	A

Movement	Future Total Morning Peak Hour		Future Total Afternoon Peak Hour	
	Delay (seconds)	LOS	Delay (seconds)	LOS
Lakeshore Road East & Haig Boulevard				
NBL	47	D	54	D
NBT	46	D	49	D
NBR	28	C	29	C
WBL	174	F	145	F
WBT	34	C	55	E
WBR	35	D	52	D
SBL	46	D	51	D
SBT	43	D	51	D
SBR	24	C	31	C
EBL	79	E	66	E
EBT	17	B	20	C
EBR	9	A	7	A
Lakeshore Road East & Dixie Road				
NBL	42	D	35	D
NBT	-	-	47	D
WBL	156	F	125	F
WBT	135	F	58	E
WBR	113	F	44	D
SBL	47	D	125	F
SBR	13	B	121	F
EBL	71	E	108	F
EBT	23	C	20	C
EBR	24	C	19	B

8.2.1.3 Scenario 3A: Intersection Queuing Summary

A summary of the VISSIM model queuing results is provided in **Table 27** with highlights as follows:

- Due to high volumes, northbound queues leaving the Site at both East Avenue and Lakefront Promenade may extend beyond the available storage. Northbound queues at the remainder of streets leaving the Site may be lengthy but can be accommodated within the planned available storage.
- During the AM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound vehicles at Cawthra Road and for eastbound vehicles at East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road. It is noted that eastbound right turning volumes are high during the AM peak hour, from Lakeshore Road East to the Site.
- During the PM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound and southbound vehicles at Cawthra Road, and southbound vehicles at Dixie Road.

TABLE 27 SCENARIO 3A: SIGNALIZED INTERSECTION QUEUES

Movement	Available Queuing Space (metres)	Future Total AM Peak Hour			Future Total PM Peak Hour		
		50th percentile (metres)	85th percentile (metres)	95th percentile (metres)	50th percentile (metres)	85th percentile (metres)	95th percentile (metres)
Lakeshore Road East & Cawthra Road							
NB	10	0	0	0	0	1	5
WB	325	171	329	358	111	296	344
SB	250	81	166	199	246	287	288
EB	260	172	342	357	33	82	112
Lakeshore Road East & East Avenue							
NB	130	78	153	164	10	29	40
WB	340	136	261	322	97	223	294
SB	80	0	6	13	0	6	10
EB	330	208	319	353	140	278	321
Lakeshore Road East & Lakefront Promenade							
NB	130	53	135	178	33	70	102
WB	240	13	53	70	75	141	191
SB	-	-	-	-	-	-	-
EB	340	200	357	384	71	236	327
Lakeshore Road East & Ogden Avenue							
NB	130	52	93	107	44	82	96
WB	200	45	82	94	78	124	150
SB	160	9	25	37	15	35	48
EB	240	125	229	309	116	175	229
Lakeshore Road East & Hydro Road							
NB	130	32	85	119	43	106	140
WB	155	19	43	56	56	101	139
SB	40	0	0	1	0	0	1
EB	200	70	225	273	23	49	91
Lakeshore Road East & Haig Boulevard							
NB	130	19	46	67	37	77	100
WB	600	67	153	189	194	325	368
SB	320	4	18	27	11	36	50
EB	165	43	92	157	35	67	83
Lakeshore Road East & Dixie Road							
NB	95	0	0	3	0	0	4
WB	460	181	277	300	105	186	226
SB	310	16	41	57	208	347	367
EB	600	154	304	399	99	175	224

8.2.2 Scenario 3B (2041): Phase 2 + Dual NBL at Lakefront Promenade/Lakeshore Road East (Haig not connected)

8.2.2.1 Scenario 3B: GEH Values

A comparison of projected traffic volumes for each scenario versus the VISSIM modelled volumes were used to calculate the GEH values. As shown in in **Table 25**, as none of the GEH values are greater than the recommended maximum of 5.0, the fit between the simulated and observed flows within the VISSIM model is appropriate.

TABLE 28 SCENARIO 3B: VOLUME COMPARISON INPUT VS. MODELLED 2041

Scenario	Future Total Morning Peak Hour			Future Total Afternoon Peak Hour		
Movement	Modelled Volume	Input Volume (projected)	GEH	Modelled Volume	Input Volume (projected)	GEH
Lakeshore Road East & Cawthra Road						
NBL	0	0	0	2	2	0.0
NBT	0	0	0.0	1	4	1.9
NBR	0	0	0.0	1	1	0.0
WBL	9	3	2.5	8	3	2.1
WBT	1072	1104	1.0	1259	1277	0.5
WBR	976	983	0.2	796	806	0.4
SBL	734	761	1.0	1086	1068	0.5
SBR	363	379	0.8	405	425	1.0
EBL	482	482	0.0	246	309	3.8
EBT	1114	1152	1.1	854	1096	7.8
EBR	0	0	0	0	0	0
Lakeshore Road East & East Avenue						
NBL	177	174	0.2	191	185	0.4
NBR	173	179	0.5	61	64	0.4
WBL	22	25	0.5	110	117	0.7
WBT	1893	1952	1.3	1837	1853	0.4
WBR	8	9	0.2	23	24	0.2
SBL	33	32	0.2	18	24	1.3
SBR	7	10	0.8	8	4	1.6
EBL	37	37	0.0	47	49	0.3
EBT	1729	1820	2.2	1762	1899	3.2
EBR	83	82	0.1	119	153	2.9
Lakeshore Road East & Lakefront Promenade						
NBL	471	483	0.5	587	553	1.4
NBR	468	470	0.1	201	214	0.9

Scenario	Future Total Morning Peak Hour			Future Total Afternoon Peak Hour		
Movement	Modelled Volume	Input Volume (projected)	GEH	Modelled Volume	Input Volume (projected)	GEH
WBL	97	102	0.5	260	302	2.6
WBT	1041	1097	1.7	1224	1205	0.5
EBT	1552	1668	2.9	1511	1633	3.1
EBR	263	264	0.1	324	353	1.6
Lakeshore Road East & Ogden Avenue						
NBL	272	273	0.1	175	165	0.7
NBT	70	70	0.0	52	48	0.4
NBR	340	351	0.6	172	166	0.5
WBL	111	115	0.4	265	275	0.6
WBT	832	878	1.6	1189	1231	1.2
WBR	117	120	0.3	123	123	0.0
SBL	123	123	0.0	137	143	0.6
SBT	30	28	0.4	88	88	0.1
SBR	52	48	0.6	128	111	1.5
EBL	194	211	1.1	150	154	0.4
EBT	1617	1715	2.4	1349	1474	3.3
EBR	214	228	0.9	331	360	1.6
Lakeshore Road East & Hydro Road						
NBL	298	318	1.1	216	218	0.1
NBR	368	400	1.6	336	386	2.6
WBL	106	132	2.4	267	337	4.0
WBT	765	787	0.8	1382	1408	0.7
WBR	0	0	0.0	1	9	3.6
SBL	1	2	0.1	3	2	0.6
SBR	10	9	0.5	0	3	2.4
EBL	3	4	0.2	7	5	0.8
EBT	1632	1718	2.1	1185	1288	3.0
EBR	441	467	1.2	458	490	1.5
Lakeshore Road East & Haig Boulevard						
WBT	1258	1316	1.6	1752	1868	2.7
WBR	37	41	0.5	77	84	0.8
SBL	34	35	0.1	18	26	1.7
SBR	51	47	0.6	147	145	0.1
EBL	141	153	1.0	107	123	1.6
EBT	1963	2075	2.5	1410	1549	3.6
EBR	0	0	0.0	0	0	0.0
Lakeshore Road East & Dixie Road						
NBL	5	3	1.0	1	1	0.0
NBT	0	0	0.0	4	3	0.5

Scenario	Future Total Morning Peak Hour			Future Total Afternoon Peak Hour		
Movement	Modelled Volume	Input Volume (projected)	GEH	Modelled Volume	Input Volume (projected)	GEH
WBL	9	9	0.0	4	2	1.2
WBT	874	911	1.2	1146	1149	0.1
WBR	161	171	0.7	211	220	0.6
SBL	157	151	0.5	281	278	0.2
SBR	428	443	0.7	739	801	2.3
EBL	662	733	2.7	355	401	2.4
EBT	1279	1356	2.1	1025	1161	4.1
EBR	18	20	0.4	9	13	1.2

8.2.2.2 Scenario 3B: Intersection Capacity Summary

A summary of the VISSIM model results for delay and LOS at each intersection is provided in **Table 29**. The VISSIM results are as expected and align very well with the results of the Synchro analysis.

The VISSIM analysis shows that the intersections work acceptably with the following exceptions:

- The northbound left-turn/ northbound through movements at Lakeshore Road East & Cawthra Road operate with a LOS F during the afternoon peak hour. This is expected as both of these movements include very low traffic volumes (south approach at this time serves a driveway to only a small office).
- The southbound left-turn movement at Lakeshore Road East & Cawthra Road operates with a LOS F in the morning peak hour due to heavy southbound left-turning volumes. It is noted that this movement already experiences a LOS E during the peak periods under existing conditions.
- The eastbound left-turn at Cawthra Road operates with a LOS F during the afternoon peak period due to high volumes.
- At the intersection of Dixie Road, many movements operate with a LOS F during both the morning and afternoon peak periods due to heavy volumes.
- All eastbound left-turn/westbound left-turn movements at intersections along Lakeshore Road East are expected to experience poor levels of service with increased delays as a direct result of the implementation of the fully protected left-turn phasing required to accommodate the BRT.

TABLE 29 SCENARIO 3B: SIGNALIZED INTERSECTIONS DELAY AND LOS

Movement	Future Total Morning Peak Hour		Future Total Afternoon Peak Hour	
	Delay (seconds)	LOS	Delay (seconds)	LOS
Lakeshore Road East & Cawthra Road				
NBL	-	-	111	F
NBT	-	-	8	A
NBR	-	-	8	A
WBL	37	D	23	C
WBT	28	C	25	C
WBR	17	B	7	A
SBL	113	F	66	E
SBT	-	-	-	-
SBR	43	D	11	B
EBL	56	E	150	F
EBT	39	D	159	F
EBR	-	-	-	-
Lakeshore Road East & East Avenue				
NBL	52	D	53	D
NBR	26	C	13	B
WBL	75	E	118	F
WBT	40	D	27	C

Movement	Future Total Morning Peak Hour		Future Total Afternoon Peak Hour	
	Delay (seconds)	LOS	Delay (seconds)	LOS
WBR	17	B	12	B
SBL	47	D	49	D
SBT	-	-	-	-
SBR	28	C	26	C
EBL	96	F	135	F
EBT	40	D	50	D
EBR	39	D	53	D
Lakeshore Road East & Lakefront Promenade				
NBL	60	E	58	E
NBT	-	-	-	-
NBR	34	C	21	C
WBL	57	E	99	F
WBT	28	C	25	C
EBT	22	C	25	C
EBR	5	A	6	A
Lakeshore Road East & Ogden Avenue				
NBL	51	D	57	E
NBT	32	C	33	C
NBR	27	C	16	B
WBL	82	F	80	F
WBT	17	B	23	C
WBR	15	B	22	C
SBL	44	D	40	D
SBT	42	D	51	D
SBR	15	B	29	C
EBL	74	E	76	E
EBT	23	C	28	C
EBR	9	A	12	B
Lakeshore Road East & Hydro Road				
NBL	59	E	60	E
NBR	35	D	62	E
WBL	203	F	84	F
WBT	3	A	13	B
WBR	-	-	0	A
SBL	31	C	50	D
SBR	4	A	-	-
EBL	74	E	64	E
EBT	20	C	21	C
EBR	8	A	6	A

Movement	Future Total Morning Peak Hour		Future Total Afternoon Peak Hour	
	Delay (seconds)	LOS	Delay (seconds)	LOS
Lakeshore Road East & Haig Boulevard				
WBT	35	D	65	E
WBR	32	C	62	E
SBL	43	D	57	E
SBR	17	B	23	C
EBL	96	F	80	F
EBT	11	B	5	A
EBR	-	-	-	-
Lakeshore Road East & Dixie Road				
NBL	43	D	91	F
NBT	-	-	40	D
WBL	159	F	241	F
WBT	125	F	135	F
WBR	103	F	119	F
SBL	44	D	91	F
SBR	11	B	76	E
EBL	70	E	60	E
EBT	24	C	14	B
EBR	22	C	13	B

8.2.2.3 Scenario 3B: Intersection Queuing Summary

A summary of the VISSIM model queuing results is provided in **Table 30** with highlights as follows:

- Due to high volumes, northbound queues leaving the Site at both Lakefront Promenade and Hydro Road may extend beyond the available storage. Northbound queues at the remainder of streets leaving the Site may be lengthy but can be accommodated within the planned available storage.
- During the AM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound vehicles at Cawthra Road and for eastbound vehicles at East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road. It is noted that eastbound right-turning volumes are high during the AM peak hour, from Lakeshore Road East to the Site.
- During the PM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound and southbound vehicles at Cawthra Road, and southbound vehicles at Dixie Road.
- The northbound left-turning volumes at Lakefront Promenade at Lakeshore Road East are expected to be high and queueing could become a concern.
- High volumes of traffic are expected along Lakeshore Road East during the peak periods of the day which could create potential east-west queuing concerns at Cawthra Road, East Avenue, Lakefront Promenade (eastbound only) and Hydro Road (eastbound only).

TABLE 30 SCENARIO 3B: INTERSECTION QUEUING SUMMARY

Movement	Available Queuing Space (metres)	Future Total Morning Peak Hour			Future Total Afternoon Peak Hour		
		50th percentile (metres)	85th percentile (metres)	95th percentile (metres)	50th percentile (metres)	85th percentile (metres)	95th percentile (metres)
Lakeshore Road East & Cawthra Road							
NB	10	0	0	0	0	0	4
WB	325	108	304	344	56	222	328
SB	250	135	202	219	98	162	189
EB	260	111	235	263	373	376	380
Lakeshore Road East & East Avenue							
NB	130	17	37	50	18	44	62
WB	340	161	311	356	82	220	285
SB	80	0	7	12	0	5	12
EB	330	195	308	343	320	344	365
Lakeshore Road East & Lakefront Promenade							
NB	130	49	133	192	44	132	208
WB	240	40	80	99	68	106	138
SB	-	-	-	-	-	-	-
EB	340	184	346	380	171	245	347
Lakeshore Road East & Ogden Avenue							
NB	130	51	89	106	24	44	64
WB	200	17	52	66	45	89	113
SB	160	10	24	34	17	37	52
EB	240	56	110	224	49	88	199
Lakeshore Road East & Hydro Road							
NB	130	139	175	180	109	175	180
WB	155	50	84	108	51	84	124
SB	40	0	0	0	0	0	4
EB	200	50	147	237	30	56	77
Lakeshore Road East & Haig Boulevard							
NB	130	0	0	0	0	0	0
WB	600	58	148	175	291	497	503
SB	320	0	11	22	0	19	32
EB	165	40	125	190	19	37	48
Lakeshore Road East & Dixie Road							
NB	95	0	0	3	0	0	5
WB	460	180	252	275	281	319	322
SB	310	15	36	49	113	250	308
EB	600	200	359	428	49	96	122

8.2.3 VISSIM Summary

The VISSIM analysis completed by BA Group confirms the results of the traffic analysis undertaken with Synchro by both TMIG and BA Group. The VISSIM microsimulation analysis included 7 intersections along the Lakeshore Road East corridor for Scenario 3A (Haig connected to Lakeshore Road East) and 3B (no Haig connection but dual left-turning lanes on Lakefront Promenade). A comparison of projected traffic volumes for each scenario versus the VISSIM modelled volumes were used to calculate the GEH values for both Scenario 3A and 3B. As none of the GEH values were greater than the recommended maximum of 5.0, the fit between the simulated and observed flows within the VISSIM model is appropriate.

The VISSIM analysis for **Scenario 3A** shows that the intersections work acceptably with the following exceptions:

- The northbound left-turn/ northbound through movements at Lakeshore Road East & Cawthra Road operate with a LOS F during the afternoon peak hour. This is expected as both of these movements include very low traffic volumes (south approach at this time serves a driveway to only a small office).
- The southbound left-turn movement at Lakeshore Road East & Cawthra Road operates with a LOS F in both the morning and afternoon peak hours due to heavy southbound left-turning volumes. It is noted that this movement already experiences a LOS E during the peak periods under existing conditions.
- All eastbound left-turn/westbound left-turn movements at intersections along Lakeshore Road East are expected to experience poor levels of service with increased delays as a direct result of the implementation of the fully protected left-turn phasing required to accommodate the BRT.

Queuing concerns for **Scenario 3A** were noted as follows:

- Due to high volumes, northbound queues leaving the Site at both East Avenue and Lakefront Promenade may extend beyond the available storage. Northbound queues at the remainder of streets leaving the Site may be lengthy but can be accommodated within the planned available storage.
- During the AM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound vehicles at Cawthra Road and for eastbound vehicles at East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road. It is noted that eastbound right turning volumes are high during the AM peak hour, from Lakeshore Road East to the Site.
- During the PM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound and southbound vehicles at Cawthra Road, and southbound vehicles at Dixie Road.

The VISSIM analysis for **Scenario 3B** shows that the intersections work acceptably with the following exceptions:

- The northbound left-turn/ northbound through movements at Lakeshore Road East & Cawthra Road operate with a LOS F during the afternoon peak hour. This is expected as both of these movements include very low traffic volumes (south approach at this time serves a driveway to only a small office).
- The southbound left-turn movement at Lakeshore Road East & Cawthra Road operates with a LOS F in the morning peak hour due to heavy southbound left-turning volumes. It is noted that this movement already experiences a LOS E during the peak periods under existing conditions.
- The eastbound left-turn at Cawthra Road operates with a LOS F during the afternoon peak period due to high volumes.
- At the intersection of Dixie Road, many movements operate with a LOS F during both the morning and afternoon peak periods due to heavy volumes.
- All eastbound left-turn/westbound left-turn movements at intersections along Lakeshore Road East are expected to experience poor levels of service with increased delays as a direct result of the implementation of the fully protected left-turn phasing required to accommodate the BRT.

Queuing concerns for **Scenario 3B** were noted as follows:

- Due to high volumes, northbound queues leaving the Site at both Lakefront Promenade and Hydro Road may extend beyond the available storage. Northbound queues at the remainder of streets leaving the Site may be lengthy but can be accommodated within the planned available storage.
- During the AM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound vehicles at Cawthra Road and for eastbound vehicles at East Avenue, Lakefront Promenade, Ogden Avenue and Hydro Road. It is noted that eastbound right-turning volumes are high during the AM peak hour, from Lakeshore Road East to the Site.
- During the PM peak hour along Lakeshore Road East, some queuing is expected to occur for westbound and southbound vehicles at Cawthra Road, and southbound vehicles at Dixie Road.
- The northbound left-turning volumes at Lakefront Promenade at Lakeshore Road East are expected to be high and queueing could become a concern.
- High volumes of traffic are expected along Lakeshore Road East during the peak periods of the day which could create potential east-west queuing concerns at Cawthra Road, East Avenue, Lakefront Promenade (eastbound only) and Hydro Road (eastbound only).

8.2.4 Conclusions

The VISSIM analysis confirms that the future transportation network, with BRT along Lakeshore Road East, can acceptably accommodate the travel demands of the Rangeview Site with 5,300 residential units and 95,000 ft² GFA of non-residential uses, if the road network includes the planned upgrades along Lakeshore Road East, in addition to the extension of Ogden Avenue from Lakeshore Road East to Rangeview Road, and **either** the connection of Haig Boulevard to Lakeshore Road East **or** a dual northbound left-turn on Lakefront Promenade at Lakeshore Road East.

Appendix A: Rangeview Estates Landowner Map



RANGEVIEW ESTATES

Rangeview Development Master Plan

Ownership Map



Legend Rangeview Estates Precinct Area (Gross Area = ~25.67 ha) X Non-Participating Landowners - - Existing Parcel Lines

Appendix B: Rangeview Estates Master Plan



MASTER PLAN V6.2

Rangeview Development Master Plan

Concept Plan

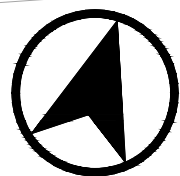
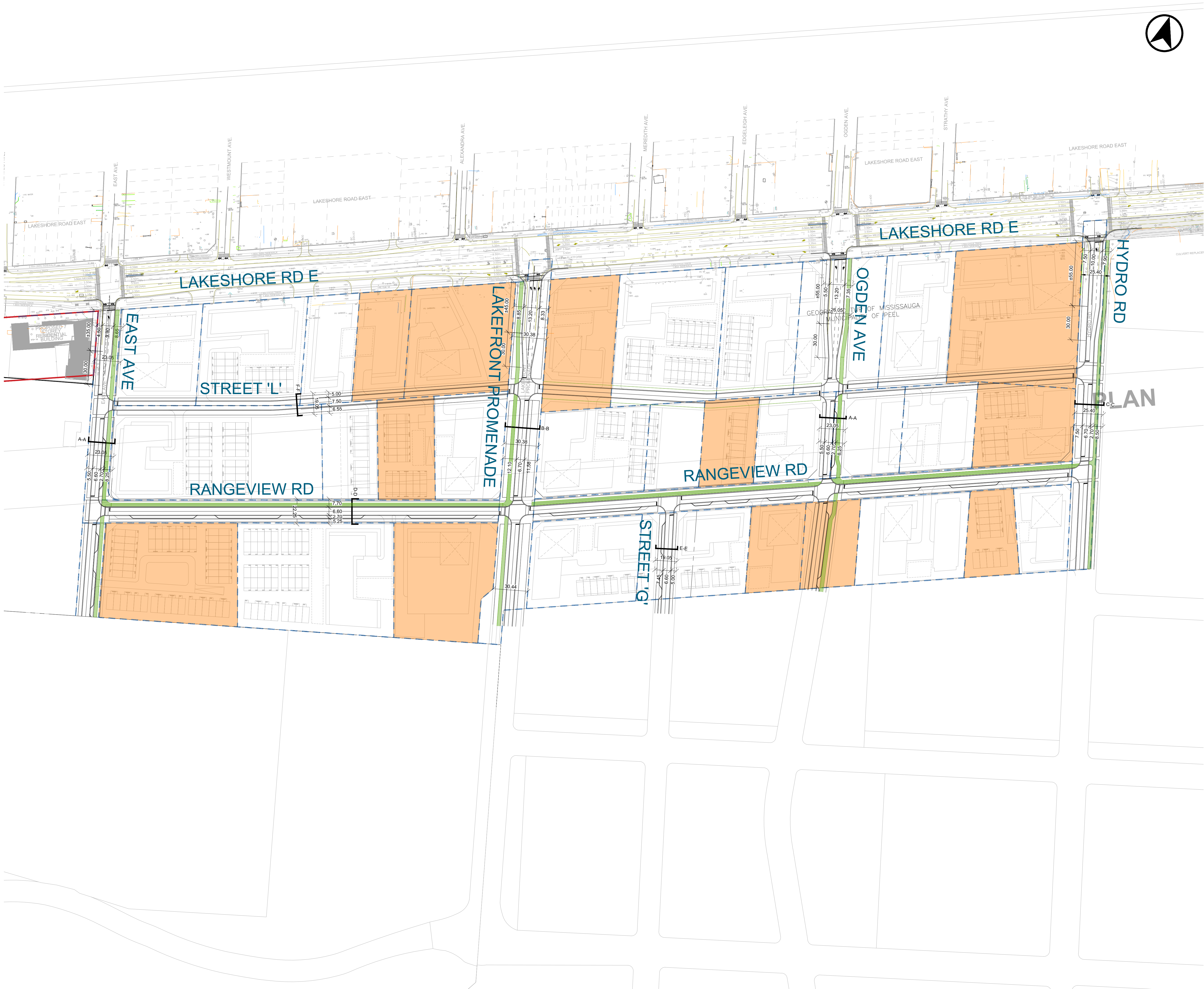


Legend Rangeview Estates Precinct Area --- Existing Parcel Lines

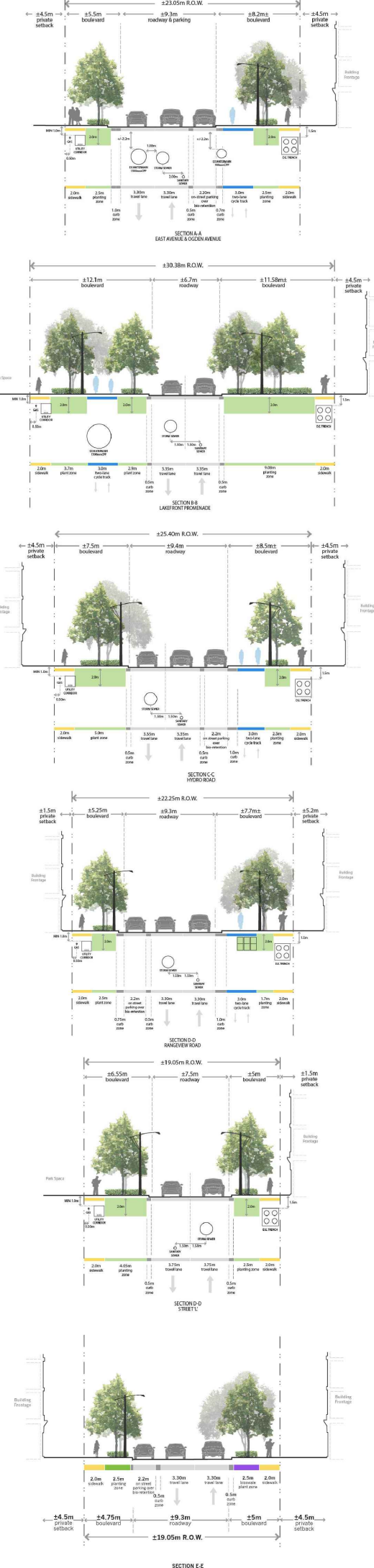
Appendix C:

Rangeview Estates Functional Road Plan





- LEGEND
- EXISTING PROPERTY LINE
 - PROPOSED RIGHT OF WAY
 - NON-PARTICIPATING LANDOWNERS
 - PARKS



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MOVEMENT
IN URBAN
ENVIRONMENTS
BAGROUP.COM

DORSAY PROPERTIES

ULTIMATE ROAD PLAN

Date: September 26, 2023

Project No.: 8061-01

Scale: 1:1,500

Appendix D:

Excerpts from April 2021 TMIG Report for Lakeview Village



LAKEVIEW VILLAGE

TRAFFIC CONSIDERATIONS REPORT ADDENDUM

FINAL ▪ APRIL 2021

REPORT PREPARED FOR



LAKEVIEW
COMMUNITY
PARTNERS LIMITED
4595 PALLADIUM WAY
BURLINGTON, ON L7M 0W9

REPORT PREPARED BY



THE MUNICIPAL
INFRASTRUCTURE
GROUP LTD., A T.Y.
LIN INTERNATIONAL
COMPANY
8800 DUFFERIN STREET, SUITE
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TMIG PROJECT NUMBER 17201

Trip Generation Summary – Lakeview Village

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) (LUC 220) 355 units	Fitted Curve Equation	$\ln(T) = 0.95 \ln(X) - 0.51$			$\ln(T) = 0.89 \ln(X) - 0.02$		
	Distribution	23%	77%	-	63%	37%	-
	Gross Vehicle Site Trips	38	129	167	120	71	191
	Vehicle to Person Trip Conversion Rate	-	-	1.13	-	-	1.21
	Gross Person Trips	43	146	189	146	85	231
	Internal Reduction	1	2	3	13	9	22
	Total External Person Trips	42	144	186	133	76	209
	Mode Split Reduction	17	58	75	51	30	81
	Total Auto Driver Trips	25	86	111	82	46	128
Multifamily Housing (Mid-Rise) (LUC 221) 5287 units	Average Rate	0.2			0.18		
	Distribution	12%	88%	-	72%	28%	-
	Gross Vehicle Site Trips	127	930	1057	685	267	952
	Vehicle to Person Trip Conversion Rate	-	-	1.9	-	-	2
	Gross Person Trips	241	1768	2009	1370	533	1903
	Internal Reduction	5	31	36	119	59	178
	Total External Person Trips	236	1737	1973	1251	474	1725
	Mode Split Reduction	95	702	797	487	184	671
	Total Auto Driver Trips	141	1035	1176	764	290	1054
Multifamily Housing (High-Rise) (LUC 222) 2389 units	Average Rate or Fitted Curve Equation	$\ln(T) = 0.84 \ln(X) - 0.65$			2.17		
	Distribution	12%	88%		70%	30%	
	Gross Vehicle Site Trips	43	316	359	318	136	454
	Vehicle to Person Trip Conversion Rate	-	-	2.81	-	-	2.17
	Gross Person Trips	121	889	1010	690	295	985
	Internal Reduction	2	16	18	60	32	92
	Total External Person Trips	119	873	992	630	263	893
	Mode Split Reduction	48	353	401	245	102	347
	Total Auto Driver Trips	71	520	591	385	161	546
Hotel (LUC 310) 191 rooms	Fitted Curve Equation	$T = 0.50(X) - 5.34$			$T = 0.75(X) - 26.02$		
	Distribution	59%	41%		51%	49%	
	Gross Vehicle Site Trips	53	37	90	60	57	117
	Vehicle to Person Trip Conversion Rate	-	-	1.00	-	-	1.00

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
	Gross Person Trips	53	37	90	60	57	117
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	53	37	90	60	57	117
	Mode Split Reduction	21	15	36	23	22	45
	Total Auto Driver Trips	32	22	54	37	35	72
Recreational Community Center (LUC 495)	Fitted Curve Equation	$\ln(T) = 0.54 \ln(X) + 2.73$			$\ln(T) = 0.76 \ln(X) + 2.00$		
	Distribution	66%	34%		47%	53%	
	Gross Vehicle Site Trips	269	139	408	352	397	749
	Vehicle to Person Trip Conversion Rate	-	-	1.86	-	-	1.82
	Gross Person Trips	501	258	759	641	722	1363
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	501	258	759	641	722	1363
	Mode Split Reduction	202	104	306	249	281	530
	Total Auto Driver Trips	299	154	453	392	441	833
General Office Building (LUC 710)	Fitted Curve Equation	$T = 0.72(X) + 21.64$			$T = 0.83(X) + 7.99$		
	Distribution	86%	14%		17%	83%	
	Gross Vehicle Site Trips	480	78	558	107	520	627
	Vehicle to Person Trip Conversion Rate	-	-	1.47	-	-	1.46
	Gross Person Trips	706	115	821	156	759	915
	Internal Reduction	49	32	81	51	65	116
	Total External Person Trips	657	83	740	105	694	799
	Mode Split Reduction	266	34	300	41	270	311
	Total Auto Driver Trips	391	49	440	64	424	488
Research and Development Center (LUC 760)	Average Rate	0.42			0.49		
	Distribution	75%	25%		15%	85%	
	Gross Vehicle Site Trips	235	78	313	55	310	365
	Vehicle to Person Trip Conversion Rate	-	-	1.36	-	-	1.45
	Gross Person Trips	320	106	426	80	450	530
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	320	106	426	80	450	530
	Mode Split Reduction	129	43	172	31	175	206
	Total Auto Driver Trips	191	63	254	49	275	324
Shopping Center	Fitted Curve Equation	$T = 0.50(X) + 151.78$			$\ln(T) = 0.74 \ln(X) + 2.89$		
	Distribution	62%	38%		48%	52%	

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
(LUC 820)	Gross Vehicle Site Trips	157	96	253	440	477	917
	Vehicle to Person Trip Conversion Rate	-	-	1.31	-	-	1.43
	Gross Person Trips	206	126	332	629	682	1311
	Internal Reduction	60	36	96	113	191	304
	Total External Person Trips	146	90	236	516	491	1007
	Mode Split Reduction	59	36	95	201	191	392
	Total Auto Driver Trips	87	54	141	315	300	615
Elementary School (LUC 520) 850 student capacity	Average Rate	0.67			0.17		
	Distribution	54%	46%	-	48%	52%	-
	Gross Vehicle Site Trips	308	262	570	69	76	145
	Internal Reduction (50%)	154	131	285	34	38	72
	Total Auto Driver Trips	154	131	285	35	38	73
Day Care Center (LUC 565) 39 Student Capacity	Fitted Curve Equation	$T = 0.66(X) + 8.42$			$\ln(T) = 0.87 \ln(X) + 0.29$		
	Distribution	53%	47%	-	47%	53%	-
	Gross Vehicle Site Trips	18	16	34	15	17	32
	Internal Reduction	9	8	17	7	9	16
	Total Auto Driver Trips	9	8	17	8	8	16

Trip Generation Summary – Rangeview Estates

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) (LUC 221) 2981 units	Average Rate	0.2			0.18		
	Distribution	12%	88%	-	72%	28%	-
	Gross Vehicle Site Trips	72	524	596	386	151	537
	Vehicle to Person Trip Conversion Rate	-	-	1.9	-	-	2
	Gross Person Trips	136	997	1133	773	300	1073
	Internal Reduction	3	12	15	61	28	89
	Total External Person Trips	133	985	1118	712	272	984
	Mode Split Reduction	54	398	452	277	106	383
	Total Auto Driver Trips	79	587	666	435	166	601
General Office Building (LUC 710)	Fitted Curve Equation	$T = 0.72(X) + 21.64$			$T = 0.83(X) + 7.99$		
	Distribution	86%	14%	-	17%	83%	-
	Gross Vehicle Site Trips	48	8	56	8	39	47
	Vehicle to Person Trip Conversion Rate	-	-	1.47	-	-	1.46
	Gross Person Trips	71	11	82	12	57	69
	Internal Reduction	5	3	8	11	12	23
	Total External Person Trips	66	8	74	1	45	46
	Mode Split Reduction	27	3	30	0	18	18
	Total Auto Driver Trips	39	5	44	1	27	28
Shopping Center (LUC 820)	Fitted Curve Equation	$T = 0.50(X) + 151.78$			$\ln(T) = 0.74\ln(X) + 2.89$		
	Distribution	62%	38%	-	48%	52%	-
	Gross Vehicle Site Trips	109	66	175	150	162	312
	Vehicle to Person Trip Conversion Rate	-	-	1.31	-	-	1.43
	Gross Person Trips	143	87	230	214	231	445
	Internal Reduction	13	6	19	32	64	96
	Total External Person Trips	130	81	211	182	167	349
	Mode Split Reduction	53	33	86	71	65	136
	Total Auto Driver Trips	77	48	125	111	102	213

Trip Generation Summary – Serson North

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
General Office Building (LUC 710)	Fitted Curve Equation	$T = 0.72(X) + 21.64$			$T = 0.83(X) + 7.99$		
	Distribution	86%	14%	-	17%	83%	-
	Gross Vehicle Site Trips	158	25	183	33	161	194
	Vehicle to Person Trip Conversion Rate	-	-	1.47	-	-	1.46
	Gross Person Trips	231	38	269	48	236	284
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	231	38	269	48	236	284
	Mode Split Reduction	115	19	134	24	118	142
	Total Auto Driver Trips	116	19	135	24	118	142
Research and Development Center (LUC 760)	Average Rate	0.42			0.49		
	Distribution	75%	25%	-	15%	85%	-
	Gross Vehicle Site Trips	71	23	94	16	94	110
	Vehicle to Person Trip Conversion Rate	-	-	1.36	-	-	1.45
	Gross Person Trips	96	32	128	24	135	159
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	96	32	128	24	135	159
	Mode Split Reduction	48	16	64	12	67	79
	Total Auto Driver Trips	48	16	64	12	68	80

Trip Generation Summary – 2041 50% Mode Split Sensitivity – Lakeview Village

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) (LUC 220) 355 units	Fitted Curve Equation	$\ln(T) = 0.95 \ln(X) - 0.51$			$\ln(T) = 0.89 \ln(X) - 0.02$		
	Distribution	23%	77%	-	63%	37%	-
	Gross Vehicle Site Trips	38	129	167	120	71	191
	Vehicle to Person Trip Conversion Rate	-	-	1.13	-	-	1.21
	Gross Person Trips	43	146	189	146	85	231
	Internal Reduction	1	2	3	13	9	22
	Total External Person Trips	42	144	186	133	76	209
	Mode Split Reduction	20	73	93	66	39	105
	Total Auto Driver Trips	22	71	93	67	37	104
Multifamily Housing (Mid-Rise) (LUC 221) 5287 units	Average Rate	0.2			0.18		
	Distribution	12%	88%	-	72%	28%	-
	Gross Vehicle Site Trips	127	930	1057	685	267	952
	Vehicle to Person Trip Conversion Rate	-	-	1.9	-	-	2
	Gross Person Trips	241	1768	2009	1370	533	1903
	Internal Reduction	5	31	36	119	59	178
	Total External Person Trips	236	1737	1973	1251	474	1725
	Mode Split Reduction	118	868	986	626	236	862
	Total Auto Driver Trips	118	869	987	625	238	863
Multifamily Housing (High-Rise) (LUC 222) 2389 units	Average Rate or Fitted Curve Equation	$\ln(T) = 0.84 \ln(X) - 0.65$			2.17		
	Distribution	12%	88%		70%	30%	
	Gross Vehicle Site Trips	43	316	359	318	136	454
	Vehicle to Person Trip Conversion Rate	-	-	2.81	-	-	2.17
	Gross Person Trips	121	889	1010	690	295	985
	Internal Reduction	2	16	18	60	32	92
	Total External Person Trips	119	873	992	630	263	893
	Mode Split Reduction	60	436	496	315	131	446
	Total Auto Driver Trips	59	437	496	315	132	447
Hotel (LUC 310) 191 rooms	Fitted Curve Equation	$T = 0.50(X) - 5.34$			$T = 0.75(X) - 26.02$		
	Distribution	59%	41%		51%	49%	
	Gross Vehicle Site Trips	53	37	90	60	57	117
	Vehicle to Person Trip Conversion Rate	-	-	1.00	-	-	1.00

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
	Gross Person Trips	53	37	90	60	57	117
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	53	37	90	60	57	117
	Mode Split Reduction	26	18	44	30	28	58
	Total Auto Driver Trips	27	19	46	30	29	59
Recreational Community Center (LUC 495)	Fitted Curve Equation	$\ln(T) = 0.54 \ln(X) + 2.73$			$\ln(T) = 0.76 \ln(X) + 2.00$		
	Distribution	66%	34%		47%	53%	
	Gross Vehicle Site Trips	269	139	408	352	397	749
	Vehicle to Person Trip Conversion Rate	-	-	1.86	-	-	1.82
	Gross Person Trips	501	258	759	641	722	1363
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	501	258	759	641	722	1363
	Mode Split Reduction	250	129	379	320	361	681
	Total Auto Driver Trips	251	129	380	321	361	682
General Office Building (LUC 710)	Fitted Curve Equation	$T = 0.72(X) + 21.64$			$T = 0.83(X) + 7.99$		
	Distribution	86%	14%		17%	83%	
	Gross Vehicle Site Trips	480	78	558	107	520	627
	Vehicle to Person Trip Conversion Rate	-	-	1.47	-	-	1.46
	Gross Person Trips	706	115	821	156	759	915
	Internal Reduction	49	32	81	51	65	116
	Total External Person Trips	657	83	740	105	694	799
	Mode Split Reduction	266	34	300	41	270	311
	Total Auto Driver Trips	391	49	440	64	424	488
Research and Development Center (LUC 760)	Average Rate	0.42			0.49		
	Distribution	75%	25%		15%	85%	
	Gross Vehicle Site Trips	235	78	313	55	310	365
	Vehicle to Person Trip Conversion Rate	-	-	1.36	-	-	1.45
	Gross Person Trips	320	106	426	80	450	530
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	657	83	740	105	694	799
	Mode Split Reduction	328	41	369	52	347	399
	Total Auto Driver Trips	329	42	371	53	347	400
Shopping Center	Fitted Curve Equation	$T = 0.50(X) + 151.78$			$\ln(T) = 0.74\ln(X) + 2.89$		
	Distribution	62%	38%		48%	52%	

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
(LUC 820)	Gross Vehicle Site Trips	157	96	253	440	477	917
	Vehicle to Person Trip Conversion Rate	-	-	1.31	-	-	1.43
	Gross Person Trips	206	126	332	629	682	1311
	Internal Reduction	60	36	96	113	191	304
	Total External Person Trips	146	90	236	516	491	1007
	Mode Split Reduction	73	45	118	258	245	503
	Total Auto Driver Trips	73	45	118	258	246	504
Elementary School (LUC 520) 850 student capacity	Average Rate	0.67			0.17		
	Distribution	54%	46%	-	48%	52%	-
	Gross Vehicle Site Trips	308	262	570	69	76	145
	Internal Reduction (50%)	154	131	285	34	38	72
	Total Auto Driver Trips	154	131	285	35	38	73
Day Care Center (LUC 565) 39 Student Capacity	Fitted Curve Equation	$T = 0.66(X) + 8.42$			$\ln(T) = 0.87 \ln(X) + 0.29$		
	Distribution	53%	47%	-	47%	53%	-
	Gross Vehicle Site Trips	18	16	34	15	17	32
	Internal Reduction	9	8	17	7	9	16
	Total Auto Driver Trips	9	8	17	8	8	16

Trip Generation Summary – 2041 50% Mode Split Sensitivity – Rangeview Estates

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) (LUC 221) 2981 units	Average Rate	0.2			0.18		
	Distribution	12%	88%	-	72%	28%	-
	Gross Vehicle Site Trips	72	524	596	386	151	537
	Vehicle to Person Trip Conversion Rate	-	-	1.9	-	-	2
	Gross Person Trips	136	997	1133	773	300	1073
	Internal Reduction	3	12	15	61	28	89
	Total External Person Trips	133	985	1118	712	272	984
	Mode Split Reduction	66	492	558	356	136	492
	Total Auto Driver Trips	67	493	560	356	136	492
General Office Building (LUC 710)	Fitted Curve Equation	$T = 0.72(X) + 21.64$			$T = 0.83(X) + 7.99$		
	Distribution	86%	14%	-	17%	83%	-
	Gross Vehicle Site Trips	48	8	56	8	39	47
	Vehicle to Person Trip Conversion Rate	-	-	1.47	-	-	1.46
	Gross Person Trips	71	11	82	12	57	69
	Internal Reduction	5	3	8	11	12	23
	Total External Person Trips	66	8	74	1	45	46
	Mode Split Reduction	33	4	37	0	22	22
	Total Auto Driver Trips	33	4	37	1	23	24
Shopping Center (LUC 820)	Fitted Curve Equation	$T = 0.50(X) + 151.78$			$\ln(T) = 0.74\ln(X) + 2.89$		
	Distribution	62%	38%	-	48%	52%	-
	Gross Vehicle Site Trips	109	66	175	150	162	312
	Vehicle to Person Trip Conversion Rate	-	-	1.31	-	-	1.43
	Gross Person Trips	143	87	230	214	231	445
	Internal Reduction	13	6	19	32	64	96
	Total External Person Trips	130	81	211	182	167	349
	Mode Split Reduction	65	40	105	91	83	174
	Total Auto Driver Trips	65	41	106	91	84	175

Trip Generation Summary – 2041 50% Mode Split Sensitivity – Serson North

Land Use	Parameters	Peak Hour of Trip Generator					
		Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
General Office Building (LUC 710)	Fitted Curve Equation	$T = 0.72(X) + 21.64$			$T = 0.83(X) + 7.99$		
	Distribution	86%	14%	-	17%	83%	-
	Gross Vehicle Site Trips	158	25	183	33	161	194
	Vehicle to Person Trip Conversion Rate	-	-	1.47	-	-	1.46
	Gross Person Trips	231	38	269	48	236	284
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	231	38	269	48	236	284
	Mode Split Reduction	115	19	134	24	118	142
	Total Auto Driver Trips	116	19	135	24	118	142
Research and Development Center (LUC 760)	Average Rate	0.42			0.49		
	Distribution	75%	25%	-	15%	85%	-
	Gross Vehicle Site Trips	71	23	94	16	94	110
	Vehicle to Person Trip Conversion Rate	-	-	1.36	-	-	1.45
	Gross Person Trips	96	32	128	24	135	159
	Internal Reduction	-	-	-	-	-	-
	Total External Person Trips	96	32	128	24	135	159
	Mode Split Reduction	48	16	64	12	67	79
	Total Auto Driver Trips	48	16	64	12	68	80

Appendix E: Synchro Worksheets



Lanes and Geometrics

1: Ogden Ave & Lakeshore Rd E

08/04/2023

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	28.0		0.0	25.0		0.0		0.0		0.0		0.0
Storage Lanes	1		0	1		0		0		0	1	0
Taper Length (m)	7.5			7.5				0.0			0.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00			0.99		1.00	0.99	
Frt					0.990			0.899			0.854	
Flt Protected	0.950			0.950				0.988		0.950		
Satd. Flow (prot)	1785	3443	0	1785	3324	0	0	1672	0	1767	1603	0
Flt Permitted	0.445			0.257				0.910		0.755		
Satd. Flow (perm)	827	3443	0	481	3324	0	0	1539	0	1402	1603	0
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		1			14			27			40	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			89.7			246.5	
Travel Time (s)		19.6			16.0			6.5			17.7	

Intersection Summary

Area Type: Other

Timings

1: Ogden Ave & Lakeshore Rd E

08/04/2023

	↖	→	↗	↖	←	↖	↖	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT		
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖		
Traffic Volume (vph)	87	1001	7	487	1	0	47	1		
Future Volume (vph)	87	1001	7	487	1	0	47	1		
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA		
Protected Phases		4		8		2		6		
Permitted Phases	4		8		2		6			
Detector Phase	4	4	8	8	2	2	6	6		
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	24.0	24.0	24.0	24.0	25.0	25.0	25.0	25.0		
Total Split (s)	90.0	90.0	90.0	90.0	30.0	30.0	30.0	30.0		
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%	25.0%	25.0%		
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0		
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.0		7.0	7.0	7.0		
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None		
Act Effct Green (s)	101.0	101.0	101.0	101.0		9.7	9.7	9.7		
Actuated g/C Ratio	0.84	0.84	0.84	0.84		0.08	0.08	0.08		
v/c Ratio	0.13	0.37	0.02	0.20		0.03	0.44	0.25		
Control Delay	2.7	2.6	6.9	5.7		0.2	63.8	18.9		
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0		
Total Delay	2.7	2.6	6.9	5.7		0.2	63.8	18.9		
LOS	A	A	A	A		A	E	B		
Approach Delay		2.6		5.7		0.3		43.6		
Approach LOS		A		A		A		D		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.44

Intersection Signal Delay: 5.6

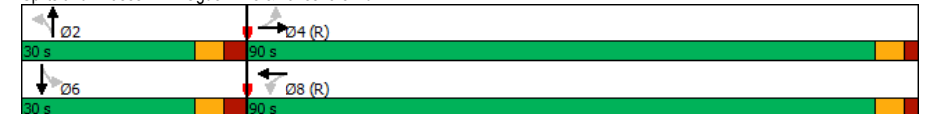
Intersection LOS: A

Intersection Capacity Utilization 56.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues

1: Ogden Ave & Lakeshore Rd E

08/04/2023

							
Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	93	1068	7	554	4	50	41
v/c Ratio	0.13	0.37	0.02	0.20	0.03	0.44	0.25
Control Delay	2.7	2.6	6.9	5.7	0.2	63.8	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.7	2.6	6.9	5.7	0.2	63.8	18.9
Queue Length 50th (m)	3.6	21.8	0.4	17.0	0.0	12.0	0.2
Queue Length 95th (m)	6.4	26.4	0.8	50.2	0.0	24.7	11.2
Internal Link Dist (m)		248.7		198.5	65.7		222.5
Turn Bay Length (m)	28.0		25.0				
Base Capacity (vph)	696	2899	405	2801	316	268	339
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	0.13	0.37	0.02	0.20	0.01	0.19	0.12

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

08/04/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	1001	3	7	487	34	1	0	3	47	1	38
Future Volume (vph)	87	1001	3	7	487	34	1	0	3	47	1	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	6.0	6.0		6.0	6.0			7.0		7.0		
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00		0.99
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00		1.00		1.00
Frt	1.00	1.00		1.00	0.99			0.90		1.00		0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95		1.00
Satd. Flow (prot)	1766	3442		1775	3325			1670		1764		1602
Flt Permitted	0.44	1.00		0.26	1.00			0.91		0.76		1.00
Satd. Flow (perm)	826	3442		481	3325			1539		1402		1602
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	93	1065	3	7	518	36	1	0	3	50	1	40
RTOR Reduction (vph)	0	0	0	0	3	0	0	4	0	0	37	0
Lane Group Flow (vph)	93	1068	0	7	551	0	0	0	0	50	4	0
Confl. Peds. (#/hr)	7		8	8		7	1		1	1		1
Heavy Vehicles (%)	0%	6%	2%	0%	9%	0%	1%	0%	1%	1%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	98.4	98.4		98.4	98.4			8.6		8.6	8.6	
Effective Green, g (s)	98.4	98.4		98.4	98.4			8.6		8.6	8.6	
Actuated g/C Ratio	0.82	0.82		0.82	0.82			0.07		0.07	0.07	
Clearance Time (s)	6.0	6.0		6.0	6.0			7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	677	2822		394	2726			110		100	114	
v/s Ratio Prot		c0.31			0.17						0.00	
v/s Ratio Perm	0.11			0.01				0.00		c0.04		
v/c Ratio	0.14	0.38		0.02	0.20			0.00		0.50	0.03	
Uniform Delay, d1	2.2	2.8		2.0	2.3			51.7		53.6	51.8	
Progression Factor	0.84	0.74		2.40	2.23			1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.4		0.1	0.2			0.0		3.9	0.1	
Delay (s)	2.2	2.4		4.8	5.3			51.7		57.5	52.0	
Level of Service	A	A		A	A			D		E	D	
Approach Delay (s)		2.4			5.3			51.7			55.0	
Approach LOS		A			A			D			E	
Intersection Summary												
HCM 2000 Control Delay			6.1									
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			120.0							13.0		
Intersection Capacity Utilization			56.2%									
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics

2: Dixie Rd & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰↱			↰↱		↰	↰	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								1.00				0.99
Frt		0.996			0.972							0.850
Flt Protected	0.950			0.950			0.950		0.950			
Satd. Flow (prot)	1653	3465	0	1785	3385	0	0	1825	0	1767	1477	0
Flt Permitted	0.217			0.342			0.362		0.756			
Satd. Flow (perm)	378	3465	0	643	3385	0	0	695	0	1406	1477	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			30						326	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings

2: Dixie Rd & Lakeshore Rd E

08/04/2023

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↰↱	↰	↰↱		↰↱	↰	↰
Traffic Volume (vph)	352	769	9	738		0	151	0
Future Volume (vph)	352	769	9	738	3	0	151	0
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	18.0	78.0	60.0	60.0	42.0	42.0	42.0	42.0
Total Split (%)	15.0%	65.0%	50.0%	50.0%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	91.2	87.2	62.0	62.0		18.8	18.8	18.8
Actuated g/C Ratio	0.76	0.73	0.52	0.52		0.16	0.16	0.16
v/c Ratio	0.70	0.33	0.03	0.54		0.03	0.71	0.45
Control Delay	20.0	6.5	18.2	21.3		39.3	65.0	3.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	20.0	6.5	18.2	21.3		39.3	65.0	3.2
LOS	C	A	B	C		D	E	A
Approach Delay		10.6		21.3		39.3		28.3
Approach LOS		B		C		D		C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 17.4

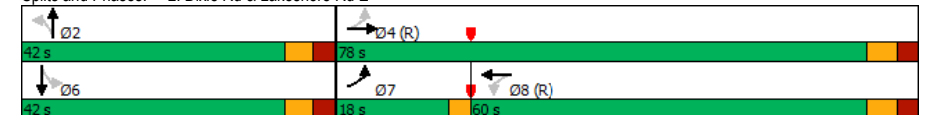
Intersection LOS: B

Intersection Capacity Utilization 74.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E



Queues

2: Dixie Rd & Lakeshore Rd E

08/04/2023

							
Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	367	822	9	947	3	157	229
v/c Ratio	0.70	0.33	0.03	0.54	0.03	0.71	0.45
Control Delay	20.0	6.5	18.2	21.3	39.3	65.0	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	6.5	18.2	21.3	39.3	65.0	3.2
Queue Length 50th (m)	35.1	32.0	1.1	76.8	0.7	37.4	0.0
Queue Length 95th (m)	89.0	62.1	4.6	113.2	3.4	57.3	0.6
Internal Link Dist (m)		598.7		375.1	69.6		268.8
Turn Bay Length (m)	44.0		25.0				
Base Capacity (vph)	522	2518	332	1764	202	410	661
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	0.70	0.33	0.03	0.54	0.01	0.38	0.35
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

08/04/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	769	20	9	738	171	3	0	0	151	0	220
Future Volume (vph)	352	769	20	9	738	171	3	0	0	151	0	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.0		7.0	7.0			7.0		7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.97			1.00		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.95		0.95	1.00	
Satd. Flow (prot)	1653	3466		1785	3384			1823		1767	1477	
Flt Permitted	0.22	1.00		0.34	1.00			0.36		0.76	1.00	
Satd. Flow (perm)	378	3466		642	3384			694		1406	1477	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	367	801	21	9	769	178	3	0	0	157	0	229
RTOR Reduction (vph)	0	1	0	0	15	0	0	0	0	0	193	0
Lane Group Flow (vph)	367	821	0	9	933	0	0	3	0	157	36	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	8%	5%	2%	0%	5%	4%	0%	0%	0%	1%	0%	9%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	87.2	87.2		62.0	62.0			18.8		18.8	18.8	
Effective Green, g (s)	87.2	87.2		62.0	62.0			18.8		18.8	18.8	
Actuated g/C Ratio	0.73	0.73		0.52	0.52			0.16		0.16	0.16	
Clearance Time (s)	3.0	7.0		7.0	7.0			7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	510	2518		331	1748			108		220	231	
v/s Ratio Prot	c0.13	0.24			0.28						0.02	
v/s Ratio Perm	c0.39			0.01				0.00		c0.11		
v/c Ratio	0.72	0.33		0.03	0.53			0.03		0.71	0.16	
Uniform Delay, d1	10.3	5.9		14.2	19.4			42.9		48.0	43.7	
Progression Factor	1.43	0.95		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.3		0.2	1.2			0.1		10.4	0.3	
Delay (s)	19.3	5.9		14.4	20.5			43.0		58.5	44.1	
Level of Service	B	A		B	C			D		E	D	
Approach Delay (s)		10.0			20.5			43.0			49.9	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			20.1			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			74.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics

3: Lakeshore Rd E & Cawthra Rd

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↪	↩	↩	↩↪	↩	↩	↩↪	↩	↩	↩↪	↩
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		0	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor	0.99			1.00	0.99							0.98
Frt					0.965							0.850
Flt Protected	0.950			0.950						0.950	0.950	
Satd. Flow (prot)	1736	3539	0	1805	3270	0	0	1900	0	1588	1588	1524
Flt Permitted	0.247			0.252						0.950	0.950	
Satd. Flow (perm)	448	3539	0	477	3270	0	0	1900	0	1588	1588	1489
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					33							283
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings

3: Lakeshore Rd E & Cawthra Rd

08/04/2023

	EBL	EBT	WBL	WBT	SBL	SBT	SBR	Ø2
Lane Group	EBL	EBT	WBL	WBT	SBL	SBT	SBR	Ø2
Lane Configurations	↩	↩↪	↩	↩↪	↩	↩↪	↩	
Traffic Volume (vph)	482	1072	3	573	238	0	379	
Future Volume (vph)	482	1072	3	573	238	0	379	
Turn Type	pm+pt	NA	Perm	NA	Split	NA	pm+ov	
Protected Phases	7	4		8	1	1	7	2
Permitted Phases	4		8				1	
Detector Phase	7	4	8	8	1	1	7	
Switch Phase								
Minimum Initial (s)	5.0	7.0	8.0	8.0	8.0	8.0	5.0	7.0
Minimum Split (s)	11.0	39.0	39.0	39.0	36.0	36.0	11.0	14.0
Total Split (s)	20.0	80.0	60.0	60.0	40.0	40.0	20.0	18.0
Total Split (%)	14.5%	58.0%	43.5%	43.5%	29.0%	29.0%	14.5%	13%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	3.0	3.0	3.0	3.0	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)	3.0	7.0	7.0	7.0	7.0	7.0	3.0	
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	111.7	107.7	60.1	60.1	16.3	16.3	64.9	
Actuated g/C Ratio	0.81	0.78	0.44	0.44	0.12	0.12	0.47	
v/c Ratio	0.65	0.41	0.01	0.54	0.67	0.67	0.46	
Control Delay	14.6	5.8	22.7	29.1	74.7	75.1	8.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	14.6	5.8	22.7	29.1	74.7	75.1	8.2	
LOS	B	A	C	C	E	E	A	
Approach Delay		8.5		29.1		34.0		
Approach LOS		A		C		C		

Intersection Summary

Cycle Length: 138

Actuated Cycle Length: 138

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 19.1

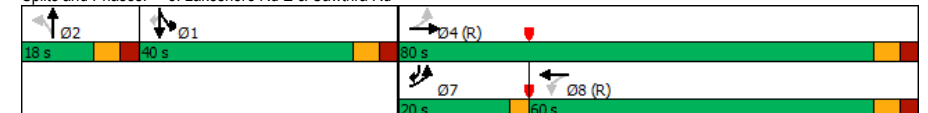
Intersection LOS: B

Intersection Capacity Utilization 75.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd



Queues

3: Lakeshore Rd E & Cawthra Rd

08/04/2023

							
Lane Group	EBL	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	507	1128	3	784	125	126	399
v/c Ratio	0.65	0.41	0.01	0.54	0.67	0.67	0.46
Control Delay	14.6	5.8	22.7	29.1	74.7	75.1	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.6	5.8	22.7	29.1	74.7	75.1	8.2
Queue Length 50th (m)	45.8	47.0	0.5	77.2	36.7	37.0	19.2
Queue Length 95th (m)	97.5	70.8	2.8	107.6	57.5	57.8	40.5
Internal Link Dist (m)		297.4		113.2		931.9	
Turn Bay Length (m)	35.0		60.0		115.0		
Base Capacity (vph)	779	2761	207	1442	379	379	861
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	0.65	0.41	0.01	0.54	0.33	0.33	0.46
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

08/04/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	482	1072	0	3	573	172	0	0	0	238	0	379
Future Volume (vph)	482	1072	0	3	573	172	0	0	0	238	0	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0					7.0	7.0	3.0
Lane Util. Factor	1.00	0.95		1.00	0.95					0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99					1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00					1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.97					1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)	1733	3539		1799	3271					1588	1588	1515
Flt Permitted	0.25	1.00		0.25	1.00					0.95	0.95	1.00
Satd. Flow (perm)	451	3539		478	3271					1588	1588	1515
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	507	1128	0	3	603	181	0	0	0	251	0	399
RTOR Reduction (vph)	0	0	0	0	19	0	0	0	0	0	0	158
Lane Group Flow (vph)	507	1128	0	3	765	0	0	0	0	125	126	241
Confl. Peds. (#/hr)	25		8	8		25	13					13
Heavy Vehicles (%)	4%	2%	0%	0%	5%	7%	0%	0%	0%	8%	0%	6%
Turn Type	pm+pt	NA		Perm	NA					Split	NA	pm+ov
Protected Phases	7	4			8			2		1	1	7
Permitted Phases	4			8			2					1
Actuated Green, G (s)	107.7	107.7		60.1	60.1					16.3	16.3	60.9
Effective Green, g (s)	107.7	107.7		60.1	60.1					16.3	16.3	60.9
Actuated g/C Ratio	0.78	0.78		0.44	0.44					0.12	0.12	0.44
Clearance Time (s)	3.0	7.0		7.0	7.0					7.0	7.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)	766	2761		208	1424					187	187	668
v/s Ratio Prot	c0.21	0.32			0.23					0.08	c0.08	0.12
v/s Ratio Perm	c0.30			0.01								0.04
v/c Ratio	0.66	0.41		0.01	0.54					0.67	0.67	0.36
Uniform Delay, d1	12.4	4.9		22.1	28.7					58.3	58.3	25.6
Progression Factor	1.00	1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2	2.2	0.4		0.1	1.5					8.7	9.2	0.3
Delay (s)	14.6	5.3		22.3	30.2					67.0	67.5	25.9
Level of Service	B	A		C	C					E	E	C
Approach Delay (s)		8.2			30.1			0.0			41.9	
Approach LOS		A			C			A			D	
Intersection Summary												
HCM 2000 Control Delay		21.0								C		
HCM 2000 Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		138.0						24.0				
Intersection Capacity Utilization		75.0%								D		
Analysis Period (min)		15										
c Critical Lane Group												

Lanes and Geometrics

4: Montbeck Cr/West Ave & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↪	↪	↩	↩↪	↪	↩	↩↪	↪	↩	↩↪	↪
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999			0.999			0.858			0.929	
Flt Protected	0.950			0.950			0.950				0.977	
Satd. Flow (prot)	1770	3536	0	1610	3387	0	1770	1598	0	0	1691	0
Flt Permitted	0.950			0.950			0.950				0.977	
Satd. Flow (perm)	1770	3536	0	1610	3387	0	1770	1598	0	0	1691	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		137.2			226.1			93.9			87.4	
Travel Time (s)		9.9			16.3			6.8			6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis

4: Montbeck Cr/West Ave & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↪	↪	↩	↩↪	↪	↩	↩↪	↪	↩	↩↪	↪
Traffic Volume (veh/h)	10	1393	5	18	587	5	8	2	36	10	0	11
Future Volume (Veh/h)	10	1393	5	18	587	5	8	2	36	10	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	1393	5	18	587	5	8	2	36	10	0	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWTL			TWTL							
Median storage (veh)		2			2							
Upstream signal (m)		137			226							
pX, platoon unblocked				0.89			0.89	0.89	0.89	0.89	0.89	
vC, conflicting volume	592			1398			1756	2044	699	1379	2044	296
vC1, stage 1 conf vol							1416	1416		626	626	
vC2, stage 2 conf vol							340	628		754	1418	
vCu, unblocked vol	592			1208			1609	1930	426	1187	1930	296
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			96			95	99	93	97	100	98
cM capacity (veh/h)	980			512			160	197	515	310	184	700
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1			
Volume Total	10	929	469	12	300	298	8	38	21			
Volume Left	10	0	0	12	6	0	8	0	10			
Volume Right	0	0	5	0	0	5	0	36	11			
cSH	980	1700	1700	512	512	1700	160	475	438			
Volume to Capacity	0.01	0.55	0.28	0.04	0.04	0.18	0.05	0.08	0.05			
Queue Length 95th (m)	0.2	0.0	0.0	0.9	0.9	0.0	1.3	2.1	1.2			
Control Delay (s)	8.7	0.0	0.0	12.3	0.8	0.0	28.7	13.2	13.6			
Lane LOS	A			B	A		D	B	B			
Approach Delay (s)	0.1			0.6			15.9		13.6			
Approach LOS							C		B			
Intersection Summary												
Average Delay				0.7								
Intersection Capacity Utilization				53.2%			ICU Level of Service		A			
Analysis Period (min)				15								

Lanes and Geometrics

5: East Avenue & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩	↩	↩	↩↩	↩	↩	↩	↩	↩	↩	↩
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.94		0.94	1.00	0.99		1.00	0.98		
Frt			0.850			0.850		0.865			0.862	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3476	1566	1785	3380	1566	1750	1612	0	1785	1630	0
Flt Permitted	0.359			0.199			0.755			0.755		
Satd. Flow (perm)	669	3476	1478	374	3380	1478	1384	1612	0	1416	1630	0
Right Turn on Red			Yes			Yes		Yes			Yes	
Satd. Flow (RTOR)			45			45		9			11	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		226.1			305.9			335.9			178.2	
Travel Time (s)		16.3			22.0			24.2			12.8	

Intersection Summary

Area Type: Other

Timings

5: East Avenue & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↩	↩↩	↩	↩	↩↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	12	1199	66	16	710	9	19	1	6	1
Future Volume (vph)	12	1199	66	16	710	9	19	1	6	1
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		4			8			2		6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	4	4	4	8	8	8	2	2	6	6
Switch Phase										
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	68.0	68.0	68.0	68.0	68.0	68.0	52.0	52.0	52.0	52.0
Total Split (%)	56.7%	56.7%	56.7%	56.7%	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0	8.0	8.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	106.3	106.3	106.3	106.3	106.3	106.3	8.5	8.5	8.5	8.5
Actuated g/C Ratio	0.89	0.89	0.89	0.89	0.89	0.89	0.07	0.07	0.07	0.07
v/c Ratio	0.02	0.42	0.05	0.05	0.26	0.01	0.22	0.08	0.07	0.10
Control Delay	2.3	2.9	1.2	2.9	2.2	0.1	57.8	29.6	53.2	28.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.3	2.9	1.2	2.9	2.2	0.1	57.8	29.6	53.2	28.0
LOS	A	A	A	A	A	A	E	C	D	C
Approach Delay		2.8			2.2			48.7		37.3
Approach LOS		A			A			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 3.5

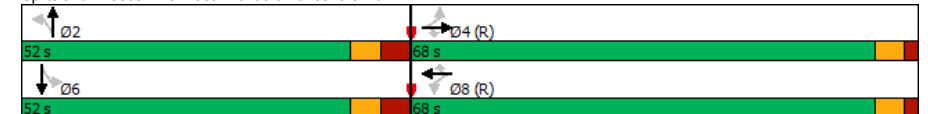
Intersection LOS: A

Intersection Capacity Utilization 52.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E



Queues

5: East Avenue & Lakeshore Rd E

08/04/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT		
Lane Group Flow (vph)	13	1303	72	17	772	10	21	10	7	12		
v/c Ratio	0.02	0.42	0.05	0.05	0.26	0.01	0.22	0.08	0.07	0.10		
Control Delay	2.3	2.9	1.2	2.9	2.2	0.1	57.8	29.6	53.2	28.0		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	2.3	2.9	1.2	2.9	2.2	0.1	57.8	29.6	53.2	28.0		
Queue Length 50th (m)	0.5	38.9	1.0	0.6	16.5	0.0	5.0	0.2	1.7	0.2		
Queue Length 95th (m)	1.7	53.3	3.8	2.3	24.2	0.2	13.5	5.9	6.6	6.6		
Internal Link Dist (m)		202.1			281.9			311.9		154.2		
Turn Bay Length (m)	72.0		45.0	50.0		20.0	20.0		45.0			
Base Capacity (vph)	593	3079	1314	331	2995	1314	507	596	519	604		
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.02	0.42	0.05	0.05	0.26	0.01	0.04	0.02	0.01	0.02		
Intersection Summary												

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

08/04/2023

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	12	1199	66	16	710	9	19	1	8	6	1	10	
Future Volume (vph)	12	1199	66	16	710	9	19	1	8	6	1	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0	8.0	8.0	8.0	8.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.94	1.00	0.99	1.00	1.00	0.98	1.00	
Flpb, ped/bikes	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	1.00	1.00	0.86	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1763	3476	1478	1776	3380	1478	1741	1612	1782	1631	1782	1631	
Flt Permitted	0.36	1.00	1.00	0.20	1.00	1.00	0.75	1.00	0.75	1.00	0.75	1.00	
Satd. Flow (perm)	666	3476	1478	373	3380	1478	1384	1612	1416	1631	1416	1631	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	13	1303	72	17	772	10	21	1	9	7	1	11	
RTOR Reduction (vph)	0	0	7	0	0	2	0	9	0	0	11	0	
Lane Group Flow (vph)	13	1303	65	17	772	8	21	1	0	7	1	0	
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3	
Heavy Vehicles (%)	0%	5%	2%	0%	8%	2%	2%	0%	2%	0%	0%	0%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2			6			
Actuated Green, G (s)	100.7	100.7	100.7	100.7	100.7	100.7	5.3	5.3		5.3	5.3		
Effective Green, g (s)	100.7	100.7	100.7	100.7	100.7	100.7	5.3	5.3		5.3	5.3		
Actuated g/C Ratio	0.84	0.84	0.84	0.84	0.84	0.84	0.04	0.04		0.04	0.04		
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0		8.0	8.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	558	2916	1240	313	2836	1240	61	71		62	72		
v/s Ratio Prot		c0.37			0.23			0.00			0.00		
v/s Ratio Perm	0.02		0.04	0.05		0.01	c0.02			0.00			
v/c Ratio	0.02	0.45	0.05	0.05	0.27	0.01	0.34	0.02		0.11	0.02		
Uniform Delay, d1	1.6	2.5	1.6	1.6	2.0	1.6	55.7	54.9		55.1	54.9		
Progression Factor	1.00	1.00	1.00	1.09	1.03	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.5	0.1	0.3	0.2	0.0	3.4	0.1		0.8	0.1		
Delay (s)	1.7	3.0	1.7	2.1	2.3	1.6	59.0	55.0		55.9	55.0		
Level of Service	A	A	A	A	A	A	E	D		E	D		
Approach Delay (s)		2.9			2.3			57.7			55.3		
Approach LOS		A			A			E			E		
Intersection Summary													
HCM 2000 Control Delay	3.9			HCM 2000 Level of Service					A				
HCM 2000 Volume to Capacity ratio	0.44												
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					14.0				
Intersection Capacity Utilization	52.9%			ICU Level of Service					A				
Analysis Period (min)	15												
c Critical Lane Group													

Lanes and Geometrics

6: Alexandra Ave & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			0.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987			0.996			0.900			0.913	
Flt Protected	0.950			0.950				0.990			0.989	
Satd. Flow (prot)	1770	3493	0	1770	3525	0	0	1660	0	0	1682	0
Flt Permitted	0.950			0.950				0.990			0.989	
Satd. Flow (perm)	1770	3493	0	1770	3525	0	0	1660	0	0	1682	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		305.9			65.1			145.2			233.9	
Travel Time (s)		22.0			4.7			10.5			16.8	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis

6: Alexandra Ave & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (veh/h)	30	1263	119	80	848	25	39	10	140	12	8	36
Future Volume (Veh/h)	30	1263	119	80	848	25	39	10	140	12	8	36
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	30	1263	119	80	848	25	39	10	140	12	8	36
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWTL			TWTL							
Median storage (veh)		2			2							
Upstream signal (m)		306			65							
pX, platoon unblocked	0.97			0.91			0.93	0.93	0.91	0.93	0.93	0.97
vC, conflicting volume	873			1382			2006	2416	691	1857	2462	436
vC1, stage 1 conf vol							1382	1382		1020	1020	
vC2, stage 2 conf vol							624	1033		836	1442	
vCu, unblocked vol	796			1219			1757	2199	458	1596	2250	344
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			84			74	94	72	92	93	94
cM capacity (veh/h)	793			516			149	160	499	145	112	629
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	30	842	540	80	565	308	189	56				
Volume Left	30	0	0	80	0	0	39	12				
Volume Right	0	0	119	0	0	25	140	36				
cSH	793	1700	1700	516	1700	1700	312	265				
Volume to Capacity	0.04	0.50	0.32	0.16	0.33	0.18	0.60	0.21				
Queue Length 95th (m)	0.9	0.0	0.0	4.4	0.0	0.0	29.6	6.2				
Control Delay (s)	9.7	0.0	0.0	13.3	0.0	0.0	32.7	22.2				
Lane LOS	A			B			D	C				
Approach Delay (s)	0.2			1.1			32.7	22.2				
Approach LOS							D	C				
Intersection Summary												
Average Delay				3.4								
Intersection Capacity Utilization				68.1%			ICU Level of Service			C		
Analysis Period (min)				15								

Lanes and Geometrics

7: Lakefront Promanade & Lakeshore Rd E

08/04/2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↑	↓
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	35.0		0.0	0.0
Storage Lanes		1	1		1	0
Taper Length (m)			7.5		0.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.97	1.00		0.98	
Frt		0.850			0.938	
Flt Protected			0.950		0.974	
Satd. Flow (prot)	3438	1482	1719	3343	1398	0
Flt Permitted			0.231		0.974	
Satd. Flow (perm)	3438	1442	418	3343	1381	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		62			22	
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	331.7	
Travel Time (s)	4.7			19.6	23.9	

Intersection Summary

Area Type: Other

Timings

7: Lakefront Promanade & Lakeshore Rd E

08/04/2023

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↑↑	↑	↓	↑↑	↑
Traffic Volume (vph)	1040	55	20	605	23
Future Volume (vph)	1040	55	20	605	23
Turn Type	NA	Perm	Perm	NA	Perm
Protected Phases	4			8	
Permitted Phases		4	8		2
Detector Phase	4	4	8	8	2
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	25.0
Total Split (s)	88.0	88.0	88.0	88.0	32.0
Total Split (%)	73.3%	73.3%	73.3%	73.3%	26.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0

Lead/Lag

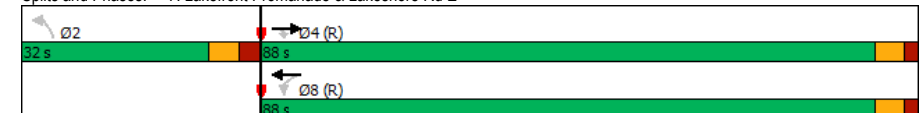
Lead-Lag Optimize?

Recall Mode	C-Max	C-Max	C-Max	C-Max	None
Act Effct Green (s)	102.6	102.6	102.6	102.6	8.1
Actuated g/C Ratio	0.86	0.86	0.86	0.86	0.07
v/c Ratio	0.40	0.05	0.06	0.24	0.42
Control Delay	1.7	0.2	3.1	3.5	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	1.7	0.2	3.1	3.5	44.4
LOS	A	A	A	A	D
Approach Delay	1.6			3.5	44.4
Approach LOS	A			A	D

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.42
 Intersection Signal Delay: 3.3
 Intersection Capacity Utilization 45.4%
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promanade & Lakeshore Rd E



Queues

7: Lakefront Promenade & Lakeshore Rd E

08/04/2023

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	1169	62	22	680	48
v/c Ratio	0.40	0.05	0.06	0.24	0.42
Control Delay	1.7	0.2	3.1	3.5	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	1.7	0.2	3.1	3.5	44.4
Queue Length 50th (m)	11.7	0.0	1.6	35.6	6.3
Queue Length 95th (m)	14.6	0.1	3.0	22.9	18.2
Internal Link Dist (m)	41.1			248.7	307.7
Turn Bay Length (m)			35.0		
Base Capacity (vph)	2938	1241	357	2857	305
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.40	0.05	0.06	0.24	0.16
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

08/04/2023

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	
Traffic Volume (vph)	1040	55	20	605	23	20
Future Volume (vph)	1040	55	20	605	23	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	7.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frpb, ped/bikes	1.00	0.97	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Frt	1.00	0.85	1.00	1.00	0.94	
Flt Protected	1.00	1.00	0.95	1.00	0.97	
Satd. Flow (prot)	3438	1442	1717	3343	1381	
Flt Permitted	1.00	1.00	0.23	1.00	0.97	
Satd. Flow (perm)	3438	1442	418	3343	1381	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	1169	62	22	680	26	22
RTOR Reduction (vph)	0	10	0	0	21	0
Lane Group Flow (vph)	1169	52	22	680	27	0
Confl. Peds. (#/hr)		2	2		11	5
Heavy Vehicles (%)	5%	9%	5%	8%	17%	30%
Turn Type	NA	Perm	Perm	NA	Perm	
Protected Phases	4			8		
Permitted Phases		4	8		2	
Actuated Green, G (s)	100.0	100.0	100.0	100.0	7.0	
Effective Green, g (s)	100.0	100.0	100.0	100.0	7.0	
Actuated g/C Ratio	0.83	0.83	0.83	0.83	0.06	
Clearance Time (s)	6.0	6.0	6.0	6.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2865	1201	348	2785	80	
v/s Ratio Prot	c0.34			0.20		
v/s Ratio Perm		0.04	0.05		c0.02	
v/c Ratio	0.41	0.04	0.06	0.24	0.34	
Uniform Delay, d1	2.5	1.7	1.8	2.1	54.3	
Progression Factor	0.49	0.15	1.12	1.47	1.00	
Incremental Delay, d2	0.4	0.1	0.3	0.2	2.5	
Delay (s)	1.7	0.3	2.3	3.3	56.8	
Level of Service	A	A	A	A	E	
Approach Delay (s)	1.6			3.3	56.8	
Approach LOS	A			A	E	
Intersection Summary						
HCM 2000 Control Delay		3.5		HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio		0.40				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)	13.0	
Intersection Capacity Utilization		45.4%		ICU Level of Service	A	
Analysis Period (min)		15				
c Critical Lane Group						

Lanes and Geometrics

8: Hydro Rd & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩		↩	↩↩		↩	↩			↩↩	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.996						0.850			0.890	
Flt Protected	0.950			0.950			0.950				0.991	
Satd. Flow (prot)	1770	3395	0	1770	3343	0	1770	1583	0	0	1643	0
Flt Permitted	0.950			0.950			0.950				0.991	
Satd. Flow (perm)	1770	3395	0	1770	3343	0	1770	1583	0	0	1643	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			386.1			191.6	
Travel Time (s)		16.0			14.1			27.8			13.8	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

08/04/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩		↩	↩↩		↩	↩			↩↩	
Traffic Volume (veh/h)	3	1021	28	52	673	0	5	0	27	2	0	9
Future Volume (Veh/h)	3	1021	28	52	673	0	5	0	27	2	0	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	3	1021	28	52	673	0	5	0	27	2	0	9
Pedestrians		1						4			2	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage (veh)		2			2							
Upstream signal (m)		223			195							
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	675			1053			1496	1824	528	1322	1838	340
vC1, stage 1 conf vol							1045	1045		779	779	
vC2, stage 2 conf vol							450	779		544	1059	
vCu, unblocked vol	675			914			1388	1740	352	1203	1755	340
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			92			98	100	95	99	100	99
cM capacity (veh/h)	911			690			247	253	599	286	224	655
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1			
Volume Total	3	681	368	52	449	224	5	27	11			
Volume Left	3	0	0	52	0	0	5	0	2			
Volume Right	0	0	28	0	0	0	0	27	9			
cSH	911	1700	1700	690	1700	1700	247	599	531			
Volume to Capacity	0.00	0.40	0.22	0.08	0.26	0.13	0.02	0.05	0.02			
Queue Length 95th (m)	0.1	0.0	0.0	2.0	0.0	0.0	0.5	1.1	0.5			
Control Delay (s)	9.0	0.0	0.0	10.6	0.0	0.0	19.9	11.3	11.9			
Lane LOS	A			B			C	B	B			
Approach Delay (s)	0.0			0.8			12.6		11.9			
Approach LOS							B		B			
Intersection Summary												
Average Delay				0.6								
Intersection Capacity Utilization				45.8%			ICU Level of Service		A			
Analysis Period (min)				15								

Lanes and Geometrics

9: Lakeshore Rd E & Haig Blvd

08/04/2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	50.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	7.5				0.0	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor	1.00		1.00	0.99		
Frt			0.994		0.943	
Flt Protected	0.950				0.972	
Satd. Flow (prot)	1719	3438	3404	0	1692	0
Flt Permitted	0.266				0.972	
Satd. Flow (perm)	479	3438	3404	0	1690	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			9		28	
Link Speed (k/h)		50	50		50	
Link Distance (m)		195.3	622.7		883.5	
Travel Time (s)		14.1	44.8		63.6	

Intersection Summary

Area Type: Other

Timings

9: Lakeshore Rd E & Haig Blvd

08/04/2023

Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	19	1209	923	35
Future Volume (vph)	19	1209	923	35
Turn Type	Perm	NA	NA	Perm
Protected Phases		4	8	
Permitted Phases	4			6
Detector Phase	4	4	8	6
Switch Phase				
Minimum Initial (s)	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	25.0
Total Split (s)	90.0	90.0	90.0	30.0
Total Split (%)	75.0%	75.0%	75.0%	25.0%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0

Lead/Lag

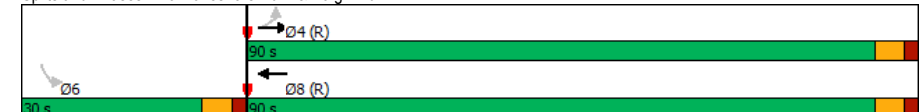
Lead-Lag Optimize?

Recall Mode	C-Max	C-Max	C-Max	None
Act Effct Green (s)	102.8	102.8	102.8	9.2
Actuated g/C Ratio	0.86	0.86	0.86	0.08
v/c Ratio	0.05	0.45	0.36	0.43
Control Delay	2.5	3.0	2.1	41.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.5	3.0	2.1	41.4
LOS	A	A	A	D
Approach Delay		3.0	2.1	41.4
Approach LOS		A	A	D

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.45
 Intersection Signal Delay: 3.7
 Intersection Capacity Utilization 50.9%
 Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues

9: Lakeshore Rd E & Haig Blvd

08/04/2023

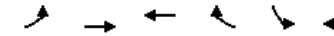


Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	21	1314	1048	66
v/c Ratio	0.05	0.45	0.36	0.43
Control Delay	2.5	3.0	2.1	41.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.5	3.0	2.1	41.4
Queue Length 50th (m)	0.7	32.8	18.4	9.2
Queue Length 95th (m)	2.4	50.0	24.0	23.3
Internal Link Dist (m)		171.3	598.7	859.5
Turn Bay Length (m)	50.0			
Base Capacity (vph)	410	2944	2917	360
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.05	0.45	0.36	0.18
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

08/04/2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕		↕	↕
Traffic Volume (vph)	19	1209	923	41	35	26
Future Volume (vph)	19	1209	923	41	35	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	0.99	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.94	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1710	3438	3403		1690	
Flt Permitted	0.27	1.00	1.00		0.97	
Satd. Flow (perm)	479	3438	3403		1690	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	1314	1003	45	38	28
RTOR Reduction (vph)	0	0	1	0	26	0
Lane Group Flow (vph)	21	1314	1047	0	40	0
Confl. Peds. (#/hr)	7			7	1	3
Heavy Vehicles (%)	5%	5%	5%	10%	3%	1%
Turn Type	Perm	NA	NA		Perm	
Protected Phases		4	8			
Permitted Phases	4				6	
Actuated Green, G (s)	100.4	100.4	100.4		7.6	
Effective Green, g (s)	100.4	100.4	100.4		7.6	
Actuated g/C Ratio	0.84	0.84	0.84		0.06	
Clearance Time (s)	6.0	6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	400	2876	2847		107	
v/s Ratio Prot		c0.38	0.31			
v/s Ratio Perm	0.04				c0.02	
v/c Ratio	0.05	0.46	0.37		0.37	
Uniform Delay, d1	1.7	2.6	2.3		53.9	
Progression Factor	0.97	0.90	0.73		1.00	
Incremental Delay, d2	0.2	0.5	0.3		2.2	
Delay (s)	1.9	2.8	2.0		56.1	
Level of Service	A	A	A		E	
Approach Delay (s)		2.8	2.0		56.1	
Approach LOS		A	A		E	
Intersection Summary						
HCM 2000 Control Delay			3.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.45			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			50.9%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes and Geometrics

1: Ogden Ave & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗			↖↗		↖	↖	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	28.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			0.99		0.99	0.98	
Frt				0.995				0.973			0.850	
Flt Protected	0.950							0.971		0.950		
Satd. Flow (prot)	1767	3614	0	1879	3554	0	0	1809	0	1785	1597	0
Flt Permitted	0.220							0.790		0.754		
Satd. Flow (perm)	408	3614	0	1879	3554	0	0	1463	0	1408	1597	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					7			1			116	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			89.7			246.5	
Travel Time (s)		19.6			16.0			6.5			17.7	

Intersection Summary

Area Type: Other

Timings

1: Ogden Ave & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	↖	→	↗	↖	↑	↗	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↖↗	↖↗		↖↗	↖	↖
Traffic Volume (vph)	69	787	1092	3	1	25	0
Future Volume (vph)	69	787	1092	3	1	25	0
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA
Protected Phases		4	8		2		6
Permitted Phases	4			2		6	
Detector Phase	4	4	8	2	2	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	25.0	25.0	25.0	25.0
Total Split (s)	90.0	90.0	90.0	30.0	30.0	30.0	30.0
Total Split (%)	75.0%	75.0%	75.0%	25.0%	25.0%	25.0%	25.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		7.0	7.0	7.0
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	102.8	102.8	102.8		7.9	7.9	7.9
Actuated g/C Ratio	0.86	0.86	0.86		0.07	0.07	0.07
v/c Ratio	0.21	0.27	0.40		0.05	0.29	0.21
Control Delay	3.2	1.8	6.8		48.0	60.8	2.3
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	3.2	1.8	6.8		48.0	60.8	2.3
LOS	A	A	A		D	E	A
Approach Delay		1.9	6.8		48.0		24.2
Approach LOS		A	A		D		C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.40

Intersection Signal Delay: 5.4

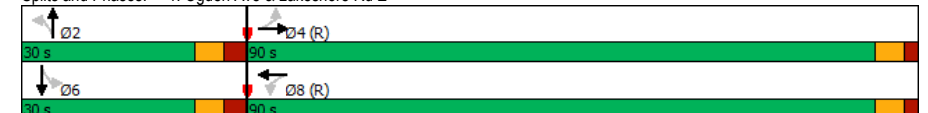
Intersection LOS: A

Intersection Capacity Utilization 57.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues

1: Ogden Ave & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

						
Lane Group	EBL	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	74	846	1216	5	27	45
v/c Ratio	0.21	0.27	0.40	0.05	0.29	0.21
Control Delay	3.2	1.8	6.8	48.0	60.8	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.2	1.8	6.8	48.0	60.8	2.3
Queue Length 50th (m)	2.4	14.5	82.2	1.0	6.5	0.0
Queue Length 95th (m)	4.6	17.5	83.4	5.1	16.2	0.0
Internal Link Dist (m)		248.7	198.5	65.7		222.5
Turn Bay Length (m)	28.0					
Base Capacity (vph)	349	3097	3046	281	269	399
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.27	0.40	0.02	0.10	0.11
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	787	0	0	1092	39	3	1	1	25	0	42
Future Volume (vph)	69	787	0	0	1092	39	3	1	1	25	0	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	6.0	6.0			6.0			7.0		7.0		
Lane Util. Factor	1.00	0.95			0.95			1.00		1.00		
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00		0.98
Flpb, ped/bikes	1.00	1.00			1.00			0.99		0.99		1.00
Frt	1.00	1.00			0.99			0.97		1.00		0.85
Flt Protected	0.95	1.00			1.00			0.97		0.95		1.00
Satd. Flow (prot)	1761	3614			3554			1798		1774		1597
Flt Permitted	0.22	1.00			1.00			0.79		0.75		1.00
Satd. Flow (perm)	407	3614			3554			1463		1409		1597
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	74	846	0	0	1174	42	3	1	1	27	0	45
RTOR Reduction (vph)	0	0	0	0	1	0	0	1	0	0	42	0
Lane Group Flow (vph)	74	846	0	0	1215	0	0	4	0	27	3	0
Confl. Peds. (#/hr)	7		2	2		7	5		3	3		5
Heavy Vehicles (%)	1%	1%	0%	0%	2%	3%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	100.2	100.2			100.2			6.8		6.8		6.8
Effective Green, g (s)	100.2	100.2			100.2			6.8		6.8		6.8
Actuated g/C Ratio	0.84	0.84			0.84			0.06		0.06		0.06
Clearance Time (s)	6.0	6.0			6.0			7.0		7.0		7.0
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0		3.0
Lane Grp Cap (vph)	339	3017			2967			82		79		90
v/s Ratio Prot		0.23			c0.34							0.00
v/s Ratio Perm	0.18							0.00		c0.02		
v/c Ratio	0.22	0.28			0.41			0.05		0.34		0.03
Uniform Delay, d1	2.0	2.1			2.5			53.5		54.4		53.5
Progression Factor	0.69	0.70			2.50			1.00		1.00		1.00
Incremental Delay, d2	1.5	0.2			0.4			0.3		2.6		0.1
Delay (s)	2.8	1.7			6.6			53.8		57.0		53.6
Level of Service	A	A			A			D		E		D
Approach Delay (s)		1.8			6.6			53.8				54.9
Approach LOS		A			A			D				D
Intersection Summary												
HCM 2000 Control Delay			6.3		HCM 2000 Level of Service					A		
HCM 2000 Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					13.0		
Intersection Capacity Utilization			57.3%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics

2: Dixie Rd & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱	↰	↰	↰↱	↰	↰	↰↱	↰	↰	↰	↰
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	1.00			1.00			0.96	
Frt		0.997			0.977						0.850	
Flt Protected	0.950			0.950				0.988		0.950		
Satd. Flow (prot)	1733	3567	0	1785	3489	0	0	1893	0	1767	1532	0
Flt Permitted	0.066			0.382				0.937		0.755		
Satd. Flow (perm)	120	3567	0	716	3489	0	0	1789	0	1405	1532	0
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		3			24						202	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings

2: Dixie Rd & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↰↱	↰	↰↱		↰↱	↰	↰
Traffic Volume (vph)	233	660	2	1198	1	3	278	0
Future Volume (vph)	233	660	2	1198	1	3	278	0
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	25.0	25.0	25.0	12.0	12.0	25.0	25.0
Total Split (s)	14.0	78.0	64.0	64.0	42.0	42.0	42.0	42.0
Total Split (%)	11.7%	65.0%	53.3%	53.3%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	80.8	76.8	57.5	57.5		29.2	29.2	29.2
Actuated g/C Ratio	0.67	0.64	0.48	0.48		0.24	0.24	0.24
v/c Ratio	0.82	0.31	0.01	0.89		0.01	0.86	0.61
Control Delay	50.0	13.8	17.0	35.8		31.0	66.4	18.9
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	50.0	13.8	17.0	35.8		31.0	66.4	18.9
LOS	D	B	B	D		C	E	B
Approach Delay		23.1		35.8		31.0		41.6
Approach LOS		C		D		C		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 33.0

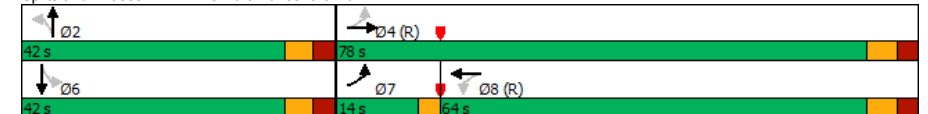
Intersection LOS: C

Intersection Capacity Utilization 90.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E



Queues

2: Dixie Rd & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

							
Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	245	709	2	1493	4	293	320
v/c Ratio	0.82	0.31	0.01	0.89	0.01	0.86	0.61
Control Delay	50.0	13.8	17.0	35.8	31.0	66.4	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.0	13.8	17.0	35.8	31.0	66.4	18.9
Queue Length 50th (m)	44.4	53.7	0.3	170.8	0.8	68.9	24.4
Queue Length 95th (m)	#105.8	73.7	1.8	207.0	3.6	98.9	52.8
Internal Link Dist (m)		598.7		375.1	69.6		268.8
Turn Bay Length (m)	44.0		25.0				
Base Capacity (vph)	300	2284	343	1683	521	409	589
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	0.82	0.31	0.01	0.89	0.01	0.72	0.54

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	233	660	13	2	1198	220	1	3	0	278	0	304
Future Volume (vph)	233	660	13	2	1198	220	1	3	0	278	0	304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.0		7.0	7.0			7.0		7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98			1.00		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1733	3567		1780	3488			1886		1767	1532	
Flt Permitted	0.07	1.00		0.38	1.00			0.94		0.76	1.00	
Satd. Flow (perm)	121	3567		716	3488			1790		1405	1532	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	245	695	14	2	1261	232	1	3	0	293	0	320
RTOR Reduction (vph)	0	1	0	0	13	0	0	0	0	0	153	0
Lane Group Flow (vph)	245	708	0	2	1481	0	0	4	0	293	167	0
Confl. Peds. (#/hr)	1		2	2		1	16					16
Heavy Vehicles (%)	3%	2%	0%	0%	2%	1%	1%	0%	0%	1%	0%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	76.8	76.8		57.5	57.5			29.2		29.2	29.2	
Effective Green, g (s)	76.8	76.8		57.5	57.5			29.2		29.2	29.2	
Actuated g/C Ratio	0.64	0.64		0.48	0.48			0.24		0.24	0.24	
Clearance Time (s)	3.0	7.0		7.0	7.0			7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	296	2282		343	1671			435		341	372	
v/s Ratio Prot	c0.11	0.20			c0.42						0.11	
v/s Ratio Perm	0.42			0.00				0.00		c0.21		
v/c Ratio	0.83	0.31		0.01	0.89			0.01		0.86	0.45	
Uniform Delay, d1	35.8	9.7		16.3	28.3			34.4		43.4	38.6	
Progression Factor	0.90	1.30		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	16.6	0.3		0.0	7.3			0.0		18.9	0.9	
Delay (s)	48.9	12.9		16.4	35.6			34.4		62.3	39.4	
Level of Service	D	B		B	D			C		E	D	
Approach Delay (s)		22.2			35.6			34.4			50.4	
Approach LOS		C			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			34.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			90.1%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics

3: Lakeshore Rd E & Cawthra Rd

Existing Conditions 2021

Afternoon Peak Hour

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗			↖↗		↖	↖↗	↖
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		0	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		0.99	0.99			0.99				
Frt					0.969			0.981				0.850
Flt Protected	0.950			0.950				0.986		0.950	0.950	
Satd. Flow (prot)	1733	3544	0	1785	3441	0	0	1858	0	1646	1683	1581
Flt Permitted	0.068			0.390				0.986		0.950	0.950	
Satd. Flow (perm)	124	3544	0	722	3441	0	0	1845	0	1646	1683	1581
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					30			1				438
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings

3: Lakeshore Rd E & Cawthra Rd

Existing Conditions 2021

Afternoon Peak Hour

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT	SBR				
Lane Configurations	↖	↖↗	↖	↖↗	↖↗	↖	↖↗	↖				
Traffic Volume (vph)	309	664	3	1087	4	199	0	425				
Future Volume (vph)	309	664	3	1087	4	199	0	425				
Turn Type	pm+pt	NA	Perm	NA	NA	Split	NA	Over				
Protected Phases	7	4		8	2	1	1	7				
Permitted Phases	4		8									
Detector Phase	7	4	8	8	2	1	1	7				
Switch Phase												
Minimum Initial (s)	5.0	7.0	8.0	8.0	7.0	5.0	5.0	5.0				
Minimum Split (s)	13.0	39.0	39.0	39.0	14.0	36.0	36.0	13.0				
Total Split (s)	19.0	69.0	50.0	50.0	15.0	36.0	36.0	19.0				
Total Split (%)	15.8%	57.5%	41.7%	41.7%	12.5%	30.0%	30.0%	15.8%				
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0				
All-Red Time (s)	0.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0				
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)	3.0	7.0	7.0	7.0	7.0	7.0	7.0	3.0				
Lead/Lag	Lead		Lag	Lag	Lead	Lag	Lag	Lead				
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None				
Act Effct Green (s)	94.4	90.4	61.3	61.3	7.0	12.8	12.8	26.1				
Actuated g/C Ratio	0.79	0.75	0.51	0.51	0.06	0.11	0.11	0.22				
v/c Ratio	0.71	0.26	0.01	0.80	0.06	0.58	0.58	0.64				
Control Delay	38.0	5.8	21.7	26.0	51.6	63.6	62.9	8.3				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	38.0	5.8	21.7	26.0	51.6	63.6	62.9	8.3				
LOS	D	A	C	C	D	E	E	A				
Approach Delay		16.0		25.9	51.6		25.8					
Approach LOS		B		C	D		C					

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 125

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 22.7

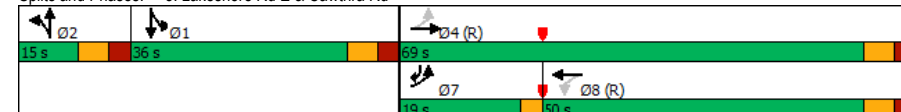
Intersection LOS: C

Intersection Capacity Utilization 90.5%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd



Queues
3: Lakeshore Rd E & Cawthra Rd

Existing Conditions 2021
Afternoon Peak Hour

	EBL	EBT	WBL	WBT	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	319	687	3	1410	7	102	103	438
v/c Ratio	0.71	0.26	0.01	0.80	0.06	0.58	0.58	0.64
Control Delay	38.0	5.8	21.7	26.0	51.6	63.6	62.9	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	5.8	21.7	26.0	51.6	63.6	62.9	8.3
Queue Length 50th (m)	53.1	20.7	0.3	66.4	1.4	25.7	26.0	0.0
Queue Length 95th (m)	91.5	50.6	m0.7	#242.7	6.5	43.7	43.8	28.3
Internal Link Dist (m)		297.4		113.2	71.8		931.9	
Turn Bay Length (m)	35.0		60.0			115.0		
Base Capacity (vph)	447	2669	368	1772	124	397	406	686
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	0.71	0.26	0.01	0.80	0.06	0.26	0.25	0.64

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
3: Lakeshore Rd E & Cawthra Rd

Existing Conditions 2021
Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	309	664	2	3	1087	280	2	4	1	199	0	425
Future Volume (vph)	309	664	2	3	1087	280	2	4	1	199	0	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.0		7.0	7.0			7.0		7.0	7.0	3.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	0.95	1.00
Satd. Flow (prot)	1733	3542		1759	3441			1858		1646	1683	1581
Flt Permitted	0.07	1.00		0.39	1.00			0.99		0.95	0.95	1.00
Satd. Flow (perm)	124	3542		723	3441			1858		1646	1683	1581
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	319	685	2	3	1121	289	2	4	1	205	0	438
RTOR Reduction (vph)	0	0	0	0	16	0	0	1	0	0	0	343
Lane Group Flow (vph)	319	687	0	3	1394	0	0	6	0	102	103	95
Confl. Peds. (#/hr)	49		20	20		49	23					23
Heavy Vehicles (%)	3%	3%	0%	0%	1%	3%	0%	0%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Split	NA		Split	NA	Over
Protected Phases	7	4			8		2	2		1	1	7
Permitted Phases	4			8								
Actuated Green, G (s)	84.8	84.8		55.7	55.7			1.4		12.8	12.8	26.1
Effective Green, g (s)	84.8	84.8		55.7	55.7			1.4		12.8	12.8	26.1
Actuated g/C Ratio	0.71	0.71		0.46	0.46			0.01		0.11	0.11	0.22
Clearance Time (s)	3.0	7.0		7.0	7.0			7.0		7.0	7.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	437	2503		335	1597			21		175	179	343
v/s Ratio Prot	c0.16	0.19			c0.41			c0.00		c0.06	0.06	0.06
v/s Ratio Perm	0.36			0.00								
v/c Ratio	0.73	0.27		0.01	0.87			0.29		0.58	0.58	0.28
Uniform Delay, d1	33.1	6.4		17.3	29.0			58.8		51.1	51.0	39.1
Progression Factor	1.00	1.00		1.05	0.86			1.00		1.00	1.00	1.00
Incremental Delay, d2	6.0	0.3		0.0	6.3			7.4		4.9	4.4	0.4
Delay (s)	39.1	6.7		18.2	31.3			66.2		55.9	55.4	39.5
Level of Service	D	A		B	C			E		E	E	D
Approach Delay (s)		17.0			31.2			66.2			44.7	
Approach LOS		B			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			29.5			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)		24.0				
Intersection Capacity Utilization			90.5%			ICU Level of Service		E				
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics

4: Montbeck Cr/West Ave & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩		↩	↩↩		↩	↩			↩↩	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.995			0.998			0.850			0.876	
Flt Protected	0.950			0.950			0.950				0.996	
Satd. Flow (prot)	1750	3482	0	1592	3346	0	1750	1566	0	0	1607	0
Flt Permitted	0.950			0.950			0.950				0.996	
Satd. Flow (perm)	1750	3482	0	1592	3346	0	1750	1566	0	0	1607	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		137.2			226.1			93.9			87.4	
Travel Time (s)		9.9			16.3			6.8			6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis

4: Montbeck Cr/West Ave & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩		↩	↩↩		↩	↩			↩↩	
Traffic Volume (veh/h)	18	1012	36	30	1407	21	6	0	23	1	0	11
Future Volume (Veh/h)	18	1012	36	30	1407	21	6	0	23	1	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	1012	36	30	1407	21	6	0	23	1	0	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWTL			TWTL							
Median storage (veh)		2			2							
Upstream signal (m)		137			226							
pX, platoon unblocked	0.87			0.93			0.90	0.90	0.93	0.90	0.90	0.87
vC, conflicting volume	1428			1048			1840	2554	524	2042	2562	714
vC1, stage 1 conf vol							1066	1066		1478	1478	
vC2, stage 2 conf vol							774	1488		565	1084	
vCu, unblocked vol	1194			911			1389	2179	350	1613	2187	374
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			96			97	100	96	99	100	98
cM capacity (veh/h)	505			695			229	155	604	145	161	543
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1			
Volume Total	18	675	373	20	714	724	6	23	12			
Volume Left	18	0	0	20	10	0	6	0	1			
Volume Right	0	0	36	0	0	21	0	23	11			
cSH	505	1700	1700	695	695	1700	229	604	442			
Volume to Capacity	0.04	0.40	0.22	0.04	0.04	0.43	0.03	0.04	0.03			
Queue Length 95th (m)	0.9	0.0	0.0	1.1	1.1	0.0	0.6	0.9	0.7			
Control Delay (s)	12.4	0.0	0.0	10.4	0.9	0.0	21.1	11.2	13.4			
Lane LOS	B			B	A		C	B	B			
Approach Delay (s)	0.2			0.6			13.2		13.4			
Approach LOS							B		B			
Intersection Summary												
Average Delay				0.6								
Intersection Capacity Utilization				50.7%			ICU Level of Service		A			
Analysis Period (min)				15								

Lanes and Geometrics

5: East Avenue & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.96	1.00		0.96	0.99	0.99		1.00	0.98	
Frt			0.850			0.850		0.914			0.880	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3614	1597	1785	3614	1597	1785	1741	0	1785	1659	0
Flt Permitted	0.166			0.289			0.754			0.731		
Satd. Flow (perm)	312	3614	1539	542	3614	1539	1401	1741	0	1369	1659	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			45			45		23			4	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		226.1			305.9			335.9			178.2	
Travel Time (s)		16.3			22.0			24.2			12.8	

Intersection Summary

Area Type: Other

Timings

5: East Avenue & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	11	870	28	8	1300	24	22	15	5	1
Future Volume (vph)	11	870	28	8	1300	24	22	15	5	1
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		4			8			2		6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	4	4	4	8	8	8	2	2	6	6
Switch Phase										
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0
Total Split (s)	68.0	68.0	68.0	68.0	68.0	68.0	52.0	52.0	52.0	52.0
Total Split (%)	56.7%	56.7%	56.7%	56.7%	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0	8.0	8.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	101.8	101.8	101.8	101.8	101.8	101.8	8.6	8.6	8.6	8.6
Actuated g/C Ratio	0.85	0.85	0.85	0.85	0.85	0.85	0.07	0.07	0.07	0.07
v/c Ratio	0.05	0.32	0.02	0.02	0.47	0.02	0.24	0.27	0.06	0.04
Control Delay	2.0	2.4	0.3	3.9	5.1	1.3	58.3	33.6	52.6	35.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	2.4	0.3	3.9	5.1	1.3	58.3	33.6	52.6	35.0
LOS	A	A	A	A	A	A	E	C	D	C
Approach Delay		2.4			5.0			42.8		44.6
Approach LOS		A			A			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 5.1

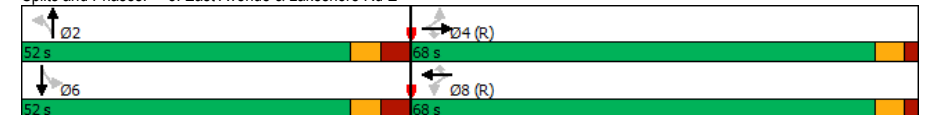
Intersection LOS: A

Intersection Capacity Utilization 56.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E



Queues Existing Conditions 2021
5: East Avenue & Lakeshore Rd E Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	12	967	31	9	1444	27	24	40	6	5
v/c Ratio	0.05	0.32	0.02	0.02	0.47	0.02	0.24	0.27	0.06	0.04
Control Delay	2.0	2.4	0.3	3.9	5.1	1.3	58.3	33.6	52.6	35.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	2.4	0.3	3.9	5.1	1.3	58.3	33.6	52.6	35.0
Queue Length 50th (m)	0.4	35.3	0.1	0.5	51.7	0.1	5.8	4.1	1.4	0.2
Queue Length 95th (m)	0.7	11.0	0.2	m1.7	81.2	2.4	14.7	15.3	5.9	4.4
Internal Link Dist (m)	202.1			281.9			311.9			154.2
Turn Bay Length (m)	72.0	45.0		50.0	20.0		20.0	45.0		
Base Capacity (vph)	264	3066	1312	459	3066	1312	513	652	501	610
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.32	0.02	0.02	0.47	0.02	0.05	0.06	0.01	0.01

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis Existing Conditions 2021
5: East Avenue & Lakeshore Rd E Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	11	870	28	8	1300	24	22	15	21	5	1	4
Future Volume (vph)	11	870	28	8	1300	24	22	15	21	5	1	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0		8.0	8.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.96	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1782	3614	1539	1778	3614	1539	1765	1740		1779	1659	
Flt Permitted	0.17	1.00	1.00	0.29	1.00	1.00	0.75	1.00		0.73	1.00	
Satd. Flow (perm)	312	3614	1539	541	3614	1539	1401	1740		1369	1659	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	12	967	31	9	1444	27	24	17	23	6	1	4
RTOR Reduction (vph)	0	0	5	0	0	5	0	22	0	0	4	0
Lane Group Flow (vph)	12	967	26	9	1444	22	24	18	0	6	1	0
Confl. Peds. (#/hr)	5		5	5		5	7		2	2		7
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4			8			2			6		
Permitted Phases	4		4	8		8	2		6		6	
Actuated Green, G (s)	99.0	99.0	99.0	99.0	99.0	99.0	7.0	7.0		7.0	7.0	
Effective Green, g (s)	99.0	99.0	99.0	99.0	99.0	99.0	7.0	7.0		7.0	7.0	
Actuated g/C Ratio	0.82	0.82	0.82	0.82	0.82	0.82	0.06	0.06		0.06	0.06	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0		8.0	8.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	2981	1269	446	2981	1269	81	101		79	96	
v/s Ratio Prot	0.27			c0.40			0.01			0.00		
v/s Ratio Perm	0.04		0.02	0.02		0.01	c0.02			0.00		
v/c Ratio	0.05	0.32	0.02	0.02	0.48	0.02	0.30	0.18		0.08	0.01	
Uniform Delay, d1	1.9	2.5	1.9	1.9	3.1	1.9	54.1	53.8		53.4	53.2	
Progression Factor	0.68	0.84	0.71	1.58	1.44	3.99	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.0	0.1	0.6	0.0	2.0	0.9		0.4	0.1	
Delay (s)	1.6	2.4	1.3	3.0	5.0	7.5	56.2	54.6		53.9	53.3	
Level of Service	A	A	A	A	A	A	E	D		D	D	
Approach Delay (s)	2.4			5.0			55.2			53.6		
Approach LOS	A			A			E			D		
Intersection Summary												
HCM 2000 Control Delay	5.4			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.47											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			14.0					
Intersection Capacity Utilization	56.7%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes and Geometrics

6: Alexandra Ave & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱	↱	↰	↰↱	↱	↰	↰↱	↱	↰	↰↱	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			0.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.992			0.996			0.913			0.913	
Flt Protected	0.950			0.950				0.983			0.984	
Satd. Flow (prot)	1750	3472	0	1750	3486	0	0	1653	0	0	1655	0
Flt Permitted	0.950			0.950				0.983			0.984	
Satd. Flow (perm)	1750	3472	0	1750	3486	0	0	1653	0	0	1655	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		305.9			65.1			145.2			233.9	
Travel Time (s)		22.0			4.7			10.5			16.8	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis

6: Alexandra Ave & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱	↱	↰	↰↱	↱	↰	↰↱	↱	↰	↰↱	↱
Traffic Volume (veh/h)	35	941	54	22	1543	43	24	1	45	13	1	25
Future Volume (Veh/h)	35	941	54	22	1543	43	24	1	45	13	1	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	35	941	54	22	1543	43	24	1	45	13	1	25
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWTL			TWTL							
Median storage (veh)		2			2							
Upstream signal (m)		306			65							
pX, platoon unblocked	0.91			0.96			0.93	0.93	0.96	0.93	0.93	0.91
vC, conflicting volume	1586			995			1879	2668	498	2194	2674	793
vC1, stage 1 conf vol							1038	1038		1608	1608	
vC2, stage 2 conf vol							841	1630		586	1065	
vCu, unblocked vol	1452			913			1609	2455	395	1948	2461	584
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			97			88	99	92	88	99	94
cM capacity (veh/h)	422			713			196	115	580	111	138	416
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	35	627	368	22	1029	557	70	39				
Volume Left	35	0	0	22	0	0	24	13				
Volume Right	0	0	54	0	0	43	45	25				
cSH	422	1700	1700	713	1700	1700	336	211				
Volume to Capacity	0.08	0.37	0.22	0.03	0.61	0.33	0.21	0.18				
Queue Length 95th (m)	2.2	0.0	0.0	0.8	0.0	0.0	6.2	5.3				
Control Delay (s)	14.3	0.0	0.0	10.2	0.0	0.0	18.5	25.9				
Lane LOS	B			B			C	D				
Approach Delay (s)	0.5			0.1			18.5	25.9				
Approach LOS							C	D				
Intersection Summary												
Average Delay				1.1								
Intersection Capacity Utilization			56.2%		ICU Level of Service			B				
Analysis Period (min)			15									

Lanes and Geometrics

7: Lakefront Promenade & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↑	↓
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	35.0		0.0	0.0
Storage Lanes		1	1		1	0
Taper Length (m)			7.5		0.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.96	1.00		0.98	
Frt		0.850			0.952	
Flt Protected			0.950		0.969	
Satd. Flow (prot)	3614	1174	1785	3579	1695	0
Flt Permitted			0.352		0.969	
Satd. Flow (perm)	3614	1132	658	3579	1682	0
Right Turn on Red		Yes			Yes	
Satd. Flow (RTOR)		15			21	
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	331.7	
Travel Time (s)	4.7			19.6	23.9	

Intersection Summary

Area Type: Other

Timings

7: Lakefront Promenade & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↑↑	↑	↓	↑↑	↑
Traffic Volume (vph)	747	14	8	1068	44
Future Volume (vph)	747	14	8	1068	44
Turn Type	NA	Perm	Perm	NA	Perm
Protected Phases	4			8	
Permitted Phases		4	8		2
Detector Phase	4	4	8	8	2
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	25.0
Total Split (s)	88.0	88.0	88.0	88.0	32.0
Total Split (%)	73.3%	73.3%	73.3%	73.3%	26.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0

Lead/Lag

Lead-Lag Optimize?

Recall Mode	C-Max	C-Max	C-Max	C-Max	Min
Act Effct Green (s)	97.9	97.9	97.9	97.9	9.1
Actuated g/C Ratio	0.82	0.82	0.82	0.82	0.08
v/c Ratio	0.27	0.02	0.01	0.39	0.48
Control Delay	1.4	0.2	1.6	2.2	48.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	1.4	0.2	1.6	2.2	48.7
LOS	A	A	A	A	D
Approach Delay	1.4			2.2	48.7
Approach LOS	A			A	D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 3.5

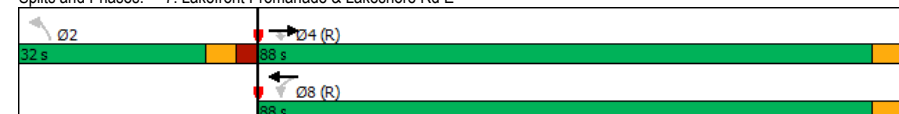
Intersection LOS: A

Intersection Capacity Utilization 46.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promenade & Lakeshore Rd E



Queues

7: Lakefront Promenade & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	786	15	8	1124	71
v/c Ratio	0.27	0.02	0.01	0.39	0.48
Control Delay	1.4	0.2	1.6	2.2	48.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	1.4	0.2	1.6	2.2	48.7
Queue Length 50th (m)	7.1	0.0	0.2	26.2	12.0
Queue Length 95th (m)	9.7	0.2	m0.7	26.7	26.7
Internal Link Dist (m)	41.1			248.7	307.7
Turn Bay Length (m)			35.0		
Base Capacity (vph)	2947	926	536	2918	367
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	0.02	0.01	0.39	0.19

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Existing Conditions 2021

Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↗
Traffic Volume (vph)	747	14	8	1068	44	24
Future Volume (vph)	747	14	8	1068	44	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	6.0	6.0	6.0	6.0	7.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	0.99	1.00	0.99	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	1.00	1.00	0.95	1.00	0.97	
Satd. Flow (prot)	3614	1132	1775	3579	1682	
Flt Permitted	1.00	1.00	0.35	1.00	0.97	
Satd. Flow (perm)	3614	1132	658	3579	1682	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	786	15	8	1124	46	25
RTOR Reduction (vph)	0	3	0	0	19	0
Lane Group Flow (vph)	786	12	8	1124	52	0
Confl. Peds. (#/hr)		5	5		6	6
Heavy Vehicles (%)	1%	36%	0%	2%	0%	4%
Turn Type	NA	Perm	Perm	NA	Perm	
Protected Phases	4			8		
Permitted Phases		4	8		2	
Actuated Green, G (s)	97.9	97.9	97.9	97.9	9.1	
Effective Green, g (s)	97.9	97.9	97.9	97.9	9.1	
Actuated g/C Ratio	0.82	0.82	0.82	0.82	0.08	
Clearance Time (s)	6.0	6.0	6.0	6.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2948	923	536	2919	127	
v/s Ratio Prot	0.22			c0.31		
v/s Ratio Perm		0.01	0.01		c0.03	
v/c Ratio	0.27	0.01	0.01	0.39	0.41	
Uniform Delay, d1	2.6	2.1	2.1	3.0	52.9	
Progression Factor	0.44	0.16	0.58	0.57	1.00	
Incremental Delay, d2	0.2	0.0	0.0	0.4	2.1	
Delay (s)	1.3	0.4	1.2	2.0	55.0	
Level of Service	A	A	A	A	D	
Approach Delay (s)	1.3			2.0	55.0	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			3.6		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.39			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	13.0
Intersection Capacity Utilization			46.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Existing Conditions 2021
Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰↱		↰	↰			↱↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999			0.999			0.850			0.919	
Flt Protected	0.950			0.950			0.950				0.980	
Satd. Flow (prot)	1750	3365	0	1750	3304	0	1750	1566	0	0	1659	0
Flt Permitted	0.950			0.950			0.950				0.980	
Satd. Flow (perm)	1750	3365	0	1750	3304	0	1750	1566	0	0	1659	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			386.1			191.6	
Travel Time (s)		16.0			14.1			27.8			13.8	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis
8: Hydro Rd & Lakeshore Rd E

Existing Conditions 2021
Afternoon Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰↱		↰	↰			↱↰	
Traffic Volume (veh/h)	3	844	6	3	1144	9	8	0	39	2	0	3
Future Volume (Veh/h)	3	844	6	3	1144	9	8	0	39	2	0	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	3	844	6	3	1144	9	8	0	39	2	0	3
Pedestrians		1						4			2	
Lane Width (m)		3.5						3.5			3.5	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh		2			2							
Upstream signal (m)		223			195							
pX, platoon unblocked	0.91			0.97			0.93	0.93	0.97	0.93	0.93	0.91
vC, conflicting volume	1155			854			1439	2018	429	1624	2016	580
vC1, stage 1 conf vol							857	857		1156	1156	
vC2, stage 2 conf vol							582	1161		467	860	
vCu, unblocked vol	976			781			1158	1782	341	1356	1780	344
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	94	99	100	99
cM capacity (veh/h)	639			802			306	241	631	227	239	592
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1			
Volume Total	3	563	287	3	763	390	8	39	5			
Volume Left	3	0	0	3	0	0	8	0	2			
Volume Right	0	0	6	0	0	9	0	39	3			
cSH	639	1700	1700	802	1700	1700	306	631	360			
Volume to Capacity	0.00	0.33	0.17	0.00	0.45	0.23	0.03	0.06	0.01			
Queue Length 95th (m)	0.1	0.0	0.0	0.1	0.0	0.0	0.6	1.6	0.3			
Control Delay (s)	10.7	0.0	0.0	9.5	0.0	0.0	17.1	11.1	15.1			
Lane LOS	B			A			C	B	C			
Approach Delay (s)	0.0			0.0			12.1		15.1			
Approach LOS							B		C			
Intersection Summary												
Average Delay				0.3								
Intersection Capacity Utilization				41.9%			ICU Level of Service		A			
Analysis Period (min)				15								

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Existing Conditions 2021
Afternoon Peak Hour

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	50.0			0.0	0.0	0.0
Storage Lanes	1			0	1	0
Taper Length (m)	7.5				0.0	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			1.00	0.98		
Frt			0.991	0.943		
Flt Protected	0.950			0.972		
Satd. Flow (prot)	1785	3579	3536	0	1711	0
Flt Permitted	0.155			0.972		
Satd. Flow (perm)	291	3579	3536	0	1693	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			12	20		
Link Speed (k/h)		50	50	50		
Link Distance (m)		195.3	622.7	883.5		
Travel Time (s)		14.1	44.8	63.6		

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

Existing Conditions 2021
Afternoon Peak Hour

Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	24	908	1400	26
Future Volume (vph)	24	908	1400	26
Turn Type	Perm	NA	NA	Prot
Protected Phases		4	8	6
Permitted Phases	4			
Detector Phase	4	4	8	6
Switch Phase				
Minimum Initial (s)	8.0	8.0	8.0	8.0
Minimum Split (s)	24.0	24.0	24.0	24.0
Total Split (s)	90.0	90.0	90.0	30.0
Total Split (%)	75.0%	75.0%	75.0%	25.0%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0

Lead/Lag

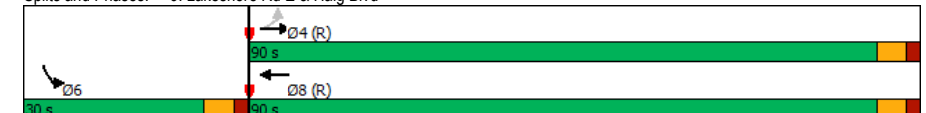
Lead-Lag Optimize?

Recall Mode	C-Max	C-Max	C-Max	None
Act Effct Green (s)	103.3	103.3	103.3	8.7
Actuated g/C Ratio	0.86	0.86	0.86	0.07
v/c Ratio	0.10	0.30	0.50	0.33
Control Delay	2.9	2.1	4.3	40.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.9	2.1	4.3	40.9
LOS	A	A	A	D
Approach Delay		2.1	4.3	40.9
Approach LOS		A	A	D

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.50
 Intersection Signal Delay: 4.1
 Intersection Capacity Utilization 58.7%
 Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues

9: Lakeshore Rd E & Haig Blvd

Existing Conditions 2021

Afternoon Peak Hour



Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	24	927	1515	47
v/c Ratio	0.10	0.30	0.50	0.33
Control Delay	2.9	2.1	4.3	40.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.9	2.1	4.3	40.9
Queue Length 50th (m)	0.7	16.0	44.1	6.5
Queue Length 95th (m)	2.8	28.2	77.3	18.8
Internal Link Dist (m)		171.3	598.7	859.5
Turn Bay Length (m)	50.0			
Base Capacity (vph)	250	3081	3046	358
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.10	0.30	0.50	0.13

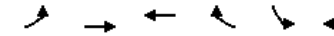
Intersection Summary

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Existing Conditions 2021

Afternoon Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↗	↗		↰	↗
Traffic Volume (vph)	24	908	1400	84	26	20
Future Volume (vph)	24	908	1400	84	26	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.7	3.5	3.5	3.5
Total Lost time (s)	6.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.94	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1777	3579	3538		1710	
Flt Permitted	0.16	1.00	1.00		0.97	
Satd. Flow (perm)	290	3579	3538		1710	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	24	927	1429	86	27	20
RTOR Reduction (vph)	0	0	2	0	19	0
Lane Group Flow (vph)	24	927	1513	0	28	0
Confl. Peds. (#/hr)	15			15	9	2
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	100.9	100.9	100.9		7.1	
Effective Green, g (s)	100.9	100.9	100.9		7.1	
Actuated g/C Ratio	0.84	0.84	0.84		0.06	
Clearance Time (s)	6.0	6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	243	3009	2974		101	
v/s Ratio Prot		0.26	c0.43		c0.02	
v/s Ratio Perm	0.08					
v/c Ratio	0.10	0.31	0.51		0.28	
Uniform Delay, d1	1.7	2.1	2.7		54.0	
Progression Factor	0.95	0.86	1.41		1.00	
Incremental Delay, d2	0.8	0.3	0.3		1.5	
Delay (s)	2.4	2.0	4.1		55.5	
Level of Service	A	A	A		E	
Approach Delay (s)		2.0	4.1		55.5	
Approach LOS		A	A		E	
Intersection Summary						
HCM 2000 Control Delay			4.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			58.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Lanes and Geometrics
1: Ogden Ave & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

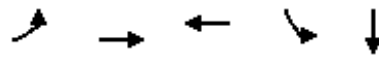
													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 								
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	
Grade (%)	0%				0%				0%				
Storage Length (m)	28.0	25.0		25.0	0.0		30.0	30.0		0.0	0.0		
Storage Lanes	1	1		1	0		1	0		1	0		
Taper Length (m)	7.5			7.5			7.5			0.0			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	0.99					0.99					1.00	0.99	
Frt					0.979								0.881
Flt Protected	0.950									0.950			
Satd. Flow (prot)	1750	3444	1842	1842	3288	0	1842	1883	1842	1750	1642	0	
Flt Permitted	0.950									0.950			
Satd. Flow (perm)	1738	3444	1842	1842	3288	0	1842	1883	1842	1747	1642	0	
Right Turn on Red				Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					18								46
Link Speed (k/h)	50				50				50				50
Link Distance (m)	272.7				222.5				142.3				246.5
Travel Time (s)	19.6				16.0				10.2				17.7

Intersection Summary

Area Type: Other

Timings
1: Ogden Ave & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour



Lane Group	EBL	EBT	WBT	SBL	SBT	Ø2	Ø3	Ø5
Lane Configurations								
Traffic Volume (vph)	200	1645	799	114	12			
Future Volume (vph)	200	1645	799	114	12			
Turn Type	Prot	NA	NA	pm+pt	NA			
Protected Phases	7	4	8	1	6	2	3	5
Permitted Phases				6				
Detector Phase	7	4	8	1	6			
Switch Phase								
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	9.0	34.0	34.0	11.0	9.0
Total Split (s)	26.0	75.0	61.0	9.0	34.0	34.0	12.0	9.0
Total Split (%)	20.0%	57.7%	46.9%	6.9%	26.2%	26%	9%	7%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0
All-Red Time (s)	3.0	2.0	2.0	1.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0			
Total Lost Time (s)	5.0	5.0	5.0	3.0	6.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	None	None	None	None
Act Effect Green (s)	21.1	108.0	81.9	14.0	11.0			
Actuated g/C Ratio	0.16	0.83	0.63	0.11	0.08			
v/c Ratio	0.70	0.57	0.45	0.61	0.32			
Control Delay	51.8	6.8	5.7	69.0	24.7			
Queue Delay	0.0	0.2	0.0	0.0	0.0			
Total Delay	51.8	7.0	5.7	69.0	24.7			
LOS	D	A	A	E	C			
Approach Delay		11.8	5.7		54.1			
Approach LOS		B	A		D			

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 12.4

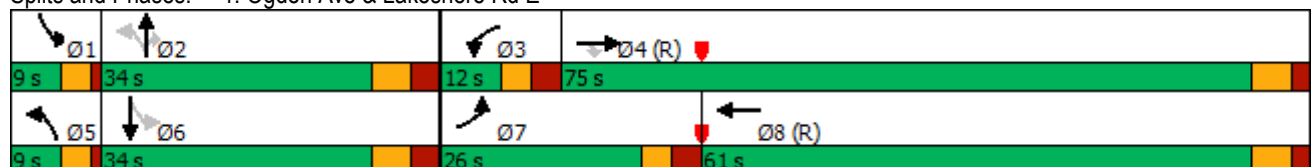
Intersection LOS: B

Intersection Capacity Utilization 76.3%

ICU Level of Service D

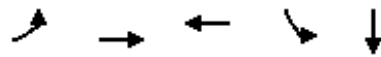
Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues
1: Ogden Ave & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour



Lane Group	EBL	EBT	WBT	SBL	SBT
Lane Group Flow (vph)	200	1645	931	114	58
v/c Ratio	0.70	0.57	0.45	0.61	0.32
Control Delay	51.8	6.8	5.7	69.0	24.7
Queue Delay	0.0	0.2	0.0	0.0	0.0
Total Delay	51.8	7.0	5.7	69.0	24.7
Queue Length 50th (m)	49.0	38.2	11.3	30.2	3.1
Queue Length 95th (m)	m77.2	155.0	62.8	48.6	16.6
Internal Link Dist (m)		248.7	198.5		222.5
Turn Bay Length (m)	28.0				
Base Capacity (vph)	309	2862	2079	187	389
Starvation Cap Reductn	0	392	0	0	0
Spillback Cap Reductn	0	98	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.65	0.67	0.45	0.61	0.15
Intersection Summary					
m Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	1645	0	0	799	132	0	0	0	114	12	46
Future Volume (vph)	200	1645	0	0	799	132	0	0	0	114	12	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0			5.0					3.0	6.0	
Lane Util. Factor	1.00	0.95			0.95					1.00	1.00	
Frpb, ped/bikes	1.00	1.00			0.99					1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00					1.00	1.00	
Frt	1.00	1.00			0.98					1.00	0.88	
Flt Protected	0.95	1.00			1.00					0.95	1.00	
Satd. Flow (prot)	1750	3444			3287					1750	1642	
Flt Permitted	0.95	1.00			1.00					0.95	1.00	
Satd. Flow (perm)	1750	3444			3287					1750	1642	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	1645	0	0	799	132	0	0	0	114	12	46
RTOR Reduction (vph)	0	0	0	0	7	0	0	0	0	0	42	0
Lane Group Flow (vph)	200	1645	0	0	924	0	0	0	0	114	16	0
Confl. Peds. (#/hr)	7		8	8		7	1		1	1		1
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt		Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	20.1	107.0			80.9					13.0	10.0	
Effective Green, g (s)	21.1	108.0			81.9					14.0	11.0	
Actuated g/C Ratio	0.16	0.83			0.63					0.11	0.08	
Clearance Time (s)	6.0	6.0			6.0					4.0	7.0	
Vehicle Extension (s)	3.0	3.0			3.0					3.0	3.0	
Lane Grp Cap (vph)	284	2861			2070					188	138	
v/s Ratio Prot	c0.11	c0.48			0.28					c0.07	0.01	
v/s Ratio Perm												
v/c Ratio	0.70	0.57			0.45					0.61	0.12	
Uniform Delay, d1	51.5	3.6			12.4					55.4	55.0	
Progression Factor	0.82	1.61			0.38					1.00	1.00	
Incremental Delay, d2	5.6	0.6			0.6					5.4	0.4	
Delay (s)	47.9	6.3			5.4					60.8	55.4	
Level of Service	D	A			A					E	E	
Approach Delay (s)		10.9			5.4		0.0				59.0	
Approach LOS		B			A		A				E	
Intersection Summary												
HCM 2000 Control Delay			11.9			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				19.0		
Intersection Capacity Utilization			76.3%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
2: Dixie Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.96		0.99			0.99	0.98
Frt		0.997				0.850						0.850
Flt Protected	0.950			0.950				0.950			0.953	
Satd. Flow (prot)	1653	3465	0	1785	3476	1536	0	1825	0	0	1813	1465
Flt Permitted	0.950			0.950				0.529			0.726	
Satd. Flow (perm)	1642	3465	0	1778	3476	1478	0	1011	0	0	1371	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				134						27
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings
2: Dixie Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	645	1092	9	726	171	3	0	151	1	374
Future Volume (vph)	645	1092	9	726	171	3	0	151	1	374
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA	pm+ov
Protected Phases	7	4	3	8			2		6	7
Permitted Phases					8	2		6		6
Detector Phase	7	4	3	8	8	2	2	6	6	7
Switch Phase										
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0
Minimum Split (s)	12.0	24.0	11.0	24.0	24.0	34.0	34.0	34.0	34.0	12.0
Total Split (s)	56.0	85.0	11.0	40.0	40.0	34.0	34.0	34.0	34.0	56.0
Total Split (%)	43.1%	65.4%	8.5%	30.8%	30.8%	26.2%	26.2%	26.2%	26.2%	43.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0		6.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	55.6	96.2	6.8	37.8	37.8		20.6		20.6	77.2
Actuated g/C Ratio	0.43	0.74	0.05	0.29	0.29		0.16		0.16	0.59
v/c Ratio	0.91	0.43	0.10	0.72	0.33		0.02		0.70	0.43
Control Delay	47.2	5.2	61.2	46.9	12.0		42.3		68.2	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	47.2	5.2	61.2	46.9	12.0		42.3		68.2	12.3
LOS	D	A	E	D	B		D		E	B
Approach Delay		20.6		40.5			42.3		28.4	
Approach LOS		C		D			D		C	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 27.5

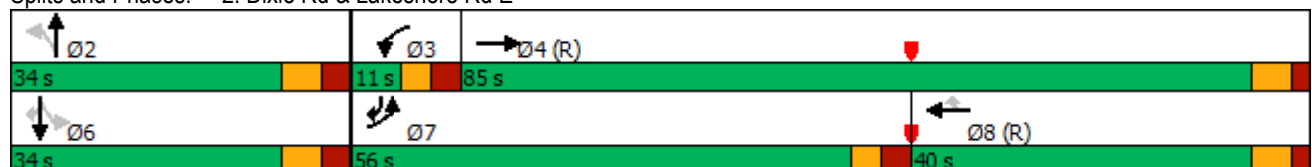
Intersection LOS: C

Intersection Capacity Utilization 79.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E

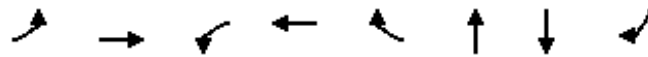


Queues

Scenario 1 2500 Units 2031

2: Dixie Rd & Lakeshore Rd E

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	645	1112	9	726	171	3	152	374
v/c Ratio	0.91	0.43	0.10	0.72	0.33	0.02	0.70	0.43
Control Delay	47.2	5.2	61.2	46.9	12.0	42.3	68.2	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	5.2	61.2	46.9	12.0	42.3	68.2	12.3
Queue Length 50th (m)	115.1	42.9	2.4	96.6	7.6	0.7	39.3	38.8
Queue Length 95th (m)	#251.8	89.1	8.6	119.4	27.0	3.5	59.9	59.2
Internal Link Dist (m)		598.7		375.1		69.6	268.8	
Turn Bay Length (m)	44.0		25.0		30.0			
Base Capacity (vph)	707	2565	92	1016	526	217	295	876
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	0.91	0.43	0.10	0.71	0.33	0.01	0.52	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	645	1092	20	9	726	171	3	0	0	151	1	374
Future Volume (vph)	645	1092	20	9	726	171	3	0	0	151	1	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		6.0			6.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96		1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.99			0.99	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95			0.95	1.00
Satd. Flow (prot)	1653	3466		1785	3476	1478		1815			1799	1458
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.53			0.73	1.00
Satd. Flow (perm)	1653	3466		1785	3476	1478		1011			1372	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	645	1092	20	9	726	171	3	0	0	151	1	374
RTOR Reduction (vph)	0	1	0	0	0	95	0	0	0	0	0	11
Lane Group Flow (vph)	645	1111	0	9	726	76	0	3	0	0	152	363
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Heavy Vehicles (%)	8%	5%	2%	0%	5%	4%	0%	0%	0%	1%	0%	9%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases						8	2			6		6
Actuated Green, G (s)	54.6	90.4		1.0	36.8	36.8		19.6			19.6	74.2
Effective Green, g (s)	55.6	91.4		2.0	37.8	37.8		20.6			20.6	76.2
Actuated g/C Ratio	0.43	0.70		0.02	0.29	0.29		0.16			0.16	0.59
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		7.0			7.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	706	2436		27	1010	429		160			217	854
v/s Ratio Prot	c0.39	0.32		0.01	c0.21							0.18
v/s Ratio Perm						0.05		0.00			c0.11	0.07
v/c Ratio	0.91	0.46		0.33	0.72	0.18		0.02			0.70	0.42
Uniform Delay, d1	34.9	8.4		63.3	41.3	34.5		46.2			51.8	14.8
Progression Factor	0.87	0.61		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	13.9	0.5		7.2	4.4	0.9		0.0			9.8	0.3
Delay (s)	44.4	5.7		70.5	45.7	35.4		46.2			61.5	15.2
Level of Service	D	A		E	D	D		D			E	B
Approach Delay (s)		19.9			44.0			46.2			28.6	
Approach LOS		B			D			D			C	
Intersection Summary												
HCM 2000 Control Delay			28.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			79.3%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
3: Lakeshore Rd E & Cawthra Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00			1.00		0.96						0.97
Frt						0.850						0.850
Flt Protected	0.950			0.950						0.950	0.953	
Satd. Flow (prot)	1716	3579	0	1785	3476	1493	0	1921	0	1570	1611	1507
Flt Permitted	0.120			0.288						0.950	0.950	
Satd. Flow (perm)	216	3579	0	539	3476	1430	0	1921	0	1570	1606	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						272						25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings
3: Lakeshore Rd E & Cawthra Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT	SBR	Ø2
Lane Configurations									
Traffic Volume (vph)	482	994	3	892	765	587	2	379	
Future Volume (vph)	482	994	3	892	765	587	2	379	
Turn Type	pm+pt	NA	Perm	NA	pm+ov	Prot	NA	pm+ov	
Protected Phases	7	4		8	1	1	6	7	2
Permitted Phases	4		8		8			6	
Detector Phase	7	4	8	8	1	1	6	7	
Switch Phase									
Minimum Initial (s)	5.0	7.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0
Minimum Split (s)	11.0	38.0	38.0	38.0	14.0	14.0	38.0	11.0	11.0
Total Split (s)	39.0	84.0	45.0	45.0	35.0	35.0	46.0	39.0	11.0
Total Split (%)	30.0%	64.6%	34.6%	34.6%	26.9%	26.9%	35.4%	30.0%	8%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	
Lead/Lag	Lead		Lag	Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	Max	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	82.0	79.0	42.6	42.6	83.6	41.0	41.0	78.4	
Actuated g/C Ratio	0.63	0.61	0.33	0.33	0.64	0.32	0.32	0.60	
v/c Ratio	0.90	0.46	0.02	0.78	0.74	0.59	0.58	0.42	
Control Delay	53.1	14.7	43.3	47.8	9.1	43.3	42.9	13.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	53.1	14.7	43.3	47.8	9.1	43.3	42.9	13.0	
LOS	D	B	D	D	A	D	D	B	
Approach Delay		27.2		30.0			31.3		
Approach LOS		C		C			C		

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 8:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 29.3

Intersection LOS: C

Intersection Capacity Utilization 85.0%

ICU Level of Service E

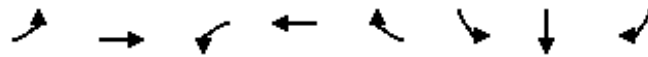
Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd



Queues
3: Lakeshore Rd E & Cawthra Rd

Scenario 1 2500 Units 2031
Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT	SBR
Lane Group Flow (vph)	482	994	3	892	765	293	296	379
v/c Ratio	0.90	0.46	0.02	0.78	0.74	0.59	0.58	0.42
Control Delay	53.1	14.7	43.3	47.8	9.1	43.3	42.9	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	14.7	43.3	47.8	9.1	43.3	42.9	13.0
Queue Length 50th (m)	99.6	72.4	0.5	105.6	29.2	70.0	70.4	42.7
Queue Length 95th (m)	#160.0	88.0	m1.3	129.7	m48.0	103.2	103.5	62.9
Internal Link Dist (m)		297.4		113.2			931.9	
Turn Bay Length (m)	35.0		60.0		70.0	115.0		
Base Capacity (vph)	563	2174	176	1139	1036	495	508	934
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	0.86	0.46	0.02	0.78	0.74	0.59	0.58	0.41

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	482	994	0	3	892	765	0	0	0	587	2	379
Future Volume (vph)	482	994	0	3	892	765	0	0	0	587	2	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	2.0	5.0		5.0	5.0	5.0				5.0	5.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00				0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98				1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00				1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85				1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00				0.95	0.95	1.00
Satd. Flow (prot)	1716	3579		1778	3476	1461				1570	1611	1484
Flt Permitted	0.12	1.00		0.29	1.00	1.00				0.95	0.95	1.00
Satd. Flow (perm)	217	3579		539	3476	1461				1570	1606	1484
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	482	994	0	3	892	765	0	0	0	587	2	379
RTOR Reduction (vph)	0	0	0	0	0	97	0	0	0	0	0	10
Lane Group Flow (vph)	482	994	0	3	892	668	0	0	0	293	296	369
Confl. Peds. (#/hr)	25		8	8		25	13					13
Heavy Vehicles (%)	4%	2%	0%	0%	5%	7%	0%	0%	0%	8%	0%	6%
Turn Type	pm+pt	NA		Perm	NA	pm+ov				Prot	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	78.0	78.0		41.6	41.6	81.6				40.0	40.0	73.4
Effective Green, g (s)	79.0	79.0		42.6	42.6	83.6				41.0	41.0	75.4
Actuated g/C Ratio	0.61	0.61		0.33	0.33	0.64				0.32	0.32	0.58
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0				6.0	6.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0				3.0	3.0	3.0
Lane Grp Cap (vph)	528	2174		176	1139	995				495	508	860
v/s Ratio Prot	c0.24	0.28			c0.26	c0.21				0.19	0.18	0.11
v/s Ratio Perm	0.31			0.01		0.25						0.14
v/c Ratio	0.91	0.46		0.02	0.78	0.67				0.59	0.58	0.43
Uniform Delay, d1	34.6	13.9		29.5	39.5	14.6				37.5	37.3	15.3
Progression Factor	1.00	1.00		1.35	1.08	0.61				1.00	1.00	1.00
Incremental Delay, d2	20.2	0.7		0.1	4.2	1.4				1.9	1.7	0.3
Delay (s)	54.8	14.5		40.1	46.7	10.2				39.4	39.0	15.6
Level of Service	D	B		D	D	B				D	D	B
Approach Delay (s)		27.7			29.9			0.0			30.0	
Approach LOS		C			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			29.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				17.0		
Intersection Capacity Utilization			85.0%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
5: East Avenue & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00		0.94	1.00	0.99		1.00	0.98	
Frt		0.986				0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3418	0	1785	3380	1566	1750	1579	0	1785	1606	0
Flt Permitted	0.950			0.950			0.751			0.441		
Satd. Flow (perm)	1773	3418	0	1777	3380	1473	1377	1579	0	828	1606	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				84		101			110	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		226.1			305.9			132.2			178.2	
Travel Time (s)		16.3			22.0			9.5			12.8	

Intersection Summary

Area Type: Other

Timings
5: East Avenue & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	37	1390	68	1292	9	379	0	32	0
Future Volume (vph)	37	1390	68	1292	9	379	0	32	0
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	7	4	3	8			2		6
Permitted Phases					8	2		6	
Detector Phase	7	4	3	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	11.0	24.0	24.0	31.0	31.0	31.0	31.0
Total Split (s)	11.0	70.0	12.0	71.0	71.0	48.0	48.0	48.0	48.0
Total Split (%)	8.5%	53.8%	9.2%	54.6%	54.6%	36.9%	36.9%	36.9%	36.9%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	6.5	69.5	7.8	73.2	73.2	39.2	39.2	39.2	39.2
Actuated g/C Ratio	0.05	0.53	0.06	0.56	0.56	0.30	0.30	0.30	0.30
v/c Ratio	0.42	0.84	0.64	0.68	0.01	0.91	0.49	0.13	0.02
Control Delay	77.7	36.7	85.6	22.9	0.0	70.8	25.4	33.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.7	36.7	85.6	22.9	0.0	70.8	25.4	33.1	0.1
LOS	E	D	F	C	A	E	C	C	A
Approach Delay		37.6		25.8			51.9		25.2
Approach LOS		D		C			D		C

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 35.6

Intersection LOS: D

Intersection Capacity Utilization 88.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E

				
Ø2		Ø3		Ø4 (R)
48 s		12 s		70 s
				
Ø6		Ø7		Ø8 (R)
48 s		11 s		71 s



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	1534	68	1292	9	379	270	32	10
v/c Ratio	0.42	0.84	0.64	0.68	0.01	0.91	0.49	0.13	0.02
Control Delay	77.7	36.7	85.6	22.9	0.0	70.8	25.4	33.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.7	36.7	85.6	22.9	0.0	70.8	25.4	33.1	0.1
Queue Length 50th (m)	9.4	211.1	17.7	133.6	0.0	95.3	35.5	6.1	0.0
Queue Length 95th (m)	m19.9	241.7	m#40.4	193.2	m0.0	#151.6	62.6	14.6	0.0
Internal Link Dist (m)		202.1		281.9			108.2		154.2
Turn Bay Length (m)	72.0		50.0		20.0	20.0		45.0	
Base Capacity (vph)	89	1834	107	1903	866	444	578	267	593
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.84	0.64	0.68	0.01	0.85	0.47	0.12	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1390	144	68	1292	9	379	0	270	32	0	10
Future Volume (vph)	37	1390	144	68	1292	9	379	0	270	32	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.94	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3418		1785	3380	1473	1742	1579		1783	1606	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.75	1.00		0.44	1.00	
Satd. Flow (perm)	1785	3418		1785	3380	1473	1377	1579		829	1606	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	37	1390	144	68	1292	9	379	0	270	32	0	10
RTOR Reduction (vph)	0	6	0	0	0	4	0	71	0	0	7	0
Lane Group Flow (vph)	37	1528	0	68	1292	5	379	199	0	32	3	0
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3
Heavy Vehicles (%)	0%	5%	2%	0%	8%	2%	2%	0%	2%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	3.0	67.4		5.4	69.8	69.8	38.2	38.2		38.2	38.2	
Effective Green, g (s)	4.0	68.4		6.4	70.8	70.8	39.2	39.2		39.2	39.2	
Actuated g/C Ratio	0.03	0.53		0.05	0.54	0.54	0.30	0.30		0.30	0.30	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	54	1798		87	1840	802	415	476		249	484	
v/s Ratio Prot	0.02	c0.45		c0.04	0.38			0.13			0.00	
v/s Ratio Perm						0.00	c0.28			0.04		
v/c Ratio	0.69	0.85		0.78	0.70	0.01	0.91	0.42		0.13	0.01	
Uniform Delay, d1	62.4	26.4		61.1	21.8	13.5	43.8	36.3		33.0	31.8	
Progression Factor	1.07	1.20		1.02	0.95	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	27.8	4.8		34.5	2.2	0.0	24.1	0.6		0.2	0.0	
Delay (s)	94.6	36.3		96.5	23.0	13.5	67.9	36.9		33.2	31.8	
Level of Service	F	D		F	C	B	E	D		C	C	
Approach Delay (s)		37.7			26.6			55.0			32.9	
Approach LOS		D			C			E			C	
Intersection Summary												
HCM 2000 Control Delay			36.5			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			88.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
7: Lakefront Promenade & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		25.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		0.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.96	1.00		0.99	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3476	1566	1750	3476	1750	1566
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3476	1507	1745	3476	1737	1536
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		66				21
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	130.4	
Travel Time (s)	4.7			19.6	9.4	

Intersection Summary

Area Type: Other

Timings
7: Lakefront Promenade & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	1352	219	98	840	301	435
Future Volume (vph)	1352	219	98	840	301	435
Turn Type	NA	Perm	Prot	NA	Perm	pm+ov
Protected Phases	4		3	8		3
Permitted Phases		4			2	2
Detector Phase	4	4	3	8	2	3
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	8.0	5.0	5.0
Minimum Split (s)	24.0	24.0	12.0	24.0	34.0	12.0
Total Split (s)	66.0	66.0	28.0	94.0	36.0	28.0
Total Split (%)	50.8%	50.8%	21.5%	72.3%	27.7%	21.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	6.0	5.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes			Yes
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	71.6	71.6	14.2	91.8	27.2	41.4
Actuated g/C Ratio	0.55	0.55	0.11	0.71	0.21	0.32
v/c Ratio	0.71	0.25	0.51	0.34	0.83	0.86
Control Delay	28.2	17.8	74.5	1.6	68.3	51.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	17.8	74.5	1.6	68.3	51.3
LOS	C	B	E	A	E	D
Approach Delay	26.7			9.2	58.2	
Approach LOS	C			A	E	

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 28.8
 Intersection LOS: C
 Intersection Capacity Utilization 74.5%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promenade & Lakeshore Rd E

↖ Ø2	↘ Ø3	→ Ø4 (R)
36 s	28 s	66 s
	← Ø8 (R)	
	94 s	

Queues
7: Lakefront Promenade & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1352	219	98	840	301	435
v/c Ratio	0.71	0.25	0.51	0.34	0.83	0.86
Control Delay	28.2	17.8	74.5	1.6	68.3	51.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	17.8	74.5	1.6	68.3	51.3
Queue Length 50th (m)	131.4	28.2	25.5	6.6	77.1	96.0
Queue Length 95th (m)	133.0	m33.4	41.2	10.0	#112.6	120.7
Internal Link Dist (m)	41.1			248.7	106.4	
Turn Bay Length (m)		25.0	35.0			
Base Capacity (vph)	1913	859	296	2461	404	599
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.25	0.33	0.34	0.75	0.73
Intersection Summary						
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.						
m Volume for 95th percentile queue is metered by upstream signal.						

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (vph)	1352	219	98	840	301	435
Future Volume (vph)	1352	219	98	840	301	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	5.0	5.0	6.0	5.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3476	1507	1750	3476	1737	1546
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3476	1507	1750	3476	1737	1546
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1352	219	98	840	301	435
RTOR Reduction (vph)	0	30	0	0	0	14
Lane Group Flow (vph)	1352	189	98	840	301	421
Confl. Peds. (#/hr)		5	5		5	5
Heavy Vehicles (%)	5%	2%	2%	5%	2%	2%
Turn Type	NA	Perm	Prot	NA	Perm	pm+ov
Protected Phases	4		3	8		3
Permitted Phases		4			2	2
Actuated Green, G (s)	70.6	70.6	13.2	90.8	26.2	39.4
Effective Green, g (s)	71.6	71.6	14.2	91.8	27.2	41.4
Actuated g/C Ratio	0.55	0.55	0.11	0.71	0.21	0.32
Clearance Time (s)	6.0	6.0	7.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1914	830	191	2454	363	563
v/s Ratio Prot	c0.39		0.06	0.24		c0.08
v/s Ratio Perm		0.13			0.17	0.19
v/c Ratio	0.71	0.23	0.51	0.34	0.83	0.75
Uniform Delay, d1	21.5	15.0	54.6	7.4	49.2	39.6
Progression Factor	1.13	1.43	1.23	0.16	1.00	1.00
Incremental Delay, d2	1.7	0.5	2.2	0.4	14.4	5.4
Delay (s)	25.9	21.9	69.4	1.6	63.6	45.0
Level of Service	C	C	E	A	E	D
Approach Delay (s)	25.4			8.6	52.6	
Approach LOS	C			A	D	
Intersection Summary						
HCM 2000 Control Delay			26.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.77			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	18.0
Intersection Capacity Utilization			74.5%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	60.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			30.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.97	1.00			1.00					
Frt			0.850					0.850			0.890	
Flt Protected	0.950			0.950			0.950				0.991	
Satd. Flow (prot)	1750	3444	1566	1750	3380	0	1750	1601	0	0	1661	0
Flt Permitted	0.950			0.950			0.750				0.949	
Satd. Flow (perm)	1746	3444	1512	1746	3380	0	1380	1601	0	0	1591	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			162					101			76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			135.3			191.6	
Travel Time (s)		16.0			14.1			9.7			13.8	

Intersection Summary

Area Type: Other

Timings
8: Hydro Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	4	1398	315	95	806	304	0	2	0
Future Volume (vph)	4	1398	315	95	806	304	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		5		2
Permitted Phases			4			5		2	
Detector Phase	7	4	4	3	8	5	5	2	2
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	12.0	12.0
Total Split (s)	11.0	66.0	66.0	15.0	70.0	49.0	49.0	49.0	49.0
Total Split (%)	8.5%	50.8%	50.8%	11.5%	53.8%	37.7%	37.7%	37.7%	37.7%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	6.6	67.9	67.9	11.6	82.2	34.6	34.6		34.6
Actuated g/C Ratio	0.05	0.52	0.52	0.09	0.63	0.27	0.27		0.27
v/c Ratio	0.05	0.78	0.36	0.61	0.38	0.83	0.66		0.02
Control Delay	52.8	33.2	14.8	63.4	12.1	63.3	34.7		0.1
Queue Delay	0.0	1.7	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	52.8	34.9	14.8	63.4	12.1	63.3	34.7		0.1
LOS	D	C	B	E	B	E	C		A
Approach Delay		31.3			17.5		48.4		0.1
Approach LOS		C			B		D		A

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 30.7

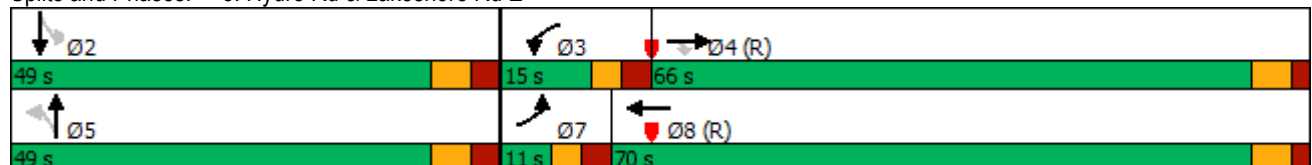
Intersection LOS: C

Intersection Capacity Utilization 80.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 8: Hydro Rd & Lakeshore Rd E



Queues
8: Hydro Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	4	1398	315	95	806	304	331	11
v/c Ratio	0.05	0.78	0.36	0.61	0.38	0.83	0.66	0.02
Control Delay	52.8	33.2	14.8	63.4	12.1	63.3	34.7	0.1
Queue Delay	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	34.9	14.8	63.4	12.1	63.3	34.7	0.1
Queue Length 50th (m)	1.0	150.1	25.7	18.2	102.5	77.1	55.6	0.0
Queue Length 95th (m)	m1.7	208.2	60.4	#50.6	101.8	105.0	82.1	0.0
Internal Link Dist (m)		198.5			171.3		111.3	167.6
Turn Bay Length (m)	25.0		50.0	25.0		60.0		
Base Capacity (vph)	88	1797	866	158	2137	456	597	577
Starvation Cap Reductn	0	232	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	0.05	0.89	0.36	0.60	0.38	0.67	0.55	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	1398	315	95	806	0	304	0	331	2	0	9
Future Volume (vph)	4	1398	315	95	806	0	304	0	331	2	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1750	3444	1512	1750	3380		1747	1601			1660	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00			0.95	
Satd. Flow (perm)	1750	3444	1512	1750	3380		1380	1601			1590	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	1398	315	95	806	0	304	0	331	2	0	9
RTOR Reduction (vph)	0	0	78	0	0	0	0	74	0	0	8	0
Lane Group Flow (vph)	4	1398	237	95	806	0	304	257	0	0	3	0
Confl. Peds. (#/hr)	2		4	4		2	1					
Heavy Vehicles (%)	2%	6%	2%	2%	8%	2%	2%	0%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			5				2
Permitted Phases			4				5			2		
Actuated Green, G (s)	1.0	66.8	66.8	10.6	76.4		33.6	33.6			33.6	
Effective Green, g (s)	2.0	67.8	67.8	11.6	77.4		34.6	34.6			34.6	
Actuated g/C Ratio	0.02	0.52	0.52	0.09	0.60		0.27	0.27			0.27	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	7.0			7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	26	1796	788	156	2012		367	426			423	
v/s Ratio Prot	0.00	c0.41		c0.05	0.24			0.16				
v/s Ratio Perm			0.16				c0.22				0.00	
v/c Ratio	0.15	0.78	0.30	0.61	0.40		0.83	0.60			0.01	
Uniform Delay, d1	63.2	25.0	17.7	57.0	14.0		44.9	41.7			35.1	
Progression Factor	0.88	1.13	1.44	0.83	0.88		1.00	1.00			1.00	
Incremental Delay, d2	2.3	2.8	0.8	5.9	0.5		14.2	2.4			0.0	
Delay (s)	57.9	31.2	26.2	53.4	12.8		59.1	44.1			35.1	
Level of Service	E	C	C	D	B		E	D			D	
Approach Delay (s)		30.3			17.1			51.3			35.1	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			30.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			80.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Scenario 1 2500 Units 2031
Morning Peak Hour

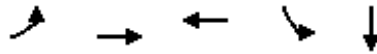
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		50.0	100.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			50.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00										0.99	
Frt					0.995						0.930	
Flt Protected	0.950										0.977	
Satd. Flow (prot)	1750	3476	1842	1842	3462	0	0	1883	1842	0	1697	0
Flt Permitted	0.950										0.847	
Satd. Flow (perm)	1741	3476	1842	1842	3462	0	0	1883	1842	0	1470	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					4						76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		195.3			622.7			123.3			883.5	
Travel Time (s)		14.1			44.8			8.9			63.6	

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

Scenario 1 2500 Units 2031
Morning Peak Hour

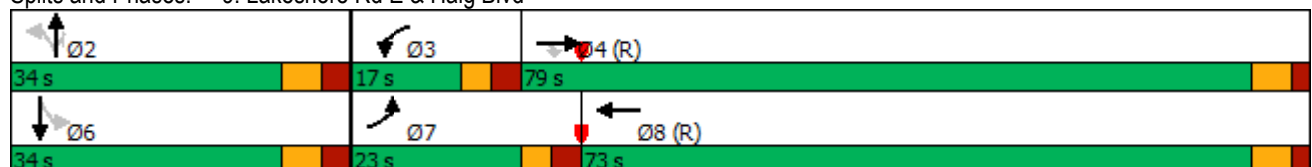


Lane Group	EBL	EBT	WBT	SBL	SBT	Ø2	Ø3
Lane Configurations							
Traffic Volume (vph)	116	1793	1138	35	0		
Future Volume (vph)	116	1793	1138	35	0		
Turn Type	Prot	NA	NA	Perm	NA		
Protected Phases	7	4	8		6	2	3
Permitted Phases				6			
Detector Phase	7	4	8	6	6		
Switch Phase							
Minimum Initial (s)	5.0	8.0	8.0	8.0	8.0	8.0	5.0
Minimum Split (s)	11.0	24.0	24.0	34.0	34.0	34.0	11.0
Total Split (s)	23.0	79.0	73.0	34.0	34.0	34.0	17.0
Total Split (%)	17.7%	60.8%	56.2%	26.2%	26.2%	26%	13%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0		
Total Lost Time (s)	5.0	5.0	5.0		6.0		
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?	Yes	Yes	Yes				Yes
Recall Mode	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	14.9	113.5	92.6		9.5		
Actuated g/C Ratio	0.11	0.87	0.71		0.07		
v/c Ratio	0.58	0.59	0.48		0.41		
Control Delay	48.6	8.1	24.9		18.7		
Queue Delay	0.0	0.7	0.0		0.0		
Total Delay	48.6	8.8	24.9		18.7		
LOS	D	A	C		B		
Approach Delay		11.2	24.9		18.7		
Approach LOS		B	C		B		

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 16.5
 Intersection LOS: B
 Intersection Capacity Utilization 79.3%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues
9: Lakeshore Rd E & Haig Blvd

Scenario 1 2500 Units 2031
Morning Peak Hour



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	116	1793	1179	73
v/c Ratio	0.58	0.59	0.48	0.41
Control Delay	48.6	8.1	24.9	18.7
Queue Delay	0.0	0.7	0.0	0.0
Total Delay	48.6	8.8	24.9	18.7
Queue Length 50th (m)	30.3	121.6	147.7	0.0
Queue Length 95th (m)	m43.4	133.4	165.4	14.6
Internal Link Dist (m)		171.3	598.7	859.5
Turn Bay Length (m)	50.0			
Base Capacity (vph)	248	3035	2468	376
Starvation Cap Reductn	0	790	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.47	0.80	0.48	0.19

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	1793	0	0	1138	41	0	0	0	35	0	38
Future Volume (vph)	116	1793	0	0	1138	41	0	0	0	35	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0			5.0						6.0	
Lane Util. Factor	1.00	0.95			0.95						1.00	
Frpb, ped/bikes	1.00	1.00			1.00						0.99	
Flpb, ped/bikes	1.00	1.00			1.00						1.00	
Frt	1.00	1.00			0.99						0.93	
Flt Protected	0.95	1.00			1.00						0.98	
Satd. Flow (prot)	1750	3476			3462						1694	
Flt Permitted	0.95	1.00			1.00						0.85	
Satd. Flow (perm)	1750	3476			3462						1470	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	116	1793	0	0	1138	41	0	0	0	35	0	38
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	69	0
Lane Group Flow (vph)	116	1793	0	0	1178	0	0	0	0	0	4	0
Confl. Peds. (#/hr)	7			7			3		1	1		3
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA				Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	13.9	110.1			90.2						6.9	
Effective Green, g (s)	14.9	111.1			91.2						7.9	
Actuated g/C Ratio	0.11	0.85			0.70						0.06	
Clearance Time (s)	6.0	6.0			6.0						7.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	200	2970			2428						89	
v/s Ratio Prot	0.07	c0.52			0.34							
v/s Ratio Perm											c0.00	
v/c Ratio	0.58	0.60			0.49						0.05	
Uniform Delay, d1	54.6	2.8			8.8						57.5	
Progression Factor	0.74	2.47			2.58						1.00	
Incremental Delay, d2	3.0	0.7			0.6						0.2	
Delay (s)	43.4	7.7			23.2						57.7	
Level of Service	D	A			C						E	
Approach Delay (s)		9.9			23.2			0.0			57.7	
Approach LOS		A			C			A			E	
Intersection Summary												
HCM 2000 Control Delay			15.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			79.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.997
Satd. Flow (prot)	1593	0	1842	0	0	1837
Flt Permitted						0.997
Satd. Flow (perm)	1593	0	1842	0	0	1837
Link Speed (k/h)	50		50			50
Link Distance (m)	85.8		91.1			132.2
Travel Time (s)	6.2		6.6			9.5

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 101: East Avenue & Street L

Scenario 1 2500 Units 2031
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	96	553	0	13	199
Future Volume (vph)	0	96	553	0	13	199
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	96	553	0	13	199
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	96	553	212			
Volume Left (vph)	0	0	13			
Volume Right (vph)	96	0	0			
Hadj (s)	-0.57	0.03	0.05			
Departure Headway (s)	5.0	4.4	4.8			
Degree Utilization, x	0.13	0.68	0.28			
Capacity (veh/h)	624	789	717			
Control Delay (s)	8.8	16.4	9.7			
Approach Delay (s)	8.8	16.4	9.7			
Approach LOS	A	C	A			
Intersection Summary						
Delay			13.9			
Level of Service			B			
Intersection Capacity Utilization			41.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
102: Lakefront Promenade & Street L

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt											0.999	
Flt Protected		0.950										
Satd. Flow (prot)	0	1750	0	0	1842	0	0	1842	0	0	1840	0
Flt Permitted		0.950										
Satd. Flow (perm)	0	1750	0	0	1842	0	0	1842	0	0	1840	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		86.0			72.6			101.7			130.4	
Travel Time (s)		6.2			5.2			7.3			9.4	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 102: Lakefront Promenade & Street L

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	0	0	0	0	0	0	817	0	0	315	3
Future Volume (vph)	25	0	0	0	0	0	0	817	0	0	315	3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	0	0	0	0	0	0	817	0	0	315	3
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	25	0	817	318								
Volume Left (vph)	25	0	0	0								
Volume Right (vph)	0	0	0	3								
Hadj (s)	0.23	0.00	0.03	0.03								
Departure Headway (s)	6.6	6.4	4.4	4.9								
Degree Utilization, x	0.05	0.00	0.99	0.43								
Capacity (veh/h)	525	546	817	739								
Control Delay (s)	9.9	9.4	50.4	11.4								
Approach Delay (s)	9.9	0.0	50.4	11.4								
Approach LOS	A	A	F	B								
Intersection Summary												
Delay			38.9									
Level of Service			E									
Intersection Capacity Utilization			53.0%	ICU Level of Service					A			
Analysis Period (min)			15									

Lanes and Geometrics
103: Ogden Ave & Street L

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.865						0.932				
Flt Protected					0.950			0.976				
Satd. Flow (prot)	0	1593	0	0	1750	0	0	1676	0	0	1842	0
Flt Permitted					0.950			0.976				
Satd. Flow (perm)	0	1593	0	0	1750	0	0	1676	0	0	1842	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		55.4			82.6			89.6			142.3	
Travel Time (s)		4.0			5.9			6.5			10.2	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 103: Ogden Ave & Street L

Scenario 1 2500 Units 2031
Morning Peak Hour

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Sign Control		Stop			Stop			Stop			Stop									
Traffic Volume (vph)	0	0	85	81	0	0	11	0	11	0	0	0								
Future Volume (vph)	0	0	85	81	0	0	11	0	11	0	0	0								
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
Hourly flow rate (vph)	0	0	85	81	0	0	11	0	11	0	0	0								
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total (vph)	85	81	22	0																
Volume Left (vph)	0	81	11	0																
Volume Right (vph)	85	0	11	0																
Hadj (s)	-0.57	0.23	-0.17	0.00																
Departure Headway (s)	3.5	4.3	4.1	4.3																
Degree Utilization, x	0.08	0.10	0.02	0.00																
Capacity (veh/h)	1022	836	842	817																
Control Delay (s)	6.8	7.7	7.2	7.3																
Approach Delay (s)	6.8	7.7	7.2	0.0																
Approach LOS	A	A	A	A																
Intersection Summary																				
Delay			7.2																	
Level of Service			A																	
Intersection Capacity Utilization			21.2%	ICU Level of Service					A											
Analysis Period (min)			15																	

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1842	0	0	1842	1842	0
Flt Permitted						
Satd. Flow (perm)	1842	0	0	1842	1842	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	72.3			87.6	135.3	
Travel Time (s)	5.2			6.3	9.7	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 104: Hydro Rd & Street L

Scenario 1 2500 Units 2031
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	0	0	0	719	411	0
Future Volume (vph)	0	0	0	719	411	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	719	411	0
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	0	719	411			
Volume Left (vph)	0	0	0			
Volume Right (vph)	0	0	0			
Hadj (s)	0.00	0.03	0.03			
Departure Headway (s)	6.3	4.4	4.7			
Degree Utilization, x	0.00	0.87	0.53			
Capacity (veh/h)	539	816	759			
Control Delay (s)	9.3	29.1	12.8			
Approach Delay (s)	0.0	29.1	12.8			
Approach LOS	A	D	B			
Intersection Summary						
Delay			23.2			
Level of Service			C			
Intersection Capacity Utilization			41.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
105: East Avenue & Rangeview Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.999
Satd. Flow (prot)	1593	0	1842	0	0	1840
Flt Permitted						0.999
Satd. Flow (perm)	1593	0	1842	0	0	1840
Link Speed (k/h)	50		50			50
Link Distance (m)	198.1		66.7			91.1
Travel Time (s)	14.3		4.8			6.6

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 105: East Avenue & Rangeview Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	553	0	0	4	195
Future Volume (vph)	0	553	0	0	4	195
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	553	0	0	4	195
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	553	0	199			
Volume Left (vph)	0	0	4			
Volume Right (vph)	553	0	0			
Hadj (s)	-0.57	0.00	0.04			
Departure Headway (s)	3.9	5.4	5.1			
Degree Utilization, x	0.60	0.00	0.28			
Capacity (veh/h)	897	599	649			
Control Delay (s)	12.4	8.4	10.1			
Approach Delay (s)	12.4	0.0	10.1			
Approach LOS	B	A	B			
Intersection Summary						
Delay			11.8			
Level of Service			B			
Intersection Capacity Utilization			51.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
106: Lakefront Promenade & Rangeview Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.865			0.967				
Flt Protected		0.950					0.950				0.997	
Satd. Flow (prot)	0	1750	0	0	1593	0	1750	1781	0	0	1837	0
Flt Permitted		0.950					0.950				0.997	
Satd. Flow (perm)	0	1750	0	0	1593	0	1750	1781	0	0	1837	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		174.1			140.0			142.6			101.7	
Travel Time (s)		12.5			10.1			10.3			7.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 106: Lakefront Promenade & Rangeview Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	0	0	0	0	262	537	540	153	21	293	0
Future Volume (vph)	15	0	0	0	0	262	537	540	153	21	293	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	0	0	0	0	262	537	540	153	21	293	0
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	15	262	537	693	314							
Volume Left (vph)	15	0	537	0	21							
Volume Right (vph)	0	262	0	153	0							
Hadj (s)	0.23	-0.57	0.53	-0.12	0.05							
Departure Headway (s)	7.4	5.9	6.4	5.7	5.9							
Degree Utilization, x	0.03	0.43	0.95	1.10	0.51							
Capacity (veh/h)	432	587	558	633	597							
Control Delay (s)	10.7	13.2	50.4	87.5	14.9							
Approach Delay (s)	10.7	13.2	71.3		14.9							
Approach LOS	B	B	F		B							
Intersection Summary												
Delay			52.7									
Level of Service			F									
Intersection Capacity Utilization			80.5%	ICU Level of Service					D			
Analysis Period (min)			15									

Lanes and Geometrics
107: Ogden Ave & Rangeview Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt												0.932
Flt Protected		0.994										0.976
Satd. Flow (prot)	0	1831	0	0	1842	0	0	1842	0	0	1676	0
Flt Permitted		0.994										0.976
Satd. Flow (perm)	0	1831	0	0	1842	0	0	1842	0	0	1676	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		56.3			124.7			104.4			89.6	
Travel Time (s)		4.1			9.0			7.5			6.5	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 107: Ogden Ave & Rangeview Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	22	153	0	0	156	0	0	0	0	83	0	83
Future Volume (vph)	22	153	0	0	156	0	0	0	0	83	0	83
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	22	153	0	0	156	0	0	0	0	83	0	83
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	175	156	0	166								
Volume Left (vph)	22	0	0	83								
Volume Right (vph)	0	0	0	83								
Hadj (s)	0.06	0.03	0.00	-0.17								
Departure Headway (s)	4.5	4.5	4.9	4.5								
Degree Utilization, x	0.22	0.20	0.00	0.21								
Capacity (veh/h)	760	752	677	744								
Control Delay (s)	8.8	8.7	7.9	8.7								
Approach Delay (s)	8.8	8.7	0.0	8.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.7									
Level of Service			A									
Intersection Capacity Utilization			37.2%	ICU Level of Service					A			
Analysis Period (min)			15									



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.998	
Flt Protected	0.950			0.989		
Satd. Flow (prot)	1750	0	0	1822	1838	0
Flt Permitted	0.950			0.989		
Satd. Flow (perm)	1750	0	0	1822	1838	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	108.3			161.7	87.6	
Travel Time (s)	7.8			11.6	6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 108: Hydro Rd & Rangeview Rd

Scenario 1 2500 Units 2031
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	258	0	135	460	405	5
Future Volume (vph)	258	0	135	460	405	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	258	0	135	460	405	5
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	258	595	410			
Volume Left (vph)	258	135	0			
Volume Right (vph)	0	0	5			
Hadj (s)	0.23	0.08	0.03			
Departure Headway (s)	6.8	5.6	5.8			
Degree Utilization, x	0.49	0.93	0.66			
Capacity (veh/h)	512	630	592			
Control Delay (s)	16.0	43.2	19.5			
Approach Delay (s)	16.0	43.2	19.5			
Approach LOS	C	E	C			
Intersection Summary						
Delay			30.0			
Level of Service			D			
Intersection Capacity Utilization			77.6%	ICU Level of Service	D	
Analysis Period (min)			15			

Lanes and Geometrics
1: Ogden Ave & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

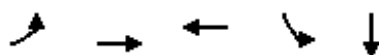
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	28.0		25.0	25.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00					1.00	0.98	
Frt					0.987							0.873
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1750	3614	1860	1842	3515	0	1842	1883	1842	1750	1617	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1743	3614	1860	1842	3515	0	1842	1883	1842	1742	1617	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9						106	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			142.3			246.5	
Travel Time (s)		19.6			16.0			10.2			17.7	

Intersection Summary

Area Type: Other

Timings
1: Ogden Ave & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour



Lane Group	EBL	EBT	WBT	SBL	SBT	Ø2	Ø3	Ø5
Lane Configurations								
Traffic Volume (vph)	149	1354	1237	144	19			
Future Volume (vph)	149	1354	1237	144	19			
Turn Type	Prot	NA	NA	pm+pt	NA			
Protected Phases	7	4	8	1	6	2	3	5
Permitted Phases				6				
Detector Phase	7	4	8	1	6			
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	34.0	34.0	11.0	11.0
Total Split (s)	20.0	64.0	71.0	11.0	34.0	38.0	27.0	15.0
Total Split (%)	14.3%	45.7%	50.7%	7.9%	24.3%	27%	19%	11%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0
All-Red Time (s)	3.0	2.0	2.0	1.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0			
Total Lost Time (s)	5.0	5.0	5.0	3.0	6.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	18.8	119.6	95.8	12.4	9.4			
Actuated g/C Ratio	0.13	0.85	0.68	0.09	0.07			
v/c Ratio	0.64	0.44	0.56	0.94	0.60			
Control Delay	55.2	4.1	6.8	119.4	27.9			
Queue Delay	0.0	0.0	0.0	0.0	0.0			
Total Delay	55.2	4.1	6.9	119.4	27.9			
LOS	E	A	A	F	C			
Approach Delay		9.2	6.9		76.9			
Approach LOS		A	A		E			

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 14.0

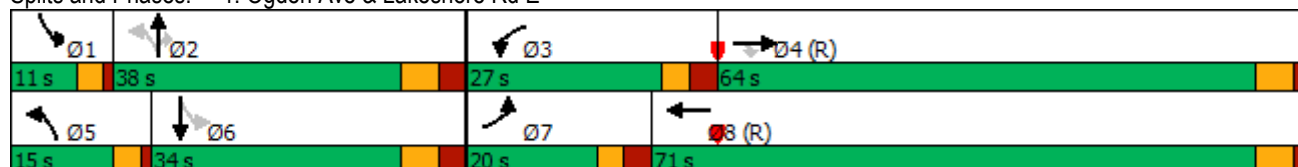
Intersection LOS: B

Intersection Capacity Utilization 75.4%

ICU Level of Service D

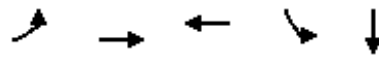
Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues
1: Ogden Ave & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour



Lane Group	EBL	EBT	WBT	SBL	SBT
Lane Group Flow (vph)	149	1354	1352	144	125
v/c Ratio	0.64	0.44	0.56	0.94	0.60
Control Delay	55.2	4.1	6.8	119.4	27.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	55.2	4.1	6.9	119.4	27.9
Queue Length 50th (m)	45.2	52.1	41.8	~44.8	5.4
Queue Length 95th (m)	68.1	80.0	47.7	64.9	25.5
Internal Link Dist (m)		248.7	198.5		222.5
Turn Bay Length (m)	28.0				
Base Capacity (vph)	240	3087	2408	154	408
Starvation Cap Reductn	0	0	111	0	0
Spillback Cap Reductn	0	26	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.62	0.44	0.59	0.94	0.31

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	1354	0	0	1237	115	0	0	0	144	19	106
Future Volume (vph)	149	1354	0	0	1237	115	0	0	0	144	19	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0			5.0					3.0	6.0	
Lane Util. Factor	1.00	0.95			0.95					1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00					1.00	0.98	
Flpb, ped/bikes	1.00	1.00			1.00					1.00	1.00	
Frt	1.00	1.00			0.99					1.00	0.87	
Flt Protected	0.95	1.00			1.00					0.95	1.00	
Satd. Flow (prot)	1750	3614			3516					1750	1617	
Flt Permitted	0.95	1.00			1.00					0.95	1.00	
Satd. Flow (perm)	1750	3614			3516					1750	1617	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	149	1354	0	0	1237	115	0	0	0	144	19	106
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	99	0
Lane Group Flow (vph)	149	1354	0	0	1349	0	0	0	0	144	26	0
Confl. Peds. (#/hr)	7		2	2		7	5		3	3		5
Heavy Vehicles (%)	2%	1%	1%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt		Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	17.8	118.6			94.8					11.4	8.4	
Effective Green, g (s)	18.8	119.6			95.8					12.4	9.4	
Actuated g/C Ratio	0.13	0.85			0.68					0.09	0.07	
Clearance Time (s)	6.0	6.0			6.0					4.0	7.0	
Vehicle Extension (s)	3.0	3.0			3.0					3.0	3.0	
Lane Grp Cap (vph)	235	3087			2405					155	108	
v/s Ratio Prot	c0.09	0.37			c0.38					c0.08	0.02	
v/s Ratio Perm												
v/c Ratio	0.63	0.44			0.56					0.93	0.24	
Uniform Delay, d1	57.3	2.4			11.3					63.4	61.9	
Progression Factor	0.79	1.42			0.49					1.00	1.00	
Incremental Delay, d2	4.6	0.4			0.8					51.0	1.2	
Delay (s)	49.8	3.8			6.3					114.4	63.1	
Level of Service	D	A			A					F	E	
Approach Delay (s)		8.3			6.3		0.0				90.6	
Approach LOS		A			A		A				F	
Intersection Summary												
HCM 2000 Control Delay			14.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			75.4%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
2: Dixie Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98		1.00				0.96
Frt		0.998				0.850						0.850
Flt Protected	0.950			0.950				0.988			0.950	
Satd. Flow (prot)	1733	3571	0	1785	3579	1581	0	1898	0	0	1807	1566
Flt Permitted	0.950			0.950				0.941			0.755	
Satd. Flow (perm)	1731	3571	0	1781	3579	1544	0	1802	0	0	1436	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				125						23
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings

2: Dixie Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031

Afternoon Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	359	927	2	1077	220	1	3	278	0	716
Future Volume (vph)	359	927	2	1077	220	1	3	278	0	716
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA	pm+ov
Protected Phases	7	4	3	8			2		6	7
Permitted Phases					8	2		6		6
Detector Phase	7	4	3	8	8	2	2	6	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	12.0	24.0	11.0	24.0	24.0	12.0	12.0	34.0	34.0	12.0
Total Split (s)	55.0	95.0	11.0	51.0	51.0	34.0	34.0	34.0	34.0	55.0
Total Split (%)	39.3%	67.9%	7.9%	36.4%	36.4%	24.3%	24.3%	24.3%	24.3%	39.3%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0		6.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	41.0	97.3	6.1	53.5	53.5		29.5		29.5	71.5
Actuated g/C Ratio	0.29	0.70	0.04	0.38	0.38		0.21		0.21	0.51
v/c Ratio	0.71	0.38	0.03	0.79	0.33		0.01		0.92	0.90
Control Delay	39.5	21.7	65.0	44.8	15.9		45.2		88.8	42.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	39.5	21.7	65.0	44.8	15.9		45.2		88.8	42.3
LOS	D	C	E	D	B		D		F	D
Approach Delay		26.6		39.9			45.3		55.3	
Approach LOS		C		D			D		E	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 39.4

Intersection LOS: D

Intersection Capacity Utilization 93.2%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E

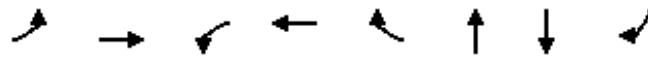


Queues

2: Dixie Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	359	940	2	1077	220	4	278	716
v/c Ratio	0.71	0.38	0.03	0.79	0.33	0.01	0.92	0.90
Control Delay	39.5	21.7	65.0	44.8	15.9	45.2	88.8	42.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	21.7	65.0	44.8	15.9	45.2	88.8	42.3
Queue Length 50th (m)	86.3	102.2	0.6	153.0	19.1	1.0	81.2	150.1
Queue Length 95th (m)	124.3	134.5	3.7	#199.8	43.2	4.5	#139.9	197.8
Internal Link Dist (m)		598.7		375.1		69.6	268.8	
Turn Bay Length (m)	44.0		25.0		30.0			
Base Capacity (vph)	618	2481	77	1366	666	380	302	897
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	0.58	0.38	0.03	0.79	0.33	0.01	0.92	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	359	927	13	2	1077	220	1	3	0	278	0	716
Future Volume (vph)	359	927	13	2	1077	220	1	3	0	278	0	716
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		6.0			6.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1733	3571		1785	3579	1544		1891			1807	1542
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.94			0.76	1.00
Satd. Flow (perm)	1733	3571		1785	3579	1544		1802			1436	1542
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	359	927	13	2	1077	220	1	3	0	278	0	716
RTOR Reduction (vph)	0	1	0	0	0	77	0	0	0	0	0	11
Lane Group Flow (vph)	359	939	0	2	1077	143	0	4	0	0	278	705
Confl. Peds. (#/hr)	1		2	2		1	16					16
Heavy Vehicles (%)	3%	2%	0%	0%	2%	1%	0%	0%	0%	1%	0%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases						8	2			6		6
Actuated Green, G (s)	40.0	91.5		1.0	52.5	52.5		28.5			28.5	68.5
Effective Green, g (s)	41.0	92.5		2.0	53.5	53.5		29.5			29.5	70.5
Actuated g/C Ratio	0.29	0.66		0.01	0.38	0.38		0.21			0.21	0.50
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		7.0			7.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	507	2359		25	1367	590		379			302	776
v/s Ratio Prot	0.21	0.26		0.00	c0.30							c0.27
v/s Ratio Perm						0.09		0.00			c0.19	0.19
v/c Ratio	0.71	0.40		0.08	0.79	0.24		0.01			0.92	0.91
Uniform Delay, d1	44.2	10.9		68.1	38.2	29.4		43.7			54.1	31.8
Progression Factor	0.75	2.32		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	4.2	0.5		1.4	4.7	1.0		0.0			31.8	14.3
Delay (s)	37.1	25.8		69.5	42.9	30.4		43.7			85.9	46.1
Level of Service	D	C		E	D	C		D			F	D
Approach Delay (s)		28.9			40.8			43.7			57.2	
Approach LOS		C			D			D			E	

Intersection Summary

HCM 2000 Control Delay	41.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes and Geometrics
3: Lakeshore Rd E & Cawthra Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00				0.93		1.00				0.96
Frt						0.850		0.981				0.850
Flt Protected	0.950							0.986		0.950	0.950	
Satd. Flow (prot)	1733	3544	0	1879	3614	1551	0	1858	0	1646	1683	1581
Flt Permitted	0.088									0.950	0.753	
Satd. Flow (perm)	161	3544	0	1879	3614	1441	0	1877	0	1646	1334	1519
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						314		1				25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings 3: Lakeshore Rd E & Cawthra Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

									
Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	309	920	1097	630	2	4	804	0	425
Future Volume (vph)	309	920	1097	630	2	4	804	0	425
Turn Type	pm+pt	NA	NA	pm+ov	Perm	NA	Prot	NA	pm+ov
Protected Phases	7	4	8	1		2	1	6	7
Permitted Phases	4			8	2				6
Detector Phase	7	4	8	1	2	2	1	6	7
Switch Phase									
Minimum Initial (s)	5.0	7.0	8.0	8.0	5.0	5.0	8.0	5.0	5.0
Minimum Split (s)	11.0	38.0	38.0	14.0	11.0	11.0	14.0	38.0	11.0
Total Split (s)	25.0	77.0	52.0	42.0	11.0	11.0	42.0	53.0	25.0
Total Split (%)	19.2%	59.2%	40.0%	32.3%	8.5%	8.5%	32.3%	40.8%	19.2%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	5.0	5.0		5.0	5.0	5.0	2.0
Lead/Lag	Lead		Lag	Lag	Lead	Lead	Lag		Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Recall Mode	None	Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	75.0	72.0	48.5	94.3		6.0	45.8	45.8	72.5
Actuated g/C Ratio	0.58	0.55	0.37	0.73		0.05	0.35	0.35	0.56
v/c Ratio	0.88	0.47	0.81	0.54		0.08	0.69	0.68	0.49
Control Delay	58.3	18.5	42.9	4.6		57.6	44.3	43.5	17.3
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	58.3	18.5	42.9	4.6		57.6	44.3	43.5	17.3
LOS	E	B	D	A		E	D	D	B
Approach Delay		28.5	28.9			57.6		34.7	
Approach LOS		C	C			E		C	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 8:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 30.5

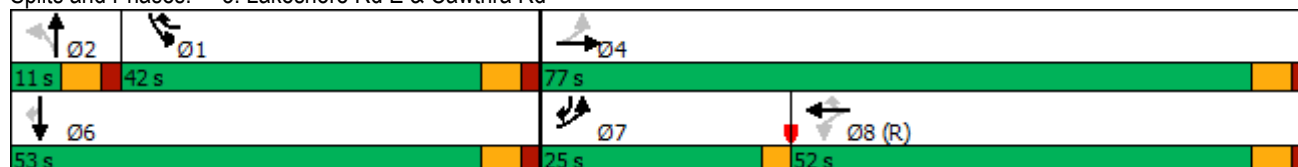
Intersection LOS: C

Intersection Capacity Utilization 88.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd





Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	309	922	1097	630	7	402	402	425
v/c Ratio	0.88	0.47	0.81	0.54	0.08	0.69	0.68	0.49
Control Delay	58.3	18.5	42.9	4.6	57.6	44.3	43.5	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.3	18.5	42.9	4.6	57.6	44.3	43.5	17.3
Queue Length 50th (m)	61.8	75.7	141.8	21.4	1.6	94.5	93.8	57.9
Queue Length 95th (m)	#110.4	92.8	171.1	38.9	6.9	#167.3	#164.2	83.7
Internal Link Dist (m)		297.4	113.2		71.8		931.9	
Turn Bay Length (m)	35.0			70.0		115.0		
Base Capacity (vph)	371	1962	1348	1170	87	579	593	886
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	0.83	0.47	0.81	0.54	0.08	0.69	0.68	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	309	920	2	0	1097	630	2	4	1	804	0	425
Future Volume (vph)	309	920	2	0	1097	630	2	4	1	804	0	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	2.0	5.0			5.0	5.0		5.0		5.0	5.0	2.0
Lane Util. Factor	1.00	0.95			0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00			1.00	0.97		1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00			1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	0.95	1.00
Satd. Flow (prot)	1733	3542			3614	1497		1849		1646	1683	1537
Flt Permitted	0.09	1.00			1.00	1.00		1.00		0.95	0.75	1.00
Satd. Flow (perm)	160	3542			3614	1497		1876		1646	1334	1537
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	309	920	2	0	1097	630	2	4	1	804	0	425
RTOR Reduction (vph)	0	0	0	0	0	98	0	1	0	0	0	11
Lane Group Flow (vph)	309	922	0	0	1097	532	0	6	0	402	402	414
Confl. Peds. (#/hr)	49		20	20		49	23					23
Heavy Vehicles (%)	3%	3%	0%	0%	1%	3%	0%	0%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	66.2	66.2			42.7	87.5		1.0		44.8	51.8	72.3
Effective Green, g (s)	67.2	67.2			43.7	89.5		2.0		45.8	52.8	74.3
Actuated g/C Ratio	0.52	0.52			0.34	0.69		0.02		0.35	0.41	0.57
Clearance Time (s)	3.0	6.0			6.0	6.0		6.0		6.0	6.0	3.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	342	1830			1214	1030		28		579	664	878
v/s Ratio Prot	c0.15	0.26			c0.30	0.18				c0.24	0.21	0.08
v/s Ratio Perm	0.32					0.17		0.00			c0.03	0.19
v/c Ratio	0.90	0.50			0.90	0.52		0.21		0.69	0.61	0.47
Uniform Delay, d1	39.2	20.5			41.1	9.8		63.2		36.1	30.4	16.3
Progression Factor	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	25.9	1.0			11.1	0.4		3.8		3.6	1.6	0.4
Delay (s)	65.1	21.5			52.2	10.2		67.1		39.7	32.0	16.7
Level of Service	E	C			D	B		E		D	C	B
Approach Delay (s)		32.4			36.9			67.1			29.2	
Approach LOS		C			D			E			C	
Intersection Summary												
HCM 2000 Control Delay			33.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			17.0		
Intersection Capacity Utilization			88.0%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
5: East Avenue & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.94	0.99	0.99		1.00	0.98	
Frt	0.989				0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3560	0	1750	3614	1597	1785	1611	0	1785	1605	0
Flt Permitted	0.950			0.950			0.755			0.734		
Satd. Flow (perm)	1774	3560	0	1744	3614	1498	1411	1611	0	1377	1605	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13				78		92			115	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		226.1			305.9			132.2			178.2	
Travel Time (s)		16.3			22.0			9.5			12.8	

Intersection Summary

Area Type: Other

Timings
5: East Avenue & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	49	1638	98	1406	24	136	0	24	0
Future Volume (vph)	49	1638	98	1406	24	136	0	24	0
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	7	4	3	8			2		6
Permitted Phases					8	2		6	
Detector Phase	7	4	3	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	11.0	24.0	24.0	31.0	31.0	31.0	31.0
Total Split (s)	11.0	98.0	11.0	98.0	98.0	31.0	31.0	31.0	31.0
Total Split (%)	7.9%	70.0%	7.9%	70.0%	70.0%	22.1%	22.1%	22.1%	22.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	9.0	88.4	16.3	98.2	98.2	19.3	19.3	19.3	19.3
Actuated g/C Ratio	0.06	0.63	0.12	0.70	0.70	0.14	0.14	0.14	0.14
v/c Ratio	0.43	0.79	0.48	0.55	0.02	0.70	0.12	0.13	0.01
Control Delay	74.4	22.0	66.6	10.5	0.0	76.1	0.8	52.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.4	22.0	66.6	10.5	0.0	76.1	0.8	52.0	0.0
LOS	E	C	E	B	A	E	A	D	A
Approach Delay		23.4		13.9			60.3		44.6
Approach LOS		C		B			E		D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 21.3

Intersection LOS: C

Intersection Capacity Utilization 82.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E





Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	1773	98	1406	24	136	36	24	4
v/c Ratio	0.43	0.79	0.48	0.55	0.02	0.70	0.12	0.13	0.01
Control Delay	74.4	22.0	66.6	10.5	0.0	76.1	0.8	52.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.4	22.0	66.6	10.5	0.0	76.1	0.8	52.0	0.0
Queue Length 50th (m)	13.8	194.2	26.5	84.2	0.0	38.2	0.0	6.2	0.0
Queue Length 95th (m)	#34.9	196.6	m#73.2	105.8	m0.2	59.8	0.0	14.9	0.0
Internal Link Dist (m)		202.1		281.9			108.2		154.2
Turn Bay Length (m)	72.0		50.0		20.0	20.0		45.0	
Base Capacity (vph)	114	2369	204	2553	1081	251	363	245	381
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.75	0.48	0.55	0.02	0.54	0.10	0.10	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1638	135	98	1406	24	136	0	36	24	0	4
Future Volume (vph)	49	1638	135	98	1406	24	136	0	36	24	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3559		1750	3614	1498	1776	1611		1782	1605	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.76	1.00		0.73	1.00	
Satd. Flow (perm)	1785	3559		1750	3614	1498	1411	1611		1376	1605	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	1638	135	98	1406	24	136	0	36	24	0	4
RTOR Reduction (vph)	0	5	0	0	0	7	0	31	0	0	3	0
Lane Group Flow (vph)	49	1768	0	98	1406	17	136	5	0	24	1	0
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3
Heavy Vehicles (%)	0%	1%	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	6.7	87.4		15.3	96.0	96.0	18.3	18.3		18.3	18.3	
Effective Green, g (s)	7.7	88.4		16.3	97.0	97.0	19.3	19.3		19.3	19.3	
Actuated g/C Ratio	0.06	0.63		0.12	0.69	0.69	0.14	0.14		0.14	0.14	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	98	2247		203	2503	1037	194	222		189	221	
v/s Ratio Prot	0.03	c0.50		c0.06	c0.39			0.00			0.00	
v/s Ratio Perm						0.01	c0.10			0.02		
v/c Ratio	0.50	0.79		0.48	0.56	0.02	0.70	0.02		0.13	0.00	
Uniform Delay, d1	64.3	18.9		57.9	10.8	6.7	57.6	52.2		53.0	52.0	
Progression Factor	1.00	1.00		1.01	0.83	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	2.9		1.7	0.9	0.0	10.9	0.0		0.3	0.0	
Delay (s)	68.3	21.8		60.4	9.9	6.7	68.5	52.2		53.3	52.1	
Level of Service	E	C		E	A	A	E	D		D	D	
Approach Delay (s)		23.0			13.1			65.1			53.1	
Approach LOS		C			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			21.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			82.8%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
7: Lakefront Promenade & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↗	↙
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		25.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		0.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.96	1.00		0.99	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3614	1566	1750	3579	1750	1566
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3614	1505	1743	3579	1739	1533
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		124				227
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	130.4	
Travel Time (s)	4.7			19.6	9.4	

Intersection Summary

Area Type: Other

Timings
7: Lakefront Promenade & Lakeshore Rd E

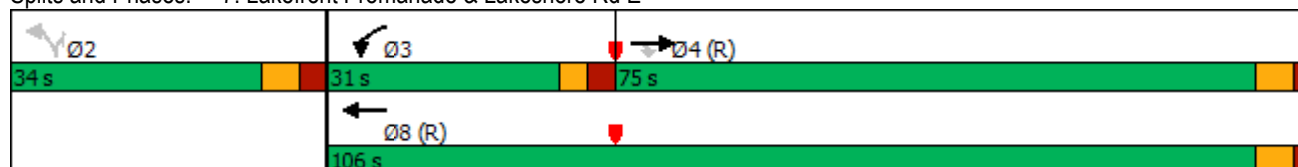
Scenario 1 2500 Units 2031
Afternoon Peak Hour

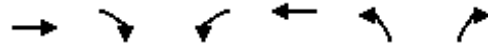
	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Traffic Volume (vph)	1172	361	338	940	353	227
Future Volume (vph)	1172	361	338	940	353	227
Turn Type	NA	Perm	Prot	NA	Perm	Perm
Protected Phases	4		3	8		
Permitted Phases		4			2	2
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	11.0	24.0	34.0	34.0
Total Split (s)	75.0	75.0	31.0	106.0	34.0	34.0
Total Split (%)	53.6%	53.6%	22.1%	75.7%	24.3%	24.3%
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	57.9	57.9	30.1	93.0	36.0	36.0
Actuated g/C Ratio	0.41	0.41	0.22	0.66	0.26	0.26
v/c Ratio	0.78	0.52	0.90	0.40	0.79	0.40
Control Delay	31.6	18.3	89.8	5.3	62.4	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	18.3	89.8	5.3	62.4	7.5
LOS	C	B	F	A	E	A
Approach Delay	28.5			27.6	40.9	
Approach LOS	C			C	D	

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 30.3
 Intersection LOS: C
 Intersection Capacity Utilization 84.5%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promenade & Lakeshore Rd E





Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1172	361	338	940	353	227
v/c Ratio	0.78	0.52	0.90	0.40	0.79	0.40
Control Delay	31.6	18.3	89.8	5.3	62.4	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	18.3	89.8	5.3	62.4	7.5
Queue Length 50th (m)	68.1	23.0	82.3	15.4	94.0	0.0
Queue Length 95th (m)	113.1	58.7	#171.2	26.5	#159.2	22.3
Internal Link Dist (m)	41.1			248.7	106.4	
Turn Bay Length (m)		25.0	35.0			
Base Capacity (vph)	1807	814	376	2581	447	562
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.44	0.90	0.36	0.79	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (vph)	1172	361	338	940	353	227
Future Volume (vph)	1172	361	338	940	353	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3614	1505	1750	3579	1739	1533
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3614	1505	1750	3579	1739	1533
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1172	361	338	940	353	227
RTOR Reduction (vph)	0	73	0	0	0	169
Lane Group Flow (vph)	1172	288	338	940	353	58
Confl. Peds. (#/hr)		5	5		4	6
Heavy Vehicles (%)	1%	2%	2%	2%	2%	2%
Turn Type	NA	Perm	Prot	NA	Perm	Perm
Protected Phases	4		3	8		
Permitted Phases		4			2	2
Actuated Green, G (s)	56.9	56.9	29.1	92.0	35.0	35.0
Effective Green, g (s)	57.9	57.9	30.1	93.0	36.0	36.0
Actuated g/C Ratio	0.41	0.41	0.22	0.66	0.26	0.26
Clearance Time (s)	6.0	6.0	6.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1494	622	376	2377	447	394
v/s Ratio Prot	c0.32		c0.19	0.26		
v/s Ratio Perm		0.19			c0.20	0.04
v/c Ratio	0.78	0.46	0.90	0.40	0.79	0.15
Uniform Delay, d1	35.6	29.8	53.5	10.7	48.5	40.2
Progression Factor	0.81	0.87	1.26	0.45	1.00	1.00
Incremental Delay, d2	3.1	1.8	20.5	0.4	9.0	0.2
Delay (s)	32.0	27.8	87.8	5.3	57.5	40.3
Level of Service	C	C	F	A	E	D
Approach Delay (s)	31.0			27.1	50.8	
Approach LOS	C			C	D	
Intersection Summary						
HCM 2000 Control Delay			32.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	17.0
Intersection Capacity Utilization			84.5%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	60.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			30.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	0.99	1.00		1.00				0.99	
Frt			0.850		0.999			0.850			0.919	
Flt Protected	0.950			0.950			0.950				0.980	
Satd. Flow (prot)	1750	3579	1597	1750	3575	0	1750	1601	0	0	1715	0
Flt Permitted	0.950			0.950			0.754				0.905	
Satd. Flow (perm)	1748	3579	1529	1740	3575	0	1385	1601	0	0	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			246		1			403			117	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			135.3			191.6	
Travel Time (s)		16.0			14.1			9.7			13.8	

Intersection Summary

Area Type: Other

Timings
8: Hydro Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	1043	481	295	1243	273	0	2	0
Future Volume (vph)	5	1043	481	295	1243	273	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	34.0	34.0
Total Split (s)	11.0	52.0	52.0	38.0	79.0	50.0	50.0	50.0	50.0
Total Split (%)	7.9%	37.1%	37.1%	27.1%	56.4%	35.7%	35.7%	35.7%	35.7%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	6.6	61.4	61.4	28.6	92.8	34.0	34.0		34.0
Actuated g/C Ratio	0.05	0.44	0.44	0.20	0.66	0.24	0.24		0.24
v/c Ratio	0.06	0.66	0.60	0.83	0.53	0.81	0.45		0.01
Control Delay	59.4	49.9	33.2	75.8	5.8	67.9	2.5		0.0
Queue Delay	0.0	0.2	0.1	0.0	0.2	0.0	0.0		0.0
Total Delay	59.4	50.0	33.3	75.8	6.0	67.9	2.5		0.0
LOS	E	D	C	E	A	E	A		A
Approach Delay		44.8			19.3		33.2		
Approach LOS		D			B		C		

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 32.1

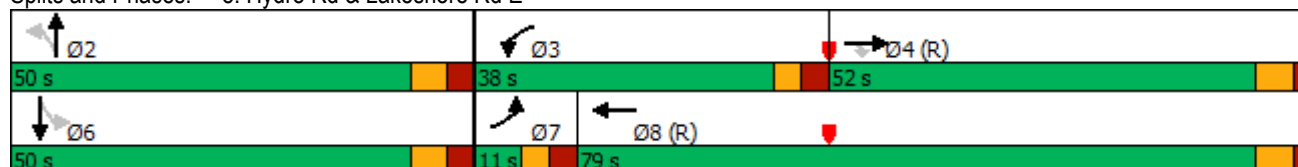
Intersection LOS: C

Intersection Capacity Utilization 80.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 8: Hydro Rd & Lakeshore Rd E



Queues
8: Hydro Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	5	1043	481	295	1252	273	309	5
v/c Ratio	0.06	0.66	0.60	0.83	0.53	0.81	0.45	0.01
Control Delay	59.4	49.9	33.2	75.8	5.8	67.9	2.5	0.0
Queue Delay	0.0	0.2	0.1	0.0	0.2	0.0	0.0	0.0
Total Delay	59.4	50.0	33.3	75.8	6.0	67.9	2.5	0.0
Queue Length 50th (m)	1.4	132.1	76.4	69.4	11.2	75.5	0.0	0.0
Queue Length 95th (m)	m3.0	m161.0	m114.6	105.3	59.7	100.9	1.4	0.0
Internal Link Dist (m)		198.5			171.3		111.3	167.6
Turn Bay Length (m)	25.0		50.0	25.0		60.0		
Base Capacity (vph)	83	1569	808	412	2369	435	779	577
Starvation Cap Reductn	0	80	22	0	376	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	0.06	0.70	0.61	0.72	0.63	0.63	0.40	0.01

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1043	481	295	1243	9	273	0	309	2	0	3
Future Volume (vph)	5	1043	481	295	1243	9	273	0	309	2	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1750	3579	1529	1750	3574		1745	1601			1715	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00			0.90	
Satd. Flow (perm)	1750	3579	1529	1750	3574		1385	1601			1583	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	1043	481	295	1243	9	273	0	309	2	0	3
RTOR Reduction (vph)	0	0	138	0	0	0	0	234	0	0	4	0
Lane Group Flow (vph)	5	1043	343	295	1252	0	273	75	0	0	1	0
Confl. Peds. (#/hr)	2		6	6		2	2					2
Heavy Vehicles (%)	2%	2%	0%	2%	2%	0%	2%	0%	2%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2				6
Permitted Phases			4				2			6		
Actuated Green, G (s)	1.0	60.4	60.4	27.6	87.0		33.0	33.0			33.0	
Effective Green, g (s)	2.0	61.4	61.4	28.6	88.0		34.0	34.0			34.0	
Actuated g/C Ratio	0.01	0.44	0.44	0.20	0.63		0.24	0.24			0.24	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	7.0			7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	25	1569	670	357	2246		336	388			384	
v/s Ratio Prot	0.00	c0.29		c0.17	0.35			0.05				
v/s Ratio Perm			0.22				c0.20				0.00	
v/c Ratio	0.20	0.66	0.51	0.83	0.56		0.81	0.19			0.00	
Uniform Delay, d1	68.2	31.1	28.4	53.3	14.9		50.0	42.1			40.2	
Progression Factor	0.91	1.42	1.88	1.16	0.37		1.00	1.00			1.00	
Incremental Delay, d2	3.5	2.0	2.5	10.6	0.7		13.9	0.2			0.0	
Delay (s)	65.4	46.3	56.0	72.4	6.2		63.9	42.4			40.2	
Level of Service	E	D	E	E	A		E	D			D	
Approach Delay (s)		49.4			18.8			52.4			40.2	
Approach LOS		D			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			37.0			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			80.3%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		50.0	100.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			50.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00						0.99	
Frt					0.993						0.892	
Flt Protected	0.950										0.990	
Satd. Flow (prot)	1750	3579	1842	1842	3541	0	0	1883	1842	0	1643	0
Flt Permitted	0.950										0.929	
Satd. Flow (perm)	1741	3579	1842	1842	3541	0	0	1883	1842	0	1538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					6						148	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		195.3			622.7			123.3			883.5	
Travel Time (s)		14.1			44.8			8.9			63.6	

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

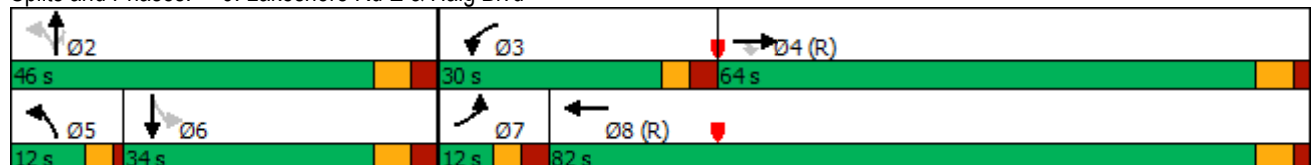
Scenario 1 2500 Units 2031
Afternoon Peak Hour

Lane Group	EBL	EBT	WBT	SBL	SBT	Ø2	Ø3	Ø5
Lane Configurations								
Traffic Volume (vph)	89	1308	1710	26	0			
Future Volume (vph)	89	1308	1710	26	0			
Turn Type	Prot	NA	NA	Perm	NA			
Protected Phases	7	4	8		6	2	3	5
Permitted Phases				6				
Detector Phase	7	4	8	6	6			
Switch Phase								
Minimum Initial (s)	5.0	8.0	8.0	8.0	8.0	8.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	34.0	34.0	34.0	11.0	11.0
Total Split (s)	12.0	64.0	82.0	34.0	34.0	46.0	30.0	12.0
Total Split (%)	8.6%	45.7%	58.6%	24.3%	24.3%	33%	21%	9%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0			
Total Lost Time (s)	5.0	5.0	5.0		6.0			
Lead/Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	16.0	119.4	98.5		9.6			
Actuated g/C Ratio	0.11	0.85	0.70		0.07			
v/c Ratio	0.45	0.43	0.72		0.53			
Control Delay	54.1	3.2	23.9		14.4			
Queue Delay	0.0	0.2	0.0		0.0			
Total Delay	54.1	3.4	23.9		14.4			
LOS	D	A	C		B			
Approach Delay		6.6	23.9		14.4			
Approach LOS		A	C		B			

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 16.3
 Intersection LOS: B
 Intersection Capacity Utilization 83.4%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues
9: Lakeshore Rd E & Haig Blvd

Scenario 1 2500 Units 2031
Afternoon Peak Hour



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	89	1308	1794	129
v/c Ratio	0.45	0.43	0.72	0.53
Control Delay	54.1	3.2	23.9	14.4
Queue Delay	0.0	0.2	0.0	0.0
Total Delay	54.1	3.4	23.9	14.4
Queue Length 50th (m)	27.1	41.3	227.4	0.0
Queue Length 95th (m)	m41.8	18.6	208.3	15.2
Internal Link Dist (m)		171.3	598.7	859.5
Turn Bay Length (m)	50.0			
Base Capacity (vph)	199	3053	2492	426
Starvation Cap Reductn	0	767	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.45	0.57	0.72	0.30

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	1308	0	0	1710	84	0	0	0	26	0	103
Future Volume (vph)	89	1308	0	0	1710	84	0	0	0	26	0	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0			5.0						6.0	
Lane Util. Factor	1.00	0.95			0.95						1.00	
Frpb, ped/bikes	1.00	1.00			1.00						0.99	
Flpb, ped/bikes	1.00	1.00			1.00						1.00	
Fr _t	1.00	1.00			0.99						0.89	
Fl _t Protected	0.95	1.00			1.00						0.99	
Satd. Flow (prot)	1750	3579			3541						1639	
Fl _t Permitted	0.95	1.00			1.00						0.93	
Satd. Flow (perm)	1750	3579			3541						1539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	89	1308	0	0	1710	84	0	0	0	26	0	103
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	120	0
Lane Group Flow (vph)	89	1308	0	0	1792	0	0	0	0	0	9	0
Confl. Peds. (#/hr)	15					15	2		9	9		2
Turn Type	Prot	NA	Perm	Prot	NA				Perm	Perm	NA	
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	15.0	118.4			97.4						8.6	
Effective Green, g (s)	16.0	119.4			98.4						9.6	
Actuated g/C Ratio	0.11	0.85			0.70						0.07	
Clearance Time (s)	6.0	6.0			6.0						7.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	200	3052			2488						105	
v/s Ratio Prot	0.05	c0.37			c0.51							
v/s Ratio Perm											c0.01	
v/c Ratio	0.45	0.43			0.72						0.08	
Uniform Delay, d ₁	57.9	2.4			12.5						61.1	
Progression Factor	0.83	1.17			1.75						1.00	
Incremental Delay, d ₂	1.3	0.4			1.1						0.3	
Delay (s)	49.4	3.2			23.0						61.4	
Level of Service	D	A			C						E	
Approach Delay (s)		6.1			23.0			0.0			61.4	
Approach LOS		A			C			A			E	
Intersection Summary												
HCM 2000 Control Delay			17.4			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			83.4%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.986
Satd. Flow (prot)	1593	0	1842	0	0	1816
Flt Permitted						0.986
Satd. Flow (perm)	1593	0	1842	0	0	1816
Link Speed (k/h)	50		50			50
Link Distance (m)	85.8		91.1			132.2
Travel Time (s)	6.2		6.6			9.5

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 101: East Avenue & Street L

Scenario 1 2500 Units 2031
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	25	147	0	65	169
Future Volume (vph)	0	25	147	0	65	169
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	25	147	0	65	169
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	25	147	234			
Volume Left (vph)	0	0	65			
Volume Right (vph)	25	0	0			
Hadj (s)	-0.57	0.03	0.09			
Departure Headway (s)	4.2	4.2	4.2			
Degree Utilization, x	0.03	0.17	0.27			
Capacity (veh/h)	784	832	848			
Control Delay (s)	7.3	8.1	8.8			
Approach Delay (s)	7.3	8.1	8.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.4			
Level of Service			A			
Intersection Capacity Utilization			33.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
102: Lakefront Promenade & Street L

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt											0.997	
Flt Protected		0.950										
Satd. Flow (prot)	0	1750	0	0	1842	0	0	1842	0	0	1837	0
Flt Permitted		0.950										
Satd. Flow (perm)	0	1750	0	0	1842	0	0	1842	0	0	1837	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		86.0			72.6			101.7			130.4	
Travel Time (s)		6.2			5.2			7.3			9.4	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 102: Lakefront Promenade & Street L

Scenario 1 2500 Units 2031
Afternoon Peak Hour

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Sign Control		Stop			Stop			Stop			Stop									
Traffic Volume (vph)	6	0	0	0	0	0	0	574	0	0	683	16								
Future Volume (vph)	6	0	0	0	0	0	0	574	0	0	683	16								
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
Hourly flow rate (vph)	6	0	0	0	0	0	0	574	0	0	683	16								
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total (vph)	6	0	574	699																
Volume Left (vph)	6	0	0	0																
Volume Right (vph)	0	0	0	16																
Hadj (s)	0.23	0.00	0.03	0.02																
Departure Headway (s)	6.8	6.6	4.7	4.6																
Degree Utilization, x	0.01	0.00	0.75	0.88																
Capacity (veh/h)	492	518	752	777																
Control Delay (s)	9.9	9.6	20.2	31.5																
Approach Delay (s)	9.9	0.0	20.2	31.5																
Approach LOS	A	A	C	D																
Intersection Summary																				
Delay			26.3																	
Level of Service			D																	
Intersection Capacity Utilization			46.9%	ICU Level of Service					A											
Analysis Period (min)			15																	

Lanes and Geometrics
103: Ogden Ave & Street L

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.865						0.934				
Flt Protected					0.950			0.975				
Satd. Flow (prot)	0	1593	0	0	1750	0	0	1677	0	0	1842	0
Flt Permitted					0.950			0.975				
Satd. Flow (perm)	0	1593	0	0	1750	0	0	1677	0	0	1842	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		55.4			82.6			89.6			142.3	
Travel Time (s)		4.0			5.9			6.5			10.2	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 103: Ogden Ave & Street L

Scenario 1 2500 Units 2031
Afternoon Peak Hour

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Sign Control		Stop			Stop			Stop			Stop									
Traffic Volume (vph)	0	0	22	21	0	0	58	0	55	0	0	0								
Future Volume (vph)	0	0	22	21	0	0	58	0	55	0	0	0								
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
Hourly flow rate (vph)	0	0	22	21	0	0	58	0	55	0	0	0								
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total (vph)	22	21	113	0																
Volume Left (vph)	0	21	58	0																
Volume Right (vph)	22	0	55	0																
Hadj (s)	-0.57	0.23	-0.16	0.00																
Departure Headway (s)	3.6	4.4	3.8	4.1																
Degree Utilization, x	0.02	0.03	0.12	0.00																
Capacity (veh/h)	966	795	918	874																
Control Delay (s)	6.7	7.5	7.4	7.1																
Approach Delay (s)	6.7	7.5	7.4	0.0																
Approach LOS	A	A	A	A																
Intersection Summary																				
Delay			7.3																	
Level of Service			A																	
Intersection Capacity Utilization			21.1%	ICU Level of Service					A											
Analysis Period (min)			15																	

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1842	0	0	1842	1842	0
Flt Permitted						
Satd. Flow (perm)	1842	0	0	1842	1842	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	72.3			87.6	135.3	
Travel Time (s)	5.2			6.3	9.7	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 104: Hydro Rd & Street L

Scenario 1 2500 Units 2031
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	0	0	0	582	776	0
Future Volume (vph)	0	0	0	582	776	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	582	776	0
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	0	582	776			
Volume Left (vph)	0	0	0			
Volume Right (vph)	0	0	0			
Hadj (s)	0.00	0.03	0.03			
Departure Headway (s)	6.8	4.7	4.6			
Degree Utilization, x	0.00	0.77	0.98			
Capacity (veh/h)	521	751	783			
Control Delay (s)	9.8	21.5	48.8			
Approach Delay (s)	0.0	21.5	48.8			
Approach LOS	A	C	E			
Intersection Summary						
Delay			37.1			
Level of Service			E			
Intersection Capacity Utilization			44.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
105: East Avenue & Rangeview Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.994
Satd. Flow (prot)	1593	0	1842	0	0	1831
Flt Permitted						0.994
Satd. Flow (perm)	1593	0	1842	0	0	1831
Link Speed (k/h)	50		50			50
Link Distance (m)	198.1		66.7			91.1
Travel Time (s)	14.3		4.8			6.6

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 105: East Avenue & Rangeview Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	147	0	0	20	148
Future Volume (vph)	0	147	0	0	20	148
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	147	0	0	20	148
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	147	0	168			
Volume Left (vph)	0	0	20			
Volume Right (vph)	147	0	0			
Hadj (s)	-0.57	0.00	0.06			
Departure Headway (s)	3.7	4.4	4.2			
Degree Utilization, x	0.15	0.00	0.20			
Capacity (veh/h)	927	795	820			
Control Delay (s)	7.4	7.4	8.3			
Approach Delay (s)	7.4	0.0	8.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.9			
Level of Service			A			
Intersection Capacity Utilization			24.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
106: Lakefront Promenade & Rangeview Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.865			0.964				
Flt Protected		0.950					0.950				0.995	
Satd. Flow (prot)	0	1750	0	0	1593	0	1750	1776	0	0	1833	0
Flt Permitted		0.950					0.950				0.995	
Satd. Flow (perm)	0	1750	0	0	1593	0	1750	1776	0	0	1833	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		174.1			140.0			142.6			101.7	
Travel Time (s)		12.5			10.1			10.3			7.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 106: Lakefront Promenade & Rangeview Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	4	0	0	0	0	118	143	451	144	64	618	0
Future Volume (vph)	4	0	0	0	0	118	143	451	144	64	618	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	0	0	0	0	118	143	451	144	64	618	0
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	4	118	143	595	682							
Volume Left (vph)	4	0	143	0	64							
Volume Right (vph)	0	118	0	144	0							
Hadj (s)	0.23	-0.57	0.53	-0.14	0.05							
Departure Headway (s)	7.8	6.4	6.2	5.5	5.3							
Degree Utilization, x	0.01	0.21	0.24	0.91	1.01							
Capacity (veh/h)	447	556	584	660	682							
Control Delay (s)	10.8	11.1	9.9	37.9	58.5							
Approach Delay (s)	10.8	11.1	32.4		58.5							
Approach LOS	B	B	D		F							
Intersection Summary												
Delay			42.3									
Level of Service			E									
Intersection Capacity Utilization			85.9%		ICU Level of Service				E			
Analysis Period (min)			15									

Lanes and Geometrics
107: Ogden Ave & Rangeview Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt												
Flt Protected		0.978										
Satd. Flow (prot)	0	1802	0	0	1842	0	0	1842	0	0	1842	0
Flt Permitted		0.978										
Satd. Flow (perm)	0	1802	0	0	1842	0	0	1842	0	0	1842	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		56.3			124.7			104.4			89.6	
Travel Time (s)		4.1			9.0			7.5			6.5	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 107: Ogden Ave & Rangeview Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	113	144	0	0	118	0	0	0	0	0	42	0
Future Volume (vph)	113	144	0	0	118	0	0	0	0	0	42	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	113	144	0	0	118	0	0	0	0	0	42	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	257	118	0	42								
Volume Left (vph)	113	0	0	0								
Volume Right (vph)	0	0	0	0								
Hadj (s)	0.12	0.03	0.00	0.03								
Departure Headway (s)	4.3	4.3	4.8	4.8								
Degree Utilization, x	0.30	0.14	0.00	0.06								
Capacity (veh/h)	833	819	694	693								
Control Delay (s)	9.1	8.0	7.8	8.0								
Approach Delay (s)	9.1	8.0	0.0	8.0								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.7									
Level of Service			A									
Intersection Capacity Utilization			30.5%	ICU Level of Service					A			
Analysis Period (min)			15									

Lanes and Geometrics
108: Hydro Rd & Rangeview Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.995	
Flt Protected	0.950			0.990		
Satd. Flow (prot)	1750	0	0	1824	1833	0
Flt Permitted	0.950			0.990		
Satd. Flow (perm)	1750	0	0	1824	1833	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	108.3			161.7	87.6	
Travel Time (s)	7.8			11.6	6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 108: Hydro Rd & Rangeview Rd

Scenario 1 2500 Units 2031
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	149	0	112	432	747	29
Future Volume (vph)	149	0	112	432	747	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	149	0	112	432	747	29
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	149	544	776			
Volume Left (vph)	149	112	0			
Volume Right (vph)	0	0	29			
Hadj (s)	0.23	0.08	0.01			
Departure Headway (s)	7.0	5.4	5.3			
Degree Utilization, x	0.29	0.82	1.14			
Capacity (veh/h)	494	654	690			
Control Delay (s)	12.8	28.4	98.8			
Approach Delay (s)	12.8	28.4	98.8			
Approach LOS	B	D	F			
Intersection Summary						
Delay			64.0			
Level of Service			F			
Intersection Capacity Utilization			88.3%	ICU Level of Service	E	
Analysis Period (min)			15			

Lanes and Geometrics
1: Ogden Ave & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	28.0		25.0	25.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.95	1.00	0.99		1.00		0.99	1.00	0.99	
Frt			0.850		0.982				0.850		0.905	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	3444	1566	1750	3296	0	1750	1883	1566	1750	1690	0
Flt Permitted	0.950			0.950			0.599			0.716		
Satd. Flow (perm)	1738	3444	1490	1745	3296	0	1102	1883	1545	1317	1690	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			117		15				159		47	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			142.3			246.5	
Travel Time (s)		19.6			16.0			10.2			17.7	

Intersection Summary

Area Type: Other

Timings
1: Ogden Ave & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	194	1680	221	113	843	281	63	313	122	27
Future Volume (vph)	194	1680	221	113	843	281	63	313	122	27
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	7	4		3	8	5	2		1	6
Permitted Phases			4			2		2	6	
Detector Phase	7	4	4	3	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	5.0	8.0	8.0	5.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	9.0	34.0	34.0	9.0	34.0
Total Split (s)	24.0	72.0	72.0	12.0	60.0	12.0	37.0	37.0	9.0	34.0
Total Split (%)	18.5%	55.4%	55.4%	9.2%	46.2%	9.2%	28.5%	28.5%	6.9%	26.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	1.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	19.3	68.5	68.5	15.2	64.3	33.3	20.6	20.6	25.4	18.0
Actuated g/C Ratio	0.15	0.53	0.53	0.12	0.49	0.26	0.16	0.16	0.20	0.14
v/c Ratio	0.75	0.93	0.26	0.55	0.59	0.82	0.21	0.83	0.44	0.27
Control Delay	61.8	34.7	11.1	70.9	16.7	62.8	46.2	43.2	44.6	22.5
Queue Delay	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.8	37.5	11.1	70.9	16.7	62.8	46.2	43.2	44.6	22.5
LOS	E	D	B	E	B	E	D	D	D	C
Approach Delay		37.0			22.4		51.9			36.3
Approach LOS		D			C		D			D

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 35.5

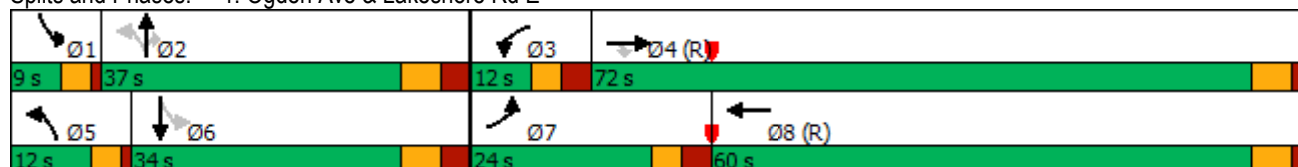
Intersection LOS: D

Intersection Capacity Utilization 88.3%

ICU Level of Service E

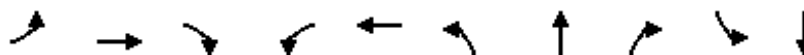
Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues
1: Ogden Ave & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	194	1680	221	113	961	281	63	313	122	74
v/c Ratio	0.75	0.93	0.26	0.55	0.59	0.82	0.21	0.83	0.44	0.27
Control Delay	61.8	34.7	11.1	70.9	16.7	62.8	46.2	43.2	44.6	22.5
Queue Delay	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.8	37.5	11.1	70.9	16.7	62.8	46.2	43.2	44.6	22.5
Queue Length 50th (m)	51.5	148.3	13.8	28.7	69.0	68.0	15.0	41.7	26.6	6.5
Queue Length 95th (m)	m65.8	m#272.9	m23.1	m#73.8	60.5	88.2	26.3	70.9	39.8	19.3
Internal Link Dist (m)	248.7				198.5		118.3		222.5	
Turn Bay Length (m)	28.0			25.0	25.0	30.0		30.0		
Base Capacity (vph)	274	1813	840	204	1638	344	449	489	279	400
Starvation Cap Reductn	0	10	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	72	0	0	0	0	0	3	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.96	0.26	0.55	0.59	0.82	0.14	0.64	0.44	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	194	1680	221	113	843	118	281	63	313	122	27	47
Future Volume (vph)	194	1680	221	113	843	118	281	63	313	122	27	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		3.0	6.0	6.0	3.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3444	1490	1750	3295		1749	1883	1545	1748	1689	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.60	1.00	1.00	0.72	1.00	
Satd. Flow (perm)	1750	3444	1490	1750	3295		1103	1883	1545	1318	1689	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	194	1680	221	113	843	118	281	63	313	122	27	47
RTOR Reduction (vph)	0	0	57	0	8	0	0	0	132	0	41	0
Lane Group Flow (vph)	194	1680	164	113	953	0	281	63	181	122	33	0
Confl. Peds. (#/hr)	7		8	8		7	1		1	1		1
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	18.3	66.1	66.1	14.2	62.0		30.7	20.9	20.9	21.2	15.4	
Effective Green, g (s)	19.3	67.1	67.1	15.2	63.0		31.7	21.9	21.9	23.2	16.4	
Actuated g/C Ratio	0.15	0.52	0.52	0.12	0.48		0.24	0.17	0.17	0.18	0.13	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	259	1777	769	204	1596		330	317	260	257	213	
v/s Ratio Prot	c0.11	c0.49		0.06	0.29		c0.08	0.03		0.02	0.02	
v/s Ratio Perm			0.11				c0.13		0.12	0.06		
v/c Ratio	0.75	0.95	0.21	0.55	0.60		0.85	0.20	0.70	0.47	0.15	
Uniform Delay, d1	53.0	29.7	17.1	54.2	24.3		45.7	46.5	50.9	47.2	50.6	
Progression Factor	0.97	0.98	1.34	1.13	0.62		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.7	7.6	0.4	2.8	1.4		18.6	0.3	7.8	1.4	0.3	
Delay (s)	57.8	36.9	23.3	64.2	16.5		64.3	46.8	58.7	48.6	51.0	
Level of Service	E	D	C	E	B		E	D	E	D	D	
Approach Delay (s)		37.4			21.5			60.0			49.5	
Approach LOS		D			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			37.4			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			88.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
2: Dixie Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.96		0.99			0.99	0.98
Frt		0.998				0.850						0.850
Flt Protected	0.950			0.950				0.950			0.950	
Satd. Flow (prot)	1653	3469	0	1785	3476	1536	0	1825	0	0	1807	1465
Flt Permitted	0.950			0.950				0.525			0.756	
Satd. Flow (perm)	1644	3469	0	1780	3476	1478	0	1003	0	0	1428	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				134						25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings
2: Dixie Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	698	1278	9	909	171	3	0	151	0	437
Future Volume (vph)	698	1278	9	909	171	3	0	151	0	437
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA	pm+ov
Protected Phases	7	4	3	8			2		6	7
Permitted Phases					8	2		6		6
Detector Phase	7	4	3	8	8	2	2	6	6	7
Switch Phase										
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0
Minimum Split (s)	12.0	24.0	11.0	24.0	24.0	34.0	34.0	34.0	34.0	12.0
Total Split (s)	56.0	85.0	11.0	40.0	40.0	34.0	34.0	34.0	34.0	56.0
Total Split (%)	43.1%	65.4%	8.5%	30.8%	30.8%	26.2%	26.2%	26.2%	26.2%	43.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0		6.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	59.1	96.7	6.9	35.0	35.0		19.9		19.9	80.0
Actuated g/C Ratio	0.45	0.74	0.05	0.27	0.27		0.15		0.15	0.62
v/c Ratio	0.93	0.50	0.10	0.97	0.35		0.02		0.69	0.48
Control Delay	52.2	5.9	60.8	70.5	12.2		43.0		67.7	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	52.2	5.9	60.8	70.5	12.2		43.0		67.7	12.7
LOS	D	A	E	E	B		D		E	B
Approach Delay		22.1		61.3			43.0		26.8	
Approach LOS		C		E			D		C	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 34.5

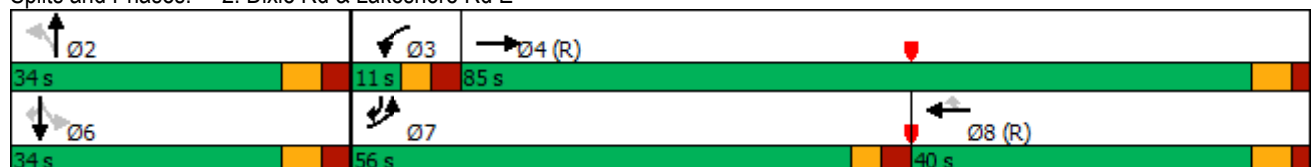
Intersection LOS: C

Intersection Capacity Utilization 87.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E

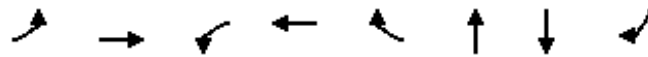


Queues

Scenario 2 3700 Units 2041

2: Dixie Rd & Lakeshore Rd E

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	698	1298	9	909	171	3	151	437
v/c Ratio	0.93	0.50	0.10	0.97	0.35	0.02	0.69	0.48
Control Delay	52.2	5.9	60.8	70.5	12.2	43.0	67.7	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	5.9	60.8	70.5	12.2	43.0	67.7	12.7
Queue Length 50th (m)	199.6	21.5	2.4	128.1	7.5	0.7	39.1	50.5
Queue Length 95th (m)	#291.5	145.3	8.5	#172.5	27.0	3.5	59.2	73.7
Internal Link Dist (m)		598.7		375.1		69.6	268.8	
Turn Bay Length (m)	44.0		25.0		30.0			
Base Capacity (vph)	751	2581	94	935	495	216	307	906
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	0.93	0.50	0.10	0.97	0.35	0.01	0.49	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	698	1278	20	9	909	171	3	0	0	151	0	437
Future Volume (vph)	698	1278	20	9	909	171	3	0	0	151	0	437
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		6.0			6.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.99			0.99	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95			0.95	1.00
Satd. Flow (prot)	1653	3468		1785	3476	1478		1815			1794	1458
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.53			0.76	1.00
Satd. Flow (perm)	1653	3468		1785	3476	1478		1004			1427	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	698	1278	20	9	909	171	3	0	0	151	0	437
RTOR Reduction (vph)	0	1	0	0	0	98	0	0	0	0	0	10
Lane Group Flow (vph)	698	1297	0	9	909	73	0	3	0	0	151	427
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Heavy Vehicles (%)	8%	5%	2%	0%	5%	4%	0%	0%	0%	1%	0%	9%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases						8	2			6		6
Actuated Green, G (s)	58.1	91.0		1.1	34.0	34.0		18.9			18.9	77.0
Effective Green, g (s)	59.1	92.0		2.1	35.0	35.0		19.9			19.9	79.0
Actuated g/C Ratio	0.45	0.71		0.02	0.27	0.27		0.15			0.15	0.61
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		7.0			7.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	751	2454		28	935	397		153			218	886
v/s Ratio Prot	c0.42	0.37		0.01	c0.26							0.22
v/s Ratio Perm						0.05		0.00			c0.11	0.07
v/c Ratio	0.93	0.53		0.32	0.97	0.18		0.02			0.69	0.48
Uniform Delay, d1	33.5	8.9		63.2	47.0	36.5		46.8			52.2	14.1
Progression Factor	1.05	0.65		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	14.1	0.6		6.6	23.4	1.0		0.1			9.1	0.4
Delay (s)	49.4	6.4		69.8	70.4	37.5		46.8			61.3	14.6
Level of Service	D	A		E	E	D		D			E	B
Approach Delay (s)		21.4			65.3			46.8			26.6	
Approach LOS		C			E			D			C	
Intersection Summary												
HCM 2000 Control Delay			35.3				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			87.2%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
3: Lakeshore Rd E & Cawthra Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor				1.00		0.96						0.97
Frt						0.850						0.850
Flt Protected	0.950			0.950						0.950	0.950	
Satd. Flow (prot)	1716	3579	0	1785	3476	1493	0	1921	0	1570	1605	1507
Flt Permitted	0.089			0.240						0.950	0.950	
Satd. Flow (perm)	161	3579	0	450	3476	1430	0	1921	0	1570	1605	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						257						25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings
3: Lakeshore Rd E & Cawthra Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT	SBR	Ø2
Lane Configurations									
Traffic Volume (vph)	482	1177	3	1070	904	748	0	379	
Future Volume (vph)	482	1177	3	1070	904	748	0	379	
Turn Type	pm+pt	NA	Perm	NA	pm+ov	Prot	NA	pm+ov	
Protected Phases	7	4		8	1	1	6	7	2
Permitted Phases	4		8		8			6	
Detector Phase	7	4	8	8	1	1	6	7	
Switch Phase									
Minimum Initial (s)	5.0	7.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0
Minimum Split (s)	11.0	38.0	38.0	38.0	14.0	14.0	38.0	11.0	11.0
Total Split (s)	37.0	84.0	47.0	47.0	35.0	35.0	46.0	37.0	11.0
Total Split (%)	28.5%	64.6%	36.2%	36.2%	26.9%	26.9%	35.4%	28.5%	8%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	
Lead/Lag	Lead		Lag	Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	Max	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	82.0	79.0	43.1	43.1	84.1	41.0	41.0	77.9	
Actuated g/C Ratio	0.63	0.61	0.33	0.33	0.65	0.32	0.32	0.60	
v/c Ratio	0.95	0.54	0.02	0.93	0.87	0.76	0.74	0.42	
Control Delay	65.9	16.1	40.7	57.3	14.7	51.2	49.9	13.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	65.9	16.1	40.7	57.3	14.7	51.2	49.9	13.5	
LOS	E	B	D	E	B	D	D	B	
Approach Delay		30.5		37.8			38.1		
Approach LOS		C		D			D		

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 8:WBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 35.3

Intersection LOS: D

Intersection Capacity Utilization 92.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd

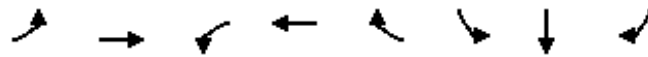


Queues

Scenario 2 3700 Units 2041

3: Lakeshore Rd E & Cawthra Rd

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT	SBR
Lane Group Flow (vph)	482	1177	3	1070	904	374	374	379
v/c Ratio	0.95	0.54	0.02	0.93	0.87	0.76	0.74	0.42
Control Delay	65.9	16.1	40.7	57.3	14.7	51.2	49.9	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.9	16.1	40.7	57.3	14.7	51.2	49.9	13.5
Queue Length 50th (m)	109.2	92.3	0.6	131.1	49.6	95.4	94.7	44.7
Queue Length 95th (m)	#177.2	111.0	m1.1m	#191.1	m#71.0	137.1	135.7	66.0
Internal Link Dist (m)		297.4		113.2			931.9	
Turn Bay Length (m)	35.0		60.0		70.0	115.0		
Base Capacity (vph)	520	2174	149	1153	1035	495	506	911
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	0.93	0.54	0.02	0.93	0.87	0.76	0.74	0.42

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	482	1177	0	3	1070	904	0	0	0	748	0	379
Future Volume (vph)	482	1177	0	3	1070	904	0	0	0	748	0	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	2.0	5.0		5.0	5.0	5.0				5.0	5.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00				0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98				1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00				1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85				1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00				0.95	0.95	1.00
Satd. Flow (prot)	1716	3579		1779	3476	1461				1570	1605	1484
Flt Permitted	0.09	1.00		0.24	1.00	1.00				0.95	0.95	1.00
Satd. Flow (perm)	160	3579		450	3476	1461				1570	1605	1484
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	482	1177	0	3	1070	904	0	0	0	748	0	379
RTOR Reduction (vph)	0	0	0	0	0	91	0	0	0	0	0	11
Lane Group Flow (vph)	482	1177	0	3	1070	813	0	0	0	374	374	368
Confl. Peds. (#/hr)	25		8	8		25	13					13
Heavy Vehicles (%)	4%	2%	0%	0%	5%	7%	0%	0%	0%	8%	0%	6%
Turn Type	pm+pt	NA		Perm	NA	pm+ov				Prot	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	78.0	78.0		42.1	42.1	82.1				40.0	40.0	72.9
Effective Green, g (s)	79.0	79.0		43.1	43.1	84.1				41.0	41.0	74.9
Actuated g/C Ratio	0.61	0.61		0.33	0.33	0.65				0.32	0.32	0.58
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0				6.0	6.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0				3.0	3.0	3.0
Lane Grp Cap (vph)	502	2174		149	1152	1001				495	506	855
v/s Ratio Prot	c0.25	0.33			c0.31	c0.26				0.24	0.23	0.11
v/s Ratio Perm	0.33			0.01		0.30						0.14
v/c Ratio	0.96	0.54		0.02	0.93	0.81				0.76	0.74	0.43
Uniform Delay, d1	39.0	14.9		29.2	42.0	17.1				40.0	39.7	15.5
Progression Factor	1.00	1.00		1.33	1.12	0.56				1.00	1.00	1.00
Incremental Delay, d2	30.2	1.0		0.2	10.3	3.5				6.5	5.6	0.4
Delay (s)	69.2	15.9		39.1	57.1	13.1				46.5	45.3	15.9
Level of Service	E	B		D	E	B				D	D	B
Approach Delay (s)		31.4			36.9			0.0			35.8	
Approach LOS		C			D			A			D	
Intersection Summary												
HCM 2000 Control Delay			34.7				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			17.0		
Intersection Capacity Utilization			92.5%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
5: East Avenue & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.94	1.00	0.99		1.00	0.98	
Frt	0.994				0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3451	0	1785	3380	1566	1750	1579	0	1785	1606	0
Flt Permitted	0.950			0.950			0.751			0.616		
Satd. Flow (perm)	1779	3451	0	1780	3380	1473	1377	1579	0	1156	1606	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	6					84		84			87	
Link Speed (k/h)	50				50			50			50	
Link Distance (m)	226.1				305.9			132.2			178.2	
Travel Time (s)	16.3				22.0			9.5			12.8	

Intersection Summary

Area Type: Other

Timings

5: East Avenue & Lakeshore Rd E

Scenario 2 3700 Units 2041

Morning Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	37	1803	23	1737	9	277	0	32	0
Future Volume (vph)	37	1803	23	1737	9	277	0	32	0
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	7	4	3	8			2		6
Permitted Phases					8	2		6	
Detector Phase	7	4	3	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	11.0	24.0	24.0	31.0	31.0	31.0	31.0
Total Split (s)	11.0	88.0	11.0	88.0	88.0	31.0	31.0	31.0	31.0
Total Split (%)	8.5%	67.7%	8.5%	67.7%	67.7%	23.8%	23.8%	23.8%	23.8%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	6.1	83.3	6.1	83.3	83.3	29.1	29.1	29.1	29.1
Actuated g/C Ratio	0.05	0.64	0.05	0.64	0.64	0.22	0.22	0.22	0.22
v/c Ratio	0.45	0.85	0.28	0.80	0.01	0.90	0.33	0.12	0.02
Control Delay	77.9	29.7	69.9	15.6	0.0	81.2	21.1	44.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.9	29.7	69.9	15.6	0.0	81.2	21.1	44.7	0.1
LOS	E	C	E	B	A	F	C	D	A
Approach Delay		30.6		16.2			61.3		34.0
Approach LOS		C		B			E		C

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 27.6

Intersection LOS: C

Intersection Capacity Utilization 88.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E



Queues

Scenario 2 3700 Units 2041

5: East Avenue & Lakeshore Rd E

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	1879	23	1737	9	277	137	32	10
v/c Ratio	0.45	0.85	0.28	0.80	0.01	0.90	0.33	0.12	0.02
Control Delay	77.9	29.7	69.9	15.6	0.0	81.2	21.1	44.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.9	29.7	69.9	15.6	0.0	81.2	21.1	44.7	0.1
Queue Length 50th (m)	9.9	223.8	6.1	137.4	0.0	~81.0	12.1	7.2	0.0
Queue Length 95th (m)	m16.8	267.0	m12.7	167.1	m0.0	#138.2	31.8	17.1	0.0
Internal Link Dist (m)		202.1		281.9			108.2		154.2
Turn Bay Length (m)	72.0		50.0		20.0	20.0		45.0	
Base Capacity (vph)	83	2217	83	2169	975	308	419	259	427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.85	0.28	0.80	0.01	0.90	0.33	0.12	0.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1803	76	23	1737	9	277	0	137	32	0	10
Future Volume (vph)	37	1803	76	23	1737	9	277	0	137	32	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3451		1785	3380	1473	1742	1579		1783	1606	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.75	1.00		0.62	1.00	
Satd. Flow (perm)	1785	3451		1785	3380	1473	1377	1579		1156	1606	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	37	1803	76	23	1737	9	277	0	137	32	0	10
RTOR Reduction (vph)	0	2	0	0	0	3	0	65	0	0	8	0
Lane Group Flow (vph)	37	1877	0	23	1737	6	277	72	0	32	2	0
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3
Heavy Vehicles (%)	0%	5%	2%	0%	8%	2%	2%	0%	2%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	3.0	79.9		3.0	79.9	79.9	28.1	28.1		28.1	28.1	
Effective Green, g (s)	4.0	80.9		4.0	80.9	80.9	29.1	29.1		29.1	29.1	
Actuated g/C Ratio	0.03	0.62		0.03	0.62	0.62	0.22	0.22		0.22	0.22	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	54	2147		54	2103	916	308	353		258	359	
v/s Ratio Prot	c0.02	c0.54		0.01	0.51			0.05			0.00	
v/s Ratio Perm						0.00	c0.20			0.03		
v/c Ratio	0.69	0.87		0.43	0.83	0.01	0.90	0.20		0.12	0.01	
Uniform Delay, d1	62.4	20.3		61.9	19.1	9.3	49.0	41.0		40.3	39.2	
Progression Factor	1.06	1.38		1.03	0.71	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.6	4.4		5.0	3.6	0.0	27.0	0.3		0.2	0.0	
Delay (s)	91.5	32.5		68.9	17.1	9.3	76.0	41.3		40.5	39.2	
Level of Service	F	C		E	B	A	E	D		D	D	
Approach Delay (s)		33.6			17.7			64.5			40.2	
Approach LOS		C			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			30.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			88.1%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
7: Lakefront Promenade & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		25.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		0.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.96	1.00		0.99	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3476	1566	1750	3476	1750	1566
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3476	1507	1747	3476	1737	1536
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		80				22
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	130.4	
Travel Time (s)	4.7			19.6	9.4	

Intersection Summary

Area Type: Other

Timings
7: Lakefront Promenade & Lakeshore Rd E

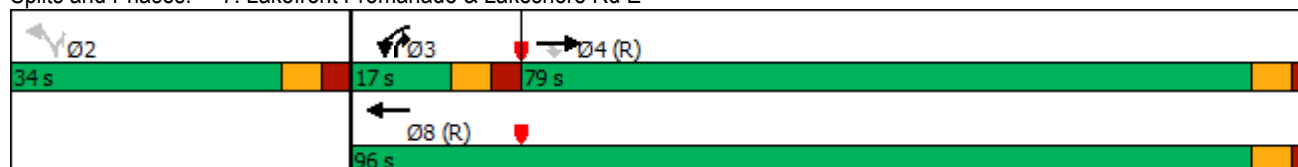
Scenario 2 3700 Units 2041
Morning Peak Hour

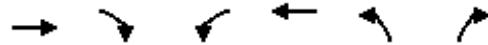
	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	1616	257	99	1229	290	426
Future Volume (vph)	1616	257	99	1229	290	426
Turn Type	NA	Perm	Prot	NA	Perm	pm+ov
Protected Phases	4		3	8		3
Permitted Phases		4			2	2
Detector Phase	4	4	3	8	2	3
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	8.0	5.0	5.0
Minimum Split (s)	24.0	24.0	12.0	24.0	34.0	12.0
Total Split (s)	79.0	79.0	17.0	96.0	34.0	17.0
Total Split (%)	60.8%	60.8%	13.1%	73.8%	26.2%	13.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	6.0	5.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes			Yes
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	75.9	75.9	11.3	93.2	25.8	37.1
Actuated g/C Ratio	0.58	0.58	0.09	0.72	0.20	0.29
v/c Ratio	0.80	0.28	0.66	0.49	0.84	0.93
Control Delay	19.5	10.8	79.5	6.9	71.5	67.2
Queue Delay	0.3	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	10.8	79.5	6.9	71.5	67.2
LOS	B	B	E	A	E	E
Approach Delay	18.6			12.3	69.0	
Approach LOS	B			B	E	

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 25.7
 Intersection LOS: C
 Intersection Capacity Utilization 81.4%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promenade & Lakeshore Rd E





Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1616	257	99	1229	290	426
v/c Ratio	0.80	0.28	0.66	0.49	0.84	0.93
Control Delay	19.5	10.8	79.5	6.9	71.5	67.2
Queue Delay	0.3	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	10.8	79.5	6.9	71.5	67.2
Queue Length 50th (m)	101.5	19.2	28.3	52.4	74.2	95.5
Queue Length 95th (m)	129.8	m31.4	m#48.5	60.6	#115.4	#129.1
Internal Link Dist (m)	41.1			248.7	106.4	
Turn Bay Length (m)		25.0	35.0			
Base Capacity (vph)	2036	916	152	2493	374	456
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	78	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.28	0.65	0.49	0.78	0.93

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (vph)	1616	257	99	1229	290	426
Future Volume (vph)	1616	257	99	1229	290	426
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	5.0	5.0	6.0	5.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3476	1507	1750	3476	1737	1545
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3476	1507	1750	3476	1737	1545
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1616	257	99	1229	290	426
RTOR Reduction (vph)	0	33	0	0	0	16
Lane Group Flow (vph)	1616	224	99	1229	290	410
Confl. Peds. (#/hr)		5	5		5	5
Heavy Vehicles (%)	5%	2%	2%	5%	2%	2%
Turn Type	NA	Perm	Prot	NA	Perm	pm+ov
Protected Phases	4		3	8		3
Permitted Phases		4			2	2
Actuated Green, G (s)	74.9	74.9	10.3	92.2	24.8	35.1
Effective Green, g (s)	75.9	75.9	11.3	93.2	25.8	37.1
Actuated g/C Ratio	0.58	0.58	0.09	0.72	0.20	0.29
Clearance Time (s)	6.0	6.0	7.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2029	879	152	2492	344	512
v/s Ratio Prot	c0.46		0.06	0.35		c0.07
v/s Ratio Perm		0.15			0.17	0.20
v/c Ratio	0.80	0.25	0.65	0.49	0.84	0.80
Uniform Delay, d1	21.0	13.2	57.4	8.1	50.2	43.0
Progression Factor	0.78	1.08	1.08	0.74	1.00	1.00
Incremental Delay, d2	2.4	0.5	8.1	0.6	16.9	8.8
Delay (s)	18.8	14.8	70.2	6.6	67.0	51.8
Level of Service	B	B	E	A	E	D
Approach Delay (s)	18.3			11.3	58.0	
Approach LOS	B			B	E	
Intersection Summary						
HCM 2000 Control Delay			23.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.85			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	18.0
Intersection Capacity Utilization			81.4%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	60.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			30.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.97	1.00			1.00					
Frt			0.850					0.850			0.890	
Flt Protected	0.950			0.950			0.950				0.991	
Satd. Flow (prot)	1750	3444	1566	1750	3380	0	1750	1601	0	0	1661	0
Flt Permitted	0.950			0.950			0.750				0.931	
Satd. Flow (perm)	1747	3444	1512	1747	3380	0	1380	1601	0	0	1561	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			223					91			76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			135.3			191.6	
Travel Time (s)		16.0			14.1			9.7			13.8	

Intersection Summary

Area Type: Other

Timings
8: Hydro Rd & Lakeshore Rd E

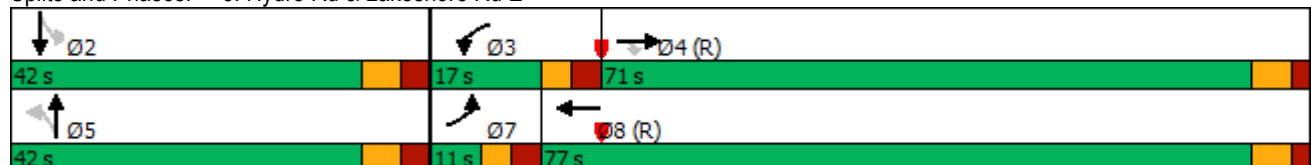
Scenario 2 3700 Units 2041
Morning Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	4	1611	463	131	1011	287	0	2	0
Future Volume (vph)	4	1611	463	131	1011	287	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		5		2
Permitted Phases			4			5		2	
Detector Phase	7	4	4	3	8	5	5	2	2
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	12.0	12.0
Total Split (s)	11.0	71.0	71.0	17.0	77.0	42.0	42.0	42.0	42.0
Total Split (%)	8.5%	54.6%	54.6%	13.1%	59.2%	32.3%	32.3%	32.3%	32.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	C-Min	None	C-Min	None	None	None	None
Act Effct Green (s)	6.3	69.4	69.4	13.0	85.2	31.6	31.6		31.6
Actuated g/C Ratio	0.05	0.53	0.53	0.10	0.66	0.24	0.24		0.24
v/c Ratio	0.05	0.88	0.51	0.75	0.46	0.86	0.83		0.03
Control Delay	69.5	17.6	3.7	93.9	8.9	70.3	50.8		0.1
Queue Delay	0.0	1.2	0.0	0.0	0.1	0.0	0.0		0.0
Total Delay	69.5	18.8	3.7	93.9	9.0	70.3	50.8		0.1
LOS	E	B	A	F	A	E	D		A
Approach Delay		15.6			18.7		59.2		0.1
Approach LOS		B			B		E		A

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 23.9
 Intersection LOS: C
 Intersection Capacity Utilization 88.7%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 8: Hydro Rd & Lakeshore Rd E



Queues
8: Hydro Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	4	1611	463	131	1011	287	380	11
v/c Ratio	0.05	0.88	0.51	0.75	0.46	0.86	0.83	0.03
Control Delay	69.5	17.6	3.7	93.9	8.9	70.3	50.8	0.1
Queue Delay	0.0	1.2	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	69.5	18.8	3.7	93.9	9.0	70.3	50.8	0.1
Queue Length 50th (m)	1.1	95.8	6.8	31.2	22.5	72.9	74.7	0.0
Queue Length 95th (m)	m1.4	m162.3	m10.8	#73.1	45.9	#112.0	112.2	0.0
Internal Link Dist (m)		198.5			171.3		111.3	167.6
Turn Bay Length (m)	25.0		50.0	25.0		60.0		
Base Capacity (vph)	85	1839	911	175	2216	382	509	487
Starvation Cap Reductn	0	85	0	0	283	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	0.05	0.92	0.51	0.75	0.52	0.75	0.75	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	1611	463	131	1011	0	287	0	380	2	0	9
Future Volume (vph)	4	1611	463	131	1011	0	287	0	380	2	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1750	3444	1512	1750	3380		1747	1601			1660	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00			0.93	
Satd. Flow (perm)	1750	3444	1512	1750	3380		1380	1601			1560	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	1611	463	131	1011	0	287	0	380	2	0	9
RTOR Reduction (vph)	0	0	104	0	0	0	0	69	0	0	8	0
Lane Group Flow (vph)	4	1611	359	131	1011	0	287	311	0	0	3	0
Confl. Peds. (#/hr)	2		4	4		2	1					
Heavy Vehicles (%)	2%	6%	2%	2%	8%	2%	2%	0%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			5				2
Permitted Phases			4				5			2		
Actuated Green, G (s)	1.0	68.4	68.4	12.0	79.4		30.6	30.6			30.6	
Effective Green, g (s)	2.0	69.4	69.4	13.0	80.4		31.6	31.6			31.6	
Actuated g/C Ratio	0.02	0.53	0.53	0.10	0.62		0.24	0.24			0.24	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	7.0			7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	26	1838	807	175	2090		335	389			379	
v/s Ratio Prot	0.00	c0.47		c0.07	0.30			0.19				
v/s Ratio Perm			0.24				c0.21				0.00	
v/c Ratio	0.15	0.88	0.44	0.75	0.48		0.86	0.80			0.01	
Uniform Delay, d1	63.2	26.5	18.5	56.9	13.5		47.0	46.2			37.3	
Progression Factor	1.16	0.50	0.27	1.29	0.68		1.00	1.00			1.00	
Incremental Delay, d2	1.3	3.2	0.9	13.2	0.7		18.9	11.0			0.0	
Delay (s)	74.7	16.5	5.9	86.7	9.8		65.9	57.2			37.3	
Level of Service	E	B	A	F	A		E	E			D	
Approach Delay (s)		14.2			18.6			61.0			37.3	
Approach LOS		B			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			23.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			88.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		50.0	100.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			50.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00										0.99	
Frt					0.996						0.923	
Flt Protected	0.950										0.979	
Satd. Flow (prot)	1750	3476	1842	1842	3465	0	0	1883	1842	0	1686	0
Flt Permitted	0.950										0.860	
Satd. Flow (perm)	1744	3476	1842	1842	3465	0	0	1883	1842	0	1480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					3						76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		195.3			622.7			123.3			883.5	
Travel Time (s)		14.1			44.8			8.9			63.6	

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

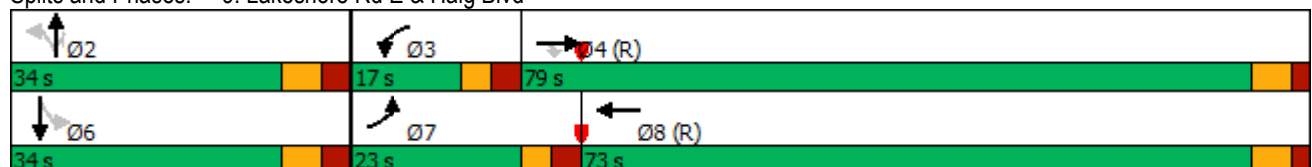
Scenario 2 3700 Units 2041
Morning Peak Hour

							
Lane Group	EBL	EBT	WBT	SBL	SBT	Ø2	Ø3
Lane Configurations							
Traffic Volume (vph)	140	2031	1421	35	0		
Future Volume (vph)	140	2031	1421	35	0		
Turn Type	Prot	NA	NA	Perm	NA		
Protected Phases	7	4	8		6	2	3
Permitted Phases				6			
Detector Phase	7	4	8	6	6		
Switch Phase							
Minimum Initial (s)	5.0	8.0	8.0	8.0	8.0	8.0	5.0
Minimum Split (s)	11.0	24.0	24.0	34.0	34.0	34.0	11.0
Total Split (s)	23.0	79.0	73.0	34.0	34.0	34.0	17.0
Total Split (%)	17.7%	60.8%	56.2%	26.2%	26.2%	26%	13%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0		
Total Lost Time (s)	5.0	5.0	5.0		6.0		
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?	Yes	Yes	Yes				Yes
Recall Mode	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	16.6	113.3	90.7		9.7		
Actuated g/C Ratio	0.13	0.87	0.70		0.07		
v/c Ratio	0.63	0.67	0.60		0.45		
Control Delay	54.2	5.2	22.6		22.0		
Queue Delay	0.0	0.4	0.0		0.0		
Total Delay	54.2	5.6	22.6		22.0		
LOS	D	A	C		C		
Approach Delay		8.7	22.6		22.0		
Approach LOS		A	C		C		

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 14.5
 Intersection LOS: B
 Intersection Capacity Utilization 86.3%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues
9: Lakeshore Rd E & Haig Blvd

Scenario 2 3700 Units 2041
Morning Peak Hour



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	140	2031	1462	81
v/c Ratio	0.63	0.67	0.60	0.45
Control Delay	54.2	5.2	22.6	22.0
Queue Delay	0.0	0.4	0.0	0.0
Total Delay	54.2	5.6	22.6	22.0
Queue Length 50th (m)	37.7	83.0	135.1	1.3
Queue Length 95th (m)	m45.1	85.0	m122.7	17.4
Internal Link Dist (m)		171.3	598.7	859.5
Turn Bay Length (m)	50.0			
Base Capacity (vph)	256	3030	2419	378
Starvation Cap Reductn	0	433	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.55	0.78	0.60	0.21

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	2031	0	0	1421	41	0	0	0	35	0	46
Future Volume (vph)	140	2031	0	0	1421	41	0	0	0	35	0	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0			5.0						6.0	
Lane Util. Factor	1.00	0.95			0.95						1.00	
Frpb, ped/bikes	1.00	1.00			1.00						0.99	
Flpb, ped/bikes	1.00	1.00			1.00						1.00	
Frt	1.00	1.00			1.00						0.92	
Flt Protected	0.95	1.00			1.00						0.98	
Satd. Flow (prot)	1750	3476			3464						1686	
Flt Permitted	0.95	1.00			1.00						0.86	
Satd. Flow (perm)	1750	3476			3464						1481	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	140	2031	0	0	1421	41	0	0	0	35	0	46
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	71	0
Lane Group Flow (vph)	140	2031	0	0	1461	0	0	0	0	0	10	0
Confl. Peds. (#/hr)	7			7			3		1	1		3
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA				Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	15.6	109.9			88.3						7.1	
Effective Green, g (s)	16.6	110.9			89.3						8.1	
Actuated g/C Ratio	0.13	0.85			0.69						0.06	
Clearance Time (s)	6.0	6.0			6.0						7.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	223	2965			2379						92	
v/s Ratio Prot	0.08	c0.58			0.42							
v/s Ratio Perm											c0.01	
v/c Ratio	0.63	0.68			0.61						0.11	
Uniform Delay, d1	53.8	3.4			11.0						57.5	
Progression Factor	0.88	1.21			1.82						1.00	
Incremental Delay, d2	3.3	0.8			0.8						0.5	
Delay (s)	50.4	4.9			20.8						58.0	
Level of Service	D	A			C						E	
Approach Delay (s)		7.8			20.8			0.0			58.0	
Approach LOS		A			C			A			E	
Intersection Summary												
HCM 2000 Control Delay			14.0			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			86.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.875					
Flt Protected	0.996					0.976
Satd. Flow (prot)	1605	0	1842	0	0	1798
Flt Permitted	0.996					0.976
Satd. Flow (perm)	1605	0	1842	0	0	1798
Link Speed (k/h)	50		50			50
Link Distance (m)	85.8		91.1			132.2
Travel Time (s)	6.2		6.6			9.5

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 101: East Avenue & Street L

Scenario 2 3700 Units 2041
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	17	224	189	0	48	51
Future Volume (vph)	17	224	189	0	48	51
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	224	189	0	48	51
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	241	189	99			
Volume Left (vph)	17	0	48			
Volume Right (vph)	224	0	0			
Hadj (s)	-0.51	0.03	0.13			
Departure Headway (s)	4.1	4.6	4.8			
Degree Utilization, x	0.27	0.24	0.13			
Capacity (veh/h)	826	744	702			
Control Delay (s)	8.6	9.0	8.5			
Approach Delay (s)	8.6	9.0	8.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.7			
Level of Service			A			
Intersection Capacity Utilization			40.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
102: Lakefront Promenade & Street L

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.893			0.972			0.994	
Flt Protected		0.950			0.997			0.996			0.993	
Satd. Flow (prot)	0	1750	0	0	1640	0	0	1783	0	0	1818	0
Flt Permitted		0.950			0.997			0.996			0.993	
Satd. Flow (perm)	0	1750	0	0	1640	0	0	1783	0	0	1818	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		86.0			72.6			101.7			130.4	
Travel Time (s)		6.2			5.2			7.3			9.4	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 102: Lakefront Promenade & Street L

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	44	0	0	18	45	244	45	428	126	48	290	17
Future Volume (vph)	44	0	0	18	45	244	45	428	126	48	290	17
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	44	0	0	18	45	244	45	428	126	48	290	17
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	44	307	599	355								
Volume Left (vph)	44	18	45	48								
Volume Right (vph)	0	244	126	17								
Hadj (s)	0.23	-0.43	-0.08	0.03								
Departure Headway (s)	7.9	6.3	5.7	6.2								
Degree Utilization, x	0.10	0.54	0.95	0.61								
Capacity (veh/h)	395	551	623	557								
Control Delay (s)	11.7	16.3	48.0	18.5								
Approach Delay (s)	11.7	16.3	48.0	18.5								
Approach LOS	B	C	E	C								
Intersection Summary												
Delay			31.3									
Level of Service			D									
Intersection Capacity Utilization			64.4%	ICU Level of Service					C			
Analysis Period (min)			15									

Lanes and Geometrics
103: Ogden Ave & Street L

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.917			0.976			0.988	
Flt Protected		0.968			0.994			0.988			0.995	
Satd. Flow (prot)	0	1765	0	0	1679	0	0	1776	0	0	1811	0
Flt Permitted		0.968			0.994			0.988			0.995	
Satd. Flow (perm)	0	1765	0	0	1679	0	0	1776	0	0	1811	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		55.4			82.6			89.6			142.3	
Travel Time (s)		4.0			5.9			6.5			10.2	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 103: Ogden Ave & Street L

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	149	58	17	27	54	130	153	378	116	39	291	31
Future Volume (vph)	149	58	17	27	54	130	153	378	116	39	291	31
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	149	58	17	27	54	130	153	378	116	39	291	31
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	224	211	647	361								
Volume Left (vph)	149	27	153	39								
Volume Right (vph)	17	130	116	31								
Hadj (s)	0.12	-0.31	-0.03	0.00								
Departure Headway (s)	7.6	7.3	6.5	6.8								
Degree Utilization, x	0.48	0.43	1.16	0.68								
Capacity (veh/h)	434	456	561	507								
Control Delay (s)	17.4	15.7	113.8	23.4								
Approach Delay (s)	17.4	15.7	113.8	23.4								
Approach LOS	C	C	F	C								
Intersection Summary												
Delay			61.9									
Level of Service			F									
Intersection Capacity Utilization			92.7%	ICU Level of Service					F			
Analysis Period (min)			15									

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.990				0.991	
Flt Protected	0.956			0.989		
Satd. Flow (prot)	1743	0	0	1822	1825	0
Flt Permitted	0.956			0.989		
Satd. Flow (perm)	1743	0	0	1822	1825	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	72.3			87.6	135.3	
Travel Time (s)	5.2			6.3	9.7	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 104: Hydro Rd & Street L

Scenario 2 3700 Units 2041
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	236	18	123	431	553	40
Future Volume (vph)	236	18	123	431	553	40
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	236	18	123	431	553	40
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	254	554	593			
Volume Left (vph)	236	123	0			
Volume Right (vph)	18	0	40			
Hadj (s)	0.18	0.08	-0.01			
Departure Headway (s)	7.1	6.0	5.8			
Degree Utilization, x	0.50	0.92	0.96			
Capacity (veh/h)	499	591	604			
Control Delay (s)	17.1	43.5	51.1			
Approach Delay (s)	17.1	43.5	51.1			
Approach LOS	C	E	F			
Intersection Summary						
Delay			42.0			
Level of Service			E			
Intersection Capacity Utilization			85.2%	ICU Level of Service	E	
Analysis Period (min)			15			

Lanes and Geometrics
105: East Avenue & Rangeview Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.979
Satd. Flow (prot)	1593	0	1842	0	0	1803
Flt Permitted						0.979
Satd. Flow (perm)	1593	0	1842	0	0	1803
Link Speed (k/h)	50		50			50
Link Distance (m)	198.1		66.7			91.1
Travel Time (s)	14.3		4.8			6.6

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 105: East Avenue & Rangeview Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	178	11	0	29	39
Future Volume (vph)	0	178	11	0	29	39
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	178	11	0	29	39
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	178	11	68			
Volume Left (vph)	0	0	29			
Volume Right (vph)	178	0	0			
Hadj (s)	-0.57	0.03	0.12			
Departure Headway (s)	3.5	4.3	4.4			
Degree Utilization, x	0.17	0.01	0.08			
Capacity (veh/h)	999	785	790			
Control Delay (s)	7.3	7.4	7.8			
Approach Delay (s)	7.3	7.4	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.4			
Level of Service			A			
Intersection Capacity Utilization			28.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
106: Lakefront Promenade & Rangeview Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.935			0.898			0.963				
Flt Protected		0.975			0.997		0.950				0.995	
Satd. Flow (prot)	0	1679	0	0	1649	0	1750	1774	0	0	1833	0
Flt Permitted		0.975			0.997		0.950				0.995	
Satd. Flow (perm)	0	1679	0	0	1649	0	1750	1774	0	0	1833	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		174.1			140.0			142.6			101.7	
Travel Time (s)		12.5			10.1			10.3			7.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 106: Lakefront Promenade & Rangeview Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	0	13	18	45	197	90	389	126	28	279	0
Future Volume (vph)	14	0	13	18	45	197	90	389	126	28	279	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	0	13	18	45	197	90	389	126	28	279	0
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	27	260	90	515	307							
Volume Left (vph)	14	18	90	0	28							
Volume Right (vph)	13	197	0	126	0							
Hadj (s)	-0.15	-0.41	0.53	-0.14	0.05							
Departure Headway (s)	6.8	5.8	6.4	5.7	5.8							
Degree Utilization, x	0.05	0.42	0.16	0.81	0.50							
Capacity (veh/h)	455	570	551	618	590							
Control Delay (s)	10.1	13.0	9.4	27.6	14.4							
Approach Delay (s)	10.1	13.0	24.9		14.4							
Approach LOS	B	B	C		B							
Intersection Summary												
Delay			19.3									
Level of Service			C									
Intersection Capacity Utilization			60.1%	ICU Level of Service					B			
Analysis Period (min)			15									

Lanes and Geometrics
107: Ogden Ave & Rangeview Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987			0.929			0.978			0.990	
Flt Protected		0.972			0.992			0.990			0.996	
Satd. Flow (prot)	0	1767	0	0	1698	0	0	1784	0	0	1816	0
Flt Permitted		0.972			0.992			0.990			0.996	
Satd. Flow (perm)	0	1767	0	0	1698	0	0	1784	0	0	1816	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		56.3			124.7			104.4			89.6	
Travel Time (s)		4.1			9.0			7.5			6.5	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 107: Ogden Ave & Rangeview Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	102	58	17	28	54	92	153	453	116	26	284	25
Future Volume (vph)	102	58	17	28	54	92	153	453	116	26	284	25
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	102	58	17	28	54	92	153	453	116	26	284	25
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	177	174	722	335								
Volume Left (vph)	102	28	153	26								
Volume Right (vph)	17	92	116	25								
Hadj (s)	0.09	-0.25	-0.02	0.00								
Departure Headway (s)	7.2	6.9	5.9	6.3								
Degree Utilization, x	0.36	0.34	1.18	0.59								
Capacity (veh/h)	465	481	620	545								
Control Delay (s)	14.2	13.4	116.6	17.9								
Approach Delay (s)	14.2	13.4	116.6	17.9								
Approach LOS	B	B	F	C								
Intersection Summary												
Delay			67.5									
Level of Service			F									
Intersection Capacity Utilization			90.3%	ICU Level of Service					E			
Analysis Period (min)			15									

Lanes and Geometrics
108: Hydro Rd & Rangeview Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.989				0.992	
Flt Protected	0.956			0.987		
Satd. Flow (prot)	1742	0	0	1818	1827	0
Flt Permitted	0.956			0.987		
Satd. Flow (perm)	1742	0	0	1818	1827	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	108.3			161.7	87.6	
Travel Time (s)	7.8			11.6	6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 108: Hydro Rd & Rangeview Rd

Scenario 2 3700 Units 2041
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	198	18	123	355	537	33
Future Volume (vph)	198	18	123	355	537	33
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	198	18	123	355	537	33
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	216	478	570			
Volume Left (vph)	198	123	0			
Volume Right (vph)	18	0	33			
Hadj (s)	0.17	0.09	0.00			
Departure Headway (s)	6.7	5.6	5.4			
Degree Utilization, x	0.40	0.75	0.86			
Capacity (veh/h)	505	623	649			
Control Delay (s)	14.2	23.3	32.5			
Approach Delay (s)	14.2	23.3	32.5			
Approach LOS	B	C	D			
Intersection Summary						
Delay			25.9			
Level of Service			D			
Intersection Capacity Utilization			77.8%	ICU Level of Service	D	
Analysis Period (min)			15			

Lanes and Geometrics
1: Ogden Ave & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	28.0		25.0	25.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.97	1.00	1.00		1.00		0.98	1.00	0.99	
Frt			0.850		0.988				0.850		0.917	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	3614	1581	1750	3520	0	1750	1883	1566	1750	1708	0
Flt Permitted	0.950			0.950			0.316			0.727		
Satd. Flow (perm)	1744	3614	1538	1748	3520	0	579	1883	1540	1333	1708	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			140		8				158		40	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			142.3			246.5	
Travel Time (s)		19.6			16.0			10.2			17.7	

Intersection Summary

Area Type: Other

Timings
1: Ogden Ave & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	150	1401	330	250	1406	285	46	158	140	82
Future Volume (vph)	150	1401	330	250	1406	285	46	158	140	82
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	7	4		3	8	5	2		1	6
Permitted Phases			4			2		2	6	
Detector Phase	7	4	4	3	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	11.0	34.0	34.0	11.0	34.0
Total Split (s)	20.0	64.0	64.0	20.0	64.0	22.0	45.0	45.0	11.0	34.0
Total Split (%)	14.3%	45.7%	45.7%	14.3%	45.7%	15.7%	32.1%	32.1%	7.9%	24.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	1.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	None	None	None	None	None
Act Effect Green (s)	17.6	59.0	59.0	24.6	66.1	43.4	29.4	29.4	29.4	18.4
Actuated g/C Ratio	0.13	0.42	0.42	0.18	0.47	0.31	0.21	0.21	0.21	0.13
v/c Ratio	0.68	0.92	0.45	0.81	0.92	0.84	0.12	0.35	0.46	0.71
Control Delay	76.7	37.0	16.5	81.7	32.9	62.0	43.3	8.2	43.1	59.8
Queue Delay	0.0	0.4	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0
Total Delay	76.7	37.4	16.5	81.7	34.4	62.0	43.3	8.2	43.1	59.8
LOS	E	D	B	F	C	E	D	A	D	E
Approach Delay		36.8			41.0		42.8			52.6
Approach LOS		D			D		D			D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 40.3

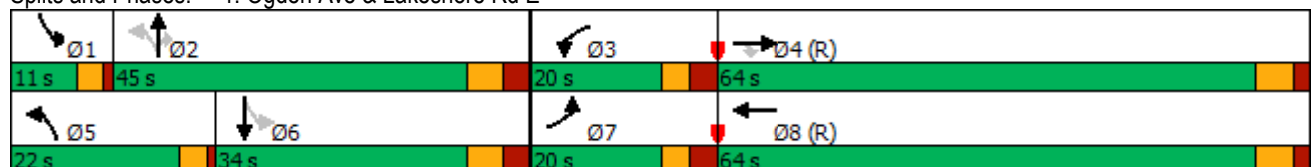
Intersection LOS: D

Intersection Capacity Utilization 97.7%

ICU Level of Service F

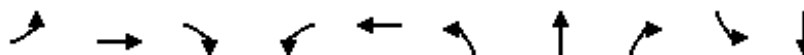
Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues
1: Ogden Ave & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	150	1401	330	250	1528	285	46	158	140	184
v/c Ratio	0.68	0.92	0.45	0.81	0.92	0.84	0.12	0.35	0.46	0.71
Control Delay	76.7	37.0	16.5	81.7	32.9	62.0	43.3	8.2	43.1	59.8
Queue Delay	0.0	0.4	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0
Total Delay	76.7	37.4	16.5	81.7	34.4	62.0	43.3	8.2	43.1	59.8
Queue Length 50th (m)	46.0	93.8	25.2	65.6	90.8	68.6	11.0	0.0	30.7	40.9
Queue Length 95th (m)	m55.0	#181.6	m36.9m	#140.6	#182.3	#96.4	21.2	18.0	45.5	64.2
Internal Link Dist (m)	248.7				198.5	118.3				222.5
Turn Bay Length (m)	28.0			25.0	25.0	30.0		30.0		
Base Capacity (vph)	224	1523	729	308	1665	338	524	542	303	373
Starvation Cap Reductn	0	0	0	0	49	0	0	0	0	0
Spillback Cap Reductn	0	12	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.93	0.45	0.81	0.95	0.84	0.09	0.29	0.46	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	1401	330	250	1406	122	285	46	158	140	82	102
Future Volume (vph)	150	1401	330	250	1406	122	285	46	158	140	82	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		3.0	6.0	6.0	3.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3614	1538	1750	3520		1748	1883	1540	1744	1708	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.32	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	1750	3614	1538	1750	3520		582	1883	1540	1335	1708	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	150	1401	330	250	1406	122	285	46	158	140	82	102
RTOR Reduction (vph)	0	0	81	0	4	0	0	0	125	0	35	0
Lane Group Flow (vph)	150	1401	249	250	1524	0	285	46	33	140	149	0
Confl. Peds. (#/hr)	7		2	2		7	5		3	3		5
Heavy Vehicles (%)	2%	1%	1%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	16.6	58.0	58.0	23.6	65.0		39.4	28.4	28.4	24.4	17.4	
Effective Green, g (s)	17.6	59.0	59.0	24.6	66.0		40.4	29.4	29.4	26.4	18.4	
Actuated g/C Ratio	0.13	0.42	0.42	0.18	0.47		0.29	0.21	0.21	0.19	0.13	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	220	1523	648	307	1659		326	395	323	275	224	
v/s Ratio Prot	0.09	0.39		c0.14	c0.43		c0.12	0.02		0.03	0.09	
v/s Ratio Perm			0.16				c0.13		0.02	0.07		
v/c Ratio	0.68	0.92	0.38	0.81	0.92		0.87	0.12	0.10	0.51	0.67	
Uniform Delay, d1	58.5	38.3	28.0	55.5	34.5		43.1	44.8	44.7	50.2	57.9	
Progression Factor	1.14	0.78	0.95	1.21	0.70		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.1	6.8	1.0	11.4	7.4		21.9	0.1	0.1	1.5	7.3	
Delay (s)	72.1	36.5	27.5	78.6	31.4		65.0	44.9	44.8	51.6	65.2	
Level of Service	E	D	C	E	C		E	D	D	D	E	
Approach Delay (s)		37.8			38.0			56.6			59.3	
Approach LOS		D			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			41.5			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			97.7%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
2: Dixie Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98		1.00				0.96
Frt		0.998				0.850						0.850
Flt Protected	0.950			0.950				0.988			0.950	
Satd. Flow (prot)	1733	3571	0	1785	3579	1581	0	1898	0	0	1807	1566
Flt Permitted	0.950			0.950				0.940			0.755	
Satd. Flow (perm)	1732	3571	0	1782	3579	1544	0	1800	0	0	1436	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				125						23
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings

2: Dixie Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041

Afternoon Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	394	1140	2	1131	220	1	3	278	0	851
Future Volume (vph)	394	1140	2	1131	220	1	3	278	0	851
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA	pm+ov
Protected Phases	7	4	3	8			2		6	7
Permitted Phases					8	2		6		6
Detector Phase	7	4	3	8	8	2	2	6	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	12.0	24.0	11.0	24.0	24.0	12.0	12.0	34.0	34.0	12.0
Total Split (s)	55.0	95.0	11.0	51.0	51.0	34.0	34.0	34.0	34.0	55.0
Total Split (%)	39.3%	67.9%	7.9%	36.4%	36.4%	24.3%	24.3%	24.3%	24.3%	39.3%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0		6.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	48.8	98.4	6.1	46.9	46.9		28.4		28.4	78.1
Actuated g/C Ratio	0.35	0.70	0.04	0.34	0.34		0.20		0.20	0.56
v/c Ratio	0.65	0.46	0.03	0.94	0.37		0.01		0.96	0.98
Control Delay	37.9	16.7	65.0	61.3	16.9		45.2		97.7	53.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	37.9	16.7	65.0	61.3	16.9		45.2		97.7	53.2
LOS	D	B	E	E	B		D		F	D
Approach Delay		22.1		54.0			45.3		64.2	
Approach LOS		C		D			D		E	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 44.6

Intersection LOS: D

Intersection Capacity Utilization 103.0%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E

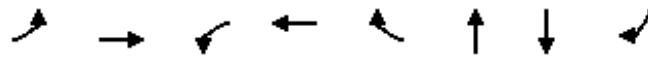


Queues

Scenario 2 3700 Units 2041

2: Dixie Rd & Lakeshore Rd E

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	394	1153	2	1131	220	4	278	851
v/c Ratio	0.65	0.46	0.03	0.94	0.37	0.01	0.96	0.98
Control Delay	37.9	16.7	65.0	61.3	16.9	45.2	97.7	53.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.9	16.7	65.0	61.3	16.9	45.2	97.7	53.2
Queue Length 50th (m)	100.0	128.7	0.6	170.3	19.8	1.0	81.2	200.9
Queue Length 95th (m)	146.4	135.4	3.7	#217.3	43.2	4.5	#139.9	#327.0
Internal Link Dist (m)		598.7		375.1		69.6	268.8	
Turn Bay Length (m)	44.0		25.0		30.0			
Base Capacity (vph)	618	2510	77	1197	600	365	291	885
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	0.64	0.46	0.03	0.94	0.37	0.01	0.96	0.96

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	394	1140	13	2	1131	220	1	3	0	278	0	851
Future Volume (vph)	394	1140	13	2	1131	220	1	3	0	278	0	851
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		6.0			6.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1733	3572		1785	3579	1544		1892			1807	1545
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.94			0.76	1.00
Satd. Flow (perm)	1733	3572		1785	3579	1544		1799			1436	1545
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	394	1140	13	2	1131	220	1	3	0	278	0	851
RTOR Reduction (vph)	0	1	0	0	0	83	0	0	0	0	0	10
Lane Group Flow (vph)	394	1152	0	2	1131	137	0	4	0	0	278	841
Confl. Peds. (#/hr)	1		2	2		1	16					16
Heavy Vehicles (%)	3%	2%	0%	0%	2%	1%	0%	0%	0%	1%	0%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases						8	2			6		6
Actuated Green, G (s)	47.8	92.6		1.0	45.8	45.8		27.4			27.4	75.2
Effective Green, g (s)	48.8	93.6		2.0	46.8	46.8		28.4			28.4	77.2
Actuated g/C Ratio	0.35	0.67		0.01	0.33	0.33		0.20			0.20	0.55
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		7.0			7.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	604	2388		25	1196	516		364			291	851
v/s Ratio Prot	0.23	0.32		0.00	c0.32							c0.34
v/s Ratio Perm						0.09		0.00			0.19	0.20
v/c Ratio	0.65	0.48		0.08	0.95	0.27		0.01			0.96	0.99
Uniform Delay, d1	38.4	11.4		68.1	45.4	34.0		44.6			55.2	30.9
Progression Factor	0.85	1.69		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	2.2	0.6		1.4	15.9	1.3		0.0			40.4	27.6
Delay (s)	35.0	19.8		69.5	61.2	35.3		44.6			95.6	58.5
Level of Service	D	B		E	E	D		D			F	E
Approach Delay (s)		23.7			57.0			44.6			67.6	
Approach LOS		C			E			D			E	
Intersection Summary												
HCM 2000 Control Delay			47.2				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			103.0%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
3: Lakeshore Rd E & Cawthra Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor				0.99		0.93		1.00				0.96
Frt						0.850		0.981				0.850
Flt Protected	0.950			0.950				0.986		0.950	0.950	
Satd. Flow (prot)	1733	3544	0	1785	3614	1551	0	1858	0	1646	1683	1581
Flt Permitted	0.080			0.263						0.950	0.753	
Satd. Flow (perm)	146	3544	0	490	3614	1441	0	1878	0	1646	1334	1519
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						305		1				25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings

3: Lakeshore Rd E & Cawthra Rd

Scenario 2 3700 Units 2041

Afternoon Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	309	1060	3	1257	785	2	4	995	0	425
Future Volume (vph)	309	1060	3	1257	785	2	4	995	0	425
Turn Type	pm+pt	NA	Perm	NA	pm+ov	Perm	NA	Prot	NA	pm+ov
Protected Phases	7	4		8	1		2	1	6	7
Permitted Phases	4		8		8	2				6
Detector Phase	7	4	8	8	1	2	2	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	7.0	8.0	8.0	8.0	5.0	5.0	8.0	5.0	5.0
Minimum Split (s)	11.0	38.0	38.0	38.0	14.0	11.0	11.0	14.0	38.0	11.0
Total Split (s)	21.0	79.0	58.0	58.0	40.0	11.0	11.0	40.0	51.0	21.0
Total Split (%)	16.2%	60.8%	44.6%	44.6%	30.8%	8.5%	8.5%	30.8%	39.2%	16.2%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	2.0
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lead	Lag		Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes
Recall Mode	None	Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	77.0	74.0	53.0	53.0	96.8		6.0	43.8	43.8	68.0
Actuated g/C Ratio	0.59	0.57	0.41	0.41	0.74		0.05	0.34	0.34	0.52
v/c Ratio	0.97	0.53	0.02	0.85	0.66		0.08	0.90	0.88	0.52
Control Delay	79.8	18.4	23.3	41.9	6.4		57.6	61.4	58.8	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	79.8	18.4	23.3	41.9	6.4		57.6	61.4	58.8	20.7
LOS	E	B	C	D	A		E	E	E	C
Approach Delay		32.2		28.2			57.6		48.3	
Approach LOS		C		C			E		D	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 8:WBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 35.3

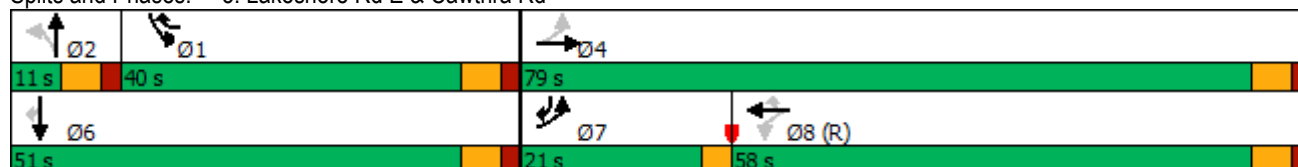
Intersection LOS: D

Intersection Capacity Utilization 97.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd



Queues

Scenario 2 3700 Units 2041

3: Lakeshore Rd E & Cawthra Rd

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	309	1060	3	1257	785	7	497	498	425
v/c Ratio	0.97	0.53	0.02	0.85	0.66	0.08	0.90	0.88	0.52
Control Delay	79.8	18.4	23.3	41.9	6.4	57.6	61.4	58.8	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.8	18.4	23.3	41.9	6.4	57.6	61.4	58.8	20.7
Queue Length 50th (m)	64.9	88.4	0.5	160.0	35.1	1.6	130.1	129.1	65.2
Queue Length 95th (m)	#125.3	107.1	2.6	191.6	58.3	6.9	#235.5	#233.1	94.2
Internal Link Dist (m)		297.4		113.2		71.8		931.9	
Turn Bay Length (m)	35.0		60.0		70.0		115.0		
Base Capacity (vph)	318	2017	199	1473	1188	87	554	567	815
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.53	0.02	0.85	0.66	0.08	0.90	0.88	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	309	1060	0	3	1257	785	2	4	1	995	0	425
Future Volume (vph)	309	1060	0	3	1257	785	2	4	1	995	0	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	2.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96		1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	0.95	1.00
Satd. Flow (prot)	1733	3544		1769	3614	1493		1850		1646	1683	1536
Flt Permitted	0.08	1.00		0.26	1.00	1.00		1.00		0.95	0.75	1.00
Satd. Flow (perm)	145	3544		489	3614	1493		1877		1646	1334	1536
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	309	1060	0	3	1257	785	2	4	1	995	0	425
RTOR Reduction (vph)	0	0	0	0	0	89	0	1	0	0	0	12
Lane Group Flow (vph)	309	1060	0	3	1257	696	0	6	0	497	498	413
Confl. Peds. (#/hr)	49		20	20		49	23					23
Heavy Vehicles (%)	3%	3%	0%	0%	1%	3%	0%	0%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	68.2	68.2		47.2	47.2	90.0		1.0		42.8	49.8	67.8
Effective Green, g (s)	69.2	69.2		48.2	48.2	92.0		2.0		43.8	50.8	69.8
Actuated g/C Ratio	0.53	0.53		0.37	0.37	0.71		0.02		0.34	0.39	0.54
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0		6.0		6.0	6.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	309	1886		181	1339	1056		28		554	638	824
v/s Ratio Prot	c0.15	0.30			c0.35	0.22				c0.30	0.26	0.07
v/s Ratio Perm	0.38			0.01		0.24		0.00			c0.04	0.20
v/c Ratio	1.00	0.56		0.02	0.94	0.66		0.21		0.90	0.78	0.50
Uniform Delay, d1	42.2	20.3		25.9	39.5	10.4		63.2		41.0	34.7	19.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	51.2	1.2		0.2	13.7	1.5		3.8		17.1	6.2	0.5
Delay (s)	93.4	21.5		26.1	53.2	11.9		67.1		58.0	40.9	19.6
Level of Service	F	C		C	D	B		E		E	D	B
Approach Delay (s)		37.7			37.3			67.1			40.5	
Approach LOS		D			D			E			D	
Intersection Summary												
HCM 2000 Control Delay		38.4			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.94										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			17.0				
Intersection Capacity Utilization		97.8%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes and Geometrics
5: East Avenue & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.94	0.99	0.99		1.00	0.98	
Frt	0.991				0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3570	0	1750	3614	1597	1785	1611	0	1785	1605	0
Flt Permitted	0.950			0.950			0.755			0.720		
Satd. Flow (perm)	1779	3570	0	1746	3614	1498	1411	1611	0	1351	1605	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	9					78			73			76
Link Speed (k/h)	50				50			50			50	
Link Distance (m)	226.1				305.9			132.2			178.2	
Travel Time (s)	16.3				22.0			9.5			12.8	

Intersection Summary

Area Type: Other

Timings

5: East Avenue & Lakeshore Rd E

Scenario 2 3700 Units 2041

Afternoon Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	49	1983	109	1860	24	137	0	24	0
Future Volume (vph)	49	1983	109	1860	24	137	0	24	0
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	7	4	3	8			2		6
Permitted Phases					8	2		6	
Detector Phase	7	4	3	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	11.0	24.0	24.0	31.0	31.0	31.0	31.0
Total Split (s)	12.0	92.0	11.0	91.0	91.0	37.0	37.0	37.0	37.0
Total Split (%)	8.6%	65.7%	7.9%	65.0%	65.0%	26.4%	26.4%	26.4%	26.4%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	9.7	86.7	17.4	96.8	96.8	19.9	19.9	19.9	19.9
Actuated g/C Ratio	0.07	0.62	0.12	0.69	0.69	0.14	0.14	0.14	0.14
v/c Ratio	0.40	0.95	0.50	0.74	0.02	0.69	0.20	0.13	0.01
Control Delay	71.5	36.2	69.0	16.2	0.0	73.7	7.6	51.1	0.0
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.5	36.9	69.0	16.2	0.0	73.7	7.6	51.1	0.0
LOS	E	D	E	B	A	E	A	D	A
Approach Delay		37.7		18.9			54.3		43.8
Approach LOS		D		B			D		D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 29.9

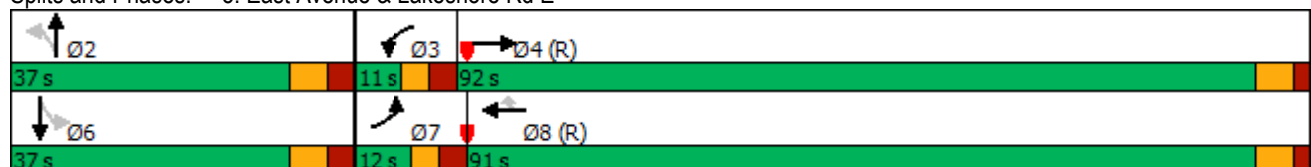
Intersection LOS: C

Intersection Capacity Utilization 92.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E



Queues

Scenario 2 3700 Units 2041

5: East Avenue & Lakeshore Rd E

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	2114	109	1860	24	137	57	24	4
v/c Ratio	0.40	0.95	0.50	0.74	0.02	0.69	0.20	0.13	0.01
Control Delay	71.5	36.2	69.0	16.2	0.0	73.7	7.6	51.1	0.0
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.5	36.9	69.0	16.2	0.0	73.7	7.6	51.1	0.0
Queue Length 50th (m)	13.8	283.8	31.7	162.0	0.0	38.5	0.0	6.2	0.0
Queue Length 95th (m)	27.8	#344.0	m#66.5	194.7	m0.0	59.2	8.5	14.6	0.0
Internal Link Dist (m)		202.1		281.9			108.2		154.2
Turn Bay Length (m)	72.0		50.0		20.0	20.0		45.0	
Base Capacity (vph)	124	2221	217	2498	1059	312	413	299	414
Starvation Cap Reductn	0	22	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.96	0.50	0.74	0.02	0.44	0.14	0.08	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1983	131	109	1860	24	137	0	57	24	0	4
Future Volume (vph)	49	1983	131	109	1860	24	137	0	57	24	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3569		1750	3614	1498	1776	1611		1782	1605	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.76	1.00		0.72	1.00	
Satd. Flow (perm)	1785	3569		1750	3614	1498	1411	1611		1350	1605	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	1983	131	109	1860	24	137	0	57	24	0	4
RTOR Reduction (vph)	0	3	0	0	0	8	0	49	0	0	3	0
Lane Group Flow (vph)	49	2111	0	109	1860	16	137	8	0	24	1	0
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3
Heavy Vehicles (%)	0%	1%	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	7.5	85.7		16.4	94.6	94.6	18.9	18.9		18.9	18.9	
Effective Green, g (s)	8.5	86.7		17.4	95.6	95.6	19.9	19.9		19.9	19.9	
Actuated g/C Ratio	0.06	0.62		0.12	0.68	0.68	0.14	0.14		0.14	0.14	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	108	2210		217	2467	1022	200	228		191	228	
v/s Ratio Prot	0.03	c0.59		c0.06	c0.51			0.01			0.00	
v/s Ratio Perm						0.01	c0.10			0.02		
v/c Ratio	0.45	0.96		0.50	0.75	0.02	0.69	0.04		0.13	0.00	
Uniform Delay, d1	63.5	24.8		57.3	14.5	7.1	57.1	51.8		52.5	51.5	
Progression Factor	1.00	1.00		1.05	0.89	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	11.1		1.6	2.0	0.0	9.3	0.1		0.3	0.0	
Delay (s)	66.5	36.0		61.8	14.9	7.1	66.4	51.8		52.7	51.5	
Level of Service	E	D		E	B	A	E	D		D	D	
Approach Delay (s)		36.7			17.3			62.1			52.6	
Approach LOS		D			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			29.1			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			92.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
7: Lakefront Promenade & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↗	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		25.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		0.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.96	1.00		0.99	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3614	1566	1750	3579	1750	1566
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3614	1505	1746	3579	1739	1533
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		79				204
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	130.4	
Travel Time (s)	4.7			19.6	9.4	

Intersection Summary

Area Type: Other

Timings
7: Lakefront Promenade & Lakeshore Rd E

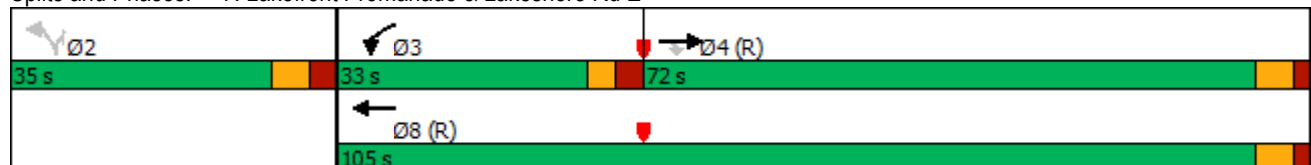
Scenario 2 3700 Units 2041
Afternoon Peak Hour

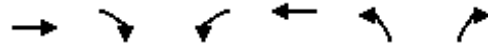
	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	1570	322	300	1426	331	204
Future Volume (vph)	1570	322	300	1426	331	204
Turn Type	NA	Perm	Prot	NA	Perm	Perm
Protected Phases	4		3	8		
Permitted Phases		4			2	2
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	11.0	24.0	34.0	34.0
Total Split (s)	72.0	72.0	33.0	105.0	35.0	35.0
Total Split (%)	51.4%	51.4%	23.6%	75.0%	25.0%	25.0%
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	68.6	68.6	26.9	100.5	28.5	28.5
Actuated g/C Ratio	0.49	0.49	0.19	0.72	0.20	0.20
v/c Ratio	0.89	0.41	0.89	0.56	0.94	0.43
Control Delay	38.2	23.9	76.6	8.3	88.6	8.8
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	38.2	23.9	76.6	8.4	88.6	8.8
LOS	D	C	E	A	F	A
Approach Delay	35.8			20.2	58.2	
Approach LOS	D			C	E	

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 32.2
 Intersection LOS: C
 Intersection Capacity Utilization 92.4%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promenade & Lakeshore Rd E





Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1570	322	300	1426	331	204
v/c Ratio	0.89	0.41	0.89	0.56	0.94	0.43
Control Delay	38.2	23.9	76.6	8.3	88.6	8.8
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	38.2	23.9	76.6	8.4	88.6	8.8
Queue Length 50th (m)	137.7	41.1	93.1	69.3	95.4	0.0
Queue Length 95th (m)	m183.8	m47.8	m103.5	m85.2	#154.1	21.7
Internal Link Dist (m)	41.1			248.7	106.4	
Turn Bay Length (m)		25.0	35.0			
Base Capacity (vph)	1770	777	350	2569	360	479
Starvation Cap Reductn	0	0	0	264	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.41	0.86	0.62	0.92	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (vph)	1570	322	300	1426	331	204
Future Volume (vph)	1570	322	300	1426	331	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3614	1505	1750	3579	1739	1533
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3614	1505	1750	3579	1739	1533
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1570	322	300	1426	331	204
RTOR Reduction (vph)	0	40	0	0	0	162
Lane Group Flow (vph)	1570	282	300	1426	331	42
Confl. Peds. (#/hr)		5	5		4	6
Heavy Vehicles (%)	1%	2%	2%	2%	2%	2%
Turn Type	NA	Perm	Prot	NA	Perm	Perm
Protected Phases	4		3	8		
Permitted Phases		4			2	2
Actuated Green, G (s)	67.6	67.6	25.9	99.5	27.5	27.5
Effective Green, g (s)	68.6	68.6	26.9	100.5	28.5	28.5
Actuated g/C Ratio	0.49	0.49	0.19	0.72	0.20	0.20
Clearance Time (s)	6.0	6.0	6.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1770	737	336	2569	354	312
v/s Ratio Prot	c0.43		c0.17	0.40		
v/s Ratio Perm		0.19			c0.19	0.03
v/c Ratio	0.89	0.38	0.89	0.56	0.94	0.13
Uniform Delay, d1	32.2	22.4	55.1	9.3	54.8	45.6
Progression Factor	1.05	1.33	1.12	0.83	1.00	1.00
Incremental Delay, d2	3.5	0.7	12.9	0.4	31.4	0.2
Delay (s)	37.4	30.4	74.9	8.1	86.2	45.8
Level of Service	D	C	E	A	F	D
Approach Delay (s)	36.2			19.7	70.8	
Approach LOS	D			B	E	
Intersection Summary						
HCM 2000 Control Delay		33.8		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.91				
Actuated Cycle Length (s)		140.0		Sum of lost time (s)		17.0
Intersection Capacity Utilization		92.4%		ICU Level of Service		F
Analysis Period (min)		15				
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	60.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			30.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	1.00	1.00		1.00				0.99	
Frt			0.850		0.999			0.850			0.919	
Flt Protected	0.950			0.950			0.950				0.980	
Satd. Flow (prot)	1750	3579	1597	1750	3575	0	1750	1601	0	0	1715	0
Flt Permitted	0.950			0.950			0.754				0.897	
Satd. Flow (perm)	1748	3579	1529	1743	3575	0	1385	1601	0	0	1569	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			229		1			293			117	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			135.3			191.6	
Travel Time (s)		16.0			14.1			9.7			13.8	

Intersection Summary

Area Type: Other

Timings
8: Hydro Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	1259	472	282	1476	325	0	2	0
Future Volume (vph)	5	1259	472	282	1476	325	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	34.0	34.0
Total Split (s)	13.0	64.0	64.0	32.0	83.0	44.0	44.0	44.0	44.0
Total Split (%)	9.3%	45.7%	45.7%	22.9%	59.3%	31.4%	31.4%	31.4%	31.4%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	C-Min	None	C-Min	None	None	None	None
Act Effect Green (s)	7.0	62.3	62.3	25.7	90.4	36.0	36.0		36.0
Actuated g/C Ratio	0.05	0.44	0.44	0.18	0.65	0.26	0.26		0.26
v/c Ratio	0.06	0.79	0.58	0.88	0.64	0.92	0.61		0.01
Control Delay	62.4	30.0	14.5	87.5	10.4	80.6	15.4		0.0
Queue Delay	0.0	0.3	0.2	0.0	0.4	0.0	0.0		0.0
Total Delay	62.4	30.4	14.7	87.5	10.7	80.6	15.4		0.0
LOS	E	C	B	F	B	F	B		A
Approach Delay		26.2			23.0		45.2		
Approach LOS		C			C		D		

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 28.0

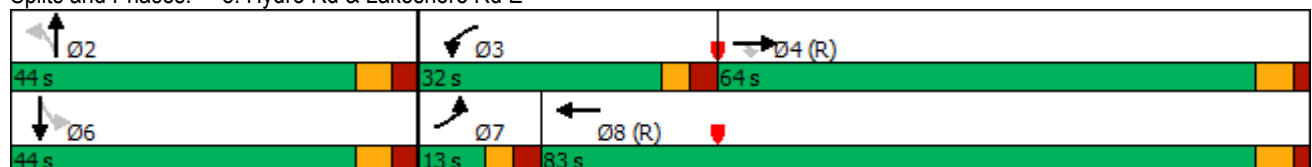
Intersection LOS: C

Intersection Capacity Utilization 88.4%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 8: Hydro Rd & Lakeshore Rd E



Queues
8: Hydro Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	5	1259	472	282	1485	325	386	5
v/c Ratio	0.06	0.79	0.58	0.88	0.64	0.92	0.61	0.01
Control Delay	62.4	30.0	14.5	87.5	10.4	80.6	15.4	0.0
Queue Delay	0.0	0.3	0.2	0.0	0.4	0.0	0.0	0.0
Total Delay	62.4	30.4	14.7	87.5	10.7	80.6	15.4	0.0
Queue Length 50th (m)	1.3	72.4	26.1	72.1	48.2	90.3	21.0	0.0
Queue Length 95th (m)	m1.9	m87.0	m31.1	m93.8	69.4	#145.2	56.7	0.0
Internal Link Dist (m)		198.5			171.3		111.3	167.6
Turn Bay Length (m)	25.0		50.0	25.0		60.0		
Base Capacity (vph)	100	1594	808	337	2309	376	648	512
Starvation Cap Reductn	0	63	38	0	314	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	0.05	0.82	0.61	0.84	0.74	0.86	0.60	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1259	472	282	1476	9	325	0	386	2	0	3
Future Volume (vph)	5	1259	472	282	1476	9	325	0	386	2	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1750	3579	1529	1750	3575		1745	1601			1715	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00			0.90	
Satd. Flow (perm)	1750	3579	1529	1750	3575		1385	1601			1569	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	1259	472	282	1476	9	325	0	386	2	0	3
RTOR Reduction (vph)	0	0	127	0	0	0	0	218	0	0	4	0
Lane Group Flow (vph)	5	1259	345	282	1485	0	325	168	0	0	1	0
Confl. Peds. (#/hr)	2		6	6		2	2					2
Heavy Vehicles (%)	2%	2%	0%	2%	2%	0%	2%	0%	2%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2				6
Permitted Phases			4				2			6		
Actuated Green, G (s)	1.4	61.3	61.3	24.7	84.6		35.0	35.0			35.0	
Effective Green, g (s)	2.4	62.3	62.3	25.7	85.6		36.0	36.0			36.0	
Actuated g/C Ratio	0.02	0.44	0.44	0.18	0.61		0.26	0.26			0.26	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	7.0			7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	30	1592	680	321	2185		356	411			403	
v/s Ratio Prot	0.00	c0.35		c0.16	0.42			0.11				
v/s Ratio Perm			0.23				c0.23				0.00	
v/c Ratio	0.17	0.79	0.51	0.88	0.68		0.91	0.41			0.00	
Uniform Delay, d1	67.8	33.3	27.8	55.6	18.1		50.5	43.2			38.7	
Progression Factor	0.98	0.80	0.85	1.28	0.59		1.00	1.00			1.00	
Incremental Delay, d2	1.5	2.4	1.5	13.8	0.9		26.9	0.7			0.0	
Delay (s)	67.7	29.0	25.2	85.2	11.5		77.4	43.8			38.7	
Level of Service	E	C	C	F	B		E	D			D	
Approach Delay (s)		28.1			23.3			59.2			38.7	
Approach LOS		C			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			31.3			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			88.4%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		50.0	100.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			50.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00						0.99	
Frt					0.994						0.887	
Flt Protected	0.950										0.992	
Satd. Flow (prot)	1750	3579	1842	1842	3545	0	0	1883	1842	0	1636	0
Flt Permitted	0.950										0.942	
Satd. Flow (perm)	1743	3579	1842	1842	3545	0	0	1883	1842	0	1550	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5						148	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		195.3			622.7			123.3			883.5	
Travel Time (s)		14.1			44.8			8.9			63.6	

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

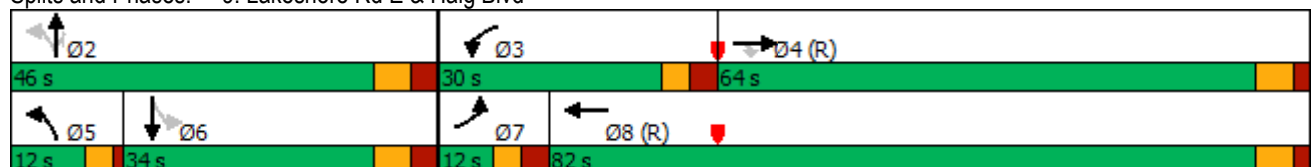
Scenario 2 3700 Units 2041
Afternoon Peak Hour

								
Lane Group	EBL	EBT	WBT	SBL	SBT	Ø2	Ø3	Ø5
Lane Configurations								
Traffic Volume (vph)	119	1568	1899	26	0			
Future Volume (vph)	119	1568	1899	26	0			
Turn Type	Prot	NA	NA	Perm	NA			
Protected Phases	7	4	8		6	2	3	5
Permitted Phases				6				
Detector Phase	7	4	8	6	6			
Switch Phase								
Minimum Initial (s)	5.0	8.0	8.0	8.0	8.0	8.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	34.0	34.0	34.0	11.0	11.0
Total Split (s)	12.0	64.0	82.0	34.0	34.0	46.0	30.0	12.0
Total Split (%)	8.6%	45.7%	58.6%	24.3%	24.3%	33%	21%	9%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0			
Total Lost Time (s)	5.0	5.0	5.0		6.0			
Lead/Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	21.7	118.3	91.6		10.7			
Actuated g/C Ratio	0.16	0.84	0.65		0.08			
v/c Ratio	0.44	0.52	0.85		0.62			
Control Delay	51.4	4.2	28.1		22.3			
Queue Delay	0.0	0.3	0.0		0.0			
Total Delay	51.4	4.5	28.1		22.3			
LOS	D	A	C		C			
Approach Delay		7.8	28.1		22.3			
Approach LOS		A	C		C			

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 18.9
 Intersection LOS: B
 Intersection Capacity Utilization 92.0%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues
9: Lakeshore Rd E & Haig Blvd

Scenario 2 3700 Units 2041
Afternoon Peak Hour



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	119	1568	1983	159
v/c Ratio	0.44	0.52	0.85	0.62
Control Delay	51.4	4.2	28.1	22.3
Queue Delay	0.0	0.3	0.0	0.0
Total Delay	51.4	4.5	28.1	22.3
Queue Length 50th (m)	35.3	58.2	216.8	3.1
Queue Length 95th (m)	m47.3	85.1	m261.4	25.7
Internal Link Dist (m)		171.3	598.7	859.5
Turn Bay Length (m)	50.0			
Base Capacity (vph)	271	3025	2321	428
Starvation Cap Reductn	0	721	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.68	0.85	0.37

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	119	1568	0	0	1899	84	0	0	0	26	0	133
Future Volume (vph)	119	1568	0	0	1899	84	0	0	0	26	0	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0			5.0						6.0	
Lane Util. Factor	1.00	0.95			0.95						1.00	
Frpb, ped/bikes	1.00	1.00			1.00						0.99	
Flpb, ped/bikes	1.00	1.00			1.00						1.00	
Fr _t	1.00	1.00			0.99						0.89	
Fl _t Protected	0.95	1.00			1.00						0.99	
Satd. Flow (prot)	1750	3579			3544						1633	
Fl _t Permitted	0.95	1.00			1.00						0.94	
Satd. Flow (perm)	1750	3579			3544						1550	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	119	1568	0	0	1899	84	0	0	0	26	0	133
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	137	0
Lane Group Flow (vph)	119	1568	0	0	1981	0	0	0	0	0	22	0
Confl. Peds. (#/hr)	15					15	2		9	9		2
Turn Type	Prot	NA	Perm	Prot	NA				Perm	Perm	NA	
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	20.7	117.3			90.6						9.7	
Effective Green, g (s)	21.7	118.3			91.6						10.7	
Actuated g/C Ratio	0.15	0.84			0.65						0.08	
Clearance Time (s)	6.0	6.0			6.0						7.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	271	3024			2318						118	
v/s Ratio Prot	0.07	c0.44			c0.56							
v/s Ratio Perm											c0.01	
v/c Ratio	0.44	0.52			0.85						0.19	
Uniform Delay, d ₁	53.6	3.0			19.0						60.6	
Progression Factor	0.87	1.17			1.37						1.00	
Incremental Delay, d ₂	0.8	0.4			1.4						0.8	
Delay (s)	47.6	3.9			27.4						61.4	
Level of Service	D	A			C						E	
Approach Delay (s)		7.0			27.4			0.0			61.4	
Approach LOS		A			C			A			E	
Intersection Summary												
HCM 2000 Control Delay		19.8			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.77										
Actuated Cycle Length (s)		140.0			Sum of lost time (s)			19.0				
Intersection Capacity Utilization		92.0%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.897					
Flt Protected	0.988					0.972
Satd. Flow (prot)	1632	0	1842	0	0	1790
Flt Permitted	0.988					0.972
Satd. Flow (perm)	1632	0	1842	0	0	1790
Link Speed (k/h)	50		50			50
Link Distance (m)	85.8		91.1			132.2
Travel Time (s)	6.2		6.6			9.5

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 101: East Avenue & Street L

Scenario 2 3700 Units 2041
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	31	101	92	0	139	101
Future Volume (vph)	31	101	92	0	139	101
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	31	101	92	0	139	101
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	132	92	240			
Volume Left (vph)	31	0	139			
Volume Right (vph)	101	0	0			
Hadj (s)	-0.38	0.03	0.15			
Departure Headway (s)	4.3	4.5	4.5			
Degree Utilization, x	0.16	0.12	0.30			
Capacity (veh/h)	776	762	777			
Control Delay (s)	8.1	8.1	9.3			
Approach Delay (s)	8.1	8.1	9.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.7			
Level of Service			A			
Intersection Capacity Utilization			34.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
102: Lakefront Promenade & Street L

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.898			0.965			0.993	
Flt Protected		0.950			0.993			0.998			0.992	
Satd. Flow (prot)	0	1750	0	0	1643	0	0	1774	0	0	1815	0
Flt Permitted		0.950			0.993			0.998			0.992	
Satd. Flow (perm)	0	1750	0	0	1643	0	0	1774	0	0	1815	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		86.0			72.6			101.7			130.4	
Travel Time (s)		6.2			5.2			7.3			9.4	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 102: Lakefront Promenade & Street L

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	0	0	33	23	172	23	345	129	102	489	31
Future Volume (vph)	18	0	0	33	23	172	23	345	129	102	489	31
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	0	0	33	23	172	23	345	129	102	489	31
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	18	228	497	622								
Volume Left (vph)	18	33	23	102								
Volume Right (vph)	0	172	129	31								
Hadj (s)	0.23	-0.39	-0.11	0.04								
Departure Headway (s)	8.0	6.5	5.6	5.6								
Degree Utilization, x	0.04	0.41	0.78	0.97								
Capacity (veh/h)	410	533	629	622								
Control Delay (s)	11.3	13.9	25.7	51.3								
Approach Delay (s)	11.3	13.9	25.7	51.3								
Approach LOS	B	B	D	F								
Intersection Summary												
Delay				35.2								
Level of Service				E								
Intersection Capacity Utilization				83.4%	ICU Level of Service				E			
Analysis Period (min)				15								

Lanes and Geometrics
103: Ogden Ave & Street L

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.978			0.930			0.968			0.982	
Flt Protected		0.976			0.990			0.990			0.994	
Satd. Flow (prot)	0	1758	0	0	1696	0	0	1765	0	0	1798	0
Flt Permitted		0.976			0.990			0.990			0.994	
Satd. Flow (perm)	0	1758	0	0	1696	0	0	1765	0	0	1798	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		55.4			82.6			89.6			142.3	
Travel Time (s)		4.0			5.9			6.5			10.2	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 103: Ogden Ave & Street L

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	94	67	31	33	46	86	116	310	135	85	489	88
Future Volume (vph)	94	67	31	33	46	86	116	310	135	85	489	88
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	94	67	31	33	46	86	116	310	135	85	489	88
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	192	165	561	662								
Volume Left (vph)	94	33	116	85								
Volume Right (vph)	31	86	135	88								
Hadj (s)	0.04	-0.24	-0.07	-0.02								
Departure Headway (s)	7.9	7.8	6.5	6.5								
Degree Utilization, x	0.42	0.36	1.01	1.20								
Capacity (veh/h)	431	441	561	560								
Control Delay (s)	16.7	15.2	65.3	128.1								
Approach Delay (s)	16.7	15.2	65.3	128.1								
Approach LOS	C	C	F	F								
Intersection Summary												
Delay			80.5									
Level of Service			F									
Intersection Capacity Utilization			78.5%		ICU Level of Service				D			
Analysis Period (min)			15									

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.983				0.986	
Flt Protected	0.958			0.991		
Satd. Flow (prot)	1735	0	0	1825	1816	0
Flt Permitted	0.958			0.991		
Satd. Flow (perm)	1735	0	0	1825	1816	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	72.3			87.6	135.3	
Travel Time (s)	5.2			6.3	9.7	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 104: Hydro Rd & Street L

Scenario 2 3700 Units 2041
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	227	33	107	483	675	78
Future Volume (vph)	227	33	107	483	675	78
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	227	33	107	483	675	78
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	260	590	753			
Volume Left (vph)	227	107	0			
Volume Right (vph)	33	0	78			
Hadj (s)	0.13	0.07	-0.03			
Departure Headway (s)	7.1	5.9	5.9			
Degree Utilization, x	0.51	0.97	1.23			
Capacity (veh/h)	502	602	618			
Control Delay (s)	17.3	54.5	139.1			
Approach Delay (s)	17.3	54.5	139.1			
Approach LOS	C	F	F			
Intersection Summary						
Delay			88.2			
Level of Service			F			
Intersection Capacity Utilization			96.2%	ICU Level of Service	F	
Analysis Period (min)			15			

Lanes and Geometrics
105: East Avenue & Rangeview Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.979
Satd. Flow (prot)	1593	0	1842	0	0	1803
Flt Permitted						0.979
Satd. Flow (perm)	1593	0	1842	0	0	1803
Link Speed (k/h)	50		50			50
Link Distance (m)	198.1		66.7			91.1
Travel Time (s)	14.3		4.8			6.6

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 105: East Avenue & Rangeview Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	88	4	0	58	74
Future Volume (vph)	0	88	4	0	58	74
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	88	4	0	58	74
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	88	4	132			
Volume Left (vph)	0	0	58			
Volume Right (vph)	88	0	0			
Hadj (s)	-0.57	0.03	0.12			
Departure Headway (s)	3.6	4.2	4.2			
Degree Utilization, x	0.09	0.00	0.15			
Capacity (veh/h)	952	816	838			
Control Delay (s)	7.0	7.3	8.0			
Approach Delay (s)	7.0	7.3	8.0			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.6			
Level of Service			A			
Intersection Capacity Utilization			25.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
106: Lakefront Promenade & Rangeview Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.902			0.901			0.959				
Flt Protected		0.986			0.992		0.950				0.995	
Satd. Flow (prot)	0	1638	0	0	1646	0	1750	1767	0	0	1833	0
Flt Permitted		0.986			0.992		0.950				0.995	
Satd. Flow (perm)	0	1638	0	0	1646	0	1750	1767	0	0	1833	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		174.1			140.0			142.6			101.7	
Travel Time (s)		12.5			10.1			10.3			7.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 106: Lakefront Promenade & Rangeview Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	0	13	33	23	153	47	339	129	54	468	0
Future Volume (vph)	5	0	13	33	23	153	47	339	129	54	468	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	0	13	33	23	153	47	339	129	54	468	0
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	18	209	47	468	522							
Volume Left (vph)	5	33	47	0	54							
Volume Right (vph)	13	153	0	129	0							
Hadj (s)	-0.34	-0.37	0.53	-0.16	0.05							
Departure Headway (s)	6.9	6.2	6.5	5.8	5.6							
Degree Utilization, x	0.03	0.36	0.08	0.75	0.81							
Capacity (veh/h)	447	532	542	607	628							
Control Delay (s)	10.2	12.6	8.9	22.7	27.9							
Approach Delay (s)	10.2	12.6	21.5		27.9							
Approach LOS	B	B	C		D							
Intersection Summary												
Delay			22.5									
Level of Service			C									
Intersection Capacity Utilization			77.6%		ICU Level of Service					D		
Analysis Period (min)			15									

Lanes and Geometrics
107: Ogden Ave & Rangeview Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.976			0.937			0.973			0.985	
Flt Protected		0.979			0.989			0.991			0.995	
Satd. Flow (prot)	0	1760	0	0	1707	0	0	1776	0	0	1805	0
Flt Permitted		0.979			0.989			0.991			0.995	
Satd. Flow (perm)	0	1760	0	0	1707	0	0	1776	0	0	1805	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		56.3			124.7			104.4			89.6	
Travel Time (s)		4.1			9.0			7.5			6.5	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 107: Ogden Ave & Rangeview Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	75	67	31	34	46	71	116	416	135	53	436	63
Future Volume (vph)	75	67	31	34	46	71	116	416	135	53	436	63
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	75	67	31	34	46	71	116	416	135	53	436	63
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	173	151	667	552								
Volume Left (vph)	75	34	116	53								
Volume Right (vph)	31	71	135	63								
Hadj (s)	0.01	-0.20	-0.05	-0.02								
Departure Headway (s)	7.8	7.7	6.3	6.3								
Degree Utilization, x	0.37	0.32	1.17	0.97								
Capacity (veh/h)	446	446	576	565								
Control Delay (s)	15.3	14.3	117.0	54.9								
Approach Delay (s)	15.3	14.3	117.0	54.9								
Approach LOS	C	B	F	F								
Intersection Summary												
Delay			73.3									
Level of Service			F									
Intersection Capacity Utilization			82.7%	ICU Level of Service					E			
Analysis Period (min)			15									

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.982				0.990	
Flt Protected	0.959			0.989		
Satd. Flow (prot)	1735	0	0	1822	1824	0
Flt Permitted	0.959			0.989		
Satd. Flow (perm)	1735	0	0	1822	1824	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	108.3			161.7	87.6	
Travel Time (s)	7.8			11.6	6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 108: Hydro Rd & Rangeview Rd

Scenario 2 3700 Units 2041
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	212	33	107	378	656	52
Future Volume (vph)	212	33	107	378	656	52
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	212	33	107	378	656	52
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	245	485	708			
Volume Left (vph)	212	107	0			
Volume Right (vph)	33	0	52			
Hadj (s)	0.13	0.08	-0.01			
Departure Headway (s)	6.9	5.8	5.6			
Degree Utilization, x	0.47	0.79	1.10			
Capacity (veh/h)	498	605	637			
Control Delay (s)	15.7	27.1	90.0			
Approach Delay (s)	15.7	27.1	90.0			
Approach LOS	C	D	F			
Intersection Summary						
Delay			56.1			
Level of Service			F			
Intersection Capacity Utilization			87.2%	ICU Level of Service	E	
Analysis Period (min)			15			

Lanes and Geometrics
1: Ogden Ave & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	28.0		25.0	25.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.95	1.00	0.99		1.00		0.99	1.00	0.99	
Frt			0.850		0.982				0.850		0.874	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	3444	1566	1750	3296	0	1750	1883	1566	1750	1628	0
Flt Permitted	0.950			0.950			0.609			0.711		
Satd. Flow (perm)	1739	3444	1490	1746	3296	0	1120	1883	1545	1308	1628	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			117		14				159		48	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			142.3			246.5	
Travel Time (s)		19.6			16.0			10.2			17.7	

Intersection Summary

Area Type: Other

Timings
1: Ogden Ave & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	211	1926	170	90	898	285	70	293	129	9
Future Volume (vph)	211	1926	170	90	898	285	70	293	129	9
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	7	4		3	8	5	2		1	6
Permitted Phases			4			2		2	6	
Detector Phase	7	4	4	3	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	5.0	8.0	8.0	5.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	9.0	34.0	34.0	9.0	34.0
Total Split (s)	25.0	74.0	74.0	12.0	61.0	10.0	35.0	35.0	9.0	34.0
Total Split (%)	19.2%	56.9%	56.9%	9.2%	46.9%	7.7%	26.9%	26.9%	6.9%	26.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	1.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	20.6	73.9	73.9	12.1	65.5	29.3	18.9	18.9	24.7	18.1
Actuated g/C Ratio	0.16	0.57	0.57	0.09	0.50	0.23	0.15	0.15	0.19	0.14
v/c Ratio	0.76	0.98	0.19	0.55	0.61	0.95	0.26	0.81	0.48	0.21
Control Delay	58.5	38.6	8.9	68.0	21.4	88.7	48.8	41.1	47.4	16.9
Queue Delay	0.0	39.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	58.5	77.8	8.9	68.0	21.4	88.7	48.8	41.2	47.4	16.9
LOS	E	E	A	E	C	F	D	D	D	B
Approach Delay		70.9			25.2		62.9			38.1
Approach LOS		E			C		E			D

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 56.3

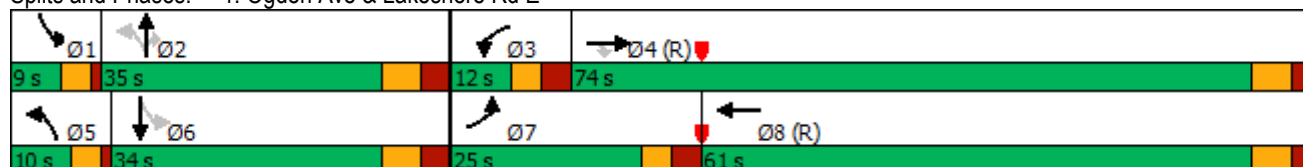
Intersection LOS: E

Intersection Capacity Utilization 94.0%

ICU Level of Service F

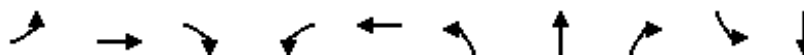
Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues
1: Ogden Ave & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	211	1926	170	90	1021	285	70	293	129	57
v/c Ratio	0.76	0.98	0.19	0.55	0.61	0.95	0.26	0.81	0.48	0.21
Control Delay	58.5	38.6	8.9	68.0	21.4	88.7	48.8	41.1	47.4	16.9
Queue Delay	0.0	39.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	58.5	77.8	8.9	68.0	21.4	88.7	48.8	41.2	47.4	16.9
Queue Length 50th (m)	56.4	~233.5	8.4	23.3	93.6	~71.1	17.0	36.0	28.8	2.1
Queue Length 95th (m)	m64.5	#339.8	m12.0	m#57.9	92.6	#98.2	29.0	64.9	42.6	13.7
Internal Link Dist (m)		248.7			198.5		118.3			222.5
Turn Bay Length (m)	28.0		25.0	25.0		30.0		30.0		
Base Capacity (vph)	290	1958	897	163	1667	299	420	468	269	388
Starvation Cap Reductn	0	20	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	203	0	0	0	0	0	8	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	1.10	0.19	0.55	0.61	0.95	0.17	0.64	0.48	0.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	1926	170	90	898	123	285	70	293	129	9	48
Future Volume (vph)	211	1926	170	90	898	123	285	70	293	129	9	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		3.0	6.0	6.0	3.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3444	1490	1750	3296		1749	1883	1545	1748	1627	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.61	1.00	1.00	0.71	1.00	
Satd. Flow (perm)	1750	3444	1490	1750	3296		1121	1883	1545	1309	1627	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	211	1926	170	90	898	123	285	70	293	129	9	48
RTOR Reduction (vph)	0	0	52	0	7	0	0	0	134	0	42	0
Lane Group Flow (vph)	211	1926	118	90	1014	0	285	70	159	129	15	0
Confl. Peds. (#/hr)	7		8	8		7	1		1	1		1
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	19.6	71.6	71.6	11.1	63.1		28.1	19.3	19.3	20.5	15.5	
Effective Green, g (s)	20.6	72.6	72.6	12.1	64.1		29.3	20.3	20.3	22.5	16.5	
Actuated g/C Ratio	0.16	0.56	0.56	0.09	0.49		0.23	0.16	0.16	0.17	0.13	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	277	1923	832	162	1625		299	294	241	246	206	
v/s Ratio Prot	c0.12	c0.56		0.05	0.31		c0.07	0.04		0.02	0.01	
v/s Ratio Perm			0.08				c0.14		0.10	0.07		
v/c Ratio	0.76	1.00	0.14	0.56	0.62		0.95	0.24	0.66	0.52	0.07	
Uniform Delay, d1	52.4	28.7	13.8	56.4	24.1		48.9	48.1	51.6	48.1	50.0	
Progression Factor	0.95	1.01	1.63	1.00	0.80		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.4	13.9	0.2	3.6	1.6		39.3	0.4	6.4	2.0	0.2	
Delay (s)	55.3	42.8	22.5	59.8	21.0		88.2	48.5	58.0	50.1	50.2	
Level of Service	E	D	C	E	C		F	D	E	D	D	
Approach Delay (s)		42.5			24.1			70.3			50.1	
Approach LOS		D			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			42.2			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			94.0%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
2: Dixie Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.96		0.99			0.99	0.98
Frt	0.998				0.850							0.850
Flt Protected	0.950			0.950				0.950			0.950	
Satd. Flow (prot)	1653	3469	0	1785	3476	1536	0	1825	0	0	1807	1465
Flt Permitted	0.950			0.950				0.525			0.756	
Satd. Flow (perm)	1644	3469	0	1780	3476	1478	0	1003	0	0	1428	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				134						25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings
2: Dixie Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	737	1367	9	919	171	3	0	151	0	471
Future Volume (vph)	737	1367	9	919	171	3	0	151	0	471
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA	pm+ov
Protected Phases	7	4	3	8			2		6	7
Permitted Phases					8	2		6		6
Detector Phase	7	4	3	8	8	2	2	6	6	7
Switch Phase										
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0
Minimum Split (s)	12.0	24.0	11.0	24.0	24.0	34.0	34.0	34.0	34.0	12.0
Total Split (s)	56.0	85.0	11.0	40.0	40.0	34.0	34.0	34.0	34.0	56.0
Total Split (%)	43.1%	65.4%	8.5%	30.8%	30.8%	26.2%	26.2%	26.2%	26.2%	43.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0		6.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	59.1	96.7	6.9	35.0	35.0		19.9		19.9	80.0
Actuated g/C Ratio	0.45	0.74	0.05	0.27	0.27		0.15		0.15	0.62
v/c Ratio	0.98	0.54	0.10	0.98	0.35		0.02		0.69	0.52
Control Delay	41.6	17.5	60.8	72.8	12.2		43.0		67.7	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	41.6	17.5	60.8	72.8	12.2		43.0		67.7	13.5
LOS	D	B	E	E	B		D		E	B
Approach Delay		25.9		63.3			43.0		26.7	
Approach LOS		C		E			D		C	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 36.7

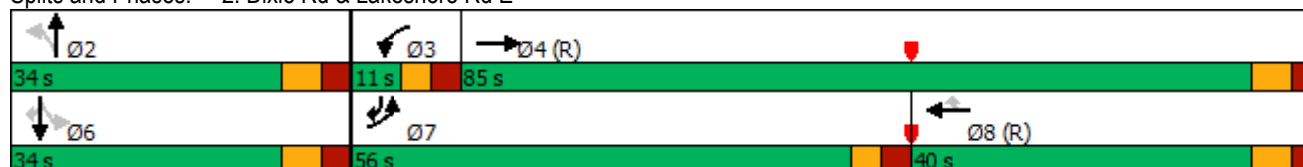
Intersection LOS: D

Intersection Capacity Utilization 89.7%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E

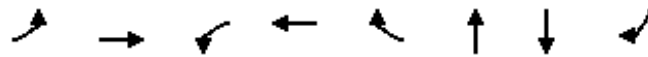


Queues

Scenario 3a 5300 Units 2041

2: Dixie Rd & Lakeshore Rd E

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	737	1387	9	919	171	3	151	471
v/c Ratio	0.98	0.54	0.10	0.98	0.35	0.02	0.69	0.52
Control Delay	41.6	17.5	60.8	72.8	12.2	43.0	67.7	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	17.5	60.8	72.8	12.2	43.0	67.7	13.5
Queue Length 50th (m)	202.5	161.5	2.4	130.1	7.5	0.7	39.1	56.5
Queue Length 95th (m)	m#262.1	m215.4	8.5	#175.4	27.0	3.5	59.2	82.2
Internal Link Dist (m)		598.7		375.1		69.6	268.8	
Turn Bay Length (m)	44.0		25.0		30.0			
Base Capacity (vph)	751	2581	94	935	495	216	307	906
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	0.98	0.54	0.10	0.98	0.35	0.01	0.49	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	737	1367	20	9	919	171	3	0	0	151	0	471
Future Volume (vph)	737	1367	20	9	919	171	3	0	0	151	0	471
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		6.0			6.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.99			0.99	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95			0.95	1.00
Satd. Flow (prot)	1653	3468		1785	3476	1478		1815			1794	1458
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.53			0.76	1.00
Satd. Flow (perm)	1653	3468		1785	3476	1478		1004			1427	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	737	1367	20	9	919	171	3	0	0	151	0	471
RTOR Reduction (vph)	0	1	0	0	0	98	0	0	0	0	0	10
Lane Group Flow (vph)	737	1386	0	9	919	73	0	3	0	0	151	461
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Heavy Vehicles (%)	8%	5%	2%	0%	5%	4%	0%	0%	0%	1%	0%	9%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases						8	2			6		6
Actuated Green, G (s)	58.1	91.0		1.1	34.0	34.0		18.9			18.9	77.0
Effective Green, g (s)	59.1	92.0		2.1	35.0	35.0		19.9			19.9	79.0
Actuated g/C Ratio	0.45	0.71		0.02	0.27	0.27		0.15			0.15	0.61
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		7.0			7.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	751	2454		28	935	397		153			218	886
v/s Ratio Prot	c0.45	0.40		0.01	c0.26							0.24
v/s Ratio Perm						0.05		0.00			c0.11	0.08
v/c Ratio	0.98	0.56		0.32	0.98	0.18		0.02			0.69	0.52
Uniform Delay, d1	34.9	9.3		63.2	47.2	36.5		46.8			52.2	14.6
Progression Factor	0.61	2.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	16.9	0.4		6.6	25.6	1.0		0.1			9.1	0.6
Delay (s)	38.3	18.9		69.8	72.8	37.5		46.8			61.3	15.2
Level of Service	D	B		E	E	D		D			E	B
Approach Delay (s)		25.6			67.3			46.8			26.4	
Approach LOS		C			E			D			C	
Intersection Summary												
HCM 2000 Control Delay			37.7				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			89.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
3: Lakeshore Rd E & Cawthra Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor				1.00		0.96						0.97
Frt						0.850						0.850
Flt Protected	0.950			0.950						0.950	0.950	
Satd. Flow (prot)	1716	3579	0	1785	3476	1493	0	1921	0	1570	1605	1507
Flt Permitted	0.089			0.225						0.950	0.950	
Satd. Flow (perm)	161	3579	0	422	3476	1430	0	1921	0	1570	1605	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						257						25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings
3: Lakeshore Rd E & Cawthra Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT	SBR	Ø2
Lane Configurations									
Traffic Volume (vph)	482	1241	3	1108	994	823	0	379	
Future Volume (vph)	482	1241	3	1108	994	823	0	379	
Turn Type	pm+pt	NA	Perm	NA	pm+ov	Prot	NA	pm+ov	
Protected Phases	7	4		8	1	1	6	7	2
Permitted Phases	4		8		8			6	
Detector Phase	7	4	8	8	1	1	6	7	
Switch Phase									
Minimum Initial (s)	5.0	7.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0
Minimum Split (s)	11.0	38.0	38.0	38.0	14.0	14.0	38.0	11.0	11.0
Total Split (s)	37.0	84.0	47.0	47.0	35.0	35.0	46.0	37.0	11.0
Total Split (%)	28.5%	64.6%	36.2%	36.2%	26.9%	26.9%	35.4%	28.5%	8%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	
Lead/Lag	Lead		Lag	Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	Max	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	82.0	79.0	43.1	43.1	84.1	41.0	41.0	77.9	
Actuated g/C Ratio	0.63	0.61	0.33	0.33	0.65	0.32	0.32	0.60	
v/c Ratio	0.95	0.57	0.02	0.96	0.96	0.83	0.81	0.42	
Control Delay	65.9	16.6	41.0	64.4	25.7	57.0	55.2	13.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	65.9	16.6	41.0	64.4	25.7	57.0	55.2	13.5	
LOS	E	B	D	E	C	E	E	B	
Approach Delay		30.4		46.1			42.7		
Approach LOS		C		D			D		

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 8:WBTL, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 39.9

Intersection LOS: D

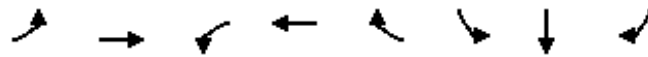
Intersection Capacity Utilization 98.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd





Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT	SBR
Lane Group Flow (vph)	482	1241	3	1108	994	411	412	379
v/c Ratio	0.95	0.57	0.02	0.96	0.96	0.83	0.81	0.42
Control Delay	65.9	16.6	41.0	64.4	25.7	57.0	55.2	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.9	16.6	41.0	64.4	25.7	57.0	55.2	13.5
Queue Length 50th (m)	109.2	100.1	0.6	143.5	71.8	108.1	107.5	44.7
Queue Length 95th (m)	#177.2	119.8	m1.0m	#202.8m	#186.7	#164.8	#162.7	66.0
Internal Link Dist (m)		297.4		113.2			931.9	
Turn Bay Length (m)	35.0		60.0		70.0	115.0		
Base Capacity (vph)	520	2174	140	1153	1035	495	506	911
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	0.93	0.57	0.02	0.96	0.96	0.83	0.81	0.42

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	482	1241	0	3	1108	994	0	0	0	823	0	379
Future Volume (vph)	482	1241	0	3	1108	994	0	0	0	823	0	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	2.0	5.0		5.0	5.0	5.0				5.0	5.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00				0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98				1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00				1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85				1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00				0.95	0.95	1.00
Satd. Flow (prot)	1716	3579		1780	3476	1461				1570	1605	1484
Flt Permitted	0.09	1.00		0.23	1.00	1.00				0.95	0.95	1.00
Satd. Flow (perm)	160	3579		422	3476	1461				1570	1605	1484
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	482	1241	0	3	1108	994	0	0	0	823	0	379
RTOR Reduction (vph)	0	0	0	0	0	91	0	0	0	0	0	11
Lane Group Flow (vph)	482	1241	0	3	1108	903	0	0	0	411	412	368
Confl. Peds. (#/hr)	25		8	8		25	13					13
Heavy Vehicles (%)	4%	2%	0%	0%	5%	7%	0%	0%	0%	8%	0%	6%
Turn Type	pm+pt	NA		Perm	NA	pm+ov				Prot	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	78.0	78.0		42.1	42.1	82.1				40.0	40.0	72.9
Effective Green, g (s)	79.0	79.0		43.1	43.1	84.1				41.0	41.0	74.9
Actuated g/C Ratio	0.61	0.61		0.33	0.33	0.65				0.32	0.32	0.58
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0				6.0	6.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0				3.0	3.0	3.0
Lane Grp Cap (vph)	502	2174		139	1152	1001				495	506	855
v/s Ratio Prot	c0.25	0.35			c0.32	c0.28				0.26	0.26	0.11
v/s Ratio Perm	0.33			0.01		0.33						0.14
v/c Ratio	0.96	0.57		0.02	0.96	0.90				0.83	0.81	0.43
Uniform Delay, d1	39.1	15.3		29.3	42.6	19.5				41.3	41.0	15.5
Progression Factor	1.00	1.00		1.34	1.20	0.68				1.00	1.00	1.00
Incremental Delay, d2	30.2	1.1		0.2	13.4	7.2				11.3	9.7	0.4
Delay (s)	69.3	16.4		39.3	64.7	20.5				52.6	50.7	15.9
Level of Service	E	B		D	E	C				D	D	B
Approach Delay (s)		31.2			43.8			0.0			40.4	
Approach LOS		C			D			A			D	
Intersection Summary												
HCM 2000 Control Delay			38.7				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			17.0		
Intersection Capacity Utilization			98.1%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
5: East Avenue & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.94	1.00	0.99		1.00	0.98	
Frt	0.996				0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3460	0	1785	3380	1566	1750	1579	0	1785	1606	0
Flt Permitted	0.950			0.950			0.751			0.599		
Satd. Flow (perm)	1779	3460	0	1781	3380	1473	1377	1579	0	1124	1606	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				84		77			82	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		226.1			305.9			132.2			178.2	
Travel Time (s)		16.3			22.0			9.5			12.8	

Intersection Summary

Area Type: Other

Timings
5: East Avenue & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	37	1965	12	1843	9	299	0	32	0
Future Volume (vph)	37	1965	12	1843	9	299	0	32	0
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	7	4	3	8			2		6
Permitted Phases					8	2		6	
Detector Phase	7	4	3	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	11.0	24.0	24.0	31.0	31.0	31.0	31.0
Total Split (s)	11.0	88.0	11.0	88.0	88.0	31.0	31.0	31.0	31.0
Total Split (%)	8.5%	67.7%	8.5%	67.7%	67.7%	23.8%	23.8%	23.8%	23.8%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	6.0	83.3	6.0	78.9	78.9	31.3	31.3	31.3	31.3
Actuated g/C Ratio	0.05	0.64	0.05	0.61	0.61	0.24	0.24	0.24	0.24
v/c Ratio	0.45	0.91	0.15	0.90	0.01	0.90	0.34	0.12	0.02
Control Delay	77.4	35.5	65.3	25.7	0.0	79.0	23.9	43.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.4	35.5	65.3	25.7	0.0	79.0	23.9	43.2	0.1
LOS	E	D	E	C	A	E	C	D	A
Approach Delay		36.2		25.8			60.6		32.9
Approach LOS		D		C			E		C

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 34.3

Intersection LOS: C

Intersection Capacity Utilization 91.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E



Queues

Scenario 3a 5300 Units 2041

5: East Avenue & Lakeshore Rd E

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	2019	12	1843	9	299	150	32	10
v/c Ratio	0.45	0.91	0.15	0.90	0.01	0.90	0.34	0.12	0.02
Control Delay	77.4	35.5	65.3	25.7	0.0	79.0	23.9	43.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.4	35.5	65.3	25.7	0.0	79.0	23.9	43.2	0.1
Queue Length 50th (m)	9.8	273.9	3.2	258.0	0.0	77.3	15.5	6.7	0.0
Queue Length 95th (m)	m15.5	295.7	m6.6	180.0	m0.0	#152.2	38.2	17.2	0.0
Internal Link Dist (m)		202.1		281.9			108.2		154.2
Turn Bay Length (m)	72.0		50.0		20.0	20.0		45.0	
Base Capacity (vph)	82	2226	82	2158	970	331	438	270	448
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.91	0.15	0.85	0.01	0.90	0.34	0.12	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1965	54	12	1843	9	299	0	150	32	0	10
Future Volume (vph)	37	1965	54	12	1843	9	299	0	150	32	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3460		1785	3380	1473	1742	1579		1783	1606	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.75	1.00		0.60	1.00	
Satd. Flow (perm)	1785	3460		1785	3380	1473	1377	1579		1124	1606	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	37	1965	54	12	1843	9	299	0	150	32	0	10
RTOR Reduction (vph)	0	2	0	0	0	4	0	58	0	0	8	0
Lane Group Flow (vph)	37	2017	0	12	1843	5	299	92	0	32	2	0
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3
Heavy Vehicles (%)	0%	5%	2%	0%	8%	2%	2%	0%	2%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	4.0	78.7		2.0	76.7	76.7	30.3	30.3		30.3	30.3	
Effective Green, g (s)	5.0	79.7		3.0	77.7	77.7	31.3	31.3		31.3	31.3	
Actuated g/C Ratio	0.04	0.61		0.02	0.60	0.60	0.24	0.24		0.24	0.24	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	68	2121		41	2020	880	331	380		270	386	
v/s Ratio Prot	c0.02	c0.58		0.01	0.55			0.06			0.00	
v/s Ratio Perm						0.00	c0.22			0.03		
v/c Ratio	0.54	0.95		0.29	0.91	0.01	0.90	0.24		0.12	0.01	
Uniform Delay, d1	61.4	23.3		62.5	23.1	10.6	47.9	39.8		38.6	37.5	
Progression Factor	1.05	1.46		1.03	0.86	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	9.1		3.6	7.2	0.0	26.5	0.3		0.2	0.0	
Delay (s)	71.2	43.2		68.1	27.1	10.6	74.4	40.1		38.8	37.5	
Level of Service	E	D		E	C	B	E	D		D	D	
Approach Delay (s)		43.7			27.3			62.9			38.5	
Approach LOS		D			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			38.7			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			91.8%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
7: Lakefront Promenade & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		25.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		0.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.96	1.00		0.99	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3476	1566	1750	3476	1750	1566
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3476	1507	1747	3476	1737	1536
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		57				13
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	130.4	
Travel Time (s)	4.7			19.6	9.4	

Intersection Summary

Area Type: Other

Timings
7: Lakefront Promenade & Lakeshore Rd E

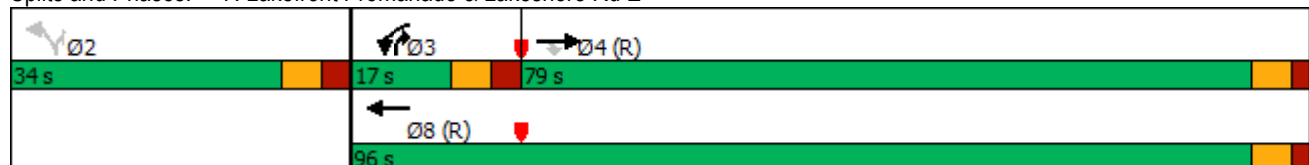
Scenario 3a 5300 Units 2041
Morning Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	1842	207	77	1311	304	412
Future Volume (vph)	1842	207	77	1311	304	412
Turn Type	NA	Perm	Prot	NA	Perm	pm+ov
Protected Phases	4		3	8		3
Permitted Phases		4			2	2
Detector Phase	4	4	3	8	2	3
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	8.0	5.0	5.0
Minimum Split (s)	24.0	24.0	12.0	24.0	34.0	12.0
Total Split (s)	79.0	79.0	17.0	96.0	34.0	17.0
Total Split (%)	60.8%	60.8%	13.1%	73.8%	26.2%	13.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	6.0	5.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes			Yes
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	75.9	75.9	10.8	92.8	26.2	37.1
Actuated g/C Ratio	0.58	0.58	0.08	0.71	0.20	0.29
v/c Ratio	0.91	0.23	0.53	0.53	0.87	0.92
Control Delay	24.6	11.3	72.1	6.8	74.3	65.3
Queue Delay	10.5	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	11.3	72.1	6.8	74.3	65.3
LOS	D	B	E	A	E	E
Approach Delay	32.7			10.4	69.1	
Approach LOS	C			B	E	

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 31.5
 Intersection LOS: C
 Intersection Capacity Utilization 87.1%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promenade & Lakeshore Rd E



Queues
7: Lakefront Promenade & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1842	207	77	1311	304	412
v/c Ratio	0.91	0.23	0.53	0.53	0.87	0.92
Control Delay	24.6	11.3	72.1	6.8	74.3	65.3
Queue Delay	10.5	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	11.3	72.1	6.8	74.3	65.3
Queue Length 50th (m)	87.5	8.2	22.1	53.2	78.6	94.9
Queue Length 95th (m)	#225.9	m25.1	m33.0	m63.2	#124.9	#162.1
Internal Link Dist (m)	41.1			248.7	106.4	
Turn Bay Length (m)		25.0	35.0			
Base Capacity (vph)	2029	903	148	2480	374	452
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	198	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.23	0.52	0.53	0.81	0.91
Intersection Summary						
# 95th percentile volume exceeds capacity, queue may be longer.						
Queue shown is maximum after two cycles.						
m Volume for 95th percentile queue is metered by upstream signal.						

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (vph)	1842	207	77	1311	304	412
Future Volume (vph)	1842	207	77	1311	304	412
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	5.0	5.0	6.0	5.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3476	1507	1750	3476	1737	1545
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3476	1507	1750	3476	1737	1545
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1842	207	77	1311	304	412
RTOR Reduction (vph)	0	24	0	0	0	9
Lane Group Flow (vph)	1842	183	77	1311	304	403
Confl. Peds. (#/hr)		5	5		5	5
Heavy Vehicles (%)	5%	2%	2%	5%	2%	2%
Turn Type	NA	Perm	Prot	NA	Perm	pm+ov
Protected Phases	4		3	8		3
Permitted Phases		4			2	2
Actuated Green, G (s)	75.0	75.0	9.8	91.8	25.2	35.0
Effective Green, g (s)	76.0	76.0	10.8	92.8	26.2	37.0
Actuated g/C Ratio	0.58	0.58	0.08	0.71	0.20	0.28
Clearance Time (s)	6.0	6.0	7.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2032	881	145	2481	350	511
v/s Ratio Prot	c0.53		0.04	0.38		c0.07
v/s Ratio Perm		0.12			0.17	0.20
v/c Ratio	0.91	0.21	0.53	0.53	0.87	0.79
Uniform Delay, d1	23.9	12.8	57.2	8.5	50.2	42.9
Progression Factor	0.78	1.12	1.07	0.69	1.00	1.00
Incremental Delay, d2	4.9	0.3	3.0	0.7	19.8	7.9
Delay (s)	23.4	14.7	63.9	6.5	70.0	50.8
Level of Service	C	B	E	A	E	D
Approach Delay (s)	22.5			9.7	58.9	
Approach LOS	C			A	E	
Intersection Summary						
HCM 2000 Control Delay		24.5		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.92				
Actuated Cycle Length (s)		130.0		Sum of lost time (s)		18.0
Intersection Capacity Utilization		87.1%		ICU Level of Service		E
Analysis Period (min)		15				
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	60.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			30.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.97	1.00			1.00					
Frt			0.850					0.850			0.890	
Flt Protected	0.950			0.950			0.950				0.991	
Satd. Flow (prot)	1750	3444	1566	1750	3380	0	1750	1601	0	0	1661	0
Flt Permitted	0.950			0.950			0.750				0.950	
Satd. Flow (perm)	1747	3444	1512	1748	3380	0	1380	1601	0	0	1592	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			147					78			76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			135.3			191.6	
Travel Time (s)		16.0			14.1			9.7			13.8	

Intersection Summary

Area Type: Other

Timings
8: Hydro Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	4	1984	323	70	1084	251	0	2	0
Future Volume (vph)	4	1984	323	70	1084	251	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		5		2
Permitted Phases			4			5		2	
Detector Phase	7	4	4	3	8	5	5	2	2
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	12.0	12.0
Total Split (s)	11.0	80.0	80.0	11.0	80.0	39.0	39.0	39.0	39.0
Total Split (%)	8.5%	61.5%	61.5%	8.5%	61.5%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	6.3	77.2	77.2	8.4	88.4	28.4	28.4		28.4
Actuated g/C Ratio	0.05	0.59	0.59	0.06	0.68	0.22	0.22		0.22
v/c Ratio	0.05	0.97	0.34	0.62	0.47	0.83	0.62		0.03
Control Delay	78.8	20.3	1.4	86.1	8.4	71.2	37.8		0.1
Queue Delay	0.0	21.2	0.0	0.0	0.1	0.0	0.0		0.0
Total Delay	78.8	41.4	1.4	86.1	8.5	71.2	37.8		0.1
LOS	E	D	A	F	A	E	D		A
Approach Delay		35.9			13.2		54.4		0.1
Approach LOS		D			B		D		A

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 31.6

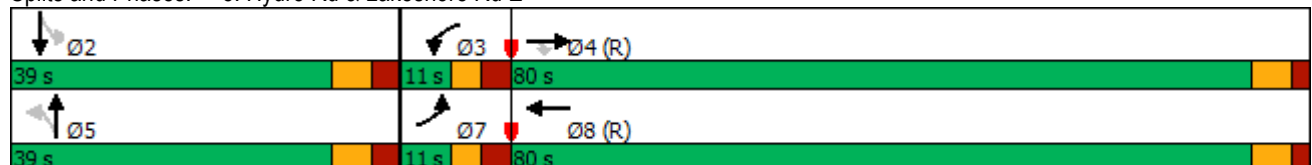
Intersection LOS: C

Intersection Capacity Utilization 87.9%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 8: Hydro Rd & Lakeshore Rd E



Queues
8: Hydro Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	4	1984	323	70	1084	251	256	11
v/c Ratio	0.05	0.97	0.34	0.62	0.47	0.83	0.62	0.03
Control Delay	78.8	20.3	1.4	86.1	8.4	71.2	37.8	0.1
Queue Delay	0.0	21.2	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	78.8	41.4	1.4	86.1	8.5	71.2	37.8	0.1
Queue Length 50th (m)	1.1	184.4	3.0	20.3	37.7	64.2	43.1	0.0
Queue Length 95th (m)	m1.1m#313.9	m3.4	m#40.4	41.3	94.5	71.0	0.0	0.0
Internal Link Dist (m)	198.5				171.3	111.3		167.6
Turn Bay Length (m)	25.0	50.0		25.0	60.0			
Base Capacity (vph)	85	2045	957	113	2299	350	464	460
Starvation Cap Reductn	0	145	0	0	274	0	0	0
Spillback Cap Reductn	0	154	0	0	0	0	3	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	1.05	0.34	0.62	0.54	0.72	0.56	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	1984	323	70	1084	0	251	0	256	2	0	9
Future Volume (vph)	4	1984	323	70	1084	0	251	0	256	2	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1750	3444	1512	1750	3380		1747	1601			1660	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00			0.95	
Satd. Flow (perm)	1750	3444	1512	1750	3380		1380	1601			1592	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	1984	323	70	1084	0	251	0	256	2	0	9
RTOR Reduction (vph)	0	0	60	0	0	0	0	61	0	0	9	0
Lane Group Flow (vph)	4	1984	263	70	1084	0	251	195	0	0	2	0
Confl. Peds. (#/hr)	2		4	4		2	1					
Heavy Vehicles (%)	2%	6%	2%	2%	8%	2%	2%	0%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			5			2	
Permitted Phases			4				5			2		
Actuated Green, G (s)	1.0	76.2	76.2	7.4	82.6		27.4	27.4			27.4	
Effective Green, g (s)	2.0	77.2	77.2	8.4	83.6		28.4	28.4			28.4	
Actuated g/C Ratio	0.02	0.59	0.59	0.06	0.64		0.22	0.22			0.22	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	7.0			7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	26	2045	897	113	2173		301	349			347	
v/s Ratio Prot	0.00	c0.58		c0.04	0.32			0.12				
v/s Ratio Perm			0.17				c0.18				0.00	
v/c Ratio	0.15	0.97	0.29	0.62	0.50		0.83	0.56			0.01	
Uniform Delay, d1	63.2	25.3	13.0	59.2	12.2		48.5	45.2			39.8	
Progression Factor	1.32	0.44	0.14	1.16	0.71		1.00	1.00			1.00	
Incremental Delay, d2	1.1	7.3	0.3	7.6	0.6		17.7	1.9			0.0	
Delay (s)	84.2	18.5	2.1	76.5	9.3		66.2	47.2			39.8	
Level of Service	F	B	A	E	A		E	D			D	
Approach Delay (s)		16.3			13.4			56.6			39.8	
Approach LOS		B			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			20.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			87.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		50.0	100.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			50.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			1.00				1.00	0.99		0.99	
Frt			0.850		0.995				0.850		0.940	
Flt Protected	0.950			0.950				0.959			0.984	
Satd. Flow (prot)	1750	3476	1566	1750	3462	0	0	1806	1566	0	1729	0
Flt Permitted	0.950			0.950				0.649			0.753	
Satd. Flow (perm)	1743	3476	1566	1747	3462	0	0	1219	1545	0	1323	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159		4				163		29	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		195.3			622.7			123.3			883.5	
Travel Time (s)		14.1			44.8			8.9			63.6	

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

Scenario 3a 5300 Units 2041
Morning Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	133	1938	349	160	1304	127	21	269	35	23
Future Volume (vph)	133	1938	349	160	1304	127	21	269	35	23
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	Perm	NA
Protected Phases	7	4		3	8		2			6
Permitted Phases			4			2		2	6	
Detector Phase	7	4	4	3	8	2	2	2	6	6
Switch Phase										
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	34.0	34.0	34.0
Total Split (s)	23.0	79.0	79.0	17.0	73.0	34.0	34.0	34.0	34.0	34.0
Total Split (%)	17.7%	60.8%	60.8%	13.1%	56.2%	26.2%	26.2%	26.2%	26.2%	26.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					
Recall Mode	None	C-Min	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	15.4	76.2	76.2	16.6	77.5		21.2	21.2		21.2
Actuated g/C Ratio	0.12	0.59	0.59	0.13	0.60		0.16	0.16		0.16
v/c Ratio	0.65	0.95	0.36	0.72	0.65		0.75	0.70		0.44
Control Delay	61.5	25.3	8.0	59.3	21.5		73.6	29.0		39.6
Queue Delay	0.0	9.4	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	61.5	34.7	8.0	59.3	21.5		73.6	29.0		39.6
LOS	E	C	A	E	C		E	C		D
Approach Delay		32.3			25.6		44.8			39.6
Approach LOS		C			C		D			D

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 31.4

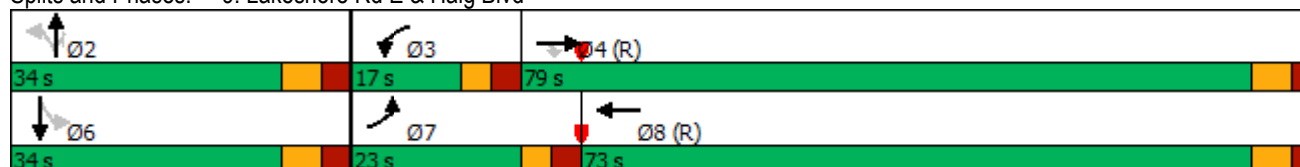
Intersection LOS: C

Intersection Capacity Utilization 92.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues
9: Lakeshore Rd E & Haig Blvd

Scenario 3a 5300 Units 2041
Morning Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	133	1938	349	160	1345	148	269	105
v/c Ratio	0.65	0.95	0.36	0.72	0.65	0.75	0.70	0.44
Control Delay	61.5	25.3	8.0	59.3	21.5	73.6	29.0	39.6
Queue Delay	0.0	9.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.5	34.7	8.0	59.3	21.5	73.6	29.0	39.6
Queue Length 50th (m)	37.1	119.8	17.7	44.4	97.2	38.4	26.6	18.4
Queue Length 95th (m)	m41.8m#215.7	m20.2	m#65.1	m112.3	59.8	55.2	35.5	
Internal Link Dist (m)		171.3			598.7	99.3		859.5
Turn Bay Length (m)	50.0		50.0	100.0				
Base Capacity (vph)	243	2037	983	223	2064	262	460	307
Starvation Cap Reductn	0	118	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	0.55	1.01	0.36	0.72	0.65	0.56	0.58	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	1938	349	160	1304	41	127	21	269	35	23	47
Future Volume (vph)	133	1938	349	160	1304	41	127	21	269	35	23	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	0.99		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		0.98	
Satd. Flow (prot)	1750	3476	1566	1750	3463			1801	1545		1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.65	1.00		0.75	
Satd. Flow (perm)	1750	3476	1566	1750	3463			1219	1545		1323	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	133	1938	349	160	1304	41	127	21	269	35	23	47
RTOR Reduction (vph)	0	0	66	0	2	0	0	0	136	0	24	0
Lane Group Flow (vph)	133	1938	283	160	1343	0	0	148	133	0	81	0
Confl. Peds. (#/hr)	7			7			3		1	1		3
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	14.4	75.2	75.2	15.6	76.4			20.2	20.2		20.2	
Effective Green, g (s)	15.4	76.2	76.2	16.6	77.4			21.2	21.2		21.2	
Actuated g/C Ratio	0.12	0.59	0.59	0.13	0.60			0.16	0.16		0.16	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	207	2037	917	223	2061			198	251		215	
v/s Ratio Prot	0.08	c0.56		c0.09	0.39							
v/s Ratio Perm			0.18					c0.12	0.09		0.06	
v/c Ratio	0.64	0.95	0.31	0.72	0.65			0.75	0.53		0.38	
Uniform Delay, d1	54.7	25.2	13.6	54.4	17.4			51.8	49.8		48.5	
Progression Factor	0.99	0.69	0.98	0.84	1.08			1.00	1.00		1.00	
Incremental Delay, d2	3.3	6.5	0.4	6.7	1.0			14.3	2.0		1.1	
Delay (s)	57.7	24.0	13.8	52.7	19.8			66.1	51.8		49.6	
Level of Service	E	C	B	D	B			E	D		D	
Approach Delay (s)		24.3			23.3			56.9			49.6	
Approach LOS		C			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			27.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			92.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.872					
Flt Protected	0.997					0.973
Satd. Flow (prot)	1601	0	1842	0	0	1792
Flt Permitted	0.997					0.973
Satd. Flow (perm)	1601	0	1842	0	0	1792
Link Speed (k/h)	50		50			50
Link Distance (m)	85.8		91.1			132.2
Travel Time (s)	6.2		6.6			9.5

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 101: East Avenue & Street L

Scenario 3a 5300 Units 2041
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	14	262	187	0	37	29
Future Volume (vph)	14	262	187	0	37	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	262	187	0	37	29
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	276	187	66			
Volume Left (vph)	14	0	37			
Volume Right (vph)	262	0	0			
Hadj (s)	-0.53	0.03	0.15			
Departure Headway (s)	4.0	4.6	4.9			
Degree Utilization, x	0.31	0.24	0.09			
Capacity (veh/h)	850	737	685			
Control Delay (s)	8.7	9.1	8.4			
Approach Delay (s)	8.7	9.1	8.4			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.8			
Level of Service			A			
Intersection Capacity Utilization			40.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
102: Lakefront Promenade & Street L

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.887			0.976			0.984	
Flt Protected		0.950			0.998			0.997			0.991	
Satd. Flow (prot)	0	1750	0	0	1631	0	0	1792	0	0	1796	0
Flt Permitted		0.950			0.998			0.997			0.991	
Satd. Flow (perm)	0	1750	0	0	1631	0	0	1792	0	0	1796	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		86.0			72.6			101.7			130.4	
Travel Time (s)		6.2			5.2			7.3			9.4	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 102: Lakefront Promenade & Street L

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	62	0	0	13	37	255	37	399	93	50	199	34
Future Volume (vph)	62	0	0	13	37	255	37	399	93	50	199	34
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	62	0	0	13	37	255	37	399	93	50	199	34
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	62	305	529	283								
Volume Left (vph)	62	13	37	50								
Volume Right (vph)	0	255	93	34								
Hadj (s)	0.23	-0.46	-0.06	0.00								
Departure Headway (s)	7.2	5.9	5.5	6.0								
Degree Utilization, x	0.12	0.50	0.82	0.47								
Capacity (veh/h)	429	559	634	551								
Control Delay (s)	11.3	14.6	28.3	14.2								
Approach Delay (s)	11.3	14.6	28.3	14.2								
Approach LOS	B	B	D	B								
Intersection Summary												
Delay				20.5								
Level of Service				C								
Intersection Capacity Utilization				63.8%	ICU Level of Service		B					
Analysis Period (min)				15								

Lanes and Geometrics
103: Ogden Ave & Street L

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.908			0.981			0.985	
Flt Protected		0.963			0.996			0.988			0.992	
Satd. Flow (prot)	0	1758	0	0	1666	0	0	1785	0	0	1800	0
Flt Permitted		0.963			0.996			0.988			0.992	
Satd. Flow (perm)	0	1758	0	0	1666	0	0	1785	0	0	1800	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		55.4			82.6			89.6			142.3	
Travel Time (s)		4.0			5.9			6.5			10.2	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 103: Ogden Ave & Street L

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	168	38	14	18	47	141	132	339	77	41	199	29
Future Volume (vph)	168	38	14	18	47	141	132	339	77	41	199	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	168	38	14	18	47	141	132	339	77	41	199	29
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	220	206	548	269								
Volume Left (vph)	168	18	132	41								
Volume Right (vph)	14	141	77	29								
Hadj (s)	0.15	-0.36	0.00	0.00								
Departure Headway (s)	7.2	6.8	6.0	6.6								
Degree Utilization, x	0.44	0.39	0.92	0.49								
Capacity (veh/h)	470	492	585	507								
Control Delay (s)	15.7	14.0	43.8	15.9								
Approach Delay (s)	15.7	14.0	43.8	15.9								
Approach LOS	C	B	E	C								
Intersection Summary												
Delay			27.8									
Level of Service			D									
Intersection Capacity Utilization			81.9%	ICU Level of Service					D			
Analysis Period (min)			15									

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.992				0.990	
Flt Protected	0.955			0.988		
Satd. Flow (prot)	1745	0	0	1820	1824	0
Flt Permitted	0.955			0.988		
Satd. Flow (perm)	1745	0	0	1820	1824	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	72.3			87.6	135.3	
Travel Time (s)	5.2			6.3	9.7	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 104: Hydro Rd & Street L

Scenario 3a 5300 Units 2041
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	202	13	102	305	362	29
Future Volume (vph)	202	13	102	305	362	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	202	13	102	305	362	29
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	215	407	391			
Volume Left (vph)	202	102	0			
Volume Right (vph)	13	0	29			
Hadj (s)	0.19	0.08	-0.01			
Departure Headway (s)	6.1	5.2	5.2			
Degree Utilization, x	0.36	0.59	0.56			
Capacity (veh/h)	541	658	671			
Control Delay (s)	12.5	15.6	14.6			
Approach Delay (s)	12.5	15.6	14.6			
Approach LOS	B	C	B			
Intersection Summary						
Delay			14.6			
Level of Service			B			
Intersection Capacity Utilization			64.5%	ICU Level of Service	C	
Analysis Period (min)			15			

Lanes and Geometrics
105: East Avenue & Rangeview Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.971
Satd. Flow (prot)	1593	0	1842	0	0	1789
Flt Permitted						0.971
Satd. Flow (perm)	1593	0	1842	0	0	1789
Link Speed (k/h)	50		50			50
Link Distance (m)	198.1		66.7			91.1
Travel Time (s)	14.3		4.8			6.6

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 105: East Avenue & Rangeview Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	171	15	0	25	17
Future Volume (vph)	0	171	15	0	25	17
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	171	15	0	25	17
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	171	15	42			
Volume Left (vph)	0	0	25			
Volume Right (vph)	171	0	0			
Hadj (s)	-0.57	0.03	0.15			
Departure Headway (s)	3.5	4.3	4.4			
Degree Utilization, x	0.16	0.02	0.05			
Capacity (veh/h)	1018	795	787			
Control Delay (s)	7.1	7.4	7.6			
Approach Delay (s)	7.1	7.4	7.6			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.3			
Level of Service			A			
Intersection Capacity Utilization			26.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
106: Lakefront Promenade & Rangeview Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.945			0.893			0.966			0.996	
Flt Protected		0.971			0.997		0.950				0.994	
Satd. Flow (prot)	0	1690	0	0	1640	0	1750	1779	0	0	1824	0
Flt Permitted		0.971			0.997		0.950				0.994	
Satd. Flow (perm)	0	1690	0	0	1640	0	1750	1779	0	0	1824	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		174.1			140.0			142.6			101.7	
Travel Time (s)		12.5			10.1			10.3			7.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 106: Lakefront Promenade & Rangeview Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	0	13	13	37	189	74	320	93	27	179	6
Future Volume (vph)	19	0	13	13	37	189	74	320	93	27	179	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	19	0	13	13	37	189	74	320	93	27	179	6
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	32	239	74	413	212							
Volume Left (vph)	19	13	74	0	27							
Volume Right (vph)	13	189	0	93	6							
Hadj (s)	-0.09	-0.43	0.53	-0.12	0.04							
Departure Headway (s)	6.1	5.3	6.1	5.4	5.5							
Degree Utilization, x	0.05	0.35	0.12	0.62	0.32							
Capacity (veh/h)	501	624	574	639	618							
Control Delay (s)	9.4	11.1	8.7	15.7	11.1							
Approach Delay (s)	9.4	11.1	14.6		11.1							
Approach LOS	A	B	B		B							
Intersection Summary												
Delay			12.8									
Level of Service			B									
Intersection Capacity Utilization			53.5%	ICU Level of Service					A			
Analysis Period (min)			15									

Lanes and Geometrics
107: Ogden Ave & Rangeview Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.988			0.922			0.982			0.987	
Flt Protected		0.968			0.994			0.988			0.995	
Satd. Flow (prot)	0	1762	0	0	1688	0	0	1787	0	0	1809	0
Flt Permitted		0.968			0.994			0.988			0.995	
Satd. Flow (perm)	0	1762	0	0	1688	0	0	1787	0	0	1809	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		56.3			124.7			104.4			89.6	
Travel Time (s)		4.1			9.0			7.5			6.5	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 107: Ogden Ave & Rangeview Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	102	38	14	18	47	89	132	356	77	24	184	22
Future Volume (vph)	102	38	14	18	47	89	132	356	77	24	184	22
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	102	38	14	18	47	89	132	356	77	24	184	22
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	154	154	565	230								
Volume Left (vph)	102	18	132	24								
Volume Right (vph)	14	89	77	22								
Hadj (s)	0.11	-0.29	0.00	0.00								
Departure Headway (s)	6.6	6.2	5.3	5.8								
Degree Utilization, x	0.28	0.26	0.83	0.37								
Capacity (veh/h)	499	526	663	557								
Control Delay (s)	12.1	11.4	29.1	12.2								
Approach Delay (s)	12.1	11.4	29.1	12.2								
Approach LOS	B	B	D	B								
Intersection Summary												
Delay				20.7								
Level of Service				C								
Intersection Capacity Utilization				73.8%	ICU Level of Service	D						
Analysis Period (min)				15								

Lanes and Geometrics
108: Hydro Rd & Rangeview Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.989				0.992	
Flt Protected	0.956			0.986		
Satd. Flow (prot)	1742	0	0	1816	1827	0
Flt Permitted	0.956			0.986		
Satd. Flow (perm)	1742	0	0	1816	1827	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	108.3			161.7	87.6	
Travel Time (s)	7.8			11.6	6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 108: Hydro Rd & Rangeview Rd

Scenario 3a 5300 Units 2041
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	150	13	102	257	353	23
Future Volume (vph)	150	13	102	257	353	23
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	150	13	102	257	353	23
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	163	359	376			
Volume Left (vph)	150	102	0			
Volume Right (vph)	13	0	23			
Hadj (s)	0.17	0.09	0.00			
Departure Headway (s)	5.8	5.0	4.9			
Degree Utilization, x	0.26	0.50	0.51			
Capacity (veh/h)	559	699	712			
Control Delay (s)	10.9	12.8	12.9			
Approach Delay (s)	10.9	12.8	12.9			
Approach LOS	B	B	B			
Intersection Summary						
Delay			12.5			
Level of Service			B			
Intersection Capacity Utilization			58.2%	ICU Level of Service	B	
Analysis Period (min)			15			

Lanes and Geometrics
1: Ogden Ave & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	28.0		25.0	25.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.97	1.00	1.00		0.99		0.98	1.00	0.99	
Frt			0.850		0.988				0.850		0.905	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	3614	1581	1750	3520	0	1750	1883	1566	1750	1683	0
Flt Permitted	0.950			0.950			0.306			0.726		
Satd. Flow (perm)	1746	3614	1538	1748	3520	0	561	1883	1540	1331	1683	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			156		9				148		55	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			142.3			246.5	
Travel Time (s)		19.6			16.0			10.2			17.7	

Intersection Summary

Area Type: Other

Timings
1: Ogden Ave & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	154	1469	319	245	1618	230	48	105	146	65
Future Volume (vph)	154	1469	319	245	1618	230	48	105	146	65
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	7	4		3	8	5	2		1	6
Permitted Phases			4			2		2	6	
Detector Phase	7	4	4	3	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	11.0	34.0	34.0	11.0	34.0
Total Split (s)	20.0	64.0	64.0	27.0	71.0	15.0	38.0	38.0	11.0	34.0
Total Split (%)	14.3%	45.7%	45.7%	19.3%	50.7%	10.7%	27.1%	27.1%	7.9%	24.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	1.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	18.3	66.6	66.6	25.7	74.0	34.7	20.7	20.7	27.7	16.7
Actuated g/C Ratio	0.13	0.48	0.48	0.18	0.53	0.25	0.15	0.15	0.20	0.12
v/c Ratio	0.68	0.85	0.39	0.77	0.94	0.96	0.17	0.30	0.51	0.71
Control Delay	66.1	32.9	15.8	73.9	32.0	95.0	51.3	4.2	50.4	55.1
Queue Delay	0.0	0.4	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0
Total Delay	66.1	33.3	15.8	73.9	35.4	95.0	51.3	4.2	50.4	55.1
LOS	E	C	B	E	D	F	D	A	D	E
Approach Delay		33.1			40.1		64.7			52.9
Approach LOS		C			D		E			D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 40.1

Intersection LOS: D

Intersection Capacity Utilization 99.6%

ICU Level of Service F

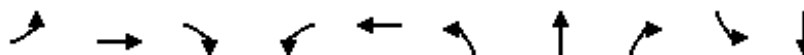
Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues
1: Ogden Ave & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	154	1469	319	245	1757	230	48	105	146	176
v/c Ratio	0.68	0.85	0.39	0.77	0.94	0.96	0.17	0.30	0.51	0.71
Control Delay	66.1	32.9	15.8	73.9	32.0	95.0	51.3	4.2	50.4	55.1
Queue Delay	0.0	0.4	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0
Total Delay	66.1	33.3	15.8	73.9	35.4	95.0	51.3	4.2	50.4	55.1
Queue Length 50th (m)	47.1	104.0	26.5	61.9	157.6	58.5	12.4	0.0	35.2	34.4
Queue Length 95th (m)	m53.7m#258.2	m34.2m#109.9	#283.1	#98.6	23.6	5.5	52.0	57.8		
Internal Link Dist (m)	248.7		198.5		118.3		222.5			
Turn Bay Length (m)	28.0		25.0	25.0		30.0		30.0		
Base Capacity (vph)	232	1720	813	326	1865	240	430	466	287	380
Starvation Cap Reductn	0	0	0	0	66	0	0	0	0	0
Spillback Cap Reductn	0	43	0	0	0	0	0	1	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.88	0.39	0.75	0.98	0.96	0.11	0.23	0.51	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	154	1469	319	245	1618	139	230	48	105	146	65	111
Future Volume (vph)	154	1469	319	245	1618	139	230	48	105	146	65	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		3.0	6.0	6.0	3.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3614	1538	1750	3520		1748	1883	1540	1745	1684	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.31	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	1750	3614	1538	1750	3520		563	1883	1540	1333	1684	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	154	1469	319	245	1618	139	230	48	105	146	65	111
RTOR Reduction (vph)	0	0	82	0	4	0	0	0	89	0	48	0
Lane Group Flow (vph)	154	1469	237	245	1753	0	230	48	16	146	128	0
Confl. Peds. (#/hr)	7		2	2		7	5		3	3		5
Heavy Vehicles (%)	2%	1%	1%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	17.3	65.6	65.6	24.7	73.0		30.7	19.7	19.7	22.7	15.7	
Effective Green, g (s)	18.3	66.6	66.6	25.7	74.0		31.7	20.7	20.7	24.7	16.7	
Actuated g/C Ratio	0.13	0.48	0.48	0.18	0.53		0.23	0.15	0.15	0.18	0.12	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	228	1719	731	321	1860		229	278	227	258	200	
v/s Ratio Prot	0.09	0.41		c0.14	c0.50		c0.09	0.03		0.03	0.08	
v/s Ratio Perm			0.15				c0.14		0.01	0.07		
v/c Ratio	0.68	0.85	0.32	0.76	0.94		1.00	0.17	0.07	0.57	0.64	
Uniform Delay, d1	58.0	32.4	22.8	54.3	31.0		51.6	52.2	51.3	51.9	58.8	
Progression Factor	1.00	0.87	1.17	1.16	0.71		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.2	3.1	0.6	7.3	8.3		60.6	0.3	0.1	2.8	6.5	
Delay (s)	62.0	31.4	27.2	70.0	30.5		112.2	52.5	51.5	54.7	65.3	
Level of Service	E	C	C	E	C		F	D	D	D	E	
Approach Delay (s)		33.1			35.3			88.0			60.5	
Approach LOS		C			D			F			E	
Intersection Summary												
HCM 2000 Control Delay			40.5			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			99.6%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
2: Dixie Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98		1.00				0.96
Frt		0.998				0.850						0.850
Flt Protected	0.950			0.950				0.988			0.950	
Satd. Flow (prot)	1733	3571	0	1785	3579	1581	0	1898	0	0	1807	1566
Flt Permitted	0.950			0.950				0.939			0.755	
Satd. Flow (perm)	1732	3571	0	1782	3579	1544	0	1798	0	0	1436	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				125						23
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings
2: Dixie Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	415	1211	2	1153	220	1	3	278	0	910
Future Volume (vph)	415	1211	2	1153	220	1	3	278	0	910
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA	pm+ov
Protected Phases	7	4	3	8			2		6	7
Permitted Phases					8	2		6		6
Detector Phase	7	4	3	8	8	2	2	6	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	12.0	24.0	11.0	24.0	24.0	12.0	12.0	34.0	34.0	12.0
Total Split (s)	55.0	95.0	11.0	51.0	51.0	34.0	34.0	34.0	34.0	55.0
Total Split (%)	39.3%	67.9%	7.9%	36.4%	36.4%	24.3%	24.3%	24.3%	24.3%	39.3%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0		6.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	50.0	98.8	6.0	46.0	46.0		28.0		28.0	79.0
Actuated g/C Ratio	0.36	0.71	0.04	0.33	0.33		0.20		0.20	0.56
v/c Ratio	0.67	0.49	0.03	0.98	0.37		0.01		0.97	1.03
Control Delay	37.6	27.9	65.0	68.5	17.0		45.2		100.9	67.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	37.6	27.9	65.0	68.5	17.0		45.2		100.9	67.5
LOS	D	C	E	E	B		D		F	E
Approach Delay		30.3		60.3			45.3		75.3	
Approach LOS		C		E			D		E	

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.03
 Intersection Signal Delay: 52.9
 Intersection LOS: D
 Intersection Capacity Utilization 107.3%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E

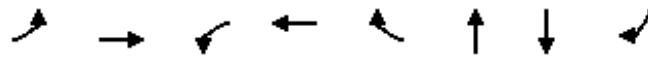


Queues

Scenario 3a 5300 Units 2041

2: Dixie Rd & Lakeshore Rd E

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	415	1224	2	1153	220	4	278	910
v/c Ratio	0.67	0.49	0.03	0.98	0.37	0.01	0.97	1.03
Control Delay	37.6	27.9	65.0	68.5	17.0	45.2	100.9	67.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	27.9	65.0	68.5	17.0	45.2	100.9	67.5
Queue Length 50th (m)	124.6	160.5	0.6	175.1	19.8	1.0	81.2	~255.7
Queue Length 95th (m)	m156.8	209.8	3.7	#224.0	43.2	4.5	#139.9	#364.4
Internal Link Dist (m)		598.7		375.1		69.6	268.8	
Turn Bay Length (m)	44.0		25.0		30.0			
Base Capacity (vph)	618	2520	76	1175	591	359	287	881
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	0.67	0.49	0.03	0.98	0.37	0.01	0.97	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	415	1211	13	2	1153	220	1	3	0	278	0	910
Future Volume (vph)	415	1211	13	2	1153	220	1	3	0	278	0	910
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		6.0			6.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1733	3573		1785	3579	1544		1892			1807	1545
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.94			0.76	1.00
Satd. Flow (perm)	1733	3573		1785	3579	1544		1798			1436	1545
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	415	1211	13	2	1153	220	1	3	0	278	0	910
RTOR Reduction (vph)	0	0	0	0	0	84	0	0	0	0	0	10
Lane Group Flow (vph)	415	1224	0	2	1153	136	0	4	0	0	278	900
Confl. Peds. (#/hr)	1		2	2		1	16					16
Heavy Vehicles (%)	3%	2%	0%	0%	2%	1%	0%	0%	0%	1%	0%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases						8	2			6		6
Actuated Green, G (s)	49.0	93.0		1.0	45.0	45.0		27.0			27.0	76.0
Effective Green, g (s)	50.0	94.0		2.0	46.0	46.0		28.0			28.0	78.0
Actuated g/C Ratio	0.36	0.67		0.01	0.33	0.33		0.20			0.20	0.56
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		7.0			7.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	618	2399		25	1175	507		359			287	860
v/s Ratio Prot	0.24	0.34		0.00	c0.32							c0.37
v/s Ratio Perm						0.09		0.00			0.19	0.21
v/c Ratio	0.67	0.51		0.08	0.98	0.27		0.01			0.97	1.05
Uniform Delay, d1	38.1	11.5		68.1	46.6	34.6		44.9			55.6	31.0
Progression Factor	0.87	2.82		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	1.9	0.5		1.4	22.1	1.3		0.0			44.0	43.5
Delay (s)	35.0	32.9		69.5	68.7	35.9		44.9			99.6	74.5
Level of Service	D	C		E	E	D		D			F	E
Approach Delay (s)		33.4			63.5			44.9			80.4	
Approach LOS		C			E			D			F	
Intersection Summary												
HCM 2000 Control Delay			56.5				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			1.02									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			107.3%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
3: Lakeshore Rd E & Cawthra Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor				0.99		0.93		1.00				0.96
Frt						0.850		0.981				0.850
Flt Protected	0.950			0.950				0.986		0.950	0.950	
Satd. Flow (prot)	1733	3544	0	1785	3614	1551	0	1858	0	1646	1683	1581
Flt Permitted	0.080			0.244						0.950	0.753	
Satd. Flow (perm)	146	3544	0	454	3614	1441	0	1878	0	1646	1334	1519
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						305		1				25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings
3: Lakeshore Rd E & Cawthra Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	309	1101	3	1324	855	2	4	1080	0	425
Future Volume (vph)	309	1101	3	1324	855	2	4	1080	0	425
Turn Type	pm+pt	NA	Perm	NA	pm+ov	Perm	NA	Prot	NA	pm+ov
Protected Phases	7	4		8	1		2	1	6	7
Permitted Phases	4		8		8	2				6
Detector Phase	7	4	8	8	1	2	2	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	7.0	8.0	8.0	8.0	5.0	5.0	8.0	5.0	5.0
Minimum Split (s)	11.0	38.0	38.0	38.0	14.0	11.0	11.0	14.0	38.0	11.0
Total Split (s)	21.0	79.0	58.0	58.0	40.0	11.0	11.0	40.0	51.0	21.0
Total Split (%)	16.2%	60.8%	44.6%	44.6%	30.8%	8.5%	8.5%	30.8%	39.2%	16.2%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	2.0
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lead	Lag		Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes
Recall Mode	None	Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	77.0	74.0	53.0	53.0	96.8		6.0	43.8	43.8	68.0
Actuated g/C Ratio	0.59	0.57	0.41	0.41	0.74		0.05	0.34	0.34	0.52
v/c Ratio	0.97	0.55	0.02	0.90	0.72		0.08	0.97	0.95	0.52
Control Delay	79.8	18.8	23.7	45.4	7.9		57.6	75.2	70.3	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	79.8	18.8	23.7	45.4	7.9		57.6	75.2	70.3	20.7
LOS	E	B	C	D	A		E	E	E	C
Approach Delay		32.1		30.7			57.6		58.0	
Approach LOS		C		C			E		E	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 8:WBTL, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 39.2

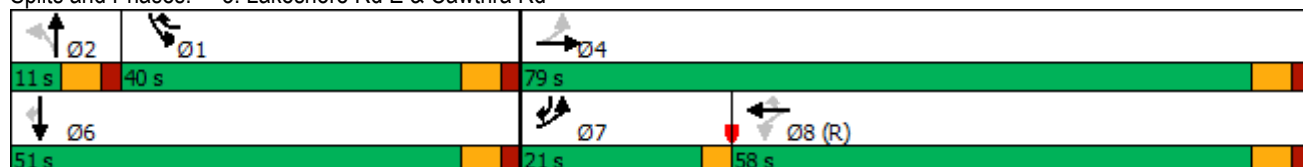
Intersection LOS: D

Intersection Capacity Utilization 102.0%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd



Queues

Scenario 3a 5300 Units 2041

3: Lakeshore Rd E & Cawthra Rd

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	309	1101	3	1324	855	7	540	540	425
v/c Ratio	0.97	0.55	0.02	0.90	0.72	0.08	0.97	0.95	0.52
Control Delay	79.8	18.8	23.7	45.4	7.9	57.6	75.2	70.3	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.8	18.8	23.7	45.4	7.9	57.6	75.2	70.3	20.7
Queue Length 50th (m)	64.9	93.4	0.5	173.6	45.7	1.6	146.7	145.0	65.2
Queue Length 95th (m)	#125.3	112.8	2.6	#207.5	75.1	6.9	#262.7	#259.7	94.2
Internal Link Dist (m)		297.4		113.2		71.8		931.9	
Turn Bay Length (m)	35.0		60.0		70.0		115.0		
Base Capacity (vph)	318	2017	185	1473	1188	87	554	567	815
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.55	0.02	0.90	0.72	0.08	0.97	0.95	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	309	1101	0	3	1324	855	2	4	1	1080	0	425
Future Volume (vph)	309	1101	0	3	1324	855	2	4	1	1080	0	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	2.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96		1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	0.95	1.00
Satd. Flow (prot)	1733	3544		1770	3614	1493		1851		1646	1683	1536
Flt Permitted	0.08	1.00		0.24	1.00	1.00		1.00		0.95	0.75	1.00
Satd. Flow (perm)	145	3544		454	3614	1493		1877		1646	1334	1536
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	309	1101	0	3	1324	855	2	4	1	1080	0	425
RTOR Reduction (vph)	0	0	0	0	0	89	0	1	0	0	0	12
Lane Group Flow (vph)	309	1101	0	3	1324	766	0	6	0	540	540	413
Confl. Peds. (#/hr)	49		20	20		49	23					23
Heavy Vehicles (%)	3%	3%	0%	0%	1%	3%	0%	0%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	68.2	68.2		47.2	47.2	90.0		1.0		42.8	49.8	67.8
Effective Green, g (s)	69.2	69.2		48.2	48.2	92.0		2.0		43.8	50.8	69.8
Actuated g/C Ratio	0.53	0.53		0.37	0.37	0.71		0.02		0.34	0.39	0.54
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0		6.0		6.0	6.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	309	1886		168	1339	1056		28		554	638	824
v/s Ratio Prot	c0.15	0.31			c0.37	0.24				c0.33	0.28	0.07
v/s Ratio Perm	0.38			0.01		0.27		0.00			c0.05	0.20
v/c Ratio	1.00	0.58		0.02	0.99	0.73		0.21		0.97	0.85	0.50
Uniform Delay, d1	42.4	20.6		25.9	40.6	11.4		63.2		42.6	36.0	19.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	51.2	1.3		0.2	22.1	2.5		3.8		31.6	10.1	0.5
Delay (s)	93.6	22.0		26.1	62.7	13.9		67.1		74.1	46.1	19.6
Level of Service	F	C		C	E	B		E		E	D	B
Approach Delay (s)		37.6			43.5			67.1			48.7	
Approach LOS		D			D			E			D	
Intersection Summary												
HCM 2000 Control Delay			43.5			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				17.0		
Intersection Capacity Utilization			102.0%			ICU Level of Service				G		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
5: East Avenue & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.94	0.99	0.99		1.00	0.98	
Frt	0.991				0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3570	0	1750	3614	1597	1785	1611	0	1785	1605	0
Flt Permitted	0.950			0.950			0.755			0.735		
Satd. Flow (perm)	1780	3570	0	1747	3614	1498	1411	1611	0	1379	1605	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				78		70			72	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		226.1			305.9			132.2			178.2	
Travel Time (s)		16.3			22.0			9.5			12.8	

Intersection Summary

Area Type: Other

Timings

5: East Avenue & Lakeshore Rd E

Scenario 3a 5300 Units 2041

Afternoon Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	49	2109	114	2012	24	123	0	24	0
Future Volume (vph)	49	2109	114	2012	24	123	0	24	0
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	7	4	3	8			2		6
Permitted Phases					8	2		6	
Detector Phase	7	4	3	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	11.0	24.0	24.0	31.0	31.0	31.0	31.0
Total Split (s)	11.0	98.0	11.0	98.0	98.0	31.0	31.0	31.0	31.0
Total Split (%)	7.9%	70.0%	7.9%	70.0%	70.0%	22.1%	22.1%	22.1%	22.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	8.5	92.1	13.5	99.6	99.6	18.4	18.4	18.4	18.4
Actuated g/C Ratio	0.06	0.66	0.10	0.71	0.71	0.13	0.13	0.13	0.13
v/c Ratio	0.45	0.95	0.67	0.78	0.02	0.67	0.12	0.13	0.01
Control Delay	76.8	32.6	81.1	13.0	0.0	74.5	1.5	52.8	0.0
Queue Delay	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.8	35.0	81.1	13.0	0.0	74.5	1.5	52.8	0.0
LOS	E	D	F	B	A	E	A	D	A
Approach Delay		35.9		16.4			58.7		45.3
Approach LOS		D		B			E		D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 27.7

Intersection LOS: C

Intersection Capacity Utilization 95.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E



Queues

Scenario 3a 5300 Units 2041

5: East Avenue & Lakeshore Rd E

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	2241	114	2012	24	123	34	24	4
v/c Ratio	0.45	0.95	0.67	0.78	0.02	0.67	0.12	0.13	0.01
Control Delay	76.8	32.6	81.1	13.0	0.0	74.5	1.5	52.8	0.0
Queue Delay	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.8	35.0	81.1	13.0	0.0	74.5	1.5	52.8	0.0
Queue Length 50th (m)	13.8	287.3	34.5	140.8	0.0	34.6	0.0	6.3	0.0
Queue Length 95th (m)	#34.9	337.4	m#86.0	165.0	m0.0	54.5	1.2	14.9	0.0
Internal Link Dist (m)		202.1		281.9			108.2		154.2
Turn Bay Length (m)	72.0		50.0		20.0	20.0		45.0	
Base Capacity (vph)	108	2374	169	2570	1088	251	345	246	345
Starvation Cap Reductn	0	73	0	14	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.97	0.67	0.79	0.02	0.49	0.10	0.10	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	2109	132	114	2012	24	123	0	34	24	0	4
Future Volume (vph)	49	2109	132	114	2012	24	123	0	34	24	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3571		1750	3614	1498	1776	1611		1782	1605	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.76	1.00		0.73	1.00	
Satd. Flow (perm)	1785	3571		1750	3614	1498	1411	1611		1379	1605	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	2109	132	114	2012	24	123	0	34	24	0	4
RTOR Reduction (vph)	0	3	0	0	0	7	0	30	0	0	3	0
Lane Group Flow (vph)	49	2238	0	114	2012	17	123	4	0	24	1	0
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3
Heavy Vehicles (%)	0%	1%	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	6.3	91.1		12.5	97.3	97.3	17.4	17.4		17.4	17.4	
Effective Green, g (s)	7.3	92.1		13.5	98.3	98.3	18.4	18.4		18.4	18.4	
Actuated g/C Ratio	0.05	0.66		0.10	0.70	0.70	0.13	0.13		0.13	0.13	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	93	2349		168	2537	1051	185	211		181	210	
v/s Ratio Prot	0.03	c0.63		c0.07	c0.56			0.00			0.00	
v/s Ratio Perm						0.01	c0.09			0.02		
v/c Ratio	0.53	0.95		0.68	0.79	0.02	0.66	0.02		0.13	0.00	
Uniform Delay, d1	64.7	21.9		61.2	14.0	6.3	57.9	53.0		53.7	52.8	
Progression Factor	1.00	1.00		1.06	0.71	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.3	10.4		9.1	2.3	0.0	8.7	0.0		0.3	0.0	
Delay (s)	70.0	32.3		73.7	12.2	6.3	66.6	53.0		54.1	52.8	
Level of Service	E	C		E	B	A	E	D		D	D	
Approach Delay (s)		33.1			15.4			63.6			53.9	
Approach LOS		C			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			26.1			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			95.9%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
7: Lakefront Promenade & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		25.0	35.0		0.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		0.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.96	1.00		0.99	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3614	1566	1750	3579	1750	1566
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3614	1505	1747	3579	1739	1533
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		75				154
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	130.4	
Travel Time (s)	4.7			19.6	9.4	

Intersection Summary

Area Type: Other

Timings 7: Lakefront Promenade & Lakeshore Rd E

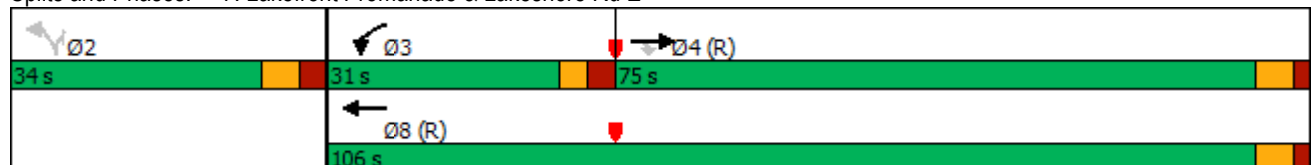
Scenario 3a 5300 Units 2041
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	1683	312	302	1591	323	154
Future Volume (vph)	1683	312	302	1591	323	154
Turn Type	NA	Perm	Prot	NA	Perm	Perm
Protected Phases	4		3	8		
Permitted Phases		4			2	2
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	11.0	24.0	34.0	34.0
Total Split (s)	75.0	75.0	31.0	106.0	34.0	34.0
Total Split (%)	53.6%	53.6%	22.1%	75.7%	24.3%	24.3%
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	70.5	70.5	25.8	101.3	27.7	27.7
Actuated g/C Ratio	0.50	0.50	0.18	0.72	0.20	0.20
v/c Ratio	0.92	0.39	0.94	0.61	0.94	0.36
Control Delay	39.4	22.7	87.4	7.8	90.7	9.3
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	39.4	22.7	87.4	7.9	90.7	9.3
LOS	D	C	F	A	F	A
Approach Delay	36.8			20.6	64.4	
Approach LOS	D			C	E	

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 32.8
 Intersection LOS: C
 Intersection Capacity Utilization 95.3%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promenade & Lakeshore Rd E



Queues
7: Lakefront Promenade & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1683	312	302	1591	323	154
v/c Ratio	0.92	0.39	0.94	0.61	0.94	0.36
Control Delay	39.4	22.7	87.4	7.8	90.7	9.3
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	39.4	22.7	87.4	7.9	90.7	9.3
Queue Length 50th (m)	162.2	40.2	93.7	60.2	93.5	0.0
Queue Length 95th (m)	m220.5	m46.8m	#101.2	m73.6	#152.4	19.4
Internal Link Dist (m)	41.1			248.7	106.4	
Turn Bay Length (m)		25.0	35.0			
Base Capacity (vph)	1820	795	325	2589	347	429
Starvation Cap Reductn	0	0	0	252	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.39	0.93	0.68	0.93	0.36
Intersection Summary						
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.					
m	Volume for 95th percentile queue is metered by upstream signal.					

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (vph)	1683	312	302	1591	323	154
Future Volume (vph)	1683	312	302	1591	323	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3614	1505	1750	3579	1739	1533
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3614	1505	1750	3579	1739	1533
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1683	312	302	1591	323	154
RTOR Reduction (vph)	0	37	0	0	0	124
Lane Group Flow (vph)	1683	275	302	1591	323	30
Confl. Peds. (#/hr)		5	5		4	6
Heavy Vehicles (%)	1%	2%	2%	2%	2%	2%
Turn Type	NA	Perm	Prot	NA	Perm	Perm
Protected Phases	4		3	8		
Permitted Phases		4			2	2
Actuated Green, G (s)	69.5	69.5	24.8	100.3	26.7	26.7
Effective Green, g (s)	70.5	70.5	25.8	101.3	27.7	27.7
Actuated g/C Ratio	0.50	0.50	0.18	0.72	0.20	0.20
Clearance Time (s)	6.0	6.0	6.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1819	757	322	2589	344	303
v/s Ratio Prot	c0.47		c0.17	0.44		
v/s Ratio Perm		0.18			c0.19	0.02
v/c Ratio	0.93	0.36	0.94	0.61	0.94	0.10
Uniform Delay, d1	32.3	21.1	56.3	9.6	55.3	46.0
Progression Factor	1.05	1.35	1.23	0.74	1.00	1.00
Incremental Delay, d2	5.0	0.6	17.7	0.4	32.7	0.1
Delay (s)	39.0	29.2	87.3	7.6	88.0	46.1
Level of Service	D	C	F	A	F	D
Approach Delay (s)	37.5			20.3	74.5	
Approach LOS	D			C	E	
Intersection Summary						
HCM 2000 Control Delay		34.1		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.94				
Actuated Cycle Length (s)		140.0		Sum of lost time (s)		17.0
Intersection Capacity Utilization		95.3%		ICU Level of Service		F
Analysis Period (min)		15				
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	60.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			30.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	1.00	1.00		1.00				0.99	
Frt			0.850		0.999			0.850			0.919	
Flt Protected	0.950			0.950			0.950				0.980	
Satd. Flow (prot)	1750	3579	1597	1750	3575	0	1750	1601	0	0	1715	0
Flt Permitted	0.950			0.950			0.754				0.907	
Satd. Flow (perm)	1749	3579	1529	1744	3575	0	1385	1601	0	0	1587	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			173		1			268			117	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			135.3			191.6	
Travel Time (s)		16.0			14.1			9.7			13.8	

Intersection Summary

Area Type: Other

Timings
8: Hydro Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	1366	387	219	1806	219	0	2	0
Future Volume (vph)	5	1366	387	219	1806	219	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	34.0	34.0
Total Split (s)	11.0	64.0	64.0	30.0	83.0	46.0	46.0	46.0	46.0
Total Split (%)	7.9%	45.7%	45.7%	21.4%	59.3%	32.9%	32.9%	32.9%	32.9%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	7.0	72.7	72.7	22.9	98.0	28.4	28.4		28.4
Actuated g/C Ratio	0.05	0.52	0.52	0.16	0.70	0.20	0.20		0.20
v/c Ratio	0.06	0.74	0.44	0.77	0.73	0.78	0.44		0.01
Control Delay	60.0	22.4	11.4	67.1	12.2	71.0	5.1		0.0
Queue Delay	0.0	0.2	0.0	0.0	0.6	0.0	0.0		0.0
Total Delay	60.0	22.7	11.4	67.1	12.8	71.0	5.1		0.0
LOS	E	C	B	E	B	E	A		A
Approach Delay		20.3			18.7		36.9		
Approach LOS		C			B		D		

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 21.3

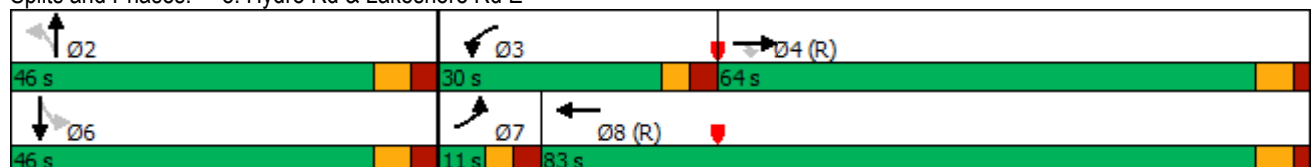
Intersection LOS: C

Intersection Capacity Utilization 86.5%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 8: Hydro Rd & Lakeshore Rd E



Queues
8: Hydro Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	5	1366	387	219	1815	219	235	5
v/c Ratio	0.06	0.74	0.44	0.77	0.73	0.78	0.44	0.01
Control Delay	60.0	22.4	11.4	67.1	12.2	71.0	5.1	0.0
Queue Delay	0.0	0.2	0.0	0.0	0.6	0.0	0.0	0.0
Total Delay	60.0	22.7	11.4	67.1	12.8	71.0	5.1	0.0
Queue Length 50th (m)	1.3	71.7	20.7	65.4	95.9	61.0	0.0	0.0
Queue Length 95th (m)	m2.0	#91.0	m30.3	m68.3	m136.6	84.7	13.1	0.0
Internal Link Dist (m)		198.5			171.3		111.3	167.6
Turn Bay Length (m)	25.0		50.0	25.0		60.0		
Base Capacity (vph)	88	1858	877	322	2502	395	648	537
Starvation Cap Reductn	0	92	0	0	309	0	0	0
Spillback Cap Reductn	0	34	0	0	17	0	2	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.77	0.44	0.68	0.83	0.55	0.36	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1366	387	219	1806	9	219	0	235	2	0	3
Future Volume (vph)	5	1366	387	219	1806	9	219	0	235	2	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1750	3579	1529	1750	3576		1745	1601			1715	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00			0.91	
Satd. Flow (perm)	1750	3579	1529	1750	3576		1385	1601			1587	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	1366	387	219	1806	9	219	0	235	2	0	3
RTOR Reduction (vph)	0	0	83	0	0	0	0	187	0	0	4	0
Lane Group Flow (vph)	5	1366	304	219	1815	0	219	48	0	0	1	0
Confl. Peds. (#/hr)	2		6	6		2	2					2
Heavy Vehicles (%)	2%	2%	0%	2%	2%	0%	2%	0%	2%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2				6
Permitted Phases			4				2			6		
Actuated Green, G (s)	1.4	71.7	71.7	21.9	92.2		27.4	27.4			27.4	
Effective Green, g (s)	2.4	72.7	72.7	22.9	93.2		28.4	28.4			28.4	
Actuated g/C Ratio	0.02	0.52	0.52	0.16	0.67		0.20	0.20			0.20	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	7.0			7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	30	1858	793	286	2380		280	324			321	
v/s Ratio Prot	0.00	0.38		c0.13	c0.51			0.03				
v/s Ratio Perm			0.20				c0.16				0.00	
v/c Ratio	0.17	0.74	0.38	0.77	0.76		0.78	0.15			0.00	
Uniform Delay, d1	67.8	26.2	20.2	56.0	15.9		52.9	45.8			44.5	
Progression Factor	0.94	0.72	0.81	1.17	0.78		1.00	1.00			1.00	
Incremental Delay, d2	1.6	1.6	0.9	1.1	0.2		13.3	0.2			0.0	
Delay (s)	65.3	20.5	17.2	66.9	12.6		66.1	46.1			44.5	
Level of Service	E	C	B	E	B		E	D			D	
Approach Delay (s)		19.9			18.4			55.7			44.5	
Approach LOS		B			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			23.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			86.5%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		50.0	100.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			50.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00			1.00	0.97		0.99	
Frt			0.850		0.993				0.850		0.900	
Flt Protected	0.950			0.950				0.958			0.993	
Satd. Flow (prot)	1750	3579	1566	1750	3541	0	0	1804	1566	0	1664	0
Flt Permitted	0.950			0.950				0.535			0.668	
Satd. Flow (perm)	1743	3579	1566	1750	3541	0	0	1006	1525	0	1119	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			156		5				269		91	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		195.3			622.7			123.3			883.5	
Travel Time (s)		14.1			44.8			8.9			63.6	

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	84	1337	216	162	1817	339	48	269	26	25
Future Volume (vph)	84	1337	216	162	1817	339	48	269	26	25
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases	7	4		3	8	5	2			6
Permitted Phases			4			2		2	6	
Detector Phase	7	4	4	3	8	5	2	2	6	6
Switch Phase										
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	5.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	11.0	34.0	34.0	34.0	34.0
Total Split (s)	12.0	64.0	64.0	30.0	82.0	12.0	46.0	46.0	34.0	34.0
Total Split (%)	8.6%	45.7%	45.7%	21.4%	58.6%	8.6%	32.9%	32.9%	24.3%	24.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	1.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead			Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	None	None	None	None	None
Act Effect Green (s)	7.0	64.9	64.9	19.1	77.0		40.0	40.0		40.0
Actuated g/C Ratio	0.05	0.46	0.46	0.14	0.55		0.29	0.29		0.29
v/c Ratio	0.97	0.81	0.27	0.68	0.98		1.35	0.43		0.51
Control Delay	145.8	22.1	4.3	58.1	39.2		217.1	6.5		27.0
Queue Delay	0.0	0.4	0.0	0.0	10.9		0.0	0.0		0.0
Total Delay	145.8	22.5	4.3	58.1	50.1		217.1	6.5		27.1
LOS	F	C	A	E	D		F	A		C
Approach Delay		26.4			50.7		130.7			27.1
Approach LOS		C			D		F			C

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.35

Intersection Signal Delay: 52.5

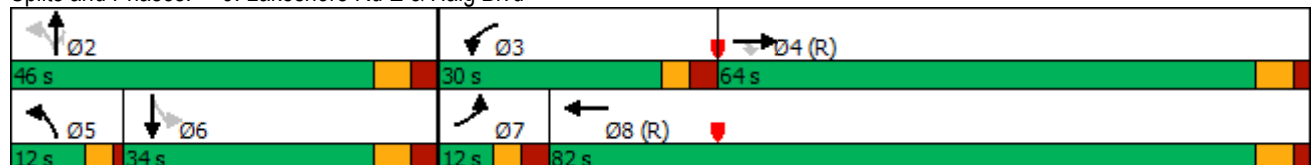
Intersection LOS: D

Intersection Capacity Utilization 110.1%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd





Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	84	1337	216	162	1901	387	269	196
v/c Ratio	0.97	0.81	0.27	0.68	0.98	1.35	0.43	0.51
Control Delay	145.8	22.1	4.3	58.1	39.2	217.1	6.5	27.0
Queue Delay	0.0	0.4	0.0	0.0	10.9	0.0	0.0	0.0
Total Delay	145.8	22.5	4.3	58.1	50.1	217.1	6.5	27.1
Queue Length 50th (m)	26.0	53.3	4.0	48.1	249.6	~147.1	0.0	25.1
Queue Length 95th (m)	m#47.1	77.4	m12.1	m46.3	m250.6	#213.0	21.6	51.8
Internal Link Dist (m)		171.3			598.7	99.3		859.5
Turn Bay Length (m)	50.0		50.0	100.0				
Base Capacity (vph)	87	1660	810	312	1949	287	627	384
Starvation Cap Reductn	0	65	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	90	0	0	2
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.84	0.27	0.52	1.02	1.35	0.43	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	1337	216	162	1817	84	339	48	269	26	25	145
Future Volume (vph)	84	1337	216	162	1817	84	339	48	269	26	25	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99			1.00	0.85		0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		0.99	
Satd. Flow (prot)	1750	3579	1566	1750	3543			1801	1525		1664	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.54	1.00		0.67	
Satd. Flow (perm)	1750	3579	1566	1750	3543			1007	1525		1120	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	1337	216	162	1817	84	339	48	269	26	25	145
RTOR Reduction (vph)	0	0	84	0	2	0	0	0	192	0	65	0
Lane Group Flow (vph)	84	1337	132	162	1899	0	0	387	77	0	131	0
Confl. Peds. (#/hr)	15					15	2		9	9		2
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	6.0	63.9	63.9	18.1	76.0			39.0	39.0		39.0	
Effective Green, g (s)	7.0	64.9	64.9	19.1	77.0			40.0	40.0		40.0	
Actuated g/C Ratio	0.05	0.46	0.46	0.14	0.55			0.29	0.29		0.29	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	87	1659	725	238	1948			287	435		320	
v/s Ratio Prot	c0.05	0.37		0.09	c0.54							
v/s Ratio Perm			0.08					c0.38	0.05		0.12	
v/c Ratio	0.97	0.81	0.18	0.68	0.97			1.35	0.18		0.41	
Uniform Delay, d1	66.4	32.2	22.0	57.5	30.6			50.0	37.6		40.4	
Progression Factor	1.12	0.56	0.50	1.00	1.20			1.00	1.00		1.00	
Incremental Delay, d2	71.5	3.2	0.4	0.7	2.6			178.2	0.2		0.9	
Delay (s)	146.1	21.2	11.3	58.1	39.4			228.2	37.8		41.3	
Level of Service	F	C	B	E	D			F	D		D	
Approach Delay (s)		26.3			40.9			150.1			41.3	
Approach LOS		C			D			F			D	
Intersection Summary												
HCM 2000 Control Delay			51.4			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			110.1%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.898					
Flt Protected	0.988					0.967
Satd. Flow (prot)	1634	0	1842	0	0	1781
Flt Permitted	0.988					0.967
Satd. Flow (perm)	1634	0	1842	0	0	1781
Link Speed (k/h)	50		50			50
Link Distance (m)	85.8		91.1			132.2
Travel Time (s)	6.2		6.6			9.5

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 101: East Avenue & Street L

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	30	93	63	0	167	79
Future Volume (vph)	30	93	63	0	167	79
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	30	93	63	0	167	79
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	123	63	246			
Volume Left (vph)	30	0	167			
Volume Right (vph)	93	0	0			
Hadj (s)	-0.37	0.03	0.17			
Departure Headway (s)	4.2	4.5	4.4			
Degree Utilization, x	0.14	0.08	0.30			
Capacity (veh/h)	787	765	785			
Control Delay (s)	8.0	7.9	9.3			
Approach Delay (s)	8.0	7.9	9.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.7			
Level of Service			A			
Intersection Capacity Utilization			34.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
102: Lakefront Promenade & Street L

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.893			0.971			0.988	
Flt Protected		0.950			0.992			0.999			0.990	
Satd. Flow (prot)	0	1750	0	0	1632	0	0	1787	0	0	1802	0
Flt Permitted		0.950			0.992			0.999			0.990	
Satd. Flow (perm)	0	1750	0	0	1632	0	0	1787	0	0	1802	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		86.0			72.6			101.7			130.4	
Travel Time (s)		6.2			5.2			7.3			9.4	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 102: Lakefront Promenade & Street L

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	0	0	31	11	158	11	295	83	128	429	56
Future Volume (vph)	23	0	0	31	11	158	11	295	83	128	429	56
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	23	0	0	31	11	158	11	295	83	128	429	56
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	23	200	389	613								
Volume Left (vph)	23	31	11	128								
Volume Right (vph)	0	158	83	56								
Hadj (s)	0.23	-0.41	-0.09	0.02								
Departure Headway (s)	7.3	6.1	5.4	5.3								
Degree Utilization, x	0.05	0.34	0.59	0.89								
Capacity (veh/h)	434	553	630	613								
Control Delay (s)	10.7	12.2	15.9	36.2								
Approach Delay (s)	10.7	12.2	15.9	36.2								
Approach LOS	B	B	C	E								
Intersection Summary												
Delay			25.4									
Level of Service			D									
Intersection Capacity Utilization			75.5%	ICU Level of Service					D			
Analysis Period (min)			15									

Lanes and Geometrics
103: Ogden Ave & Street L

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.974			0.928			0.972			0.977	
Flt Protected		0.974			0.991			0.989			0.991	
Satd. Flow (prot)	0	1748	0	0	1694	0	0	1771	0	0	1783	0
Flt Permitted		0.974			0.991			0.989			0.991	
Satd. Flow (perm)	0	1748	0	0	1694	0	0	1771	0	0	1783	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		55.4			82.6			89.6			142.3	
Travel Time (s)		4.0			5.9			6.5			10.2	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 103: Ogden Ave & Street L

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	84	41	30	26	38	74	89	226	82	110	410	108
Future Volume (vph)	84	41	30	26	38	74	89	226	82	110	410	108
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	84	41	30	26	38	74	89	226	82	110	410	108
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	155	138	397	628								
Volume Left (vph)	84	26	89	110								
Volume Right (vph)	30	74	82	108								
Hadj (s)	0.03	-0.25	-0.05	-0.03								
Departure Headway (s)	7.3	7.1	6.1	5.7								
Degree Utilization, x	0.31	0.27	0.67	1.00								
Capacity (veh/h)	461	474	580	624								
Control Delay (s)	13.6	12.7	20.6	58.5								
Approach Delay (s)	13.6	12.7	20.6	58.5								
Approach LOS	B	B	C	F								
Intersection Summary												
Delay				37.0								
Level of Service				E								
Intersection Capacity Utilization				64.6%	ICU Level of Service				C			
Analysis Period (min)				15								

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.977				0.982	
Flt Protected	0.960			0.990		
Satd. Flow (prot)	1728	0	0	1824	1809	0
Flt Permitted	0.960			0.990		
Satd. Flow (perm)	1728	0	0	1824	1809	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	72.3			87.6	135.3	
Travel Time (s)	5.2			6.3	9.7	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 104: Hydro Rd & Street L

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	155	31	80	300	525	80
Future Volume (vph)	155	31	80	300	525	80
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	155	31	80	300	525	80
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	186	380	605			
Volume Left (vph)	155	80	0			
Volume Right (vph)	31	0	80			
Hadj (s)	0.10	0.08	-0.05			
Departure Headway (s)	6.4	5.4	5.1			
Degree Utilization, x	0.33	0.57	0.85			
Capacity (veh/h)	527	633	703			
Control Delay (s)	12.6	15.5	29.7			
Approach Delay (s)	12.6	15.5	29.7			
Approach LOS	B	C	D			
Intersection Summary						
Delay			22.4			
Level of Service			C			
Intersection Capacity Utilization			73.2%	ICU Level of Service	D	
Analysis Period (min)			15			

Lanes and Geometrics
105: East Avenue & Rangeview Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.970
Satd. Flow (prot)	1593	0	1842	0	0	1787
Flt Permitted						0.970
Satd. Flow (perm)	1593	0	1842	0	0	1787
Link Speed (k/h)	50		50			50
Link Distance (m)	198.1		66.7			91.1
Travel Time (s)	14.3		4.8			6.6

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 105: East Avenue & Rangeview Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	57	5	0	67	42
Future Volume (vph)	0	57	5	0	67	42
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	57	5	0	67	42
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	57	5	109			
Volume Left (vph)	0	0	67			
Volume Right (vph)	57	0	0			
Hadj (s)	-0.57	0.03	0.16			
Departure Headway (s)	3.6	4.2	4.2			
Degree Utilization, x	0.06	0.01	0.13			
Capacity (veh/h)	969	839	848			
Control Delay (s)	6.8	7.2	7.8			
Approach Delay (s)	6.8	7.2	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.4			
Level of Service			A			
Intersection Capacity Utilization			22.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
106: Lakefront Promenade & Rangeview Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.912			0.897			0.962			0.998	
Flt Protected		0.983			0.991		0.950				0.993	
Satd. Flow (prot)	0	1651	0	0	1637	0	1750	1772	0	0	1825	0
Flt Permitted		0.983			0.991		0.950				0.993	
Satd. Flow (perm)	0	1651	0	0	1637	0	1750	1772	0	0	1825	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		174.1			140.0			142.6			101.7	
Travel Time (s)		12.5			10.1			10.3			7.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 106: Lakefront Promenade & Rangeview Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	0	13	31	11	133	23	249	83	61	390	8
Future Volume (vph)	7	0	13	31	11	133	23	249	83	61	390	8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	7	0	13	31	11	133	23	249	83	61	390	8
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	20	175	23	332	459							
Volume Left (vph)	7	31	23	0	61							
Volume Right (vph)	13	133	0	83	8							
Hadj (s)	-0.29	-0.39	0.53	-0.14	0.05							
Departure Headway (s)	6.1	5.6	6.1	5.4	5.1							
Degree Utilization, x	0.03	0.27	0.04	0.50	0.65							
Capacity (veh/h)	486	574	566	639	685							
Control Delay (s)	9.3	10.6	8.2	12.6	17.3							
Approach Delay (s)	9.3	10.6	12.3		17.3							
Approach LOS	A	B	B		C							
Intersection Summary												
Delay			14.2									
Level of Service			B									
Intersection Capacity Utilization			64.2%	ICU Level of Service					C			
Analysis Period (min)			15									

Lanes and Geometrics
107: Ogden Ave & Rangeview Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.969			0.938			0.976			0.979	
Flt Protected		0.978			0.989			0.990			0.993	
Satd. Flow (prot)	0	1746	0	0	1709	0	0	1780	0	0	1791	0
Flt Permitted		0.978			0.989			0.990			0.993	
Satd. Flow (perm)	0	1746	0	0	1709	0	0	1780	0	0	1791	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		56.3			124.7			104.4			89.6	
Travel Time (s)		4.1			9.0			7.5			6.5	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 107: Ogden Ave & Rangeview Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	59	41	30	26	38	54	89	283	82	62	331	74
Future Volume (vph)	59	41	30	26	38	54	89	283	82	62	331	74
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	59	41	30	26	38	54	89	283	82	62	331	74
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	130	118	454	467								
Volume Left (vph)	59	26	89	62								
Volume Right (vph)	30	54	82	74								
Hadj (s)	-0.01	-0.20	-0.04	-0.03								
Departure Headway (s)	6.7	6.5	5.5	5.4								
Degree Utilization, x	0.24	0.21	0.69	0.71								
Capacity (veh/h)	453	466	634	631								
Control Delay (s)	11.8	11.3	19.7	20.5								
Approach Delay (s)	11.8	11.3	19.7	20.5								
Approach LOS	B	B	C	C								
Intersection Summary												
Delay			18.3									
Level of Service			C									
Intersection Capacity Utilization			58.6%	ICU Level of Service					B			
Analysis Period (min)			15									

Lanes and Geometrics
108: Hydro Rd & Rangeview Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.975				0.988	
Flt Protected	0.961			0.988		
Satd. Flow (prot)	1726	0	0	1820	1820	0
Flt Permitted	0.961			0.988		
Satd. Flow (perm)	1726	0	0	1820	1820	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	108.3			161.7	87.6	
Travel Time (s)	7.8			11.6	6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 108: Hydro Rd & Rangeview Rd

Scenario 3a 5300 Units 2041
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	135	31	80	245	508	48
Future Volume (vph)	135	31	80	245	508	48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	135	31	80	245	508	48
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	166	325	556			
Volume Left (vph)	135	80	0			
Volume Right (vph)	31	0	48			
Hadj (s)	0.08	0.08	-0.02			
Departure Headway (s)	6.1	5.2	4.9			
Degree Utilization, x	0.28	0.47	0.75			
Capacity (veh/h)	537	662	724			
Control Delay (s)	11.5	12.9	21.2			
Approach Delay (s)	11.5	12.9	21.2			
Approach LOS	B	B	C			
Intersection Summary						
Delay			17.1			
Level of Service			C			
Intersection Capacity Utilization			66.3%	ICU Level of Service	C	
Analysis Period (min)			15			

Lanes and Geometrics
1: Ogden Ave & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	28.0		25.0	25.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.95	1.00	0.99		1.00		0.99	1.00	0.99	
Frt			0.850		0.982				0.850		0.905	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	3444	1566	1750	3296	0	1750	1883	1566	1750	1690	0
Flt Permitted	0.950			0.950			0.616			0.711		
Satd. Flow (perm)	1739	3444	1490	1746	3296	0	1133	1883	1545	1308	1690	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			117		14				159		48	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			142.3			246.5	
Travel Time (s)		19.6			16.0			10.2			17.7	

Intersection Summary

Area Type: Other

Timings
1: Ogden Ave & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	211	1753	228	115	878	273	70	351	123	28
Future Volume (vph)	211	1753	228	115	878	273	70	351	123	28
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	7	4		3	8	5	2		1	6
Permitted Phases			4			2		2	6	
Detector Phase	7	4	4	3	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	5.0	8.0	8.0	5.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	9.0	34.0	34.0	9.0	34.0
Total Split (s)	26.0	76.0	76.0	11.0	61.0	9.0	34.0	34.0	9.0	34.0
Total Split (%)	20.0%	58.5%	58.5%	8.5%	46.9%	6.9%	26.2%	26.2%	6.9%	26.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	1.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	19.8	70.0	70.0	11.5	61.7	33.1	22.7	22.7	29.3	21.9
Actuated g/C Ratio	0.15	0.54	0.54	0.09	0.47	0.25	0.17	0.17	0.23	0.17
v/c Ratio	0.79	0.95	0.27	0.75	0.64	0.81	0.21	0.88	0.39	0.23
Control Delay	71.7	28.4	9.7	84.6	21.9	62.7	45.5	50.3	41.7	20.7
Queue Delay	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	71.7	31.3	9.7	84.6	21.9	62.7	45.5	50.5	41.7	20.7
LOS	E	C	A	F	C	E	D	D	D	C
Approach Delay		33.0			28.4		54.8			33.7
Approach LOS		C			C		D			C

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 35.4

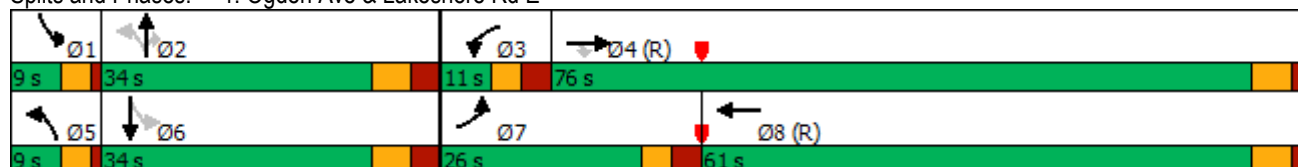
Intersection LOS: D

Intersection Capacity Utilization 90.0%

ICU Level of Service E

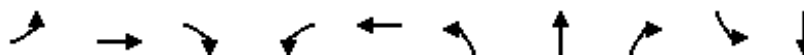
Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E



Queues
1: Ogden Ave & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	211	1753	228	115	998	273	70	351	123	76
v/c Ratio	0.79	0.95	0.27	0.75	0.64	0.81	0.21	0.88	0.39	0.23
Control Delay	71.7	28.4	9.7	84.6	21.9	62.7	45.5	50.3	41.7	20.7
Queue Delay	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	71.7	31.3	9.7	84.6	21.9	62.7	45.5	50.5	41.7	20.7
Queue Length 50th (m)	59.8	115.2	12.5	31.4	89.7	62.8	16.1	52.2	25.7	6.3
Queue Length 95th (m)	m68.3	m#142.2	m17.5	m#73.9	m74.1	#96.8	29.3	#91.2	41.5	19.8
Internal Link Dist (m)	248.7				198.5		118.3		222.5	
Turn Bay Length (m)	28.0		25.0	25.0		30.0		30.0		
Base Capacity (vph)	286	1880	866	154	1571	338	405	457	317	401
Starvation Cap Reductn	0	16	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	73	0	0	0	0	0	3	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.97	0.26	0.75	0.64	0.81	0.17	0.77	0.39	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	1753	228	115	878	120	273	70	351	123	28	48
Future Volume (vph)	211	1753	228	115	878	120	273	70	351	123	28	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		3.0	6.0	6.0	3.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3444	1490	1750	3296		1749	1883	1545	1748	1691	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.62	1.00	1.00	0.71	1.00	
Satd. Flow (perm)	1750	3444	1490	1750	3296		1135	1883	1545	1309	1691	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	211	1753	228	115	878	120	273	70	351	123	28	48
RTOR Reduction (vph)	0	0	55	0	8	0	0	0	130	0	41	0
Lane Group Flow (vph)	211	1753	173	115	990	0	273	70	221	123	35	0
Confl. Peds. (#/hr)	7		8	8		7	1		1	1		1
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	18.8	67.6	67.6	10.5	59.3		32.7	23.1	23.1	25.1	19.3	
Effective Green, g (s)	19.8	68.6	68.6	11.5	60.3		33.9	24.1	24.1	27.1	20.3	
Actuated g/C Ratio	0.15	0.53	0.53	0.09	0.46		0.26	0.19	0.19	0.21	0.16	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	266	1817	786	154	1528		346	349	286	295	264	
v/s Ratio Prot	c0.12	c0.51		0.07	0.30		c0.06	0.04		0.02	0.02	
v/s Ratio Perm			0.12				c0.14		0.14	0.06		
v/c Ratio	0.79	0.96	0.22	0.75	0.65		0.79	0.20	0.77	0.42	0.13	
Uniform Delay, d1	53.1	29.5	16.4	57.8	26.7		43.7	44.8	50.4	43.8	47.3	
Progression Factor	1.15	0.77	1.26	1.05	0.76		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.4	8.3	0.3	15.0	1.8		11.3	0.3	12.3	1.0	0.2	
Delay (s)	68.5	31.0	21.0	75.9	22.0		55.1	45.1	62.7	44.8	47.5	
Level of Service	E	C	C	E	C		E	D	E	D	D	
Approach Delay (s)		33.6			27.6			57.9			45.8	
Approach LOS		C			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			36.6			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			90.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
2: Dixie Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.96		0.99			0.99	0.98
Frt	0.998				0.850							0.850
Flt Protected	0.950			0.950				0.950			0.950	
Satd. Flow (prot)	1653	3469	0	1785	3476	1536	0	1825	0	0	1807	1465
Flt Permitted	0.950			0.950				0.525			0.756	
Satd. Flow (perm)	1644	3469	0	1780	3476	1478	0	1003	0	0	1428	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				134						25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings
2: Dixie Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	733	1356	9	911	171	3	0	151	0	443
Future Volume (vph)	733	1356	9	911	171	3	0	151	0	443
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA	pm+ov
Protected Phases	7	4	3	8			2		6	7
Permitted Phases					8	2		6		6
Detector Phase	7	4	3	8	8	2	2	6	6	7
Switch Phase										
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0
Minimum Split (s)	12.0	24.0	11.0	24.0	24.0	34.0	34.0	34.0	34.0	12.0
Total Split (s)	56.0	85.0	11.0	40.0	40.0	34.0	34.0	34.0	34.0	56.0
Total Split (%)	43.1%	65.4%	8.5%	30.8%	30.8%	26.2%	26.2%	26.2%	26.2%	43.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0		6.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	59.1	96.7	6.9	35.0	35.0		19.9		19.9	80.0
Actuated g/C Ratio	0.45	0.74	0.05	0.27	0.27		0.15		0.15	0.62
v/c Ratio	0.98	0.53	0.10	0.97	0.35		0.02		0.69	0.49
Control Delay	54.7	6.0	60.8	70.9	12.2		43.0		67.7	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	54.7	6.0	60.8	70.9	12.2		43.0		67.7	12.8
LOS	D	A	E	E	B		D		E	B
Approach Delay		22.9		61.6			43.0		26.8	
Approach LOS		C		E			D		C	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 34.7

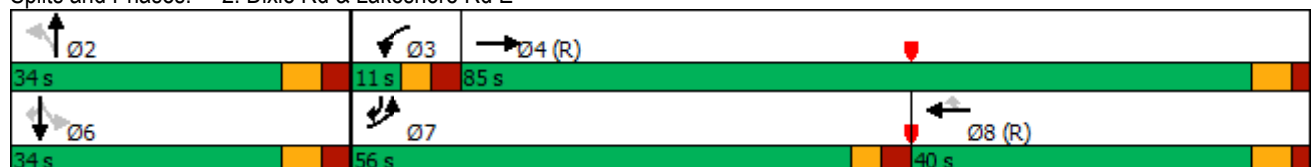
Intersection LOS: C

Intersection Capacity Utilization 89.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E

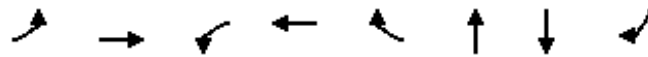


Queues

Scenario 3b 2041 - DUALS

2: Dixie Rd & Lakeshore Rd E

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	733	1376	9	911	171	3	151	443
v/c Ratio	0.98	0.53	0.10	0.97	0.35	0.02	0.69	0.49
Control Delay	54.7	6.0	60.8	70.9	12.2	43.0	67.7	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.7	6.0	60.8	70.9	12.2	43.0	67.7	12.8
Queue Length 50th (m)	211.3	22.0	2.4	128.5	7.5	0.7	39.1	51.5
Queue Length 95th (m)	#311.5	158.0	8.5	#173.1	27.0	3.5	59.2	75.3
Internal Link Dist (m)		598.7		375.1		69.6	268.8	
Turn Bay Length (m)	44.0		25.0		30.0			
Base Capacity (vph)	751	2581	94	935	495	216	307	906
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	0.98	0.53	0.10	0.97	0.35	0.01	0.49	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	733	1356	20	9	911	171	3	0	0	151	0	443
Future Volume (vph)	733	1356	20	9	911	171	3	0	0	151	0	443
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		6.0			6.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.99			0.99	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95			0.95	1.00
Satd. Flow (prot)	1653	3468		1785	3476	1478		1815			1794	1458
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.53			0.76	1.00
Satd. Flow (perm)	1653	3468		1785	3476	1478		1004			1427	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	733	1356	20	9	911	171	3	0	0	151	0	443
RTOR Reduction (vph)	0	1	0	0	0	98	0	0	0	0	0	10
Lane Group Flow (vph)	733	1375	0	9	911	73	0	3	0	0	151	433
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Heavy Vehicles (%)	8%	5%	2%	0%	5%	4%	0%	0%	0%	1%	0%	9%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases						8	2			6		6
Actuated Green, G (s)	58.1	91.0		1.1	34.0	34.0		18.9			18.9	77.0
Effective Green, g (s)	59.1	92.0		2.1	35.0	35.0		19.9			19.9	79.0
Actuated g/C Ratio	0.45	0.71		0.02	0.27	0.27		0.15			0.15	0.61
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		7.0			7.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	751	2454		28	935	397		153			218	886
v/s Ratio Prot	c0.44	0.40		0.01	c0.26							0.22
v/s Ratio Perm						0.05		0.00			c0.11	0.07
v/c Ratio	0.98	0.56		0.32	0.97	0.18		0.02			0.69	0.49
Uniform Delay, d1	34.8	9.2		63.2	47.1	36.5		46.8			52.2	14.2
Progression Factor	0.90	0.64		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	21.1	0.6		6.6	23.8	1.0		0.1			9.1	0.4
Delay (s)	52.5	6.5		69.8	70.9	37.5		46.8			61.3	14.7
Level of Service	D	A		E	E	D		D			E	B
Approach Delay (s)		22.5			65.7			46.8			26.5	
Approach LOS		C			E			D			C	
Intersection Summary												
HCM 2000 Control Delay			35.5				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			89.2%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
3: Lakeshore Rd E & Cawthra Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor				1.00		0.96						0.97
Frt						0.850						0.850
Flt Protected	0.950			0.950						0.950	0.950	
Satd. Flow (prot)	1716	3579	0	1785	3476	1493	0	1921	0	1570	1605	1507
Flt Permitted	0.089			0.238						0.950	0.950	
Satd. Flow (perm)	161	3579	0	446	3476	1430	0	1921	0	1570	1605	1465
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						257						25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings 3: Lakeshore Rd E & Cawthra Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT	SBR	Ø2
Lane Configurations									
Traffic Volume (vph)	482	1188	3	1104	983	761	0	379	
Future Volume (vph)	482	1188	3	1104	983	761	0	379	
Turn Type	pm+pt	NA	Perm	NA	pm+ov	Prot	NA	pm+ov	
Protected Phases	7	4		8	1	1	6	7	2
Permitted Phases	4		8		8			6	
Detector Phase	7	4	8	8	1	1	6	7	
Switch Phase									
Minimum Initial (s)	5.0	7.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0
Minimum Split (s)	11.0	38.0	38.0	38.0	14.0	14.0	38.0	11.0	11.0
Total Split (s)	37.0	84.0	47.0	47.0	35.0	35.0	46.0	37.0	11.0
Total Split (%)	28.5%	64.6%	36.2%	36.2%	26.9%	26.9%	35.4%	28.5%	8%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	
Lead/Lag	Lead		Lag	Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	Max	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	82.0	79.0	43.1	43.1	84.1	41.0	41.0	77.9	
Actuated g/C Ratio	0.63	0.61	0.33	0.33	0.65	0.32	0.32	0.60	
v/c Ratio	0.95	0.55	0.02	0.96	0.95	0.77	0.75	0.42	
Control Delay	65.9	16.2	43.3	62.7	26.3	52.0	50.8	13.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	65.9	16.2	43.3	62.7	26.3	52.0	50.8	13.5	
LOS	E	B	D	E	C	D	D	B	
Approach Delay		30.5		45.5			38.8		
Approach LOS		C		D			D		

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 8:WBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 38.8
 Intersection LOS: D
 Intersection Capacity Utilization 97.4%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd

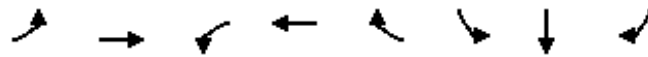


Queues

Scenario 3b 2041 - DUALS

3: Lakeshore Rd E & Cawthra Rd

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT	SBR
Lane Group Flow (vph)	482	1188	3	1104	983	380	381	379
v/c Ratio	0.95	0.55	0.02	0.96	0.95	0.77	0.75	0.42
Control Delay	65.9	16.2	43.3	62.7	26.3	52.0	50.8	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.9	16.2	43.3	62.7	26.3	52.0	50.8	13.5
Queue Length 50th (m)	109.2	93.5	0.6	142.3	66.3	97.3	97.0	44.7
Queue Length 95th (m)	#177.2	112.5	m0.9	#202.3	#182.2	140.0	139.0	66.0
Internal Link Dist (m)		297.4		113.2			931.9	
Turn Bay Length (m)	35.0		60.0		70.0	115.0		
Base Capacity (vph)	520	2174	148	1153	1035	495	506	911
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	0.93	0.55	0.02	0.96	0.95	0.77	0.75	0.42

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	482	1188	0	3	1104	983	0	0	0	761	0	379
Future Volume (vph)	482	1188	0	3	1104	983	0	0	0	761	0	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	2.0	5.0		5.0	5.0	5.0				5.0	5.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00				0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98				1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00				1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85				1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00				0.95	0.95	1.00
Satd. Flow (prot)	1716	3579		1779	3476	1461				1570	1605	1484
Flt Permitted	0.09	1.00		0.24	1.00	1.00				0.95	0.95	1.00
Satd. Flow (perm)	160	3579		445	3476	1461				1570	1605	1484
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	482	1188	0	3	1104	983	0	0	0	761	0	379
RTOR Reduction (vph)	0	0	0	0	0	91	0	0	0	0	0	11
Lane Group Flow (vph)	482	1188	0	3	1104	892	0	0	0	380	381	368
Confl. Peds. (#/hr)	25		8	8		25	13					13
Heavy Vehicles (%)	4%	2%	0%	0%	5%	7%	0%	0%	0%	8%	0%	6%
Turn Type	pm+pt	NA		Perm	NA	pm+ov				Prot	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	78.0	78.0		42.1	42.1	82.1				40.0	40.0	72.9
Effective Green, g (s)	79.0	79.0		43.1	43.1	84.1				41.0	41.0	74.9
Actuated g/C Ratio	0.61	0.61		0.33	0.33	0.65				0.32	0.32	0.58
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0				6.0	6.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0				3.0	3.0	3.0
Lane Grp Cap (vph)	502	2174		147	1152	1001				495	506	855
v/s Ratio Prot	c0.25	0.33			c0.32	c0.28				0.24	0.24	0.11
v/s Ratio Perm	0.33			0.01		0.33						0.14
v/c Ratio	0.96	0.55		0.02	0.96	0.89				0.77	0.75	0.43
Uniform Delay, d1	39.1	15.0		29.2	42.6	19.1				40.2	40.0	15.5
Progression Factor	1.00	1.00		1.41	1.15	0.81				1.00	1.00	1.00
Incremental Delay, d2	30.2	1.0		0.2	13.7	7.0				7.0	6.3	0.4
Delay (s)	69.3	16.0		41.5	62.8	22.5				47.2	46.2	15.9
Level of Service	E	B		D	E	C				D	D	B
Approach Delay (s)		31.4			43.8			0.0			36.5	
Approach LOS		C			D			A			D	
Intersection Summary												
HCM 2000 Control Delay			37.9				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			17.0		
Intersection Capacity Utilization			97.4%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
5: East Avenue & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.94	1.00	0.99		1.00	0.98	
Frt	0.994				0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3451	0	1785	3380	1566	1750	1579	0	1785	1606	0
Flt Permitted	0.950			0.950			0.751			0.462		
Satd. Flow (perm)	1780	3451	0	1780	3380	1473	1377	1579	0	867	1606	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				84		83			78	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		226.1			305.9			132.2			178.2	
Travel Time (s)		16.3			22.0			9.5			12.8	

Intersection Summary

Area Type: Other

Timings

5: East Avenue & Lakeshore Rd E

Scenario 3b 2041 - DUALS

Morning Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	37	1820	25	1952	9	174	0	32	0
Future Volume (vph)	37	1820	25	1952	9	174	0	32	0
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	7	4	3	8			2		6
Permitted Phases					8	2		6	
Detector Phase	7	4	3	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	11.0	24.0	24.0	31.0	31.0	31.0	31.0
Total Split (s)	11.0	88.0	11.0	88.0	88.0	31.0	31.0	31.0	31.0
Total Split (%)	8.5%	67.7%	8.5%	67.7%	67.7%	23.8%	23.8%	23.8%	23.8%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	7.0	90.7	6.8	90.7	90.7	21.2	21.2	21.2	21.2
Actuated g/C Ratio	0.05	0.70	0.05	0.70	0.70	0.16	0.16	0.16	0.16
v/c Ratio	0.39	0.79	0.27	0.83	0.01	0.78	0.55	0.23	0.03
Control Delay	73.0	23.1	61.4	14.4	0.0	74.4	32.1	49.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.0	23.1	61.4	14.4	0.0	74.4	32.1	49.6	0.2
LOS	E	C	E	B	A	E	C	D	A
Approach Delay		24.0		14.9			52.9		37.9
Approach LOS		C		B			D		D

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 22.3

Intersection LOS: C

Intersection Capacity Utilization 86.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E



Queues

Scenario 3b 2041 - DUALS

5: East Avenue & Lakeshore Rd E

Morning Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	1902	25	1952	9	174	179	32	10
v/c Ratio	0.39	0.79	0.27	0.83	0.01	0.78	0.55	0.23	0.03
Control Delay	73.0	23.1	61.4	14.4	0.0	74.4	32.1	49.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.0	23.1	61.4	14.4	0.0	74.4	32.1	49.6	0.2
Queue Length 50th (m)	9.9	228.5	7.1	99.6	0.0	44.9	23.1	7.5	0.0
Queue Length 95th (m)	m16.7	271.5	m12.0	108.7	m0.0	70.2	47.1	17.5	0.0
Internal Link Dist (m)		202.1		281.9			108.2		154.2
Turn Bay Length (m)	72.0		50.0		20.0	20.0		45.0	
Base Capacity (vph)	95	2410	93	2358	1052	264	370	166	371
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.79	0.27	0.83	0.01	0.66	0.48	0.19	0.03

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1820	82	25	1952	9	174	0	179	32	0	10
Future Volume (vph)	37	1820	82	25	1952	9	174	0	179	32	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3449		1785	3380	1473	1742	1579		1783	1606	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.75	1.00		0.46	1.00	
Satd. Flow (perm)	1785	3449		1785	3380	1473	1377	1579		866	1606	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	37	1820	82	25	1952	9	174	0	179	32	0	10
RTOR Reduction (vph)	0	2	0	0	0	3	0	69	0	0	8	0
Lane Group Flow (vph)	37	1900	0	25	1952	6	174	110	0	32	2	0
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3
Heavy Vehicles (%)	0%	5%	2%	0%	8%	2%	2%	0%	2%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	3.5	87.4		3.4	87.3	87.3	20.2	20.2		20.2	20.2	
Effective Green, g (s)	4.5	88.4		4.4	88.3	88.3	21.2	21.2		21.2	21.2	
Actuated g/C Ratio	0.03	0.68		0.03	0.68	0.68	0.16	0.16		0.16	0.16	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	61	2345		60	2295	1000	224	257		141	261	
v/s Ratio Prot	c0.02	0.55		0.01	c0.58			0.07			0.00	
v/s Ratio Perm						0.00	c0.13			0.04		
v/c Ratio	0.61	0.81		0.42	0.85	0.01	0.78	0.43		0.23	0.01	
Uniform Delay, d1	61.9	14.8		61.5	15.8	6.7	52.1	48.9		47.3	45.6	
Progression Factor	1.05	1.34		0.92	0.67	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.1	2.6		4.0	3.6	0.0	15.5	1.1		0.8	0.0	
Delay (s)	78.2	22.4		60.7	14.2	6.7	67.6	50.1		48.1	45.6	
Level of Service	E	C		E	B	A	E	D		D	D	
Approach Delay (s)		23.5			14.8			58.7			47.5	
Approach LOS		C			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			22.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			86.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
7: Lakefront Promenade & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		25.0	35.0		50.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor		0.96	1.00		0.99	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3476	1566	1750	3476	3395	1566
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3476	1507	1747	3476	3370	1536
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		61				359
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	130.4	
Travel Time (s)	4.7			19.6	9.4	

Intersection Summary

Area Type: Other

Timings
7: Lakefront Promanade & Lakeshore Rd E

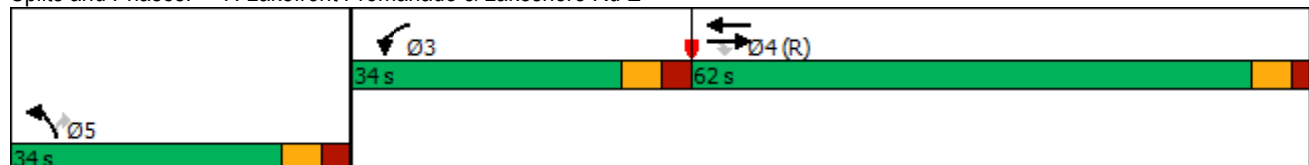
Scenario 3b 2041 - DUALS
Morning Peak Hour

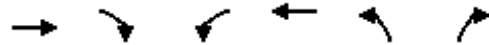
	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	1668	264	102	1254	483	470
Future Volume (vph)	1668	264	102	1254	483	470
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	4		3	4	5	
Permitted Phases		4				5
Detector Phase	4	4	3	4	5	5
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	8.0	5.0	5.0
Minimum Split (s)	24.0	24.0	34.0	24.0	34.0	34.0
Total Split (s)	62.0	62.0	34.0	62.0	34.0	34.0
Total Split (%)	47.7%	47.7%	26.2%	47.7%	26.2%	26.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	6.0	5.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	67.3	67.3	21.0	67.3	24.8	24.8
Actuated g/C Ratio	0.52	0.52	0.16	0.52	0.19	0.19
v/c Ratio	0.93	0.33	0.36	0.70	0.75	0.81
Control Delay	38.3	20.5	50.0	17.4	57.1	23.6
Queue Delay	1.2	0.0	0.0	0.0	0.0	0.1
Total Delay	39.5	20.5	50.0	17.4	57.1	23.7
LOS	D	C	D	B	E	C
Approach Delay	36.9			19.9	40.6	
Approach LOS	D			B	D	

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 4:EBWB and 8:, Start of Green
 Natural Cycle: 135
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 32.3
 Intersection LOS: C
 Intersection Capacity Utilization 84.9%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promanade & Lakeshore Rd E





Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1668	264	102	1254	483	470
v/c Ratio	0.93	0.33	0.36	0.70	0.75	0.81
Control Delay	38.3	20.5	50.0	17.4	57.1	23.6
Queue Delay	1.2	0.0	0.0	0.0	0.0	0.1
Total Delay	39.5	20.5	50.0	17.4	57.1	23.7
Queue Length 50th (m)	~253.4	36.1	25.1	63.3	63.5	28.1
Queue Length 95th (m)	#310.3	m54.8	m38.9	97.8	81.1	73.1
Internal Link Dist (m)	41.1			248.7	106.4	
Turn Bay Length (m)		25.0	35.0		50.0	
Base Capacity (vph)	1798	809	376	1798	731	612
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	40	0	0	0	0	4
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.33	0.27	0.70	0.66	0.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	1668	264	102	1254	483	470
Future Volume (vph)	1668	264	102	1254	483	470
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	5.0	5.0	6.0	5.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3476	1507	1750	3476	3395	1536
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3476	1507	1750	3476	3395	1536
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1668	264	102	1254	483	470
RTOR Reduction (vph)	0	29	0	0	0	291
Lane Group Flow (vph)	1668	235	102	1254	483	179
Confl. Peds. (#/hr)		5	5		5	5
Heavy Vehicles (%)	5%	2%	2%	5%	2%	2%
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	4		3	4	5	
Permitted Phases		4				5
Actuated Green, G (s)	66.2	66.2	20.0	66.2	23.8	23.8
Effective Green, g (s)	67.2	67.2	21.0	67.2	24.8	24.8
Actuated g/C Ratio	0.52	0.52	0.16	0.52	0.19	0.19
Clearance Time (s)	6.0	6.0	7.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1796	779	282	1796	647	293
v/s Ratio Prot	c0.48		c0.06	0.36	c0.14	
v/s Ratio Perm		0.16				0.12
v/c Ratio	0.93	0.30	0.36	0.70	0.75	0.61
Uniform Delay, d1	29.2	18.0	48.5	23.7	49.6	48.2
Progression Factor	0.98	1.21	1.02	0.59	1.00	1.00
Incremental Delay, d2	7.8	0.7	0.7	1.9	4.7	3.8
Delay (s)	36.3	22.5	50.0	15.9	54.3	52.0
Level of Service	D	C	D	B	D	D
Approach Delay (s)	34.5			18.4	53.2	
Approach LOS	C			B	D	
Intersection Summary						
HCM 2000 Control Delay		33.5		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.78				
Actuated Cycle Length (s)		130.0		Sum of lost time (s)		17.0
Intersection Capacity Utilization		84.9%		ICU Level of Service		E
Analysis Period (min)		15				
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	60.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			30.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.97	1.00			1.00					
Frt			0.850					0.850			0.890	
Flt Protected	0.950			0.950			0.950				0.991	
Satd. Flow (prot)	1750	3444	1566	1750	3380	0	1750	1601	0	0	1661	0
Flt Permitted	0.950			0.950			0.750				0.862	
Satd. Flow (perm)	1747	3444	1512	1748	3380	0	1380	1601	0	0	1445	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			229					86			76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			135.3			191.6	
Travel Time (s)		16.0			14.1			9.7			13.8	

Intersection Summary

Area Type: Other

Timings
8: Hydro Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	4	1718	467	132	1019	318	0	2	0
Future Volume (vph)	4	1718	467	132	1019	318	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		5		2
Permitted Phases			4			5		2	
Detector Phase	7	4	4	3	8	5	5	2	2
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	12.0	12.0
Total Split (s)	11.0	76.0	76.0	17.0	82.0	37.0	37.0	37.0	37.0
Total Split (%)	8.5%	58.5%	58.5%	13.1%	63.1%	28.5%	28.5%	28.5%	28.5%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	6.0	71.1	71.1	11.9	85.8	31.0	31.0		31.0
Actuated g/C Ratio	0.05	0.55	0.55	0.09	0.66	0.24	0.24		0.24
v/c Ratio	0.05	0.91	0.50	0.82	0.46	0.97	0.89		0.03
Control Delay	71.5	16.4	2.1	104.7	9.3	91.0	61.0		0.1
Queue Delay	0.0	3.6	0.0	0.0	0.1	0.0	0.0		0.0
Total Delay	71.5	20.0	2.1	104.7	9.4	91.0	61.0		0.1
LOS	E	C	A	F	A	F	E		A
Approach Delay		16.3			20.4		74.3		0.1
Approach LOS		B			C		E		A

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 27.6

Intersection LOS: C

Intersection Capacity Utilization 92.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 8: Hydro Rd & Lakeshore Rd E

		
Ø2	Ø3	Ø4 (R)
37 s	17 s	76 s
		
Ø5	Ø7	Ø8 (R)
37 s	11 s	82 s

Queues
8: Hydro Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	4	1718	467	132	1019	318	400	11
v/c Ratio	0.05	0.91	0.50	0.82	0.46	0.97	0.89	0.03
Control Delay	71.5	16.4	2.1	104.7	9.3	91.0	61.0	0.1
Queue Delay	0.0	3.6	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	71.5	20.0	2.1	104.7	9.4	91.0	61.0	0.1
Queue Length 50th (m)	1.1	134.9	5.3	37.8	32.2	85.4	84.9	0.0
Queue Length 95th (m)	m1.3	m164.3	m7.1	m#73.7	33.4	#145.9	#145.5	0.0
Internal Link Dist (m)		198.5			171.3		111.3	167.6
Turn Bay Length (m)	25.0		50.0	25.0		60.0		
Base Capacity (vph)	80	1882	930	161	2231	329	447	402
Starvation Cap Reductn	0	107	0	0	307	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	0.05	0.97	0.50	0.82	0.53	0.97	0.89	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	1718	467	132	1019	0	318	0	400	2	0	9
Future Volume (vph)	4	1718	467	132	1019	0	318	0	400	2	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1750	3444	1512	1750	3380		1747	1601			1660	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00			0.86	
Satd. Flow (perm)	1750	3444	1512	1750	3380		1380	1601			1445	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	1718	467	132	1019	0	318	0	400	2	0	9
RTOR Reduction (vph)	0	0	104	0	0	0	0	65	0	0	8	0
Lane Group Flow (vph)	4	1718	363	132	1019	0	318	335	0	0	3	0
Confl. Peds. (#/hr)	2		4	4		2	1					
Heavy Vehicles (%)	2%	6%	2%	2%	8%	2%	2%	0%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			5			2	
Permitted Phases			4				5			2		
Actuated Green, G (s)	1.0	70.1	70.1	10.9	80.0		30.0	30.0			30.0	
Effective Green, g (s)	2.0	71.1	71.1	11.9	81.0		31.0	31.0			31.0	
Actuated g/C Ratio	0.02	0.55	0.55	0.09	0.62		0.24	0.24			0.24	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	7.0			7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	26	1883	826	160	2106		329	381			344	
v/s Ratio Prot	0.00	c0.50		c0.08	0.30			0.21				
v/s Ratio Perm			0.24				c0.23				0.00	
v/c Ratio	0.15	0.91	0.44	0.82	0.48		0.97	0.88			0.01	
Uniform Delay, d1	63.2	26.6	17.6	58.0	13.2		49.0	47.7			37.8	
Progression Factor	1.19	0.44	0.14	1.31	0.77		1.00	1.00			1.00	
Incremental Delay, d2	1.3	4.1	0.8	22.9	0.6		40.3	19.8			0.0	
Delay (s)	76.4	15.7	3.3	98.9	10.9		89.3	67.5			37.8	
Level of Service	E	B	A	F	B		F	E			D	
Approach Delay (s)		13.2			21.0			77.1			37.8	
Approach LOS		B			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			26.7			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			92.9%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		50.0	100.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			50.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00										0.99	
Frt					0.996						0.923	
Flt Protected	0.950										0.979	
Satd. Flow (prot)	1750	3476	1842	1842	3465	0	0	1883	1842	0	1686	0
Flt Permitted	0.950										0.862	
Satd. Flow (perm)	1744	3476	1842	1842	3465	0	0	1883	1842	0	1484	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					3						76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		195.3			622.7			123.3			883.5	
Travel Time (s)		14.1			44.8			8.9			63.6	

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

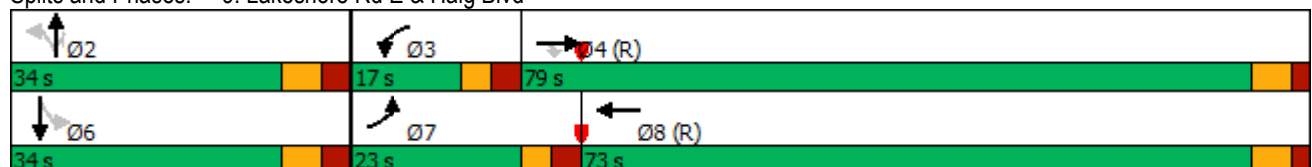
Scenario 3b 2041 - DUALS
Morning Peak Hour

							
Lane Group	EBL	EBT	WBT	SBL	SBT	Ø2	Ø3
Lane Configurations							
Traffic Volume (vph)	153	2145	1428	35	0		
Future Volume (vph)	153	2145	1428	35	0		
Turn Type	Prot	NA	NA	Perm	NA		
Protected Phases	7	4	8		6	2	3
Permitted Phases				6			
Detector Phase	7	4	8	6	6		
Switch Phase							
Minimum Initial (s)	5.0	8.0	8.0	8.0	8.0	8.0	5.0
Minimum Split (s)	11.0	24.0	24.0	34.0	34.0	34.0	11.0
Total Split (s)	23.0	79.0	73.0	34.0	34.0	34.0	17.0
Total Split (%)	17.7%	60.8%	56.2%	26.2%	26.2%	26%	13%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0		
Total Lost Time (s)	5.0	5.0	5.0		6.0		
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?	Yes	Yes	Yes				Yes
Recall Mode	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	17.5	109.3	86.8		9.7		
Actuated g/C Ratio	0.13	0.84	0.67		0.07		
v/c Ratio	0.65	0.73	0.64		0.45		
Control Delay	54.2	5.5	19.2		22.3		
Queue Delay	0.0	0.4	0.0		0.0		
Total Delay	54.2	5.9	19.2		22.3		
LOS	D	A	B		C		
Approach Delay		9.1	19.2		22.3		
Approach LOS		A	B		C		

Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 13.2
 Intersection LOS: B
 Intersection Capacity Utilization 89.5%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues

Scenario 3b 2041 - DUALS

9: Lakeshore Rd E & Haig Blvd

Morning Peak Hour



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	153	2145	1469	82
v/c Ratio	0.65	0.73	0.64	0.45
Control Delay	54.2	5.5	19.2	22.3
Queue Delay	0.0	0.4	0.0	0.0
Total Delay	54.2	5.9	19.2	22.3
Queue Length 50th (m)	40.8	76.2	102.4	1.5
Queue Length 95th (m)	m45.4	113.0	m123.5	17.7
Internal Link Dist (m)		171.3	598.7	859.5
Turn Bay Length (m)	50.0			
Base Capacity (vph)	262	2922	2313	379
Starvation Cap Reductn	0	295	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.58	0.82	0.64	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	2145	0	0	1428	41	0	0	0	35	0	47
Future Volume (vph)	153	2145	0	0	1428	41	0	0	0	35	0	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0			5.0						6.0	
Lane Util. Factor	1.00	0.95			0.95						1.00	
Frpb, ped/bikes	1.00	1.00			1.00						0.99	
Flpb, ped/bikes	1.00	1.00			1.00						1.00	
Frt	1.00	1.00			1.00						0.92	
Flt Protected	0.95	1.00			1.00						0.98	
Satd. Flow (prot)	1750	3476			3465						1685	
Flt Permitted	0.95	1.00			1.00						0.86	
Satd. Flow (perm)	1750	3476			3465						1482	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	153	2145	0	0	1428	41	0	0	0	35	0	47
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	70	0
Lane Group Flow (vph)	153	2145	0	0	1468	0	0	0	0	0	12	0
Confl. Peds. (#/hr)	7			7			3		1	1		3
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA				Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	16.5	108.3			85.8						8.7	
Effective Green, g (s)	17.5	109.3			86.8						9.7	
Actuated g/C Ratio	0.13	0.84			0.67						0.07	
Clearance Time (s)	6.0	6.0			6.0						7.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	235	2922			2313						110	
v/s Ratio Prot	0.09	c0.62			0.42							
v/s Ratio Perm											c0.01	
v/c Ratio	0.65	0.73			0.63						0.11	
Uniform Delay, d1	53.4	4.3			12.5						56.1	
Progression Factor	0.90	0.99			1.36						1.00	
Incremental Delay, d2	3.3	0.9			0.9						0.4	
Delay (s)	51.2	5.1			17.8						56.5	
Level of Service	D	A			B						E	
Approach Delay (s)		8.2			17.8			0.0			56.5	
Approach LOS		A			B			A			E	
Intersection Summary												
HCM 2000 Control Delay			12.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			89.5%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
101: East Avenue & Street L

Scenario 3b 2041 - DUALS
Morning Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.875					
Flt Protected	0.996					0.974
Satd. Flow (prot)	1605	0	1842	0	0	1794
Flt Permitted	0.996					0.974
Satd. Flow (perm)	1605	0	1842	0	0	1794
Link Speed (k/h)	50		50			50
Link Distance (m)	85.8		91.1			132.2
Travel Time (s)	6.2		6.6			9.5

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 101: East Avenue & Street L

Scenario 3b 2041 - DUALS
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	18	224	130	0	57	50
Future Volume (vph)	18	224	130	0	57	50
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	224	130	0	57	50
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	242	130	107			
Volume Left (vph)	18	0	57			
Volume Right (vph)	224	0	0			
Hadj (s)	-0.51	0.03	0.14			
Departure Headway (s)	4.0	4.6	4.7			
Degree Utilization, x	0.27	0.17	0.14			
Capacity (veh/h)	866	741	715			
Control Delay (s)	8.4	8.5	8.5			
Approach Delay (s)	8.4	8.5	8.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.4			
Level of Service			A			
Intersection Capacity Utilization			37.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
102: Lakefront Promenade & Street L

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.878			0.977			0.993	
Flt Protected		0.950			0.998			0.999			0.993	
Satd. Flow (prot)	0	1750	0	0	1614	0	0	1798	0	0	1816	0
Flt Permitted		0.950			0.998			0.999			0.993	
Satd. Flow (perm)	0	1750	0	0	1614	0	0	1798	0	0	1816	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		86.0			72.6			101.7			130.4	
Travel Time (s)		6.2			5.2			7.3			9.4	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 102: Lakefront Promenade & Street L

Scenario 3b 2041 - DUALS
Morning Peak Hour

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Sign Control		Stop			Stop			Stop			Stop									
Traffic Volume (vph)	62	0	0	18	18	326	18	564	121	54	294	18								
Future Volume (vph)	62	0	0	18	18	326	18	564	121	54	294	18								
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
Hourly flow rate (vph)	62	0	0	18	18	326	18	564	121	54	294	18								
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total (vph)	62	362	703	366																
Volume Left (vph)	62	18	18	54																
Volume Right (vph)	0	326	121	18																
Hadj (s)	0.23	-0.50	-0.06	0.03																
Departure Headway (s)	8.2	6.4	6.1	6.5																
Degree Utilization, x	0.14	0.64	1.19	0.66																
Capacity (veh/h)	377	545	595	530																
Control Delay (s)	12.5	20.0	124.5	21.5																
Approach Delay (s)	12.5	20.0	124.5	21.5																
Approach LOS	B	C	F	C																
Intersection Summary																				
Delay			69.3																	
Level of Service			F																	
Intersection Capacity Utilization			79.8%	ICU Level of Service					D											
Analysis Period (min)			15																	

Lanes and Geometrics
103: Ogden Ave & Street L

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.919			0.975			0.988	
Flt Protected		0.966			0.995			0.988			0.994	
Satd. Flow (prot)	0	1762	0	0	1684	0	0	1774	0	0	1809	0
Flt Permitted		0.966			0.995			0.988			0.994	
Satd. Flow (perm)	0	1762	0	0	1684	0	0	1774	0	0	1809	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		55.4			82.6			89.6			142.3	
Travel Time (s)		4.0			5.9			6.5			10.2	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 103: Ogden Ave & Street L

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	175	59	18	27	71	148	160	370	119	43	293	34
Future Volume (vph)	175	59	18	27	71	148	160	370	119	43	293	34
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	175	59	18	27	71	148	160	370	119	43	293	34
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	252	246	649	370								
Volume Left (vph)	175	27	160	43								
Volume Right (vph)	18	148	119	34								
Hadj (s)	0.13	-0.31	-0.03	0.00								
Departure Headway (s)	7.9	7.6	6.9	7.2								
Degree Utilization, x	0.56	0.52	1.25	0.74								
Capacity (veh/h)	420	432	525	479								
Control Delay (s)	20.5	18.5	149.7	28.5								
Approach Delay (s)	20.5	18.5	149.7	28.5								
Approach LOS	C	C	F	D								
Intersection Summary												
Delay			77.4									
Level of Service			F									
Intersection Capacity Utilization			97.0%	ICU Level of Service					F			
Analysis Period (min)			15									

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.991				0.991	
Flt Protected	0.955			0.989		
Satd. Flow (prot)	1743	0	0	1822	1825	0
Flt Permitted	0.955			0.989		
Satd. Flow (perm)	1743	0	0	1822	1825	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	72.3			87.6	135.3	
Travel Time (s)	5.2			6.3	9.7	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 104: Hydro Rd & Street L

Scenario 3b 2041 - DUALS
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	265	18	132	452	555	42
Future Volume (vph)	265	18	132	452	555	42
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	265	18	132	452	555	42
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	283	584	597			
Volume Left (vph)	265	132	0			
Volume Right (vph)	18	0	42			
Hadj (s)	0.18	0.08	-0.01			
Departure Headway (s)	7.2	6.1	6.1			
Degree Utilization, x	0.56	0.99	1.01			
Capacity (veh/h)	499	584	597			
Control Delay (s)	19.0	58.7	64.1			
Approach Delay (s)	19.0	58.7	64.1			
Approach LOS	C	F	F			
Intersection Summary						
Delay			53.2			
Level of Service			F			
Intersection Capacity Utilization			88.6%	ICU Level of Service	E	
Analysis Period (min)			15			

Lanes and Geometrics
105: East Avenue & Rangeview Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.977
Satd. Flow (prot)	1593	0	1842	0	0	1800
Flt Permitted						0.977
Satd. Flow (perm)	1593	0	1842	0	0	1800
Link Speed (k/h)	50		50			50
Link Distance (m)	198.1		66.7			91.1
Travel Time (s)	14.3		4.8			6.6

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 105: East Avenue & Rangeview Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	114	15	0	32	36
Future Volume (vph)	0	114	15	0	32	36
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	114	15	0	32	36
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	114	15	68			
Volume Left (vph)	0	0	32			
Volume Right (vph)	114	0	0			
Hadj (s)	-0.57	0.03	0.13			
Departure Headway (s)	3.5	4.2	4.3			
Degree Utilization, x	0.11	0.02	0.08			
Capacity (veh/h)	996	818	820			
Control Delay (s)	7.0	7.3	7.6			
Approach Delay (s)	7.0	7.3	7.6			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.2			
Level of Service			A			
Intersection Capacity Utilization			24.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
106: Lakefront Promenade & Rangeview Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.945			0.881			0.967				
Flt Protected		0.971			0.997		0.950				0.995	
Satd. Flow (prot)	0	1690	0	0	1618	0	1750	1781	0	0	1833	0
Flt Permitted		0.971			0.997		0.950				0.995	
Satd. Flow (perm)	0	1690	0	0	1618	0	1750	1781	0	0	1833	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		174.1			140.0			142.6			101.7	
Travel Time (s)		12.5			10.1			10.3			7.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 106: Lakefront Promenade & Rangeview Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	0	13	18	18	260	36	424	121	31	281	0
Future Volume (vph)	19	0	13	18	18	260	36	424	121	31	281	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	19	0	13	18	18	260	36	424	121	31	281	0
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	32	296	36	545	312							
Volume Left (vph)	19	18	36	0	31							
Volume Right (vph)	13	260	0	121	0							
Hadj (s)	-0.09	-0.48	0.53	-0.12	0.05							
Departure Headway (s)	7.2	5.9	6.6	5.9	6.1							
Degree Utilization, x	0.06	0.49	0.07	0.90	0.53							
Capacity (veh/h)	438	573	535	600	555							
Control Delay (s)	10.6	14.5	8.9	38.6	15.7							
Approach Delay (s)	10.6	14.5	36.8		15.7							
Approach LOS	B	B	E		C							
Intersection Summary												
Delay			25.3									
Level of Service			D									
Intersection Capacity Utilization			65.2%	ICU Level of Service					C			
Analysis Period (min)			15									

Lanes and Geometrics
107: Ogden Ave & Rangeview Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987			0.934			0.978			0.989	
Flt Protected		0.972			0.993			0.989			0.996	
Satd. Flow (prot)	0	1767	0	0	1708	0	0	1782	0	0	1814	0
Flt Permitted		0.972			0.993			0.989			0.996	
Satd. Flow (perm)	0	1767	0	0	1708	0	0	1782	0	0	1814	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		56.3			124.7			104.4			89.6	
Travel Time (s)		4.1			9.0			7.5			6.5	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 107: Ogden Ave & Rangeview Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	109	59	18	28	71	95	160	445	119	28	283	27
Future Volume (vph)	109	59	18	28	71	95	160	445	119	28	283	27
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	109	59	18	28	71	95	160	445	119	28	283	27
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	186	194	724	338								
Volume Left (vph)	109	28	160	28								
Volume Right (vph)	18	95	119	27								
Hadj (s)	0.09	-0.23	-0.02	0.00								
Departure Headway (s)	7.4	7.0	6.0	6.5								
Degree Utilization, x	0.38	0.38	1.21	0.61								
Capacity (veh/h)	456	475	603	531								
Control Delay (s)	14.8	14.3	131.8	19.0								
Approach Delay (s)	14.8	14.3	131.8	19.0								
Approach LOS	B	B	F	C								
Intersection Summary												
Delay				74.5								
Level of Service				F								
Intersection Capacity Utilization				92.3%	ICU Level of Service				F			
Analysis Period (min)				15								

Lanes and Geometrics
108: Hydro Rd & Rangeview Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.989				0.992	
Flt Protected	0.956			0.987		
Satd. Flow (prot)	1742	0	0	1818	1827	0
Flt Permitted	0.956			0.987		
Satd. Flow (perm)	1742	0	0	1818	1827	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	108.3			161.7	87.6	
Travel Time (s)	7.8			11.6	6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 108: Hydro Rd & Rangeview Rd

Scenario 3b 2041 - DUALS
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	213	18	132	372	540	34
Future Volume (vph)	213	18	132	372	540	34
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	213	18	132	372	540	34
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	231	504	574			
Volume Left (vph)	213	132	0			
Volume Right (vph)	18	0	34			
Hadj (s)	0.17	0.09	0.00			
Departure Headway (s)	6.9	5.7	5.6			
Degree Utilization, x	0.44	0.80	0.89			
Capacity (veh/h)	501	612	636			
Control Delay (s)	15.1	27.9	36.6			
Approach Delay (s)	15.1	27.9	36.6			
Approach LOS	C	D	E			
Intersection Summary						
Delay			29.5			
Level of Service			D			
Intersection Capacity Utilization			80.3%	ICU Level of Service	D	
Analysis Period (min)			15			

Lanes and Geometrics
1: Ogden Ave & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	28.0		25.0	25.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.97	1.00	1.00		1.00		0.98	1.00	0.99	
Frt			0.850		0.988				0.850		0.916	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	3614	1581	1750	3520	0	1750	1883	1566	1750	1706	0
Flt Permitted	0.950			0.950			0.296			0.726		
Satd. Flow (perm)	1744	3614	1538	1748	3520	0	543	1883	1540	1331	1706	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			187		9				166		41	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		272.7			222.5			142.3			246.5	
Travel Time (s)		19.6			16.0			10.2			17.7	

Intersection Summary

Area Type: Other

Timings
1: Ogden Ave & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	154	1438	360	275	1431	240	48	166	143	88
Future Volume (vph)	154	1438	360	275	1431	240	48	166	143	88
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	7	4		3	8	5	2		1	6
Permitted Phases			4			2		2	6	
Detector Phase	7	4	4	3	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	11.0	34.0	34.0	11.0	34.0
Total Split (s)	17.0	64.0	64.0	24.0	71.0	18.0	41.0	41.0	11.0	34.0
Total Split (%)	12.1%	45.7%	45.7%	17.1%	50.7%	12.9%	29.3%	29.3%	7.9%	24.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	1.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	3.0	6.0	6.0	3.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	18.3	59.0	59.0	27.5	68.2	40.5	26.5	26.5	30.5	19.5
Actuated g/C Ratio	0.13	0.42	0.42	0.20	0.49	0.29	0.19	0.19	0.22	0.14
v/c Ratio	0.68	0.94	0.48	0.80	0.90	0.84	0.13	0.39	0.46	0.73
Control Delay	72.1	39.6	14.6	73.6	30.2	66.0	45.8	8.8	44.3	60.5
Queue Delay	0.0	7.4	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0
Total Delay	72.1	47.0	14.6	73.6	31.8	66.0	45.8	8.8	44.3	60.5
LOS	E	D	B	E	C	E	D	A	D	E
Approach Delay		43.0			38.1		43.0			53.7
Approach LOS		D			D		D			D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 41.8

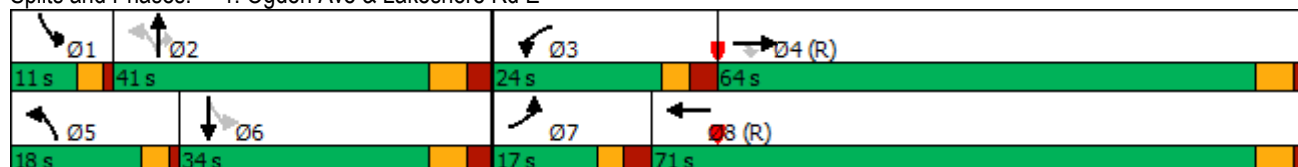
Intersection LOS: D

Intersection Capacity Utilization 98.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Ogden Ave & Lakeshore Rd E

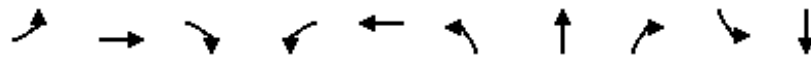


Queues

Scenario 3b 2041 - DUALS

1: Ogden Ave & Lakeshore Rd E

Afternoon Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	154	1438	360	275	1554	240	48	166	143	199
v/c Ratio	0.68	0.94	0.48	0.80	0.90	0.84	0.13	0.39	0.46	0.73
Control Delay	72.1	39.6	14.6	73.6	30.2	66.0	45.8	8.8	44.3	60.5
Queue Delay	0.0	7.4	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0
Total Delay	72.1	47.0	14.6	73.6	31.8	66.0	45.8	8.8	44.3	60.5
Queue Length 50th (m)	47.1	101.2	27.6	70.3	122.6	57.8	11.8	0.0	32.4	44.9
Queue Length 95th (m)	m#63.0	#254.2	m36.8m#145.3	#82.4	#84.1	22.2	18.7	47.8	68.9	
Internal Link Dist (m)		248.7			198.5		118.3			222.5
Turn Bay Length (m)	28.0		25.0	25.0		30.0		30.0		
Base Capacity (vph)	228	1523	756	343	1718	286	470	509	314	374
Starvation Cap Reductn	0	0	0	0	66	0	0	0	0	0
Spillback Cap Reductn	0	81	0	0	0	0	0	3	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	1.00	0.48	0.80	0.94	0.84	0.10	0.33	0.46	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Ogden Ave & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	154	1438	360	275	1431	123	240	48	166	143	88	111
Future Volume (vph)	154	1438	360	275	1431	123	240	48	166	143	88	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		3.0	6.0	6.0	3.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3614	1538	1750	3520		1748	1883	1540	1745	1707	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.30	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	1750	3614	1538	1750	3520		544	1883	1540	1333	1707	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	154	1438	360	275	1431	123	240	48	166	143	88	111
RTOR Reduction (vph)	0	0	108	0	5	0	0	0	135	0	35	0
Lane Group Flow (vph)	154	1438	252	275	1549	0	240	48	31	143	164	0
Confl. Peds. (#/hr)	7		2	2		7	5		3	3		5
Heavy Vehicles (%)	2%	1%	1%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	17.3	58.0	58.0	26.5	67.2		36.5	25.5	25.5	25.5	18.5	
Effective Green, g (s)	18.3	59.0	59.0	27.5	68.2		37.5	26.5	26.5	27.5	19.5	
Actuated g/C Ratio	0.13	0.42	0.42	0.20	0.49		0.27	0.19	0.19	0.20	0.14	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	228	1523	648	343	1714		274	356	291	285	237	
v/s Ratio Prot	0.09	c0.40		c0.16	c0.44		c0.09	0.03		0.03	0.10	
v/s Ratio Perm			0.16				c0.14		0.02	0.07		
v/c Ratio	0.68	0.94	0.39	0.80	0.90		0.88	0.13	0.11	0.50	0.69	
Uniform Delay, d1	58.0	38.9	28.0	53.7	32.9		45.1	47.2	47.0	49.3	57.4	
Progression Factor	1.09	0.78	1.00	1.13	0.71		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.6	8.7	1.0	9.0	6.0		25.3	0.2	0.2	1.4	8.4	
Delay (s)	67.8	39.1	28.9	69.8	29.4		70.3	47.4	47.1	50.7	65.8	
Level of Service	E	D	C	E	C		E	D	D	D	E	
Approach Delay (s)		39.5			35.5			59.4			59.5	
Approach LOS		D			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			41.4			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			98.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
2: Dixie Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	44.0		0.0	25.0		30.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	7.5			7.5			0.0			0.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98		1.00				0.96
Frt	0.998				0.850							0.850
Flt Protected	0.950			0.950				0.988			0.950	
Satd. Flow (prot)	1733	3571	0	1785	3579	1581	0	1898	0	0	1807	1566
Flt Permitted	0.950			0.950				0.939			0.755	
Satd. Flow (perm)	1732	3571	0	1782	3579	1544	0	1798	0	0	1436	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				125						23
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		622.7			399.1			93.6			292.8	
Travel Time (s)		44.8			28.7			6.7			21.1	

Intersection Summary

Area Type: Other

Timings

2: Dixie Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS

Afternoon Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	401	1161	2	1149	220	1	3	278	0	901
Future Volume (vph)	401	1161	2	1149	220	1	3	278	0	901
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA	pm+ov
Protected Phases	7	4	3	8			2		6	7
Permitted Phases					8	2		6		6
Detector Phase	7	4	3	8	8	2	2	6	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	12.0	24.0	11.0	24.0	24.0	12.0	12.0	34.0	34.0	12.0
Total Split (s)	55.0	95.0	11.0	51.0	51.0	34.0	34.0	34.0	34.0	55.0
Total Split (%)	39.3%	67.9%	7.9%	36.4%	36.4%	24.3%	24.3%	24.3%	24.3%	39.3%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0		6.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	50.0	98.8	6.0	46.0	46.0		28.0		28.0	79.0
Actuated g/C Ratio	0.36	0.71	0.04	0.33	0.33		0.20		0.20	0.56
v/c Ratio	0.65	0.47	0.03	0.98	0.37		0.01		0.97	1.02
Control Delay	29.7	20.1	65.0	67.8	17.0		45.2		100.9	64.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	29.7	20.1	65.0	67.8	17.0		45.2		100.9	64.6
LOS	C	C	E	E	B		D		F	E
Approach Delay		22.5		59.6			45.3		73.2	
Approach LOS		C		E			D		E	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 49.3

Intersection LOS: D

Intersection Capacity Utilization 106.6%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 2: Dixie Rd & Lakeshore Rd E

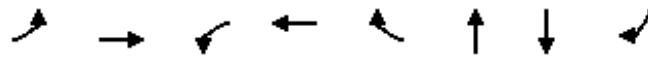


Queues

Scenario 3b 2041 - DUALS

2: Dixie Rd & Lakeshore Rd E

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	401	1174	2	1149	220	4	278	901
v/c Ratio	0.65	0.47	0.03	0.98	0.37	0.01	0.97	1.02
Control Delay	29.7	20.1	65.0	67.8	17.0	45.2	100.9	64.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	20.1	65.0	67.8	17.0	45.2	100.9	64.6
Queue Length 50th (m)	118.0	168.7	0.6	174.2	19.8	1.0	81.2	~243.3
Queue Length 95th (m)	157.9	183.9	3.7	#223.1	43.2	4.5	#139.9	#358.3
Internal Link Dist (m)		598.7		375.1		69.6	268.8	
Turn Bay Length (m)	44.0		25.0		30.0			
Base Capacity (vph)	618	2520	76	1175	591	359	287	881
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	0.65	0.47	0.03	0.98	0.37	0.01	0.97	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Dixie Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	401	1161	13	2	1149	220	1	3	0	278	0	901
Future Volume (vph)	401	1161	13	2	1149	220	1	3	0	278	0	901
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		6.0			6.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1733	3572		1785	3579	1544		1892			1807	1545
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.94			0.76	1.00
Satd. Flow (perm)	1733	3572		1785	3579	1544		1798			1436	1545
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	401	1161	13	2	1149	220	1	3	0	278	0	901
RTOR Reduction (vph)	0	1	0	0	0	84	0	0	0	0	0	10
Lane Group Flow (vph)	401	1173	0	2	1149	136	0	4	0	0	278	891
Confl. Peds. (#/hr)	1		2	2		1	16					16
Heavy Vehicles (%)	3%	2%	0%	0%	2%	1%	0%	0%	0%	1%	0%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			2			6	7
Permitted Phases						8	2			6		6
Actuated Green, G (s)	49.0	93.0		1.0	45.0	45.0		27.0			27.0	76.0
Effective Green, g (s)	50.0	94.0		2.0	46.0	46.0		28.0			28.0	78.0
Actuated g/C Ratio	0.36	0.67		0.01	0.33	0.33		0.20			0.20	0.56
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		7.0			7.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	618	2398		25	1175	507		359			287	860
v/s Ratio Prot	0.23	0.33		0.00	c0.32							c0.37
v/s Ratio Perm						0.09		0.00			0.19	0.21
v/c Ratio	0.65	0.49		0.08	0.98	0.27		0.01			0.97	1.04
Uniform Delay, d1	37.7	11.3		68.1	46.5	34.6		44.9			55.6	31.0
Progression Factor	0.66	2.05		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	2.0	0.6		1.4	21.5	1.3		0.0			44.0	40.3
Delay (s)	26.8	23.7		69.5	68.0	35.9		44.9			99.6	71.3
Level of Service	C	C		E	E	D		D			F	E
Approach Delay (s)		24.5			62.8			44.9			78.0	
Approach LOS		C			E			D			E	
Intersection Summary												
HCM 2000 Control Delay			52.5				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			106.6%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
3: Lakeshore Rd E & Cawthra Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	60.0		70.0	0.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	0		0	1		1
Taper Length (m)	7.5			7.5			0.0			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor				0.99		0.93		1.00				0.96
Frt						0.850		0.981				0.850
Flt Protected	0.950			0.950				0.986		0.950	0.950	
Satd. Flow (prot)	1733	3544	0	1785	3614	1551	0	1858	0	1646	1683	1581
Flt Permitted	0.080			0.246						0.950	0.753	
Satd. Flow (perm)	146	3544	0	458	3614	1441	0	1878	0	1646	1334	1519
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						305		1				25
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		321.4			137.2			95.8			955.9	
Travel Time (s)		23.1			9.9			6.9			68.8	

Intersection Summary

Area Type: Other

Timings

3: Lakeshore Rd E & Cawthra Rd

Scenario 3b 2041 - DUALS

Afternoon Peak Hour

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	309	1096	3	1277	806	2	4	1068	0	425
Future Volume (vph)	309	1096	3	1277	806	2	4	1068	0	425
Turn Type	pm+pt	NA	Perm	NA	pm+ov	Perm	NA	Prot	NA	pm+ov
Protected Phases	7	4		8	1		2	1	6	7
Permitted Phases	4		8		8	2				6
Detector Phase	7	4	8	8	1	2	2	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	7.0	8.0	8.0	8.0	5.0	5.0	8.0	5.0	5.0
Minimum Split (s)	11.0	38.0	38.0	38.0	14.0	11.0	11.0	14.0	38.0	11.0
Total Split (s)	21.0	79.0	58.0	58.0	40.0	11.0	11.0	40.0	51.0	21.0
Total Split (%)	16.2%	60.8%	44.6%	44.6%	30.8%	8.5%	8.5%	30.8%	39.2%	16.2%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	2.0
Lead/Lag	Lead		Lag	Lag	Lag	Lead	Lead	Lag		Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes
Recall Mode	None	Max	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	77.0	74.0	53.0	53.0	96.8		6.0	43.8	43.8	68.0
Actuated g/C Ratio	0.59	0.57	0.41	0.41	0.74		0.05	0.34	0.34	0.52
v/c Ratio	0.97	0.54	0.02	0.87	0.68		0.08	0.96	0.94	0.52
Control Delay	79.8	18.7	23.7	42.8	6.8		57.6	72.8	68.3	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	79.8	18.7	23.7	42.8	6.8		57.6	72.8	68.3	20.7
LOS	E	B	C	D	A		E	E	E	C
Approach Delay		32.2		28.9			57.6		56.4	
Approach LOS		C		C			E		E	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 8:WBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 38.1

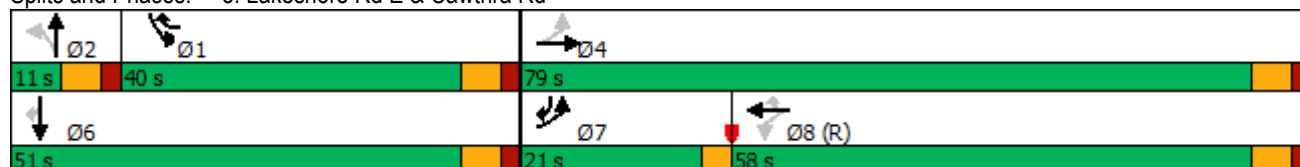
Intersection LOS: D

Intersection Capacity Utilization 100.3%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Rd E & Cawthra Rd



Queues

Scenario 3b 2041 - DUALS

3: Lakeshore Rd E & Cawthra Rd

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	309	1096	3	1277	806	7	534	534	425
v/c Ratio	0.97	0.54	0.02	0.87	0.68	0.08	0.96	0.94	0.52
Control Delay	79.8	18.7	23.7	42.8	6.8	57.6	72.8	68.3	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.8	18.7	23.7	42.8	6.8	57.6	72.8	68.3	20.7
Queue Length 50th (m)	64.9	92.8	0.5	163.9	38.0	1.6	144.2	142.7	65.2
Queue Length 95th (m)	#125.3	112.3	2.6	195.8	63.1	6.9	#259.1	#256.2	94.2
Internal Link Dist (m)		297.4		113.2		71.8		931.9	
Turn Bay Length (m)	35.0		60.0		70.0		115.0		
Base Capacity (vph)	318	2017	186	1473	1188	87	554	567	815
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.54	0.02	0.87	0.68	0.08	0.96	0.94	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Lakeshore Rd E & Cawthra Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	309	1096	0	3	1277	806	2	4	1	1068	0	425
Future Volume (vph)	309	1096	0	3	1277	806	2	4	1	1068	0	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	2.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	2.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96		1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	0.95	1.00
Satd. Flow (prot)	1733	3544		1770	3614	1493		1851		1646	1683	1536
Flt Permitted	0.08	1.00		0.25	1.00	1.00		1.00		0.95	0.75	1.00
Satd. Flow (perm)	145	3544		458	3614	1493		1877		1646	1334	1536
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	309	1096	0	3	1277	806	2	4	1	1068	0	425
RTOR Reduction (vph)	0	0	0	0	0	89	0	1	0	0	0	12
Lane Group Flow (vph)	309	1096	0	3	1277	717	0	6	0	534	534	413
Confl. Peds. (#/hr)	49		20	20		49	23					23
Heavy Vehicles (%)	3%	3%	0%	0%	1%	3%	0%	0%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	68.2	68.2		47.2	47.2	90.0		1.0		42.8	49.8	67.8
Effective Green, g (s)	69.2	69.2		48.2	48.2	92.0		2.0		43.8	50.8	69.8
Actuated g/C Ratio	0.53	0.53		0.37	0.37	0.71		0.02		0.34	0.39	0.54
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0		6.0		6.0	6.0	3.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	309	1886		169	1339	1056		28		554	638	824
v/s Ratio Prot	c0.15	0.31			c0.35	0.23				c0.32	0.28	0.07
v/s Ratio Perm	0.38			0.01		0.25		0.00			c0.04	0.20
v/c Ratio	1.00	0.58		0.02	0.95	0.68		0.21		0.96	0.84	0.50
Uniform Delay, d1	42.3	20.6		25.9	39.8	10.7		63.2		42.3	35.9	19.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	51.2	1.3		0.2	15.8	1.8		3.8		29.1	9.4	0.5
Delay (s)	93.5	21.9		26.1	55.6	12.4		67.1		71.4	45.2	19.6
Level of Service	F	C		C	E	B		E		E	D	B
Approach Delay (s)		37.7			38.9			67.1			47.3	
Approach LOS		D			D			E			D	
Intersection Summary												
HCM 2000 Control Delay			41.1				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			17.0		
Intersection Capacity Utilization			100.3%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
5: East Avenue & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)	0%				0%			0%			0%	
Storage Length (m)	72.0		45.0	50.0		20.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.94	0.99	0.99		1.00	0.98	
Frt	0.990				0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	3565	0	1750	3614	1597	1785	1611	0	1785	1605	0
Flt Permitted	0.950			0.950			0.755			0.715		
Satd. Flow (perm)	1780	3565	0	1747	3614	1498	1411	1611	0	1341	1605	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				78		70			75	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		226.1			305.9			132.2			178.2	
Travel Time (s)		16.3			22.0			9.5			12.8	

Intersection Summary

Area Type: Other

Timings

5: East Avenue & Lakeshore Rd E

Scenario 3b 2041 - DUALS

Afternoon Peak Hour

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	49	2070	87	1953	24	85	0	24	0
Future Volume (vph)	49	2070	87	1953	24	85	0	24	0
Turn Type	Prot	NA	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	7	4	3	8			2		6
Permitted Phases					8	2		6	
Detector Phase	7	4	3	8	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	11.0	24.0	24.0	31.0	31.0	31.0	31.0
Total Split (s)	11.0	96.0	13.0	98.0	98.0	31.0	31.0	31.0	31.0
Total Split (%)	7.9%	68.6%	9.3%	70.0%	70.0%	22.1%	22.1%	22.1%	22.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	9.8	95.9	13.3	101.8	101.8	14.8	14.8	14.8	14.8
Actuated g/C Ratio	0.07	0.68	0.10	0.73	0.73	0.11	0.11	0.11	0.11
v/c Ratio	0.39	0.91	0.52	0.74	0.02	0.57	0.28	0.17	0.02
Control Delay	71.1	26.2	65.3	10.6	0.0	73.7	13.0	57.6	0.2
Queue Delay	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.1	27.2	65.3	10.6	0.0	73.7	13.0	57.6	0.2
LOS	E	C	E	B	A	E	B	E	A
Approach Delay		28.1		12.8			47.6		49.4
Approach LOS		C		B			D		D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 21.9

Intersection LOS: C

Intersection Capacity Utilization 92.0%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: East Avenue & Lakeshore Rd E

 Ø2	 Ø3	 Ø4 (R)
31 s	13 s	96 s
 Ø6	 Ø7	 Ø8 (R)
31 s	11 s	98 s

Queues

Scenario 3b 2041 - DUALS

5: East Avenue & Lakeshore Rd E

Afternoon Peak Hour



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	2223	87	1953	24	85	64	24	4
v/c Ratio	0.39	0.91	0.52	0.74	0.02	0.57	0.28	0.17	0.02
Control Delay	71.1	26.2	65.3	10.6	0.0	73.7	13.0	57.6	0.2
Queue Delay	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.1	27.2	65.3	10.6	0.0	73.7	13.0	57.6	0.2
Queue Length 50th (m)	13.8	272.0	26.1	95.0	0.0	24.0	0.0	6.5	0.0
Queue Length 95th (m)	27.9	#363.1	m38.8	106.0	m0.0	41.0	12.5	15.6	0.0
Internal Link Dist (m)		202.1		281.9			108.2		154.2
Turn Bay Length (m)	72.0		50.0		20.0	20.0		45.0	
Base Capacity (vph)	125	2445	166	2627	1110	251	345	239	348
Starvation Cap Reductn	0	76	0	18	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.94	0.52	0.75	0.02	0.34	0.19	0.10	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: East Avenue & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	2070	153	87	1953	24	85	0	64	24	0	4
Future Volume (vph)	49	2070	153	87	1953	24	85	0	64	24	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3564		1750	3614	1498	1776	1611		1782	1605	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.76	1.00		0.72	1.00	
Satd. Flow (perm)	1785	3564		1750	3614	1498	1411	1611		1342	1605	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	2070	153	87	1953	24	85	0	64	24	0	4
RTOR Reduction (vph)	0	3	0	0	0	7	0	57	0	0	4	0
Lane Group Flow (vph)	49	2220	0	87	1953	17	85	7	0	24	0	0
Confl. Peds. (#/hr)	11		11	11		11	3		1	1		3
Heavy Vehicles (%)	0%	1%	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	7.6	94.9		12.3	99.6	99.6	13.8	13.8		13.8	13.8	
Effective Green, g (s)	8.6	95.9		13.3	100.6	100.6	14.8	14.8		14.8	14.8	
Actuated g/C Ratio	0.06	0.69		0.10	0.72	0.72	0.11	0.11		0.11	0.11	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	109	2441		166	2596	1076	149	170		141	169	
v/s Ratio Prot	0.03	c0.62		c0.05	c0.54			0.00			0.00	
v/s Ratio Perm						0.01	c0.06			0.02		
v/c Ratio	0.45	0.91		0.52	0.75	0.02	0.57	0.04		0.17	0.00	
Uniform Delay, d1	63.4	18.4		60.3	12.1	5.6	59.6	56.2		57.0	56.0	
Progression Factor	1.00	1.00		0.92	0.67	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	6.4		2.5	1.7	0.0	5.2	0.1		0.6	0.0	
Delay (s)	66.3	24.8		58.0	9.8	5.6	64.8	56.3		57.6	56.0	
Level of Service	E	C		E	A	A	E	E		E	E	
Approach Delay (s)		25.7			11.8			61.1			57.4	
Approach LOS		C			B			E			E	
Intersection Summary												
HCM 2000 Control Delay			20.7			HCM 2000 Level of Service					C	
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			92.0%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
7: Lakefront Promenade & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)		25.0	35.0		50.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bike Factor		0.96	1.00		0.99	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3614	1566	1750	3579	3395	1566
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3614	1505	1746	3579	3375	1533
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		84				214
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.1			272.7	130.4	
Travel Time (s)	4.7			19.6	9.4	

Intersection Summary

Area Type: Other

Timings
7: Lakefront Promenade & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	1633	353	317	1400	428	214
Future Volume (vph)	1633	353	317	1400	428	214
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	4		3	4	5	
Permitted Phases		4				2
Detector Phase	4	4	3	4	5	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	33.0	25.0	12.0	12.0
Total Split (s)	72.0	72.0	34.0	72.0	34.0	34.0
Total Split (%)	51.4%	51.4%	24.3%	51.4%	24.3%	24.3%
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	71.1	71.1	29.4	71.1	23.6	23.6
Actuated g/C Ratio	0.51	0.51	0.21	0.51	0.17	0.17
v/c Ratio	0.89	0.44	0.87	0.77	0.75	0.49
Control Delay	34.7	21.5	74.0	18.1	63.8	10.0
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	34.7	21.5	74.0	18.2	63.8	10.0
LOS	C	C	E	B	E	A
Approach Delay	32.4			28.5	45.9	
Approach LOS	C			C	D	

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 0 (0%), Referenced to phase 4:EBWB and 8:, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 32.8
 Intersection LOS: C
 Intersection Capacity Utilization 88.2%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 7: Lakefront Promenade & Lakeshore Rd E

Ø2 34 s	Ø3 34 s	Ø4 (R) 72 s
Ø5 34 s		

Queues
7: Lakefront Promenade & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1633	353	317	1400	428	214
v/c Ratio	0.89	0.44	0.87	0.77	0.75	0.49
Control Delay	34.7	21.5	74.0	18.1	63.8	10.0
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	34.7	21.5	74.0	18.2	63.8	10.0
Queue Length 50th (m)	174.0	45.0	98.2	66.1	61.8	0.0
Queue Length 95th (m)	#285.9	m58.8	m111.2	105.8	78.1	22.4
Internal Link Dist (m)	41.1			248.7	106.4	
Turn Bay Length (m)		25.0	35.0		50.0	
Base Capacity (vph)	1834	805	378	1816	679	477
Starvation Cap Reductn	0	0	0	33	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.44	0.84	0.79	0.63	0.45
Intersection Summary						
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.						
m Volume for 95th percentile queue is metered by upstream signal.						

HCM Signalized Intersection Capacity Analysis

7: Lakefront Promenade & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑
Traffic Volume (vph)	1633	353	317	1400	428	214
Future Volume (vph)	1633	353	317	1400	428	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.7	3.5	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3614	1505	1750	3579	3395	1531
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3614	1505	1750	3579	3395	1531
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1633	353	317	1400	428	214
RTOR Reduction (vph)	0	41	0	0	0	178
Lane Group Flow (vph)	1633	312	317	1400	428	36
Confl. Peds. (#/hr)		5	5		4	6
Heavy Vehicles (%)	1%	2%	2%	2%	2%	2%
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	4		3	4	5	
Permitted Phases		4				2
Actuated Green, G (s)	70.0	70.0	28.4	70.0	22.6	22.6
Effective Green, g (s)	71.0	71.0	29.4	71.0	23.6	23.6
Actuated g/C Ratio	0.51	0.51	0.21	0.51	0.17	0.17
Clearance Time (s)	6.0	6.0	6.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1832	763	367	1815	572	258
v/s Ratio Prot	c0.45		c0.18	0.39	c0.13	
v/s Ratio Perm		0.21				0.02
v/c Ratio	0.89	0.41	0.86	0.77	0.75	0.14
Uniform Delay, d1	31.0	21.4	53.4	27.9	55.4	49.6
Progression Factor	0.95	1.19	1.17	0.57	1.00	1.00
Incremental Delay, d2	4.0	0.9	9.6	1.5	5.3	0.2
Delay (s)	33.6	26.4	72.1	17.4	60.7	49.8
Level of Service	C	C	E	B	E	D
Approach Delay (s)	32.3			27.5	57.1	
Approach LOS	C			C	E	
Intersection Summary						
HCM 2000 Control Delay		34.1		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.86				
Actuated Cycle Length (s)		140.0		Sum of lost time (s)		17.0
Intersection Capacity Utilization		88.2%		ICU Level of Service		E
Analysis Period (min)		15				
c Critical Lane Group						

Lanes and Geometrics
8: Hydro Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		50.0	25.0		0.0	60.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	7.5			7.5			30.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	1.00	1.00		1.00				0.99	
Frt			0.850		0.999			0.850			0.919	
Flt Protected	0.950			0.950			0.950				0.980	
Satd. Flow (prot)	1750	3579	1597	1750	3575	0	1750	1601	0	0	1715	0
Flt Permitted	0.950			0.950			0.754				0.903	
Satd. Flow (perm)	1748	3579	1529	1743	3575	0	1385	1601	0	0	1580	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214		1			335			117	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		222.5			195.3			135.3			191.6	
Travel Time (s)		16.0			14.1			9.7			13.8	

Intersection Summary

Area Type: Other

Timings 8: Hydro Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	1288	490	352	1485	368	0	2	0
Future Volume (vph)	5	1288	490	352	1485	368	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	NA	Perm	NA
Protected Phases	7	4		3	8		2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	34.0	34.0	34.0	34.0
Total Split (s)	11.0	57.0	57.0	34.0	80.0	49.0	49.0	49.0	49.0
Total Split (%)	7.9%	40.7%	40.7%	24.3%	57.1%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	6.0	6.0		6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	6.2	53.6	53.6	30.0	86.4	40.4	40.4		40.4
Actuated g/C Ratio	0.04	0.38	0.38	0.21	0.62	0.29	0.29		0.29
v/c Ratio	0.06	0.94	0.68	0.94	0.68	0.92	0.55		0.01
Control Delay	61.4	43.3	20.4	93.2	19.6	76.9	9.6		0.0
Queue Delay	0.0	1.3	0.3	0.0	0.5	0.0	0.0		0.0
Total Delay	61.4	44.6	20.7	93.2	20.1	76.9	9.6		0.0
LOS	E	D	C	F	C	E	A		A
Approach Delay		38.1			34.0		42.5		
Approach LOS		D			C		D		

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 37.1

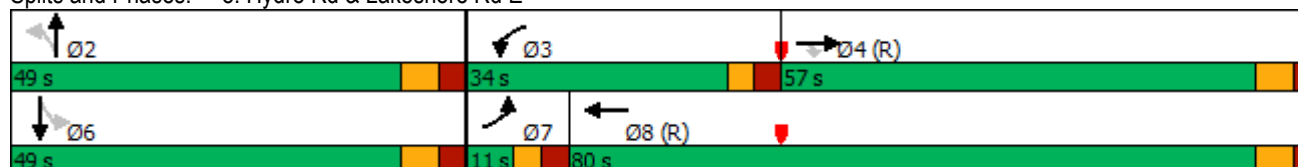
Intersection LOS: D

Intersection Capacity Utilization 95.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 8: Hydro Rd & Lakeshore Rd E



Queues
8: Hydro Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	5	1288	490	352	1494	368	386	5
v/c Ratio	0.06	0.94	0.68	0.94	0.68	0.92	0.55	0.01
Control Delay	61.4	43.3	20.4	93.2	19.6	76.9	9.6	0.0
Queue Delay	0.0	1.3	0.3	0.0	0.5	0.0	0.0	0.0
Total Delay	61.4	44.6	20.7	93.2	20.1	76.9	9.6	0.0
Queue Length 50th (m)	1.3	105.3	38.2	106.4	97.4	101.4	10.7	0.0
Queue Length 95th (m)	m1.6m#220.7		m52.0m#143.5		122.8	#158.6	40.4	0.0
Internal Link Dist (m)		198.5			171.3		111.3	167.6
Turn Bay Length (m)	25.0		50.0	25.0		60.0		
Base Capacity (vph)	77	1370	717	374	2205	425	723	566
Starvation Cap Reductn	0	22	30	0	307	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	0.06	0.96	0.71	0.94	0.79	0.87	0.53	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

8: Hydro Rd & Lakeshore Rd E

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1288	490	352	1485	9	368	0	386	2	0	3
Future Volume (vph)	5	1288	490	352	1485	9	368	0	386	2	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1750	3579	1529	1750	3575		1745	1601			1715	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00			0.90	
Satd. Flow (perm)	1750	3579	1529	1750	3575		1385	1601			1580	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	1288	490	352	1485	9	368	0	386	2	0	3
RTOR Reduction (vph)	0	0	132	0	0	0	0	238	0	0	4	0
Lane Group Flow (vph)	5	1288	358	352	1494	0	368	148	0	0	1	0
Confl. Peds. (#/hr)	2		6	6		2	2					2
Heavy Vehicles (%)	2%	2%	0%	2%	2%	0%	2%	0%	2%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2			6		
Actuated Green, G (s)	1.0	52.6	52.6	29.0	80.6		39.4	39.4			39.4	
Effective Green, g (s)	2.0	53.6	53.6	30.0	81.6		40.4	40.4			40.4	
Actuated g/C Ratio	0.01	0.38	0.38	0.21	0.58		0.29	0.29			0.29	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	7.0			7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	25	1370	585	375	2083		399	462			455	
v/s Ratio Prot	0.00	c0.36		c0.20	0.42			0.09				
v/s Ratio Perm			0.23				c0.27				0.00	
v/c Ratio	0.20	0.94	0.61	0.94	0.72		0.92	0.32			0.00	
Uniform Delay, d1	68.2	41.7	34.8	54.1	20.9		48.3	39.0			35.5	
Progression Factor	0.94	0.82	0.87	1.34	0.98		1.00	1.00			1.00	
Incremental Delay, d2	2.1	8.4	2.5	20.1	1.2		26.5	0.4			0.0	
Delay (s)	65.9	42.5	32.7	92.8	21.7		74.8	39.4			35.5	
Level of Service	E	D	C	F	C		E	D			D	
Approach Delay (s)		39.9			35.2			56.7			35.5	
Approach LOS		D			D			E			D	
Intersection Summary												
HCM 2000 Control Delay			40.8			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			95.5%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes and Geometrics
9: Lakeshore Rd E & Haig Blvd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

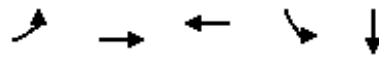
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		50.0	100.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			50.0			0.0			0.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00						0.99	
Frt					0.994						0.886	
Flt Protected	0.950										0.992	
Satd. Flow (prot)	1750	3579	1842	1842	3546	0	0	1883	1842	0	1634	0
Flt Permitted	0.950										0.946	
Satd. Flow (perm)	1744	3579	1842	1842	3546	0	0	1883	1842	0	1555	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5						145	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		195.3			622.7			123.3			883.5	
Travel Time (s)		14.1			44.8			8.9			63.6	

Intersection Summary

Area Type: Other

Timings
9: Lakeshore Rd E & Haig Blvd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

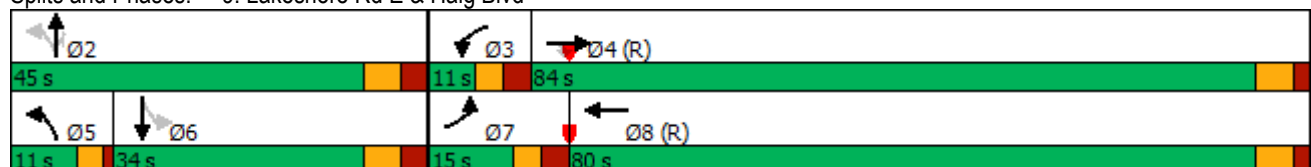


Lane Group	EBL	EBT	WBT	SBL	SBT	Ø2	Ø3	Ø5
Lane Configurations								
Traffic Volume (vph)	123	1588	1967	26	0			
Future Volume (vph)	123	1588	1967	26	0			
Turn Type	Prot	NA	NA	Perm	NA			
Protected Phases	7	4	8		6	2	3	5
Permitted Phases				6				
Detector Phase	7	4	8	6	6			
Switch Phase								
Minimum Initial (s)	5.0	8.0	8.0	8.0	8.0	8.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	34.0	34.0	34.0	11.0	11.0
Total Split (s)	15.0	84.0	80.0	34.0	34.0	45.0	11.0	11.0
Total Split (%)	10.7%	60.0%	57.1%	24.3%	24.3%	32%	8%	8%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0
All-Red Time (s)	3.0	2.0	2.0	3.0	3.0	3.0	3.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0			
Total Lost Time (s)	5.0	5.0	5.0		6.0			
Lead/Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	18.6	117.7	94.1		11.3			
Actuated g/C Ratio	0.13	0.84	0.67		0.08			
v/c Ratio	0.53	0.53	0.86		0.66			
Control Delay	66.1	2.3	18.6		26.4			
Queue Delay	0.0	0.2	0.0		0.0			
Total Delay	66.1	2.5	18.6		26.4			
LOS	E	A	B		C			
Approach Delay		7.1	18.6		26.4			
Approach LOS		A	B		C			

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 13.9
 Intersection LOS: B
 Intersection Capacity Utilization 94.8%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 9: Lakeshore Rd E & Haig Blvd



Queues

Scenario 3b 2041 - DUALS

9: Lakeshore Rd E & Haig Blvd

Afternoon Peak Hour



Lane Group	EBL	EBT	WBT	SBT
Lane Group Flow (vph)	123	1588	2051	171
v/c Ratio	0.53	0.53	0.86	0.66
Control Delay	66.1	2.3	18.6	26.4
Queue Delay	0.0	0.2	0.0	0.0
Total Delay	66.1	2.5	18.6	26.4
Queue Length 50th (m)	37.3	7.4	154.0	7.3
Queue Length 95th (m)	m44.5	m25.3	m195.0	30.9
Internal Link Dist (m)		171.3	598.7	859.5
Turn Bay Length (m)	50.0			
Base Capacity (vph)	232	3008	2385	427
Starvation Cap Reductn	0	502	0	0
Spillback Cap Reductn	0	0	10	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.53	0.63	0.86	0.40

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

9: Lakeshore Rd E & Haig Blvd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	1588	0	0	1967	84	0	0	0	26	0	145
Future Volume (vph)	123	1588	0	0	1967	84	0	0	0	26	0	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	5.0	5.0			5.0						6.0	
Lane Util. Factor	1.00	0.95			0.95						1.00	
Frpb, ped/bikes	1.00	1.00			1.00						0.99	
Flpb, ped/bikes	1.00	1.00			1.00						1.00	
Fr _t	1.00	1.00			0.99						0.89	
Fl _t Protected	0.95	1.00			1.00						0.99	
Satd. Flow (prot)	1750	3579			3545						1631	
Fl _t Permitted	0.95	1.00			1.00						0.95	
Satd. Flow (perm)	1750	3579			3545						1554	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	123	1588	0	0	1967	84	0	0	0	26	0	145
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	133	0
Lane Group Flow (vph)	123	1588	0	0	2049	0	0	0	0	0	38	0
Confl. Peds. (#/hr)	15					15	2		9	9		2
Turn Type	Prot	NA	Perm	Prot	NA				Perm	Perm	NA	
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	17.6	116.7			93.1						10.3	
Effective Green, g (s)	18.6	117.7			94.1						11.3	
Actuated g/C Ratio	0.13	0.84			0.67						0.08	
Clearance Time (s)	6.0	6.0			6.0						7.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	232	3008			2382						125	
v/s Ratio Prot	0.07	c0.44			c0.58							
v/s Ratio Perm											c0.02	
v/c Ratio	0.53	0.53			0.86						0.30	
Uniform Delay, d ₁	56.6	3.2			17.8						60.6	
Progression Factor	1.09	0.56			0.91						1.00	
Incremental Delay, d ₂	1.2	0.4			1.1						1.4	
Delay (s)	62.8	2.2			17.3						62.0	
Level of Service	E	A			B						E	
Approach Delay (s)		6.5			17.3			0.0			62.0	
Approach LOS		A			B			A			E	
Intersection Summary												
HCM 2000 Control Delay		14.6			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.79										
Actuated Cycle Length (s)		140.0			Sum of lost time (s)			19.0				
Intersection Capacity Utilization		94.8%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.901					
Flt Protected	0.987					0.967
Satd. Flow (prot)	1638	0	1842	0	0	1781
Flt Permitted	0.987					0.967
Satd. Flow (perm)	1638	0	1842	0	0	1781
Link Speed (k/h)	50		50			50
Link Distance (m)	85.8		91.1			132.2
Travel Time (s)	6.2		6.6			9.5

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 101: East Avenue & Street L

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	33	90	59	0	162	77
Future Volume (vph)	33	90	59	0	162	77
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	33	90	59	0	162	77
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	123	59	239			
Volume Left (vph)	33	0	162			
Volume Right (vph)	90	0	0			
Hadj (s)	-0.35	0.03	0.17			
Departure Headway (s)	4.2	4.5	4.4			
Degree Utilization, x	0.14	0.07	0.29			
Capacity (veh/h)	789	766	785			
Control Delay (s)	8.0	7.8	9.2			
Approach Delay (s)	8.0	7.8	9.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.7			
Level of Service			A			
Intersection Capacity Utilization			33.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
102: Lakefront Promenade & Street L

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.890			0.969			0.987	
Flt Protected		0.950			0.993			0.999			0.990	
Satd. Flow (prot)	0	1750	0	0	1628	0	0	1783	0	0	1800	0
Flt Permitted		0.950			0.993			0.999			0.990	
Satd. Flow (perm)	0	1750	0	0	1628	0	0	1783	0	0	1800	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		86.0			72.6			101.7			130.4	
Travel Time (s)		6.2			5.2			7.3			9.4	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 102: Lakefront Promenade & Street L

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	0	0	36	10	207	10	411	123	132	474	64
Future Volume (vph)	23	0	0	36	10	207	10	411	123	132	474	64
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	23	0	0	36	10	207	10	411	123	132	474	64
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	23	253	544	670								
Volume Left (vph)	23	36	10	132								
Volume Right (vph)	0	207	123	64								
Hadj (s)	0.23	-0.43	-0.10	0.02								
Departure Headway (s)	8.2	6.5	5.8	5.8								
Degree Utilization, x	0.05	0.46	0.87	1.08								
Capacity (veh/h)	403	527	617	619								
Control Delay (s)	11.6	14.9	35.5	83.7								
Approach Delay (s)	11.6	14.9	35.5	83.7								
Approach LOS	B	B	E	F								
Intersection Summary												
Delay				53.3								
Level of Service				F								
Intersection Capacity Utilization				90.2%	ICU Level of Service			E				
Analysis Period (min)				15								

Lanes and Geometrics
103: Ogden Ave & Street L

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.977			0.935			0.964			0.979	
Flt Protected		0.977			0.990			0.989			0.993	
Satd. Flow (prot)	0	1758	0	0	1705	0	0	1756	0	0	1791	0
Flt Permitted		0.977			0.990			0.989			0.993	
Satd. Flow (perm)	0	1758	0	0	1705	0	0	1756	0	0	1791	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		55.4			82.6			89.6			142.3	
Travel Time (s)		4.0			5.9			6.5			10.2	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 103: Ogden Ave & Street L

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	94	70	33	36	55	84	120	275	141	103	508	113
Future Volume (vph)	94	70	33	36	55	84	120	275	141	103	508	113
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	94	70	33	36	55	84	120	275	141	103	508	113
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	197	175	536	724								
Volume Left (vph)	94	36	120	103								
Volume Right (vph)	33	84	141	113								
Hadj (s)	0.03	-0.21	-0.08	-0.03								
Departure Headway (s)	7.9	7.8	6.5	6.6								
Degree Utilization, x	0.43	0.38	0.97	1.34								
Capacity (veh/h)	429	438	547	553								
Control Delay (s)	16.9	15.6	57.3	184.0								
Approach Delay (s)	16.9	15.6	57.3	184.0								
Approach LOS	C	C	F	F								
Intersection Summary												
Delay			104.2									
Level of Service			F									
Intersection Capacity Utilization			76.1%	ICU Level of Service					D			
Analysis Period (min)			15									

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.983				0.984	
Flt Protected	0.958			0.991		
Satd. Flow (prot)	1735	0	0	1825	1813	0
Flt Permitted	0.958			0.991		
Satd. Flow (perm)	1735	0	0	1825	1813	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	72.3			87.6	135.3	
Travel Time (s)	5.2			6.3	9.7	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 104: Hydro Rd & Street L

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	245	36	107	509	737	102
Future Volume (vph)	245	36	107	509	737	102
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	245	36	107	509	737	102
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	281	616	839			
Volume Left (vph)	245	107	0			
Volume Right (vph)	36	0	102			
Hadj (s)	0.13	0.07	-0.04			
Departure Headway (s)	7.1	6.0	5.9			
Degree Utilization, x	0.56	1.03	1.38			
Capacity (veh/h)	502	600	608			
Control Delay (s)	18.6	70.5	201.2			
Approach Delay (s)	18.6	70.5	201.2			
Approach LOS	C	F	F			
Intersection Summary						
Delay			125.3			
Level of Service			F			
Intersection Capacity Utilization			103.4%	ICU Level of Service	G	
Analysis Period (min)			15			

Lanes and Geometrics
105: East Avenue & Rangeview Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		0.0	0.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected						0.971
Satd. Flow (prot)	1593	0	1842	0	0	1789
Flt Permitted						0.971
Satd. Flow (perm)	1593	0	1842	0	0	1789
Link Speed (k/h)	50		50			50
Link Distance (m)	198.1		66.7			91.1
Travel Time (s)	14.3		4.8			6.6

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 105: East Avenue & Rangeview Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	0	53	5	0	65	45
Future Volume (vph)	0	53	5	0	65	45
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	53	5	0	65	45
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	53	5	110			
Volume Left (vph)	0	0	65			
Volume Right (vph)	53	0	0			
Hadj (s)	-0.57	0.03	0.15			
Departure Headway (s)	3.6	4.1	4.2			
Degree Utilization, x	0.05	0.01	0.13			
Capacity (veh/h)	969	842	851			
Control Delay (s)	6.8	7.2	7.8			
Approach Delay (s)	6.8	7.2	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.4			
Level of Service			A			
Intersection Capacity Utilization			22.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes and Geometrics
106: Lakefront Promenade & Rangeview Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.912			0.892			0.961			0.998	
Flt Protected		0.983			0.992		0.950				0.994	
Satd. Flow (prot)	0	1651	0	0	1630	0	1750	1770	0	0	1827	0
Flt Permitted		0.983			0.992		0.950				0.994	
Satd. Flow (perm)	0	1651	0	0	1630	0	1750	1770	0	0	1827	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		174.1			140.0			142.6			101.7	
Travel Time (s)		12.5			10.1			10.3			7.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 106: Lakefront Promenade & Rangeview Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	0	13	36	10	183	20	354	123	65	435	9
Future Volume (vph)	7	0	13	36	10	183	20	354	123	65	435	9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	7	0	13	36	10	183	20	354	123	65	435	9
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	20	229	20	477	509							
Volume Left (vph)	7	36	20	0	65							
Volume Right (vph)	13	183	0	123	9							
Hadj (s)	-0.29	-0.41	0.53	-0.15	0.05							
Departure Headway (s)	7.1	6.2	6.6	5.9	5.7							
Degree Utilization, x	0.04	0.39	0.04	0.78	0.80							
Capacity (veh/h)	438	533	534	598	617							
Control Delay (s)	10.3	13.1	8.6	25.1	27.6							
Approach Delay (s)	10.3	13.1	24.4		27.6							
Approach LOS	B	B	C		D							
Intersection Summary												
Delay			23.4									
Level of Service			C									
Intersection Capacity Utilization			78.2%	ICU Level of Service		D						
Analysis Period (min)			15									

Lanes and Geometrics
107: Ogden Ave & Rangeview Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.974			0.944			0.971			0.982	
Flt Protected		0.980			0.988			0.991			0.995	
Satd. Flow (prot)	0	1758	0	0	1718	0	0	1773	0	0	1800	0
Flt Permitted		0.980			0.988			0.991			0.995	
Satd. Flow (perm)	0	1758	0	0	1718	0	0	1773	0	0	1800	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		56.3			124.7			104.4			89.6	
Travel Time (s)		4.1			9.0			7.5			6.5	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 107: Ogden Ave & Rangeview Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	70	70	33	37	55	65	120	402	141	62	437	78
Future Volume (vph)	70	70	33	37	55	65	120	402	141	62	437	78
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	70	70	33	37	55	65	120	402	141	62	437	78
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	173	157	663	577								
Volume Left (vph)	70	37	120	62								
Volume Right (vph)	33	65	141	78								
Hadj (s)	0.00	-0.17	-0.06	-0.03								
Departure Headway (s)	7.9	7.8	6.3	6.4								
Degree Utilization, x	0.38	0.34	1.16	1.02								
Capacity (veh/h)	445	444	575	577								
Control Delay (s)	15.6	14.7	114.9	67.7								
Approach Delay (s)	15.6	14.7	114.9	67.7								
Approach LOS	C	B	F	F								
Intersection Summary												
Delay			76.6									
Level of Service			F									
Intersection Capacity Utilization			81.2%	ICU Level of Service					D			
Analysis Period (min)			15									

Lanes and Geometrics
108: Hydro Rd & Rangeview Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.981				0.989	
Flt Protected	0.959			0.989		
Satd. Flow (prot)	1733	0	0	1822	1822	0
Flt Permitted	0.959			0.989		
Satd. Flow (perm)	1733	0	0	1822	1822	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	108.3			161.7	87.6	
Travel Time (s)	7.8			11.6	6.3	

Intersection Summary

Area Type: Other

HCM Unsignalized Intersection Capacity Analysis 108: Hydro Rd & Rangeview Rd

Scenario 3b 2041 - DUALS
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	225	36	107	391	710	63
Future Volume (vph)	225	36	107	391	710	63
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	225	36	107	391	710	63
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	261	498	773			
Volume Left (vph)	225	107	0			
Volume Right (vph)	36	0	63			
Hadj (s)	0.12	0.08	-0.01			
Departure Headway (s)	6.9	5.9	5.7			
Degree Utilization, x	0.50	0.82	1.23			
Capacity (veh/h)	497	599	633			
Control Delay (s)	16.6	30.2	136.3			
Approach Delay (s)	16.6	30.2	136.3			
Approach LOS	C	D	F			
Intersection Summary						
Delay			81.4			
Level of Service			F			
Intersection Capacity Utilization			92.3%	ICU Level of Service	F	
Analysis Period (min)			15			